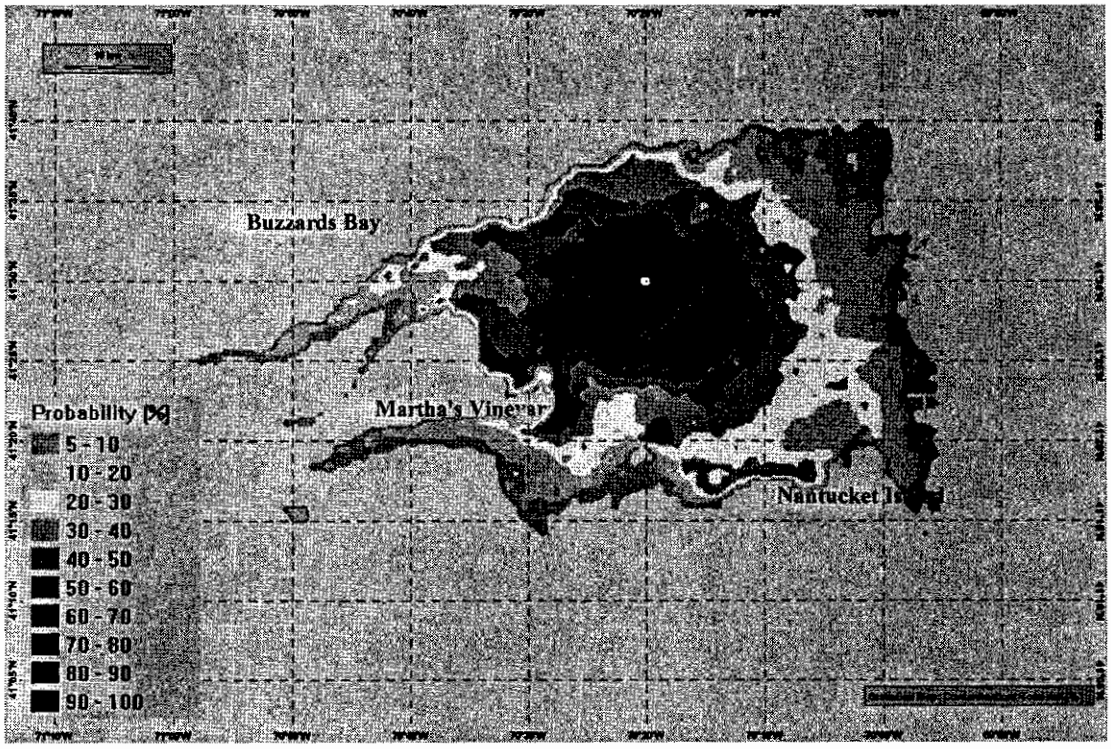


Figure 3 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 24ppb water column adverse effects threshold resulting from spillage of over 1.29 million gallons of diesel from a collision between a tanker vessel and a proposed WTG in winter.**

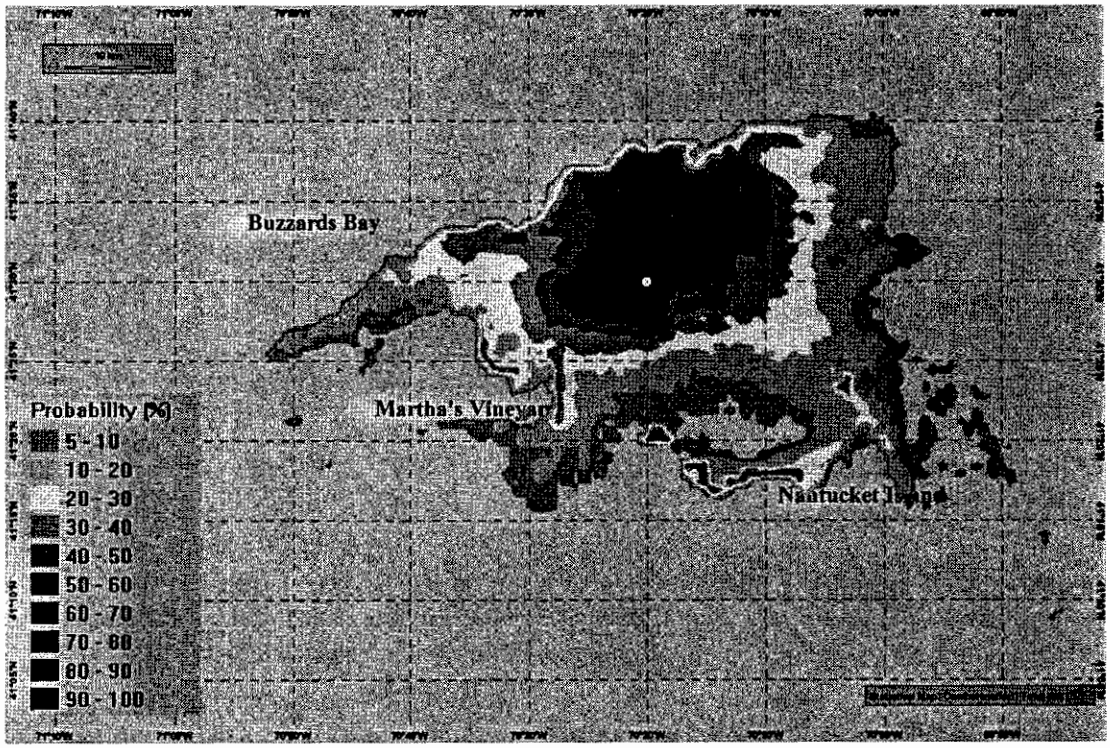


Figure 4 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 18ppb water column adverse effects threshold resulting from spillage of over 1.29 million gallons of diesel from a collision between a tanker vessel and a proposed WTG in spring.**

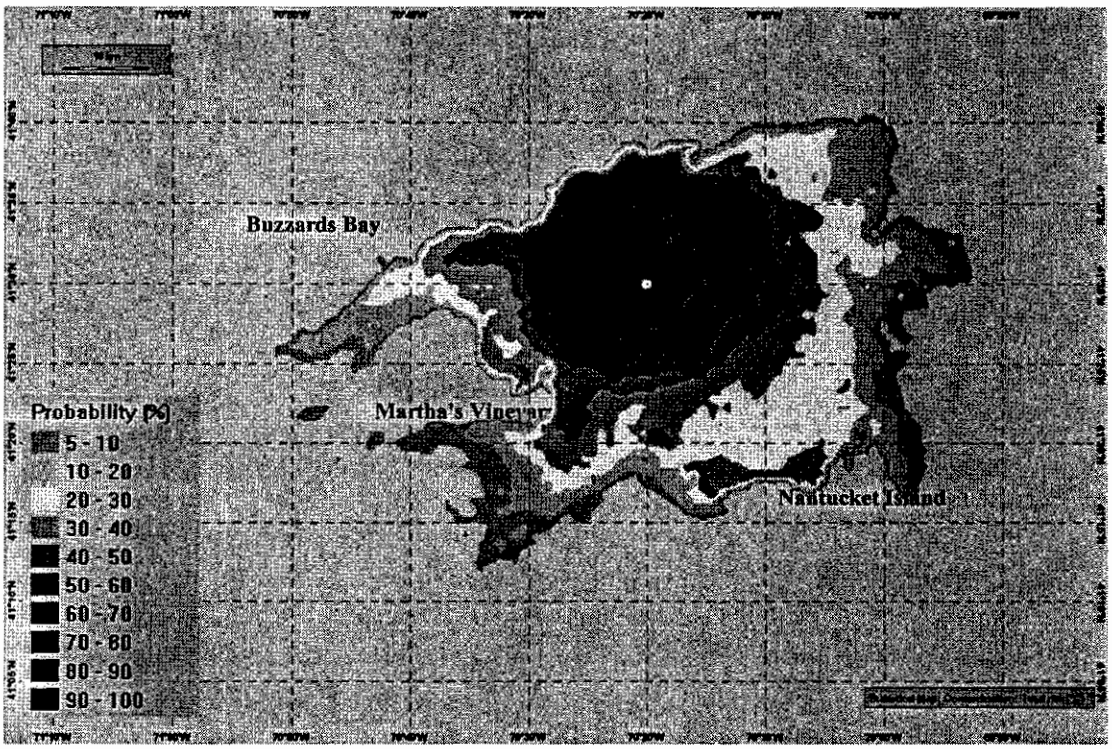


Figure 5 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 7ppb water column adverse effects threshold resulting from spillage of over 1.29 million gallons of diesel from a collision between a tanker vessel and a proposed WTG in summer.**

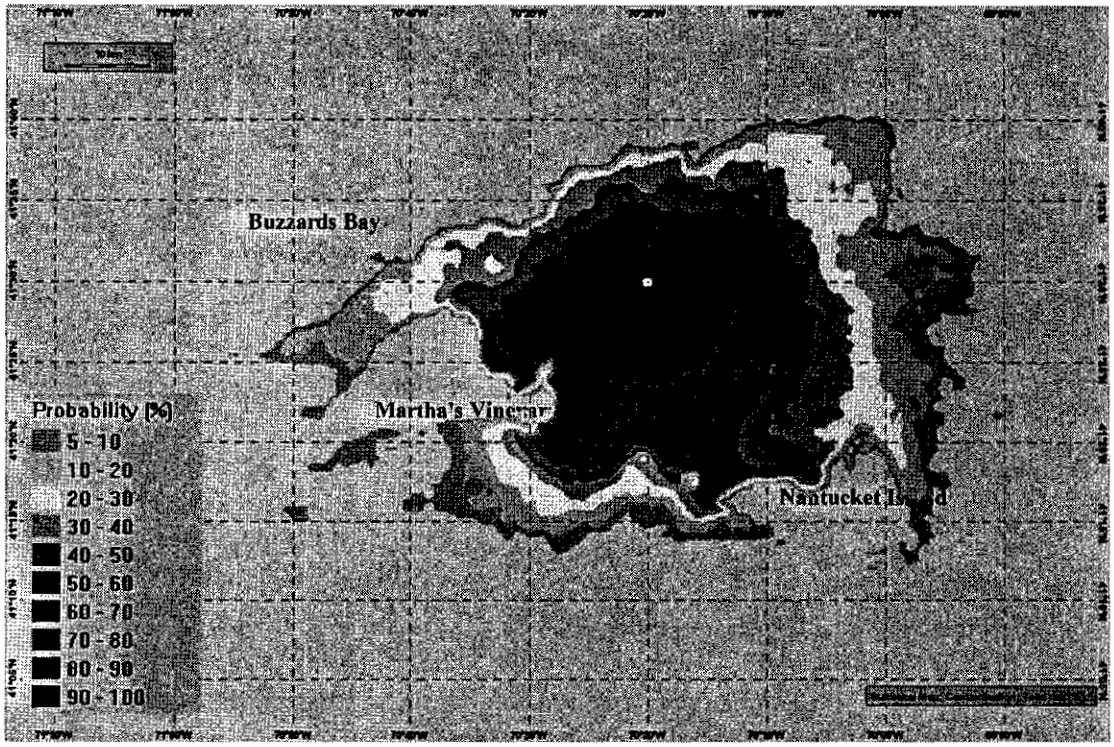


Figure 6 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 11ppb water column adverse effects threshold resulting from spillage of over 1.29 million gallons of diesel from a collision between a tanker vessel and a proposed WTG in autumn.**

Table 5

Open water areas and shoreline lengths at risk of pollution exposure and adverse effects resulting from a worst case discharge of over 1.29 million gallons of diesel from a collision between a tanker vessel and a proposed WTG during each season[1]

Habitat	Winter	Spring	Summer	Autumn
Water Column	1,800 km²	1,550 km²	2,000 km²	2,250 km²
Sea Surface	900 km²	950 km²	950 km²	1,100 km²
Shoreline	350 km	340 km	330 km	350 km

[1] Areas at risk of pollution exposures and adverse effects are defined as those locations in Figures 1-4 where there is a probability of greater that 5% exposure to oil contamination that exceeds the no adverse effects threshold concentration.

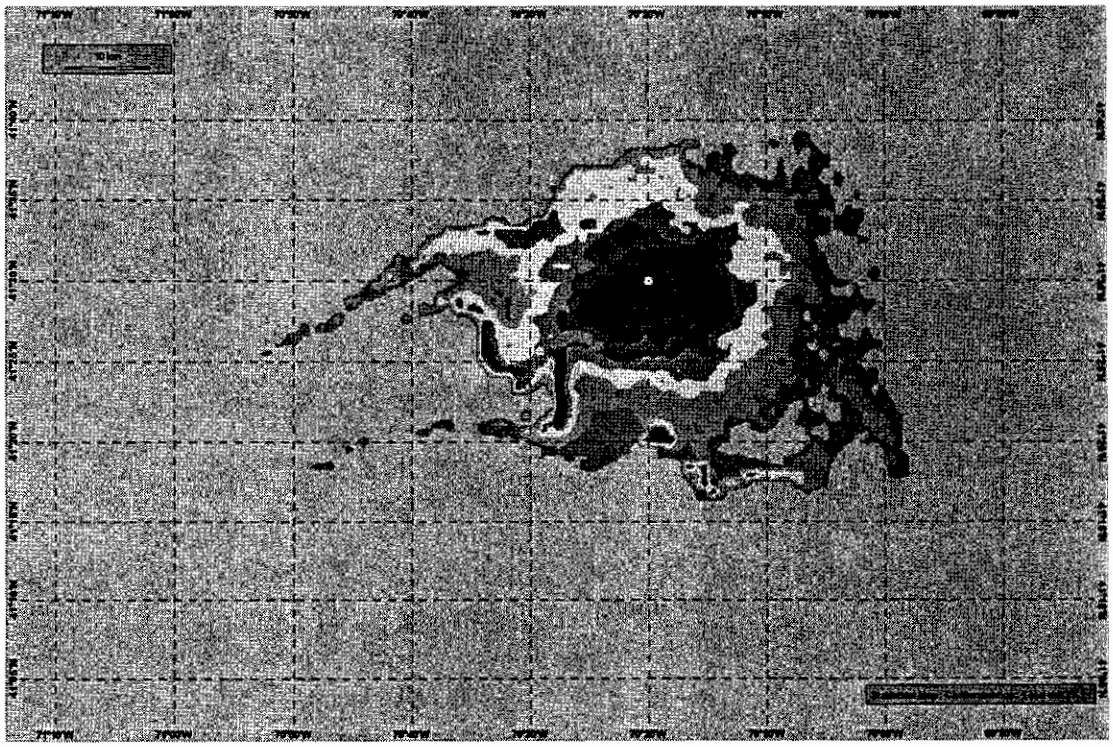


Figure 7 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 24ppb water column adverse effects threshold resulting from a (more probable) spillage of over 380,000 gallons of diesel from a collision between a tanker vessel and a proposed WTG in winter.**

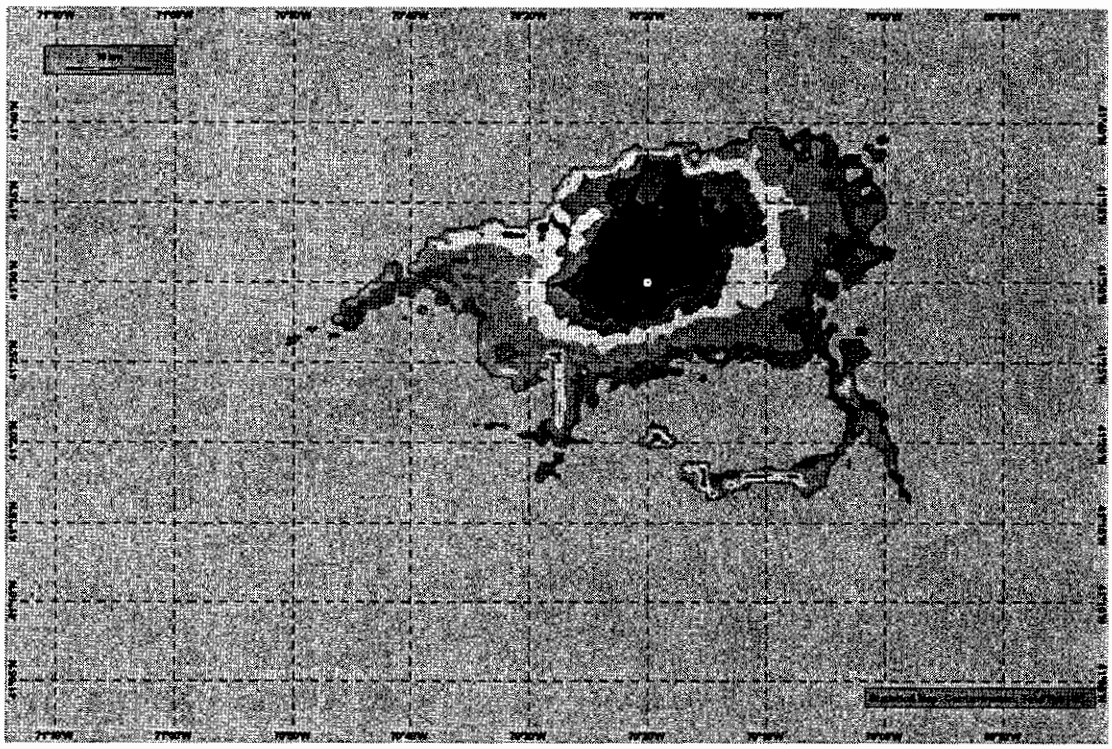


Figure 8 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 18ppb water column adverse effects threshold resulting from a (more probable) spillage of over 380,000 gallons of diesel from a collision between a tanker vessel and a proposed WTG in spring.**

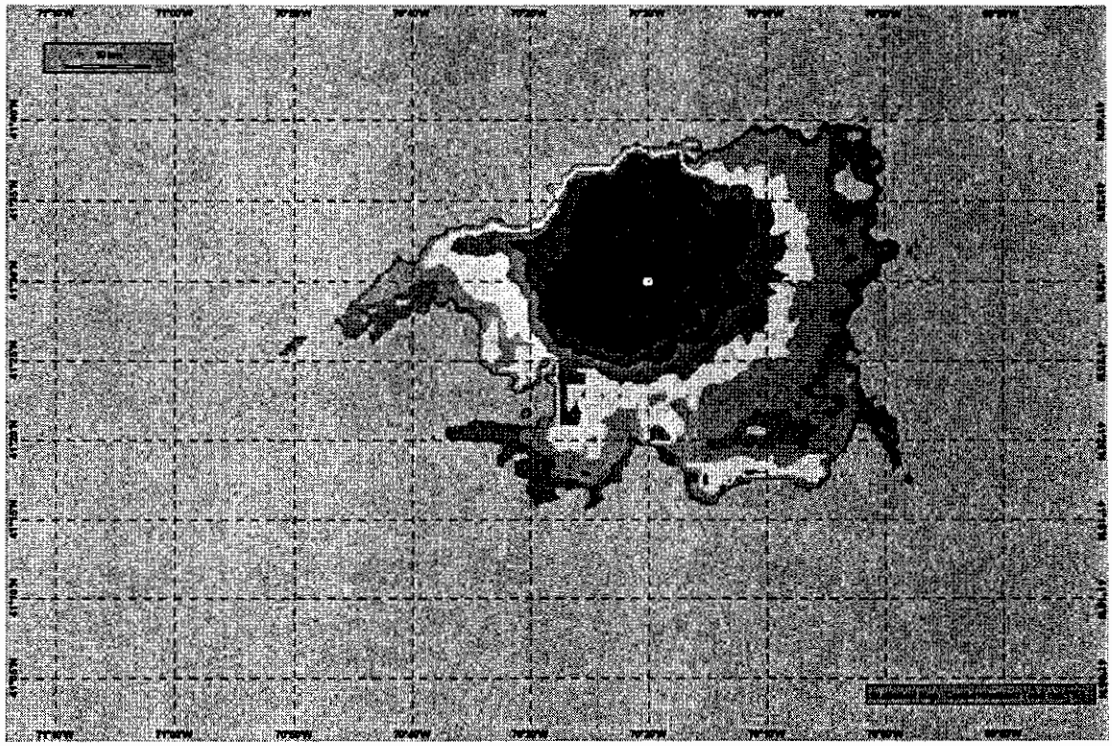


Figure 9 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 7ppb water column adverse effects threshold resulting from a (more probable) spillage of over 380,000 gallons of diesel from a collision between a tanker vessel and a proposed WTG in summer.**

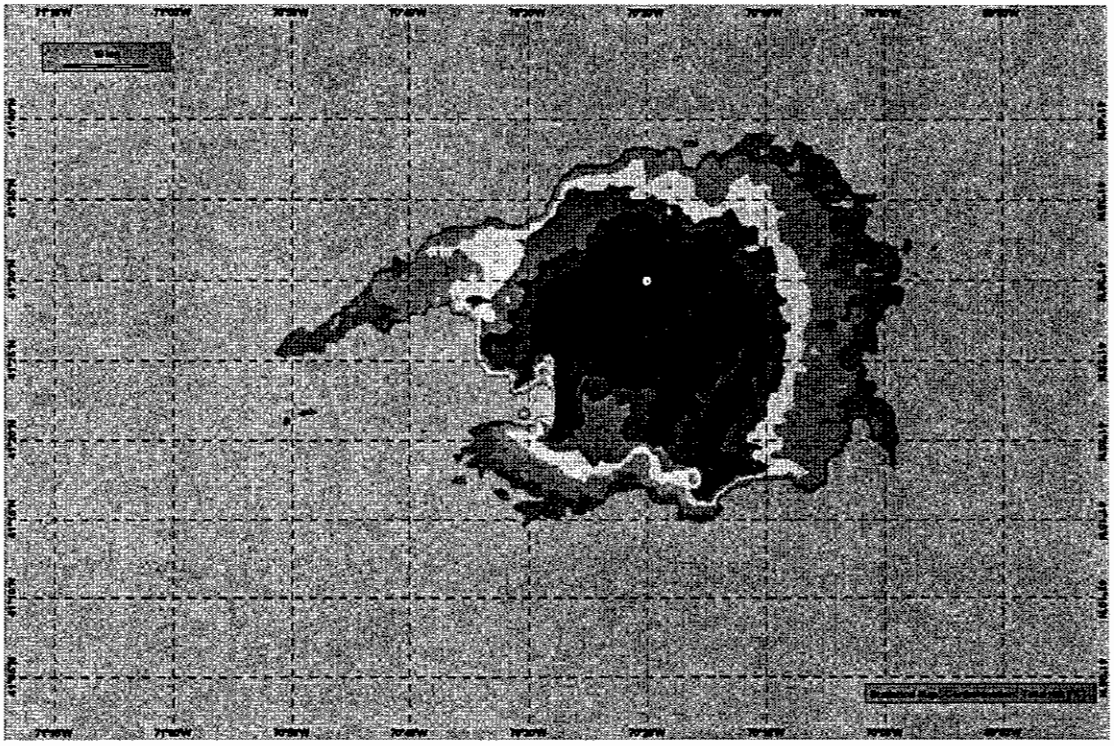


Figure 10 Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 11ppb water column adverse effects threshold resulting from a (more probable) spillage of over 380,000 gallons of diesel from a collision between a tanker vessel and a proposed WTG in autumn.

Table 6

Open water areas and shoreline lengths at risk of pollution exposure and adverse effects resulting from a more probable discharge of over 380,000 gallons of diesel from a collision between a tanker vessel and a proposed WTG during each season[1]

Habitat	Winter	Spring	Summer	Autumn
Water Column	1,200 km²	950 km²	1,600 km²	1,700 km²
Sea Surface	550 km²	700 km²	700 km²	600 km²
Shoreline	250 km	250 km	200 km	200 km

[1] Areas at risk of pollution exposures and adverse effects are defined as those locations in Figures 5-8 where there is a probability of greater that 5% exposure to oil contamination that exceeds the no adverse effects threshold concentration.

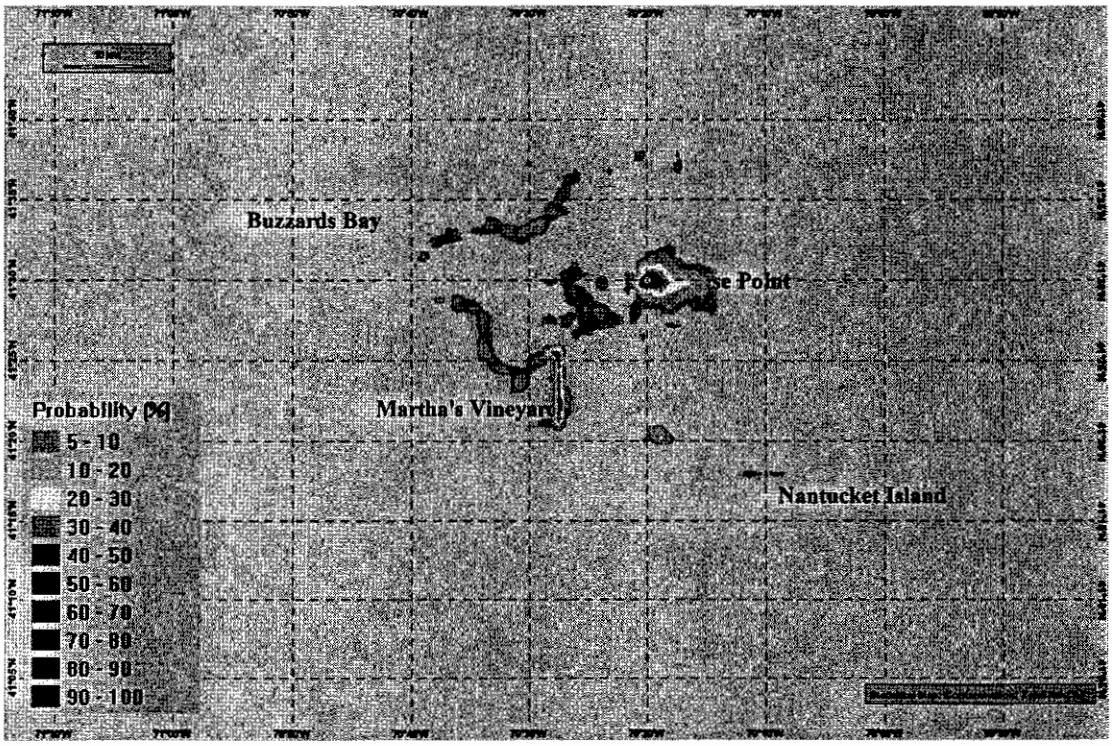


Figure 11 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 24ppb water column adverse effects threshold resulting from spillage of 41,000 gallons of diesel and transformer oils (modeled as diesel) from the ESP in winter.**

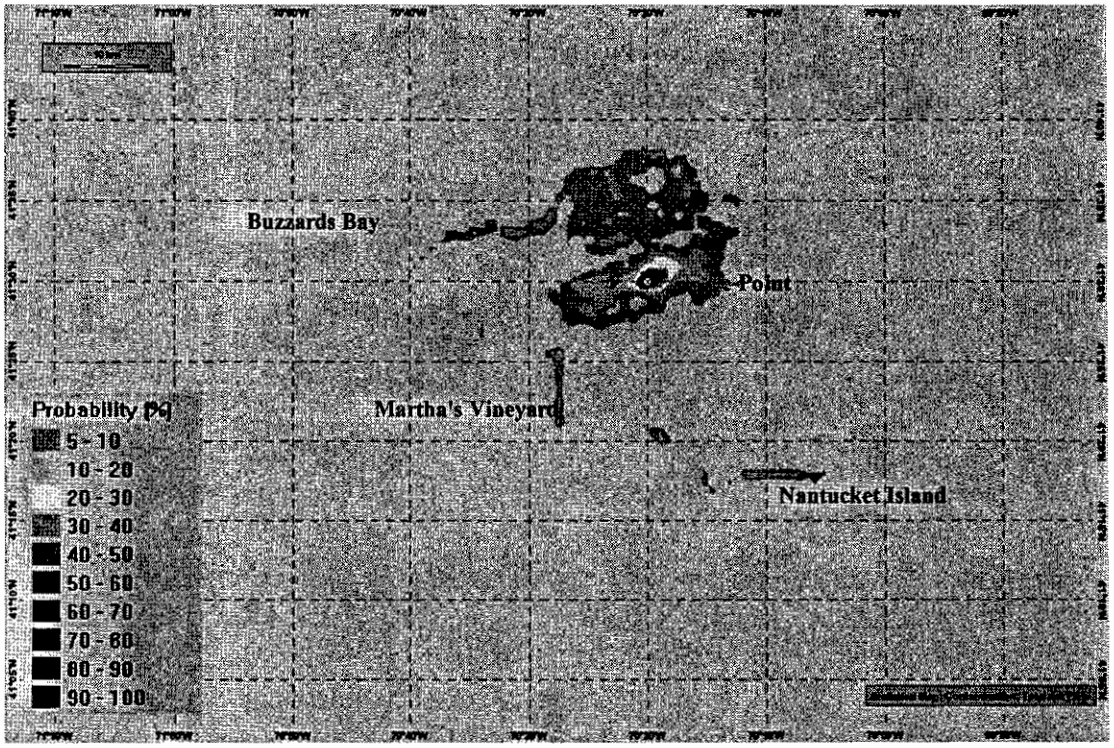


Figure 12 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 18ppb water column adverse effects threshold resulting from spillage of 41,000 gallons of diesel and transformer oils (modeled as diesel) from the ESP in spring.**

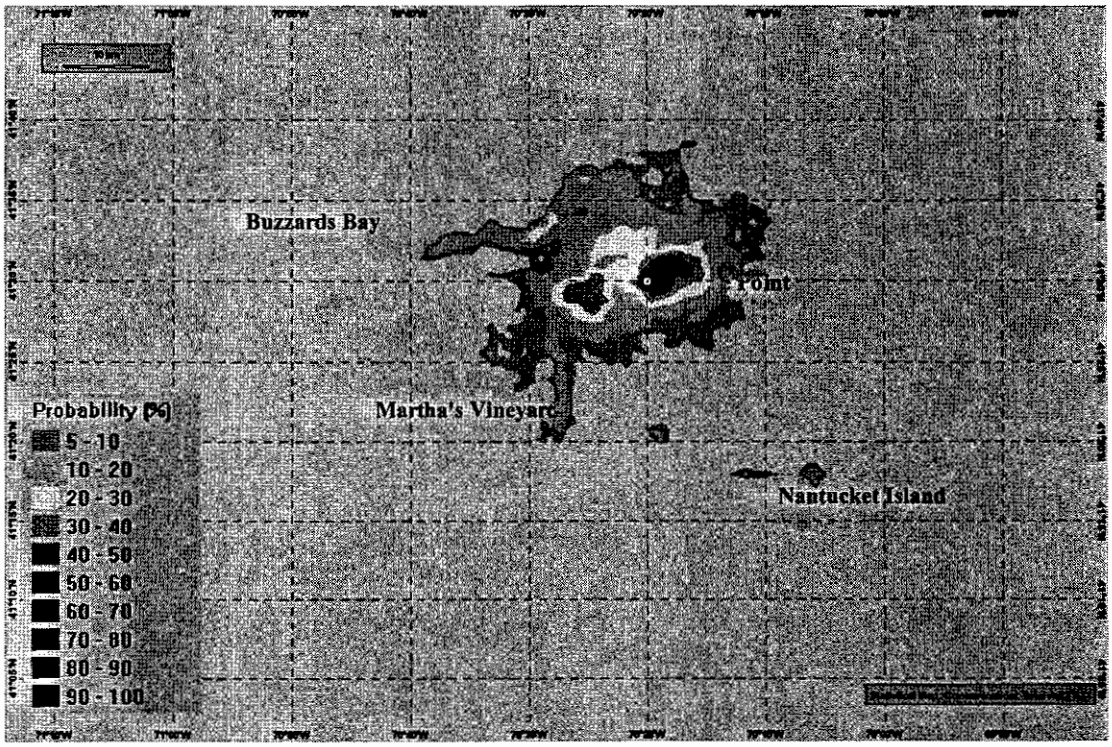


Figure 13 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 7ppb water column adverse effects threshold resulting from spillage of 41,000 gallons of diesel and transformer oils (modeled as diesel) from the ESP in summer.**

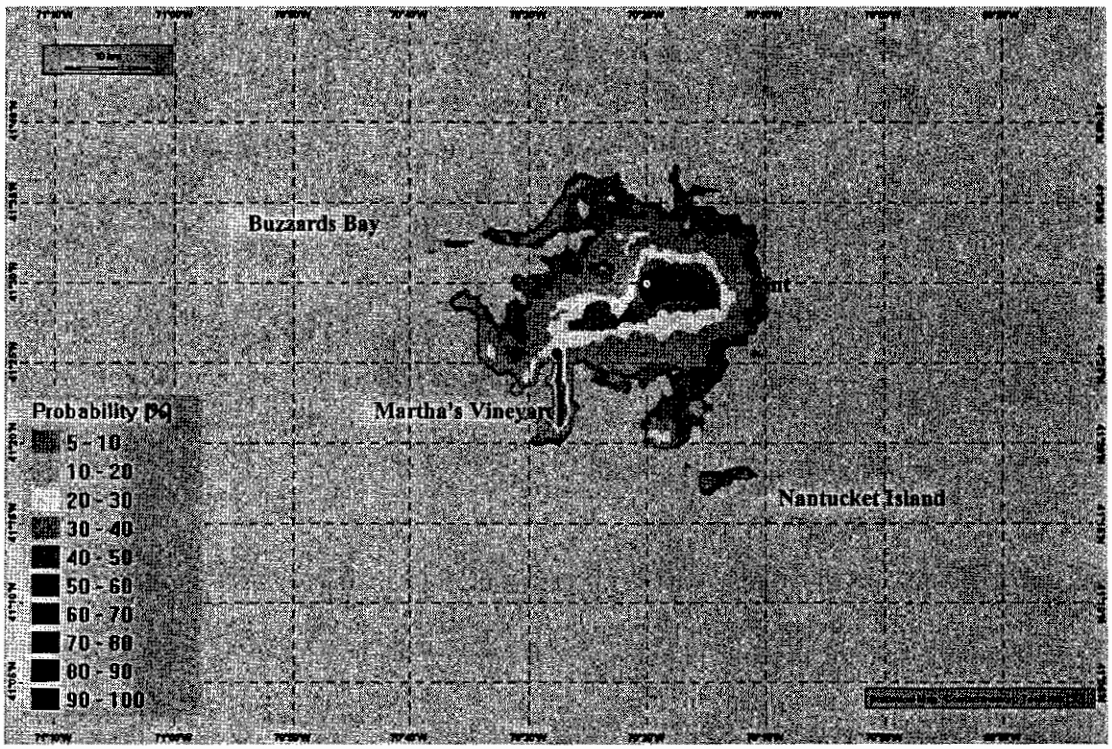


Figure 14 **Total risk map showing probability of adverse effects to shoreline, sea surface and water column biological resources with 0.1T/km² surface adverse effects threshold and 11ppb water column adverse effects threshold resulting from spillage of 41,000 gallons of diesel and transformer oils (modeled as diesel) from the ESP in autumn.**

Table 7

Open water areas and shoreline lengths at risk of pollution exposure and adverse impacts resulting from spillage of 41,000 gallons of diesel and transformer oils (modeled as diesel) from the ESP during each season[1]

Habitat	Winter	Spring	Summer	Autumn
Water Column	105 km²	135 km²	600 km²	700 km²
Sea Surface	20 km²	60 km²	60 km²	30 km²
Shoreline	90 km	80 km	70 km	75 km

[1] Areas at risk of pollution exposures and adverse effects are defined as those locations in Figures 9-12 where there is a probability of greater that 5% exposure to oil contamination that exceeds the no adverse effects threshold concentration.

From the oil spill impact analyses summarized in Figures 3 through 14, the following can be discerned regarding a spill involving the proposed offshore wind-generated power plant:

- A spill involving the proposed offshore facility would likely yield significant adverse impacts to wildlife (mortality and sublethal effects) and fish/shellfish (mortalities and sublethal effects), regardless of cause of spill or season;
- Of the scenarios modeled, a collision between a tanker vessel and a WTG will result in the most severe adverse effects to the biological resources of Nantucket

Sound due to the substantially larger volumes of petroleum products potentially spilled in either the more probable or worst case discharge scenarios;

- In addition to the risk maps (Figures 3-14), Tables 5 through 7 of this analysis quantify the geographic expanses of impacts anticipated from oil spills in Nantucket Sound and environs, involving the proposed offshore wind-generated power plant, to shorelines, sea surface and water column biological resources;
- Though spills from the ESP tend to be smaller in volume relative to spills resulting from a tanker/WTG collision, they can significantly impact coastal biological resources: petroleum discharges as little as a few thousand gallons have been observed to yield significant marine ecological impacts in several locations around the United States;
- Substantial adverse impacts to Nantucket Sound biota are anticipated to occur from a spill (especially from a tanker/WTG collision) regardless of the season that the spill occurs. The area of impact and biological assemblages impacted will vary with season due to dynamic oceanographic, meteorological and biological processes;
- Adverse impacts to biota are most severe in the area of Horseshoe Shoal, the site of the proposed wind-generated power plant and related spills;
- Probability of adverse impacts in the tanker/WTG collision scenario are apparent throughout Nantucket Sound, attenuating with increasing distance from Horseshoe Shoal, but notably continuing into the Atlantic Ocean to the east and South of the Sound, and Vineyard Sound to the west; and
- Substantial impacts to shoreline resources are anticipated from the tanker vessel/WTG collision scenario, with impacts across the south shore of Cape Cod, Nantucket, Martha's Vineyard and the Elizabethan Islands anticipated; impacts to these shores are most pronounced following a catastrophic tanker spill.

In summary, the analysis indicates that a significant oil spill event in Nantucket Sound would directly impact the Sound, Cape Cod, Martha's Vineyard, Nantucket, Vineyard Sound, proximal portions of the Atlantic Ocean and the Elizabethan Islands (Dickens et al, 2004). Significant direct and indirect adverse impacts to the rich biological, cultural and recreational resources of the area (as detailed in Sections 3 and 5 of the DEIS) are anticipated, potentially resulting in additional substantial impacts to the regional economy (i.e., through adverse impacts to the fishing industry, aquaculture and tourism). Experience with the recent (2003) spill in nearby Buzzard's Bay serves to clearly corroborate the results of this analysis.

Given inherent limitations in mechanical oil spill containment and response technology, the size of Nantucket Sound, strong tidal currents and sea states, and rapidity with which oil is anticipated to move to shore (scale of hours) following a spill, it is unclear how proponent can effectively contain and recover spilled oil prior to sustaining significant biological and public use impacts to the rich and heavily used resources of Nantucket

Sound. The failure of the DEIS to include such an analysis, and make it available for public review provides yet another example of the result-oriented nature of the document and the apparent intent to simply ignore information damaging to the proposal.

These preliminary modeling results provide reasonable cause for requiring proponent to conduct in-depth oil spill modeling studies that quantify biomass killed (and sustained lost future growth) as a result of these (and other) reasonable spill scenarios by species and life stage during each season (or month) of the year, as necessary, to obtain an accurate projection of losses resulting from spill incidents involving the proposed offshore wind-generated power plant. This modeling effort should be conducted prior to publishing the EIS.

4. SPCC Plan Comments

These oil spill risks emphasizes the importance of the SPCC Plan. The SPCC Plan should address the issues identified in the last paragraph of Page 4-21 and first paragraph of Page 4-22 in the DEIS. The SPCC Plan additionally, should address these factors:

- Types of tanks will be used at the ESP;
- Description of secondary containment system to capture released oil and hazardous substances;
- Anticipated frequency of transporting bulk oils to ESP;
- Sea states/conditions that will preclude bulk oil transport;
- Special precautions/actions to be taken to secure bulk oil and hazardous substances prior to and during extreme weather events;
- On-site spill response equipment: description and location(s);
- Adequacy of onsite response equipment to contain and collect worst case discharges;
- Spill/leak detection systems;
- Strategy for spill/leak observation and reporting when no one is onsite;
- Percentage of time the offshore facility is unmanned;
- Seasonal variations in percentage of time that facility is unmanned;
- Expected response time of spill team to remote, offshore facility;
- Strategies for spill response in ice-infested waters; and
- Descriptions of spill incidents at other offshore facilities; and strategies to prevent/reduce risk of such incidents occurring at proposed wind-generated power plant in Nantucket Sound.

CWA should address and identify effective methods and strategies for responding to, minimizing, and mitigating impacts from oil spills involving the proposed offshore wind-generated power plant in Nantucket Sound prior to the publishing of the EIS.

5. Security Comments

"Security" (4.8), page 4-22; all. The DEIS should have included a "detailed security plan." Further, it should have explained that the security plan must shall comply with applicable energy generation and/or maritime security requirements (or other applicable guidance) for security plans. It is unclear which requirements of the Maritime Transportation Security Act of 2002 (MTSA), or the new security amendments to the International Convention for the Safety of Life at Sea 1974 (SOLAS), and its complementary International Ship and Port Facility Security Code (ISPS) – may apply. The Corps must address this issue a supplemental EIS.

6. Safety Comments

"Safety" (4.9), page 4-22, all. There is insufficient discussion of the WTG rotor emergency shutdown system. Nantucket Sound is frequently used by vessels with masthead heights exceeding 75 feet which could become severely damaged by turning WTG blades if they approach or are set down by the elements on the WTG foundations (McGowan Group Report, 2004). In severe ice formation conditions, thrown ice "chunks" could threaten passing vessels until the blades were shut down. The emergency shutdown system needs to be described. Its characteristics should be compared to a known standard, e.g., the UK MCA requirements or DNV standard. The UK MCA standard requires the blades be stopped within 60 seconds and 5 degree of arc as controlled by a manned operating 365 X 24. The DEIS fails to address this issue.

Page 4-22, 4th par. According to the DEIS, "The components of the WTG are designed to last 20 years and have been tested and have had design certification…." While the components of the WTG may be designed to last 20 years, the actual WTG proposed is in the prototype phase testing only. According to DEIS Section 4.1.1.5, page 4-3, "The [WTG] design is based on a prototype that has gone through a rigorous design review." Footnote 69 on page 4-3 (Section 4.1.1.5) further states that "A prototype of the GE 3.6 MW WTG is presently undergoing testing at an upland site in Barrax, Spain. The prototype WTG has been operational for over 1,000 hours…." Thus, though the WTG components have been designed to last 20 years, the 130 WTGs proposed are based on a designed prototype that has been operational for only approximately 1,000 hours in an upland environment. The DEIS must provide additional explanation to demonstrate that this upland prototype can function in an offshore environment for 20 years. These issues should be clarified before an EIS is issued.

Page 4-22, all. This section of the DEIS needs to address the serious problem of the consequences of having a rotor break or a WTG monopole failure. If these events are truly impossible, the EIS should so state and provide appropriate technical data. If not impossible, analysis is required. For example, if a rotor blade should break off the hub at a given point in its rotation, where would it end up? It would seem hazardous to allow any vessels within a given radius of the WTG; the radius should be based on the longest

possible trajectory of a blade plus a safety factor. The rotor blades are 164 feet long and the span is longer than a football field (328 feet). When launched, they would have momentum from the rotation and start from a hub height of 105 feet. If a sailboat with a 60 foot mast is the potential victim, it is difficult to imagine a keepout radius of less than several hundred yards.

In other parts of the DEIS, it is stated that vessels can pass within 22 feet of the tower. This seems to imply that it is impossible for a blade or a rotor to fall off. This is a serious issue that needs to be addressed so that the builder can guarantee that all access by boats to the WTG farm area is not prohibited for safety reasons. Furthermore, if there is a safety "keepout" radius about the base of the tower, how will it be marked so vessels can avoid it?

If the case can be made that the blades are truly indestructible, adverse effects on the nerves of skippers who would otherwise use the area must be considered. Most prudent skippers would probably choose to avoid the area entirely, so the area would in effect be cut off to many recreational and commercial vessels that would otherwise enjoy the area. The DEIS fails to address all of these issues, pointing to another deficiency requiring supplemental analysis and additional public comment.

D. Comments on DEIS Section 5 (Environmental Resources and Consequences for the Applicant's Proposed Alternative)

As discussed in detail in this section, the DEIS discussion of the effects of the CWA wind energy project does come close to passing the applicable NEPA and MEPA tests. The discussion is largely qualitative, reflecting the views and desired end result of the applicant. Critical data that are currently available are overlooked or ignored, and virtually all aspects of the environmental impacts of the proposed plant are looked at through the prism of the applicant. This analysis does not withstand critical review, and the need for a supplemental EIS is clear. Moreover, the negative impacts that are apparent readily support permit denial.

1. Geology and Sediment Conditions Comments (5.1)

"Surface Conditions" (5.1.3.2). The first paragraph of page 5-8 refers to areas of greater sand wave height, but does not say what the heights are. These heights are critical, since they reflect the minimum vertical variation in bottom depths under normal conditions, which are important to evaluate many issues, including cable burial depth, sand layer depths, or variations in depth around monopiles before scour impacts.

This paragraph also states that side scan images show long and short period sand waves. While the period of the sand waves is important, as it shows how long the cycle of fluctuation of changes in elevation of the bottom takes, you cannot determine period from a side scan image. These images should be able to give measures of sand wave wavelength, which should be quantified and presented for evaluation.

Paragraph 2 is unclear and potentially misleading. It states that Horseshoe Shoal is predominantly composed of "...sands, winnowed of finer material by wave and tidal action." It also states that cores reached a maximum of 20 ft depth. Does this mean that there is 20 ft of reworked marine sands? Is there any indication of underlying glacial or glaciofluvial sands in these cores? These issues are important to determine the depth of vertical variation of the bottom, natural scour or infilling rates, and depth of disturbance by storms. What is the distribution of deposits "consistent with glacial drift" which could indicate an area of scour, rather than accumulation?

Page 5-9, 1st par. If the area of "average sand wave height is 4 to 5 ft," and "waves as high as 15 ft were found," if this is an area where either cable arrays are proposed to be buried to a depth of 6 ft, normal sand wave processes (without extreme events) will regularly uncover large sections of cables, suggesting depth of burial is inadequate. These data need to be integrated into the cable array discussion and into the scour around the monopole discussion. How will a 15 or more ft variation in bottom depth around a monopole (under normal conditions and without scour) affect the monopole foundation, and affect the stability of the scour aprons on the bed. How will the edges of these aprons be anchored with such extreme variation?

The sand wave crests are described as migrating both east, west, and neutral on different parts of the shoal. This is attributed to "forces in...ebb and flood tidal phases." If there is a strong variation in ebb and flood tidal phases over a small area, as described here, this should be measured or described, and it can affect very large local variations in scour and net sand transport.

The analytical sediment transport model is described as showing highest transport at the northwest corner of the shoal. Does this model agree with the field data (above) showing areas of net east, net west, and neutral sand transport in a small area? This is an important measure of the effectiveness of the model in this highly dynamic and variable area.

"Nantucket Sound and Lewis Bay Surface Conditions" (5.1.3.3), page 5-11. This section describes sand wave heights up to 3 feet. This information was not integrated into the discussion of cable burial depths of 6 feet, which means that effective cable burial depth in the presence of migrating sand waves is actually 3 feet. Is this depth suitable to minimize widespread cable exposure and potential impacts from anchors and fishing gear?

"Potential Impacts of WTG and ESP Installation and Decommissioning" (5.1.4.1), page 5-14. Scour mats are stated to "remain in place during inner array installation and throughout the life of the project." Yet there is no discussion how they will be kept in place with ongoing fluctuations of bottom depth of several feet under normal conditions due to the sand wave migration. While the scour mats may limit sand wave migration on the surface of the mat, there is no information how the edges of the mats will be anchored under up to 3 feet of vertical variations under normal conditions.

Previous sections describe ongoing transport systems across shoals through sand waves. If permanently installed scour mats function as described, will they cut off historic sand transport supplies to other areas (in the direction of net transport) which would induce scour due to the cut-off natural sand supply?

"Potential Impacts of WTG Operation," page 5-15. This section describes the scour model indicating up to 4 feet of scour around structures. Other sections of the report indicate up to 15 ft of variation in bottom depth due to sand wave migration. These two variables are not combined. This could result in up to 19 ft of vertical variation, the effect of which should be explored in terms of the stability of the foundations. As well, scour occurs around the structures due to acceleration of the tidal flow around the structures. There is no discussion whether this acceleration will lead to changes in the amplitude of the sand waves even more, which could be significant in terms of sediment transport and stability.

"Potential Impacts of Inner Array Cables Operation," page 5-16. This section again states that a 6 ft burial depth will minimize conflicts for anchoring and fishing. Since earlier sections described 3 ft height sand waves, the effective burial depth will only be 3 feet for much of this area, since cables buried across the crest of a sand wave will surely drop 3 feet as the migrating bedform passes over. Therefore, the depth of burial in the presence of sand wave analysis needs to be reconsidered. The same comments as above apply to the installation and operation of the 115 kv cable.

"Nantucket Sound and Lewis Bay Landfall" (5.1.4.2.1). Also, will tidal channels be in the route of the cable? If so, what has been the history of channel migration or changes? These questions must be answered for an adequate DEIS.

2. Physical Oceanographic Conditions Comments (5.2)

This section is largely a slightly expanded discussion of the oceanographic conditions discussed in section 3.4.3 but directed solely to the proposed Horseshoe Shoal alternative. A combination of historical data and reports plus field studies of winds, waves, tidal currents and sediment cores were used to discuss potential impacts and mitigation procedures.

The one item that is not addressed as an oceanographic consequence is the potential for a fuel spill from a collision between a moderate to large ship and one of the WTG monopoles or if some accident befalls the ESP platform that causes its fuel or transformer oil supply to spill. Appendix 5.12-B which is an assessment of the risks to navigation assumes that all vessle operators will comply with the rules of the road and that no one goes to sleep, etc. That seems to be a rather optimistic assessment to apply for the supposed two decade lifetime of the WTG array. Witness the recent NY Staten Island ferry accident. As a result, no real assessment of oil spill risks or spill modeling has been

done to date. This would involve a much more detailed modeling of the waves and currents in the Sound than has been carried out to date.

"Field Surveys" (5.2.2.2). Additional data has been gathered in the Horseshoe Shoal alternative area as a result of the proposed wind energy plant, including bathymetric surveys, vibracore and grab samples of sediments and current measurements with a ship-mounted ADCP. There is also a tower deployed in the SMDS area at 41° 28.306'N, 70°18.857'W although it doesn't appear that data from this site are included in the DEIS.

"Existing Conditions Modeling" (5.2.2.3). The waves and current description in this section are a repeat of section 3.4.3. The caveats mentioned earlier on the utility of the single tidal cycle ADCP current measurements still apply.

A new element is the wind-driven/tidal current modeling contained in Appendix 5.2-A. The modeling is of a highly idealized situation that represents Horseshoe Shoal as an elliptical mound within a rectangular basin. The intent of the modeling was to see to what extent tidal currents are accelerated over the shoal and how they compare to wind driven currents (see comment under 5.2.2.4). Tidal acceleration is thus estimated to be about 1.6 which is less than that simply due to a plane wave passing over a ~60% decrease in water depth, a reasonably plausible result. The wind-driven aspect of the model does not seem quite so reasonable since the flow is presumed to take place within a closed domain. Nantucket Sound has broad though shallow openings to the east and south with a deep approach from the west through Vineyard Sound. Given the openings to the Sound it seems unlikely that the small wind-driven component of flow estimated by the modeling is anywhere near realistic.

a. Model Simulations of Jet Plow Embedment of Cable System (5.2.2.4)

Section 5.2.2.4 presents little information, primarily serving as a mechanism for referring readers to Appendix 5.2-C ("Results of Model Simulations of Sediment Deposition from Cable Burial Operations in Lewis Bay, MA"). Most of the following comments, therefore, pertain to this Appendix.

Appendix 5.2-C purports "to simulate water column sediment concentration and sediment deposition thickness and extent resulting from the embedment of submarine electrical cables in Lewis Bay in Nantucket Sound." The Appendix describes the only apparent attempt in the DEIS to quantify such sediment transport and deposition resulting from jet plowing, so it is therefore necessary to examine how accurately this modeling effort represents what might be expected throughout the development area.

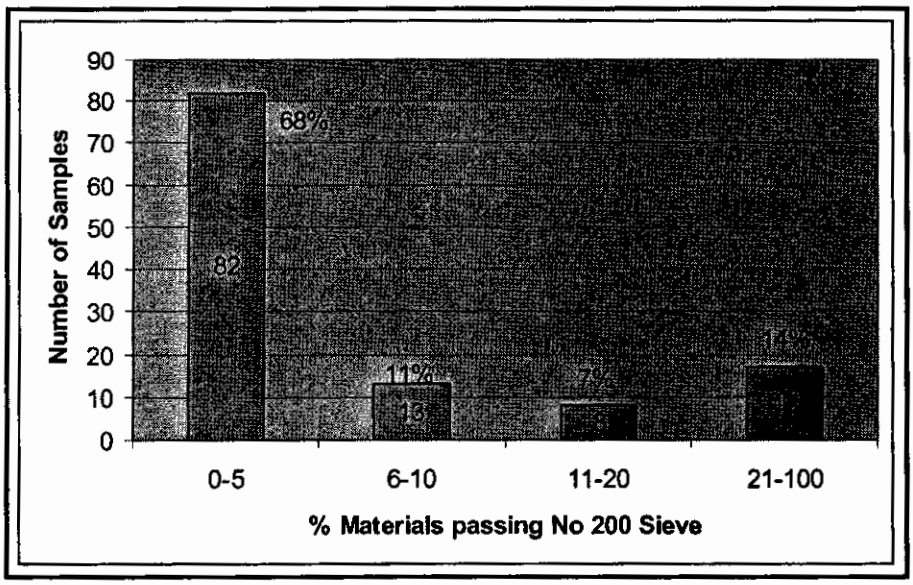
Appendix 5.2-C represents that the sediments regime used in the model run described in the Appendix "can be considered typical and generally representative of the subsurface sediment types expected to be encountered within the cable corridor" (Appendix 5.2-C, page 4, 4th par.). It also used a current speed for the modeled system of 0.6 ft/s, considered "typical tidal currents within this water body" (Appendix 5.2-C, page 3, 2nd and 4th par.).

These assumptions are very limiting to the modeling effort described in this Appendix, rendering it a very incomplete analysis of sediment deposition in the proposed areas of jet plowing. Each assumption is discussed separately below.

Appendix 5.2-C states that "Core VC01-L2 located at the mouth of Lewis Bay...was used to specify sand-sized sediment parameters" for the single SSFATE model simulation that was run (page 3, 4th par.), and that this core "can be considered typical and generally representative of the subsurface sediment types expected to be encountered within the cable corridor" (page 4, 4th par.). According to Table 5.1-3, Core VC01-L2 consisted of "wet, gray sand," that 100% of the sample passed through a No. 4 sieve, and that only 5% of the sample passed through a No. 200 sieve.

An examination of core sample data in Table 5.1-3 indicates that sample VC01-L2 is not quite as representative as implied by the Appendix. A summary of the 120 core samples in the table is presented in the figure below. At least 38 of the samples listed in Table 5.1-3 had more material pass through a No. 200 sieve than did sample VC01-L2, which is equivalent to 32% of all samples analyzed. Furthermore, 21% of all samples had more than twice the amount of fines, and 14% had at least four times the amount of fines in the "typical" sample, VC01-L2. This is significant, because fines are more likely to be carried by currents, and consequently more likely to be deposited outside the jet plow trench and to be carried farther than are heavier particles. The model was run using a heavier particle range than occurred in at least one-third of all samples, which is clearly not representative.

Table 8



It must also be observed that the DEIS (page 5-11, 1st par.) mentions three core samples that were visually observed at the time of sampling to consist of "greater than 50% fine material." These were samples VC01-G1, VC01-G4, and VC01-G11, which had 3%, 7%,

and 15%, respectively, of their material that passed through a No. 200 sieve. None of these samples had anywhere near 50% of their material pass through the No. 200 sieve. It appears, therefore, that using the parameter of "% material passing through a No. 200 sieve" understates the amount of fines in each sample, sometimes grossly. The particle size data provided in the DEIS, namely in Table 5.1-3, would appear, therefore, to be inadequate for clearly differentiating likely sediment transport from jet plowed trenches, because it apparently fails to quantify the amount of fine materials in the "sand." Note that of the 120 samples reported in Table 5.1-3, 7 (5.8%) had >50% of their material pass through a No. 200 sieve, and 5 (4.1%) of the samples actually had >80% of their content pass through a No. 200 sieve. Sample VC01-L2 was clearly not representative of these samples.

The model run described in Appendix 5.2-C used a current speed of 0.6 ft/s (feet per second) to describe the environment of the area in which jet plowing was simulated. The Appendix implies that this current speed is representative by stating: "Maximum flood and ebb tidal currents of 0.6 ft/s at this location intersect the line of the cable route at a 45° angle. The bathymetry and tidal currents were assumed constant along the cable route segment" (page 3, 4th par.).

The capacity for water to carry sediment away from jet plowing operations is a function of water movement, a major component of which is current. The faster the current, the greater the capacity for transporting sediment. The Woods Hole Group measured tidal currents occurring at the potential development sites of Horseshoe Shoal, Tuckernuck Shoal, and Handkerchief Shoal (Appendix 5.2-A, pages 22-29); resulting data are summarized in the following table.

Table 9

Location	Current Range	Factor > 0.6 ft/s
Horseshoe Shoal	1.6 – 3.2 ft/s	2.7 – 5.3 times
Tuckernuck Shoal	1.6 – 2.6 ft/s	2.7 – 4.3 times
Handkerchief Shoal	1.4 – 3.5 ft/s	2.3 – 5.8 times

The actual currents over the development sites are therefore at least 2.3 to 5.8 times greater than the current value utilized in the model run described in Appendix 5.2-C. This is clearly far from representative, and when combined with the occurrence of higher sedimentary "fines" content as discussed above, it is clear that this mathematical modeling simulation does not adequately respond to questions that must be asked concerning the amount of sediment transport and relocation that may result from installing cables using a jet plow.

Page 3, 2nd par. "...typical tidal currents within this water body that were used in the analysis." These tidal currents were not typical or representative. Please refer to comments under "Assumptions Concerning Current Regimes" above.

Page 3, 5th par. "It was assumed that 30% of the total sediment volume fluidized within the trench was evenly distributed vertically through the overlying water column by the jetting device. The remaining 70% of the sediment was assumed to remain within the limits of the trench during the burial process."

The basis for these assumptions is not provided. If these assumptions are based upon prior knowledge, experimental evidence, or separate modeling data, such information should certainly be provided in the DEIS. Without this information, reviewers clearly are at a disadvantage or even prevented from evaluating validity of the modeling effort. This is especially true in view of the discussion provided above concerning the amount of fines in bottom sediments ("Assumptions Concerning Sediment Characteristics," above). If these assumptions are arbitrary "best guesses," their source(s) should be clearly stated.

Page 4, 4th par. "The results presented herein can be considered typical and generally representative of the subsurface sediment types expected to be encountered within the cable corridor."

This statement is not true, as discussed above. The results of this model run are almost certainly not typical and representative of the general development areas proposed by the DEIS.

Page 4, 4th par., lines 5-6. "...[S]ediment deposition thicknesses and water column suspended concentrations may vary depending on location." This is accurate and should be considered if and whenever the modeling results are presented as representative of the entire development area.

b. Existing Conditions (5.2.3)

The results for waves discussed in this section were based upon analyses in Appendices 5.2-A and B. The locally generated wave estimates were based upon model simulations using 1986-2001 winds from Nantucket to get the mean conditions. The model used was very simplified as the results are solely a function of wind speed, fetch, and mean depth. No account of refraction, reflection or dissipation is included. Table 3.2 of Appendix 5.2-A shows wave heights from a variety of directions at Horseshoe Shoal for average winds as well as the average of the 10% highest winds. Depending on wind direction, the significant wave heights produced by the highest 10% of the winds range from 3.4 to 3.6 ft. Waves produced by ocean swell, 4.5 ft and 8-second period, entering the Sound from the east were propagated into the region using a shoal condition which appears to produce maximum waves over the shoals of about 6.5 ft (Figures 3-5b in Appendix 5.2A). Again, the modeling of ocean swell was very simple using a shoaling coefficient ($h_{max} < 0.78$*water depth) to limit wave heights in shallow waters.

Extremal wave heights at Horseshoe Shoal are based upon a "generalized extreme value" methodology based upon the statistics for waves generated by the maximum 3 to 4 winds events for each year of the Nantucket wind data. The same wave generation model

(ACES) with the same simplifying assumptions used for the mean conditions was used for the extremal wave generation. Limited fetch within the Sound is responsible for the limited size of these extreme waves. Various return period wave heights and periods were estimated from this analysis and then rather arbitrarily added to return period storm surges to get the final return period wave height estimates. (Storm surges can also be storm set-downs depending upon wind direction.) 50-year return period locally generated wave heights estimated in this fashion were 10.2 ft with a 6.2 second period.

"Salinity" (5.2.3.4) and "Temperature" (5.2.3.5) gradients in the generally well-mixed Sound are expected to be small. Salinities will be similar to oceanic as there are no significant fresh water sources while temperatures will be somewhat warmer in the summer due to the shallowness of the waters and the somewhat restricted exchange with the ocean. In the winter these same factors serve to increase the heat loss to the atmosphere and reduce the temperatures relative to the surrounding ocean.

c. Analysis of Impacts (5.2.4)

In the discussion of the impact of the WTGs on surface waves, the point is made that there would be no effect for wavelengths greater than 10 times the monopole diameters which are 5 to 6m. They then go on to say that the majority of the waves are locally generated with periods between 2 and 4 seconds. Assuming deep-water waves, wavelength = $g*period^2/2*\pi$ which indicates wavelengths between 6.2 m and 24.9 m which are clearly less than 10 times the monopole diameters and thus the monopoles <u>would</u> be likely to interact with the majority of surface waves. This differs from the conclusion in the DEIS, which contradicts its own preliminary discussion.

Water column sediment concentration and sediment deposition thickness resulting from jet plow embedment of the submarine cable system are discussed under 5.2.2.4.

d. Mitigation (5.2.5)

The main topic under this heading to mitigate the impact of the wind energy project on the regional oceanography is the use of scour mats to reduce scour around the monopoles. However, there is no discussion of any contemplated system to respond to man-made or natural disasters such as oil spills from shipping accidents or the failure of any of the wind farm structures. At a minimum, there should be oil containment and oil cleanup apparatus readily available during all phases of the project.

3. Benthic and Shellfish Resources Comments (5.3)

Page 5-31, 3rd par. "Macrobenthic organisms…Benthic resources have been evaluated in accordance with the specific requirements established for the Project in the MEPA scoping process and further refined in the EIS Scope of Work…. Based on communication with USEPA (Colarusso, 2002) and USACE (2002a, 2002b), a specific sampling program design, protocol, and methodology were developed and subsequently implemented…."

The methods and analyses used to survey the sites were not adequate or appropriate, as discussed in comments offered concerning Appendices 5.3-A, 5.3-B and 5.3-C. Thus, the information given in the entire Section 5 of the DEIS that centers on benthic communities is not sufficient to develop a meaningful assessment of what the potential impacts and recovery scenarios might be for the proposed activities.

Benthic studies to adequately identify and describe impacts of the proposed project should be redesigned and redone to overcome the inadequacies of the existing efforts.

Of the references provided in the quoted paragraph, Colarusso (2002) and USACE (2002a) are personal communications, while USACE (2002b) is a letter that is not copied in the DEIS. The methods and scoping requirements for these efforts are therefore not documented, and are not based upon established peer-reviewed protocols.

Page 5-31, 4th par., line 3. "References utilized for this section are listed in Section 5.3.6."

There is no Section 5.3.6.

Page 5-31, 5th par., line 1. "Comprehensive benthic field investigations were conducted by the Applicant…."

Benthic field investigations conducted by the Applicant were neither comprehensive nor adequate.

Field studies were apparently specifically designed to sample only sand habitats (Page 5-33, 6th par.), so little information is provided concerning other habitats. This fact alone disqualifies the surveys from being described as "comprehensive."

Page 5-31, 5th par., lines 4-6. "While a wide range of existing data and reports were available for many areas within Nantucket Sound, recently collected data were found to be somewhat limited, particularly in the Project area. Therefore, the Applicant conducted three separate field surveys in the Project area…."

The statement that recently collected data for the Project area are limited is correct. Unfortunately, the methods and analyses used in the three surveys conducted by the Applicant were inadequate for providing needed information. Benthos surveys should be redone.

Page 5-31, 6th par., lines 6-7. "Sample locations were chosen to reflect the range of benthic habitats (Gibson et al. [*sic*], 2000) along the proposed and alternative cable routes…."

What specific guidance principles were used as cited in Gibson *et al.* (2000) to select sample locations?

Gibson *et al.* (2000) may also be cited in regard to other concerns regarding the benthic surveys. Chapter 3 of Gibson *et al.* (*op cit.*) provides descriptions of different levels of effort associated with the detail needed for different purposes. "Tier 1," for example, is a "basic field assessment that is used for screening purposes to identify potential reference and impaired sites. For biocriteria development purposes, it is adequate for only rudimentary habitat classifications and evaluations" (page 3-20, column 2, 4th par., lines 1-6).

"Tier 2" efforts provide "the information necessary to develop a quantitative ranking of the sites that can be used to prioritize resources and sampling efforts" (page 3-21, column 2, 3rd par., lines 1-5). Tier 2 includes such sediment characteristics as the average grain size of sediments and the percent composition of silt, sand and clay (page 3-21, column 2, 5th par., lines 3-5).

"Tier 3" "provides a detailed assessment with a high level of certainty of the biological or habitat condition of the estuarine and coastal marine environment. It is the definitive assessment level to distinguish habitat variation from anthropogenic impacts when the biocriteria have been exceeded. Tier 3 focuses on biological community level investigations and thoroughly integrates the physical, chemical and biological data to yield a detailed impact assessment" (page 3-22, column 2, 2nd par., lines 1-13). Further, "Although the data collected in Tier 3 cannot prove cause-and-effect relationships between identified stressors and ecosystem responses, they can provide a strong correlation and a degree of certainty, of the biological integrity of the target waters and their habitats" (page 3-22, column 2, 3rd par., lines 9-17).

Tier 3 is the level of detail appropriate to an Environmental Impact Statement, where strong correlations and a degree of certainty are desired.

Chapter 6 of Gibson *et al.* provides detail concerning the level of data collection for the several tiers. As related to sediment grain size data, for example, "Analysis of sediment grain size for Tier 1 assessments can be limited to determining the 'percent fines' at each station" (page 6-1, column 2, 3rd par., lines 1-4). Levels 2 and 3, however, require a different level of data, such that "Additional grain size data for Tier 2 and Tier 3 assessments should include determination of the size distribution using a standard <u>graded sieve series</u>. This analysis should be performed for a sediment sample collected at <u>each</u> sampling station. In the early years of the assessment program, this analysis should be performed for each sampling period" (emphasis added) (page 6-4, column 2, 2nd par., lines 1-10).

The 2001 and 2002 studies conducted by the Applicant did not collect this level of sediment samples, and the data required for adequately analyzing benthos data are consequently not available. These studies provided no basis for providing strong

correlations with high degrees of certainty. Indeed, even low degrees of certainty are equivocal in this case.

Page 5-31, 6th par., lines 9-10. "Benthic macroinvertebrates in each sample were separated from the sediment and debris, identified to the lowest practical taxonomic level, and enumerated."

Not all organisms were separated from sediment and debris. Serious issues exist regarding the methods used for these analyses. Please see the discussion titled "Analytical and Non-Quantitative Laboratory Methods" under "Study Design Issues," above.

Page 5-32, 1st par., lines 1-3. "An assessment of the benthic macroinvertebrate community at the Proposed Site…was conducted during late spring 2002 (Appendix 5.3-B)."

Serious issues also exist concerning methods, analyses, and conclusions of Appendix 5.3-B. Please see comments specifically attached to Appendix 5.3-B.

Page 5-32, 2nd par., lines 1-4. "Each of the three Nantucket Sound study areas was evaluated with consideration for specific habitat variables such as water depth, sand wave presence, and sediment type, which are generally accepted as the primary factors influencing benthic community abundance and diversity in Nantucket Sound (Theroux and Wigley, 1998; Zajac, 1998; Colarusso, 2002)."

This sentence is misleading. Theroux and Wigley (1998) did not extract data for Nantucket Sound specifically; Zajac's (1998) review is about Long Island Sound; and it is not possible to determine information provided in the personal communication with Colarusso (2002). Therefore, although the factors noted may be important is shaping the benthic communities at the sites, there is no basis provided here in the DEIS for considering these as the primary factors.

It is also curious that, while sediment type is recognized as an important variable, such a poor job of analyzing the top ~15 cm of surficial sediment was done throughout the Applicant's studies in conjunction with benthos sampling.

Page 5-32, 3rd par., lines 2-3. "Sample locations were selected to be representative of the range of depths, sediment types, and sand wave conditions present within each of the three areas evaluated in Nantucket Sound."

On what basis was this done? According to a statement on the next page (page 5-33, 6th par., lines 1-3), sampling locations were only selected for the "dominant habitats" of coarse-grained and fine-grained sand.

During this survey, "Samples were not obtained from two locations, A1-3 and A3-5, possibly due to the presence of hard bottom or larger sized substrates in these locations" (Appendix 5.3-B, page 4, 6th par., lines 1-3).

This is a significant statement. No replicates were used for any stations, so therefore reliance was placed on single samples to characterize significantly large areas of bottom. In these two cases, sampling was unsuccessful, potentially indicating a significantly different substrate, or benthic habitat type, yet no further effort apparently was made to characterize these areas. What was the bottom type? How many and what kinds of attempts were made to sample it? Over how extensive an area around the sampling point did this bottom type occur? Were other attempts to sample the nearby bottom made to work around the issue? How can these two areas be characterized? Are there potentially other areas where hard bottom prevails? What effect does this have on projections of impact? The DEIS fails to answer these important questions.

Significant effort was made to sample predicted sediment types, but when anomalous bottom was found, it was ignored.

Page 5-32, 3rd par., lines 7-10. "Based on communication with USEPA (Colarusso, 2002), it was agreed that a minimum of five samples per habitat type would provide sufficient statistical power for evaluating differences in the benthic resources associated with the major habitat types (e.g. depth, substrate type, and sand wave presence) within each of the three Nantucket Sound study areas."

What was the basis for the decision that five samples per habitat type would provide sufficient statistical power for evaluating differences among major habitat types? Was a power analysis done? If so what was the information used for the power analysis? Without this information it cannot be assessed whether this was sufficient. Data presented in the Appendices show high variation among sampling locations. This suggests rather strongly that 5 samples were in fact not sufficient.

Indeed, one must wonder how six changed to five. Appendix 5.3-B (page 4, 6th par., lines 6-8), which is the report of this survey, states that "…it was also agreed that in order to assess the effects of key habitat variables…on the benthic community, it would be necessary to evaluate a minimum of 6 samples from each key variable."

How were these habitat types defined? Would, for example, coarse sand at 10m depth and coarse sand at 20 m depth be considered two samples from the same habitat, or would these two examples be more properly considered two distinct habitats? The Corps needs to answer these questions.

Page 5-32, 4th par., lines 1-7. "A shellfish and benthic organism survey was conducted during the summer of 2003 to describe shellfish and other benthic organisms occurring in Lewis Bay within the Town of Yarmouth shellfish area that would be crossed by the

proposed cable route....Shellfish and other benthos were surveyed at distinct locations along the proposed route in Lewis Bay using a clam rake, a 1/4-inch mesh box sieve, and a manually operated bottom dredge, as appropriate, and all sample locations were mapped. The clam rake, the box sieved samples, and the dredge were each employed at each sampling location so that all components of the benthic community could be adequately characterized."

This is simply not true. Only four stations were sampled. Two were sampled with three methods each; one was sampled with only two methods; and the fourth was sampled using only a single method, because it was considered an "extra" station. Their Table 1 from that Appendix is reproduced below to illustrate that three methods were not uniformly used at each sampling location.

Table 10

Site identification (Refer to Figure 1)	Distance from Mean-Low-Low-Water	Sample techniques employed
BGL1c	42 feet	Dredge, rake, scoop & sieve
BGL1b	178 feet	Dredge, rake, scoop & sieve
BGL1b2	410 feet	Rake
BGL1A	655 feet	Dredge, rake

The passage quoted above seems to describe a rather grand program, but the reality described by Appendix 5.3-C is somewhat different. Statistical power increases with the number of locations sampled, and the converse is also true: statistical power decreases as the number of sampled locations decreases. In this survey, the number and locations of sampling locations were inadequate for characterizing the Lewis Bay communities, with only four points directly on the cable route being sampled, and these by variable suites of methods. No transects were employed to assess whether the benthic community was consistent with distance from the cable route.

There was no replication of samples at any station. It is therefore not possible to sort out the degree of station location variation relative to the variation found among the several sampling stations or across the potentially impacted area as a whole.

No sediment data whatever were collected. No water quality data were collected. Poor laboratory procedures were apparently used. This "survey" did not meet even minimum criteria for adequately characterizing "all components of the benthic community" in Lewis Bay.

Page 5-32, 5th par., lines 1-2. "Review of the scientific literature suggests that relatively few studies pertaining to shellfish resources specific to the Proposed Site and submarine cable route in Nantucket Sound are available."

The EIS contractor, ESS, stated that "Cape Wind is conducting a series of trawls to gather abundance data," (Hertz, 2002), but resulting data do not seem to be presented anywhere in the DEIS. Where are the data resulting from this series of trawls? These data must be revealed and exposed to public comment.

Page 5-33, 3rd par., lines 2-4. A field study of the commercial shellfish resources along the cable route through Lewis Bay was conducted during 2003. The results of this study are provided as Appendix 5.3-C."

This study is inadequate. Please see comments regarding Page 5-32, 4th par., lines 1-7, above.

Page 5-33, 5th par., lines 1-6. "It is important to note that all of the literature reviewed indicated that sand, and to a lesser extent, mud and other fine-grained sediments, are by far, the dominant substrate in the Project area. Boulders, cobbles, and submerged aquatic vegetation (SAV) are not common, although these substrates are reported to occur sporadically throughout the project area. Consequently, previous studies of the area, including this evaluation, have focused on the benthic community associated with sandy-substrate as the most appropriate means for describing and quantifying the benthic resources of the area."

If this is so, then why do other habitat types figure prominently in discussions of other matters? For example, "Several…areas of coarse glacial till do exist in each of the offshore alternatives areas and are likely to support communities similar to those that may become established on the WTGs" (DEIS, page 3-170, 4th par., lines 7-9).

Or, "Therefore, it is likely that these isolated structures [monopiles] would generate a small amount of additional patch reef type habitat, <u>common in the Sound</u>, and would not substantially alter the ecology of Nantucket Sound" (emphasis added) (page 3-170, 4th par., last 2 lines).

Merely because a habitat type is not "dominant" is not justification for ignoring it. Indeed, relatively small habitats can sometimes be crucially important to the ecological functions of larger areas, as for example nursery areas, spawning habitat, or source of a particular fish prey species. Indeed, the fact that these habitats are relatively small may make them inordinately susceptible to destruction, and their loss may exert an impact disproportionate to their mere size.

Nothing is developed in the DEIS concerning potential impacts to SAV aquatic vegetation. The DEIS states in Section 5.1.3.2 page 5-9 that SAV may occur in the development area and refers the reader to Section 5.8.3.1.1. That section merely states that "Mapping indicates that two potential areas of submerged aquatic vegetation occur within the project area, beyond Massachusetts' 3-nautical mile limit."

The DEIS does not, however, divulge where these areas are, how large they are, what kind of SAV grows there, their importance or relevance to biological resources, or any other information about this resource. Considering the great importance of SAV to biological systems, much more information should be imparted about the offshore SAV. Section 6.1.3.1 indicates that maps are available, but it is unclear whether this is only for inshore SAV. It also states that a diver survey was conducted, but no resulting information or data are provided. This is inadequate, and would seem to constitute a DEIS deficiency.

Page 5-33, 5th par., lines, 6-7. "Bottom sediment maps for the project area are provided in Appendix 5.3-B."

The bottom sediment maps provided in Appendix 5.3-B are difficult to read and invalidate public review on this point.

Page 5-33, 5th par., lines 7-8. "For a discussion of the occurrence of rock substrate within the Project area see Section 5.4...."

Page 5-33, 5th par., line 7. "...[F]or a discussion of SAV occurrence within the Project area see Section 5.8."

Section 5.8 does not provide a great deal of information or analysis. Section 5.8.3.1.1 merely states that "Mapping indicates that two potential areas of submerged aquatic vegetation occur within the project area, beyond Massachusetts' 3-nautical mile limit" (page 5-141, 4th par., lines 7-8).

The DEIS does not, however, divulge where these areas are, how large they are, what kind of SAV grows there, their importance or relevance to biological resources, or any other information about this resource. Considering the great importance of SAV to biological systems, much more information should be imparted about the offshore SAV. Section 6.1.3.1 indicates that maps are available, but it is unclear whether this is only for inshore SAV. It also states that a diver survey was conducted, but no resulting information or data are provided.

Page 5-33, 6th par., lines 1-7. "Field studies conducted within the Project area during the summer of 2001 and the spring of 2002 were designed to characterize the benthic community of the dominant habitats present (coarse-grained sand, fine-grained sand, sand wave presence or absence, and differing depths) during the seasonal periods that are generally reported to have the greatest biological diversity and the highest macroinvertebrate abundance. By focusing on the dominant habitats during the peak period of abundance, this characterization of the benthic community describes an existing condition that is likely to approximate the maximum with regard to benthic community diversity and abundance for the Project area."

The DEIS needs to provide the specific months of spring and summer in which the sampling was conducted as this makes a great difference in terms of the population activity of many benthic species. The seasonal periodicity varies for the suite of species reported in the Appendices, and the generality of the statement that the sampling captured this activity *in toto* is therefore not supported by information on such benthic activity patterns for this area and suite of species. Also, some benthic organisms are active in the fall and late winter and this is not acknowledged.

Page 5-33, 7th par., lines 1-3. "Based on literature reviewed, Nantucket Sound is generally reported as a highly productive area for benthic invertebrates with numbers of benthic organisms typically averaging in excess of 2,000 organisms/m^2 (Theroux and Wigley, 1998)." The DEIS fails to explain how the data for this average were extracted from Theroux and Wigley (1998).

Page 5-33, 7th par., lines 3-4 through page 5-34, 1st par., line 1. "The studies conducted in support of the Project found macroinvertebrate abundances in the Project area averaging 4,180 organisms/m^2 at Horseshoe Shoal during 2001 and 7,574 organisms/m^2 across all three of the shoals studied in Nantucket Sound during 2002."

The averages based on surveys done at the site and reported in Appendices 5.3-A, 5.3-B and 5.3-C are overestimates of macrofaunal abundances due the inclusion of nematodes which are part of the mieofauna. Nematodes should be deleted from this survey because they are considered meiofauna (Coull, 2004), which is smaller than the macrofauna that is the objective of these surveys. Meiofauna are considered animals of microscopic size (Meiofauna Marina, 2004), although specific size definitions vary a bit. Coull (2004) defines meiofauna as animals passing through a 0.5 mm (500μm) sieve and retained by a 0.063 mm (63μm) or 0.045 mm (45μm) sieve, while Brave New Biosphere (2004) defines meiofauna as animals passing through a 1.0 mm (1,000 μm) sieve and being retained on a 0.042 mm (42μm) sieve. Theroux and Wigley (1998) used a 1.0 mm sieve.

The sieve used in this survey was 0.5 mm (500 μm), which is far larger than the lower mesh size defining meiofauna regardless of which definition is employed. Nematodes are long and very thin, and while many are entangled by larger sieves, many also pass through. Because the numbers retained *versus* those passing through are not controllable, resulting data become non-quantitative. Although nematodes were found in abundance, they are likely greatly underestimated at all sites. The inclusion of such meiofauna therefore causes quantitative variability and uncertainty, and should not be included in the analysis of macroinvertebrates, as these surveys profess to be.

Also, despite their being underestimated, nematodes are captured in high numbers, which tend to obscure differences in the remaining fauna, i.e., the macrofauna captured with them. Because nematodes are generally regarded as ubiquitous and abundant, their inclusion in the analyses adds little value to discerning differences meaningful to evaluating impacts of the proposed Project.

Page 5-34, 1st par., lines 1-6. "It is likely that the abundance averages documented during this study are higher since data collection was focused in the spring and summer which are typically the periods of peak abundance. However, it is also possible that the higher numbers if organisms found in the current studies may be due to differences in the gear employed. Historically, mesh used to sieve samples may have been larger than that used during the current studies (500μm) which may have resulted in more organisms being retained on the sieve in the current studies."

The mesh sizes used in previous studies that are cited should be reported directly if this is going to be argued as being a part of the reason in the difference in abundances and species richness among past and current studies. Many of these studies did use a 1 mm mesh sieve, but samples were collected in spring summer and fall, with many in the same period as the spring/summer surveys conducted for the DEIS.

Page 5-34, 1st par., lines 6-8. "The benthic faunal diversity (i.e., numbers of species and numbers of individuals per species) in Nantucket Sound is reported to be lower than diversity in the rest of the Southern New England Shelf (Theroux and Wigley, 1998)."

This statement is not supported by the information presented in Theroux and Wigley (1998), who include data collected in Nantucket Sound as part of the Southern New England Shelf and do not separate these out in any of the analyses presented in their report. The maps that showing spatial variation in these variables across and within the regions considered also do not support this statement; in fact many show that Nantucket Sound has a similar or higher abundance of many taxa than other areas of the Southern New England Shelf.

Page 5-34, 2nd par., lines 1-4. "...[T]he sandy substrate of Nantucket Sound is dynamic and mobile, as indicated by ripple marks and sand waves. The magnitude and frequency of sand movements has a marked influence on the structure and abundance of the benthic communities. Organisms living on or in these sandy sediments are adapted for movement or settlement in sand and recovery from natural burial."

These statements are misleading, implying that all benthic organisms in the Project area readily survive burial. Not all amphipods, polychaetes and oligochaetes are mobile. The patterns, types and extent of disturbance that will be created by the Project are different than the prevailing disturbance regimes. Some of the organisms in the area may indeed be able to withstand some of the disturbances associated with the Project, but making blanket implications such as this is incorrect. Also, having good mobility in sandy sediments does not necessarily mean that organisms will be able to withstand conditions amounting to burial.

Page 5-34, 3rd par., lines 1-4. "Literature reviewed indicates that the most abundant taxa…in the Nantucket Sound benthic fauna are crustaceans and mollusks, followed by polychaete worms (Avery et al., 1996)."

This reference to Avery *et al.* (1996) concerning dominant taxa in Nantucket Sound is not applicable, as the work described in Avery *et al.* (1996) was conducted on Georges Bank and Nantucket Shoals, and not in Nantucket Sound. These are different environments than Nantucket Sound.

Also, the work in Avery *et al.* (1996) focused on a single taxonomic group of amphipods.

Page 5-34, 3rd par., lines 7-8. "…[S]amples collected from the offshore waters during 2002 were dominated by Nematoda…comprising…45% of the macroinvertebrate communities…."

The Nematoda should not be included in any analysis of benthic macrofauna. Please see comments above, concerning page 5-33, 7th par., lines 3-4.

Page 5-34, 4th par., lines 5-9. "...[T]wo species of large gastropod whelks...are reported to be quite abundant in the coastal waters of Nantucket Sound….While the sampling program in 2001 was not specifically designed to capture these larger sized commercial shellfish species, the sampling program was modified in 2002 to ensure that the larger organisms that might occur deeper in the sediment would be accounted for in the analysis (see Appendix 5.3-B)."

This clearly implies that the sampling program in 2002, which was supposed to sample deeper dwelling fauna, would have sampled species like *Busycon* but none were found. This is an incorrect inference, because the whelks are epifaunal and not sampled effectively by Van Veen and Ponar grab samplers; they are not designed for this purpose. Data gathered with this kind of equipment should be in no way used to indicate the abundance of whelks in the site.

Page 5-34, 4th par., lines 11-13. "In 2003, a shellfish survey was conducted in Lewis Bay to specifically locate larger mollusks in the vicinity of the Project's landfall (Appendix 5.3-C). Northern quahogs were documented in the near shore areas associated with the Town of Yarmouth shellfish beds."

The survey described in Appendix 5.3-C also reported very high numbers of *Spisula solidissima*, the Atlantic Surf Clam. In Table 3 it indicates that one of the more abundant organisms found in all Ekman grab samples was *S. solidissima* in numbers of 2,424–5,540/m^2, yet no mention of this species is made in the text. This is an oversight, given that *S. solidissima* is an important resource species. This is one of the species with Essential Fish Habitat (EFH) designation. It also apparently supports a significant fishery in Nantucket Sound.

According to the "Fisheries Data Report," Appendix 5.4-A, page 18, 1st par., "Sea clams appear to be the most common species harvested over the ten-year period in Area 10, Nantucket Sound. Sea clam landings constitute 52% of the shellfish landings from 1990 through 2000." Table 8 of the same Appendix indicates that 13 million pounds of "sea clams" were landed in this ten-year period, which is reinforced by the pie diagram in Table 15 of that Appendix.

A quick "Google" Internet search readily determined that the Atlantic surf clam, *S. solidissima*, is the "Sea clam." A Mid-Atlantic Foods, Inc. site (MAFI, 2004) states, "The commercially processed clam industry makes use of two species of clams....The first clam species is the 'Surf' or 'Sea Clam' (*Spisula solidissima*). The second variety is the 'Ocean Clam' or 'Quahog' (*Arctica islandica)*." The website of the Town of Barnstable identifies *S. solidissima* as the "Sea Clam" (Barnstable, 2004) as do at least three other sites (Foodsubs, 2004; Parker River, 2004; Wellfleet, 2004).

It is not clear why this important species, which was so common in the grab samples, was not discussed in this Appendix. Again, this is a DEIS deficiency that appears to favor the applicant's desired result of suggesting minimal impacts.

Indeed, there is a question as to whether these clams were correctly identified at all. Because surf clams grow rapidly, reaching a length of approximately 1.75 inches after about a year, the small size that would allow them to be found at such high concentrations as reported by Appendix 5.3-C would require that these be young of the year juvenile clams. This is a possibility, because surf clams are reported to spawn in the summer and early fall (Cargnelli *et al.*, 1999), and these could therefore have been recently set juveniles. However, indications are that such concentrations of *S. solidissima* are probably unusual, because "High [surf] clam density may negatively affect growth rate and maximum size (Fogarty and Murawsky, 1986; Cerrato and Keith, 1992); density effects on growth have been detected at relatively low density (>50 clams per $352m^2$) (Weinberg, 1998b)" (Cargnelli *et al.*, *op cit.*). While these statements refer to growing and adult clams, it is questionable that settling larvae would choose to settle in such hugely greater densities than would be preferred by adult clams. This is not a statement of certainty, but the literature suggests that small surf clams would tend to not occur at such densities as found in this survey.

It is suggested that the clam found may actually be another species, perhaps the gem clam, *Gemma gemma*. A simple check of the voucher specimens for this survey by a qualified outside taxonomist would clarify this issue.

Page 5-34, 5th par., lines 1-4. "The annelid fauna of Nantucket Sound is also reported to be diverse (Theroux and Wigley, 1998)....Biomass is reported to be lower in shallow areas of Nantucket Sound (Theroux and Wigley, 1998)."

Information of how data were extracted from Theroux and Wigley (1998) needs to be provided. This is not clear because Theroux and Wigley (1998) worked on a much larger scale and did not break data out specifically from Nantucket Sound.

Page 5-34, 5th par., lines 1-3. "Maurer and Leathem (1981) identified 333 species of polychaete worms in sandy sediments from Georges Bank and Nantucket Shoals."

The applicability of data from studies that were not done in Nantucket Sound needs to be addressed and justified. Georges Bank and Nantucket Shoals are different environments than Nantucket Sound.

Page 5-35, 1st par. "...collected from areas on or in the immediate vicinity of Horseshoe Shoal. This is consistent with data reported in the literature (Sanders, 1958; Avery et al., 1996), which reported very high densities of amphipods from sandy bottom substrates sampled in shallow waters throughout Nantucket Sound."

It is not clear how these two cited references relate to waters throughout Nantucket Sound, as neither document discusses Nantucket Sound. Sanders (1958) dealt with Buzzards Bay, while Avery *et al.* (1996) concerns Georges Bank and Nantucket Shoals. The applicability of the data from studies that were not done in Nantucket Sound needs to be addressed and justified.

Page 5-35, 2nd par., lines 3-5. "Overall, species composition documented as part of this study was consistent with data reported in earlier studies of Nantucket Sound, Georges Bank, and the Southern New England Shelf (Pratt, 1973; Theroux and Wigley, 1998; Wigley, 1968), particularly for samples collected at the offshore sites."

The statement is made that the analyses conducted as part of the DEIS are consistent with earlier studies, yet very few specifics are provided, and given inconsistencies with where some of these studies were conducted and the way information from them was used, this statement is largely unsupported.

Page 5-35, 3rd par., line 9. "...and Nematoda."

Nematodes should be excluded from the analysis.

Page 5-35, 5th par., lines 7-9. "The patchiness in their distribution [*Crepidula* spp.] is believed to be a result of the patchiness of the underlying substrate, which has been found to have stones and boulders interspersed throughout the predominantly sandy material."

This is yet another case of habitat variability, again emphasizing the need for substrate sampling and analysis in conjunction with benthic infaunal sampling. Differences in habitat should be correlated with differences in benthic communities in order to understand potential impacts of altering habitat during construction. That such information was not

collected during the 2001, 2002, and 2003 surveys greatly restricts the utility of the surveys for predicting impacts.

Page 5-35, 6th par., line 2. "...Nematoda (roundworms)..."

Nematodes should be excluded from the analysis.

Page 5-36, 2nd par. "Based on the 2001 field surveys…represented only 75% of the community at Horseshoe Shoal during 2001."

This paragraph presents benthos data in quantitative terms that are not justified by virtue of the methods used to collect and analyze samples. The reader is referred to the discussion of "Study Design Issues," above.

Page 5-36, 2nd par., final 2 lines. "Overall, the most dominant taxon (by number) was found to be Nematoda (roundworms)...."

Nematodes should be excluded from the analysis. Please see the discussion of "Nematodes in the Analyses," above.

Page 5-36, 3rd par. "The six dominant taxa at Horseshoe Shoal were markedly different in the spring of 2002 compared to the late summer of 2001…Nematoda were much more dominant in the spring of 2002 compared to the summer of 2001…the two snail species…ranked highly…during the summer (2001) but did not appear in the top six during spring (2002)…[T]hree crustacean families ranked in the six most dominant taxa during summer 2001 as opposed to two in spring 2002. This may be attributable to the specific life cycles of these organisms, resulting in differences in their seasonal patterns of abundance or may be attributable to inter-annual variability in these populations."

The seasonal comparison made here is tenuous at best, because there is no concurrent measure of spatial variation and differences that may be due to spatial variations in habitat types. The lack of replicate sampling within sampling locations also prevents smaller scale spatial variation from being assessed. Without replicate sampling there is no measure of microhabitat influences, species patchiness, or sampling equipment operational variations, so it is not possible to say that the numbers presented in the DEIS truly reflect seasonal differences.

Page 5-36, 4th par., lines 2-4. "It is recognized that some of these organisms are not typical of deep sediments and are likely to have been incorporated with deep sediment organisms as a result of residual sediment from the upper 5 cm of dredge being passed through the sieve."

It is not clear how residual sediment from the upper 5 cm would be left in the deeper sediment fraction, unless it was from careless or sloppy sample handling, which again places into serious question the use of resulting data for quantitative analysis.

Also, some species of infauna live in tubes that extend form the surface to below 5cm and deeper, and a sample may "catch" them in any range of sediment depths.

The samples from "below 5 cm" were merely sieved and photographed, with analysis accomplished through photo analysis later in the laboratory. Several samples were noted to have "tubes," which were presumed to be empty. There is no reason presented for this assumption, and it would seem that these tubes could just have likely been occupied.

Page 5-36, 4th par., lines 4-5. "...very few organisms were observed at any site in sediment depth greater than 5 cm."

The use of a 0.65 cm (6.5 mm) sieve likely contributed to the low counts of infauna. The use of the larger sized sieve assumes that these organisms are going to be larger than the ones living in the top sediments; this may not be incorrect assumption for all species.

This entire discussion also assumes that the top layer was consistently and accurately collected. Sampling methods described for this indicate that a "gloved hand" was used to take the sample from at least the top 1.5 – 2 inches in cases when there was too much sample to fit into the pre-labeled one quart jars. Was the material deeper than 1.5 inches when this amount was taken as barren as the material deeper than 2+ inches when this amount was taken? If so, then it could be just as legitimately claimed that sediments deeper than 1.5 inches (3.8 cm) contained very few organisms, which would be a highly dubious conclusion.

The entire procedure is suspect, so this resulting discussion must also be held suspect.

Page 5-36, 4th par., lines 5-6. "This validates the data collected during the 2001 study that analyzed only the top 5 cm of sediment...."

It does no such thing. Procedures followed during the 2001 survey were sloppy, and they cannot be validated by another sloppy effort.

Page 5-36, 4th par., lines 7-9. "...this analysis also reveals that the majority of benthic organisms living at Horseshoe Shoal, including the larger shellfish and polychaetes, live in the top 5 cm of sediment."

This is not necessarily so. In order to say this, the samples would have to be collected carefully, which they apparently were not, and the samples should be handled and analyzed in the same manner. They were not. Entirely different methods were used. The samples from the upper zone were sieved in a 0.5 mm sieve, and those from "deeper" were sieved

through a 6.5 mm sieve. The discussion in this paragraph is placing a great deal of credence in a flawed study design.

Page 5-36, 5th par. "Finally, it should be noted that benthic community abundance and diversity was not significantly different on Horseshoe Shoal during the late summer 2001 sampling period versus the spring 2002 sampling period (Appendix 5.3-B, Table 6)."

The inclusion of nematodes in the macrofauna data set confuses the analyses examining differences among sites and among years at Horseshoe Shoal and the other sites.

Page 5-36, 6th par. "Overall, benthic community composition…was consistent with data reported in earlier studies of Nantucket Sound, Georges Bank, and the Southern New England Shelf (Sanders, 1956; Wigley, 1968; Pratt, 1973; Theroux and Wigley, 1998). These previous studies found the benthic community of Nantucket Sound to have a lower than average invertebrate diversity as compared to the rest of the Southern New England Shelf. However, density and biomass was (*sic*) found to be relatively high. This is not surprising, as it is understood that only a limited number of taxa are capable of withstanding the shifting, sandy substrates characteristic of these shallower waters. Consequently, these productive shallow water habitats are able to support greater densities of each successfully adapted organism."

Comparisons to the references cited in terms of how consistent the results of the surveys are to previous work are tenuous at best. Sanders (1956) contains information collected in Long Island Sound – not Nantucket Sound, and no information was provided describing how data were extracted from the other references in order to make these comparisons. It is necessary in these kinds of assessments to be as quantitative as possible. Unfortunately, this whole section of the DEIS is unacceptably general in its approach with terms like "lower than average" and "relatively high." It is necessary to provide the numbers.

The last two sentences of this paragraph are totally speculative, yet the DEIS presents them as fact.

Page 5-37, 1st par., lines 1-3. "In addition, there is natural variability in most benthic communities, since these communities are constantly subjected to a combination of physical and biological factors which results (*sic*) in a high degree of environmental variability...."

All of which argues for collection of replicate samples at each sampling location. Because replicates were not collected, quantitative discussions based on resulting data are tenuous and inadequate for judging the environmental impacts of the proposed project.

Page 5-37, 1st par., lines 3-4. "It also follows that a high sample-to-sample variability was found in total invertebrate abundance."

Same comment as above.

Page 5-37, 1st par., lines 6-9. "It is believed that the patchy nature of 'microhabitats'...in terms of such parameters as depth, substrate type, temperature, light penetration, food availability, shelter, disturbance, currents, and predation could be the reason for such variability (Sanders, 1958; DeLeuw et al., 1991; Howes, et al., 1997)."

It is unclear why the only one of these parameters to be examined during the survey conducted to develop an understanding of benthic communities in the Project area was depth, or why no replicate samples were collected. The argument is made that substrate type was examined, but it was clearly inadequately evaluated to be of use in these analyses.

It is also difficult to understand why gravel and stone, patch reef, glacial till, and SAV habitats were not examined in order to help understand this variability, or "patchiness."

Page 5-37, 2nd par., lines 2-5. "However, the data also showed that there was no such link between these variables and overall macroinvertebrate abundance. The only microhabitat variable investigated that was shown to significantly ($P<0.10$) affect macroinvertebrate abundance was the presence or absence of sand waves."

These comments are based upon statistical analyses presented in Appendix 5.3-B, which are not clearly presented. Table 6 of that Appendix presents p-values of tests among specific sites and environmental conditions. It appears that these may be results of *post hoc* tests. If so, then the original ANOVA results must be presented to confirm that the overall test was significant.

Table 6 also notes that the data were transformed. Results cannot be verified without knowing what kind of transformation was used. What transformation was used?

No measurements of variation are given in any of the results. They must be provided to enable review of results.

Given that there were data for three sites and several environmental factors, two-way analysis of variance would have likely been a better and stronger testing approach. A one-way ANOVA is not really appropriate when multiple environmental variables are examined.

Given that all these analyses include the nematodes, they likely do not yield a fair representation of potential differences or similarities among the sites. Any assessments in the DEIS based on these analyses are equivocal.

There are also no analyses of "key" taxa differences. For example, were differences in patterns of polychaetes significant? Of mollusks? Of amphipods? Such analyses

frequently clarify patterns by removing other species that may mask trends from the analysis. It appears, however, that nothing like this was attempted.

Of course, all of these comments assume that these analyses are based upon properly collected and valid samples, but they were not. The samples were non-quantitative to begin with, so quantitative analyses using data from these non-quantitative samples are inherently invalid and should not be used as a basis for evaluating impacts of the proposed Project.

Page 5-37, 4th par., line 1. "The analysis of the MDMF research trawl data...."

What happened to the trawl survey conducted by ESS as discussed by Hertz (2002)? The methods, results and conclusions of those surveys are essential, but they are not made available.

Page 5-37, 4th par., lines 5-7. "Shellfish species that were considered rare, very rare, or not observed in trawls from Horseshoe Shoal include American lobster, bay scallop, Atlantic surf clam, blue mussel, and northern horse mussel."

Also, Table 2 on pages 10-11 of Appendix 5.4-C indicates that Atlantic surf clams are "very rare" or "not observed" at the proposed and alternative Project sites. These tables do not make it clear, however, that these populations were sampled with an otter trawl, which is patently unsuitable for capturing surf clams. Otter trawls consist of a bag-like net with the leading edge held open by a lead line at the bottom and a float line at the top. The lead line scrapes across the bottom, which is a very efficient means of capturing demersal fish, but not designed to dig into the bottom to gather buried clams. The occurrence of surf clams in these samples would not be expected, and implying that surf clams are rare or non-existent based upon otter trawl surveys is irresponsible and misleading. The Appendix (page 10, par. 1) does state "the gear type (otter trawls) and methods used during the survey are similar to gear used by commercial fishermen and are more effective at collecting demersal and semi-pelagic species. True pelagics (i.e., Atlantic mackerel) and highly migratory species such as Bluefin tuna are not frequently caught in bottom trawls and may therefore be under-represented in the MDMF research trawl data." No mention is made, however, of surf clams.

It is unclear what evidence justifies a conclusion that surf clams are rare in the Project area.

As noted above, according to Appendix 5.4-A (page 18, 1st par.), the "Fisheries Data Report," "Sea clams appear to be the most common species harvested over the ten-year period in Area 10, Nantucket Sound. Sea clam landings constitute 52% of the shellfish landings from 1990 through 2000. Table 8 of the same Appendix indicates that 13 million pounds of "sea clams" were landed in this ten-year period, which is reinforced by the pie diagram in Table 15 of that Appendix. Also, as discussed previously, a "Google" Internet search readily determined that the Atlantic surf clam, *S. solidissima*, is the "Sea Clam." A

Mid-Atlantic Foods, Inc. site (MAFI, 2004) states, "The commercially processed clam industry makes use of two species of clams.... The first clam species is the 'Surf' or 'Sea Clam' (*Spisula solidissima*). The second variety is the 'Ocean Clam' or 'Quahog' (*Arctica islandica)*." The website of the Town of Barnstable identifies *S. solidissima* as the "Sea Clam" (Barnstable, 2004) as do at least three other sites (Foodsubs, 2004; Parker River, 2004; Wellfleet, 2004).

This conclusion is confirmed on page 5-38 (2nd par., lines 3-4) of the DEIS, which states "Surf clams appear to be the most common species harvested over the 11-year period in Nantucket Sound…"

Taken together, this information clearly implies that the Atlantic surf clam is not only common in the proposed Project area, but that it supports a significant fishery. This is not surprising, because the environment of the Project area apparently agrees well with parameters preferred by the surf clam.

Page 26, 4th par. Appendix 5.4-C states, "Studies reviewed in Cargnelli *et al.* (1999c) have shown that the greatest concentration (*sic*) of surf clams are usually found in well-sorted, medium-grained sand, and are most common at depths of 8-66 m in the turbulent areas beyond the breaker zone. They are also found in a salinity range greater than 28 ppt and in areas where bottom temperature rarely exceeds 25 ° C."

Page 4 of this same Appendix states that "The highest bottom water temperature in Nantucket Sound during summer is in the range of 61 to 66°F (16-19°C)." This is certainly in the surf clams preferred range.

Page 4 also indicates that salinity in the Project areas is 30-32.5 ppt, also appropriate for surf clams. Page 3 indicates depths in the Project area of <10 to >50 ft, also coinciding with the clam's preference. That the bottom consists of sand is repeatedly stated throughout the DEIS.

According to page 2, 1st par., of Appendix 5.4-C, "The term 'adverse effect' means any impacts which reduces (*sic*) quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the substrate and loss of or injury to, benthic organisms…and their habitat…."

Based on this discussion, surf clams may be very common in the area. Those living in spaces where monopiles and ESP piles will be driven will die, and these areas will not be recolonized because the monopiles will remain, eliminating EFH within their circumference. The risk that many surf clams will be killed by jet plowing exists, because these clams have heavy shells and therefore may well settle through the fluidized sediments to the bottom of the cable trench, which will be too deep for them to dig through. This is by definition an "adverse impact."

It is also not clear that jet-plowing will not alter the sediment regime in cable trenches by redistributing grain sizes. The possibility that heavier particles will settle more quickly than finer particles following sediment fluidization, resulting in poorly graded or otherwise altered sediment, has apparently not been analyzed for the DEIS, nor have any literature citations on this subject been provided. If these sediments will be appreciably altered, the Applicant should determine what the consequent impacts might be on benthos repopulation.

Page 5-37, 5th par., line 1. "Various species of shellfish are harvested commercially from Nantucket Sound."

How will the wind farm affect fishing activities? Given the relatively close spacing of the WTGs will the actual way fishing is conducted have to be changed? Will holes left by the jack-up legs affect fishing behavior?

Page 5-38, 2nd par., lines 1-4. "MDMF data for total annual shellfish landings in Nantucket Sound from methods other than fish pots are presented in Figure 5.3-3. These annual landings from 1990 through 2000 total approximately 24.7 million pounds. Surf clams appear to be the most common species harvested over the 11-year period in Nantucket Sound, constituting approximately 52% of the total shellfish landings reported to MDMF for this time period."

It is unclear on what basis do the authors conclude that Atlantic surf clams are "rare" on Horseshoe Shoal. If the only evidence for this is otter trawl data, then the conclusion is not justified. If Van Veen or Ponar grab samples are used to support this conclusion, then the conclusion is likewise not justified, because these grabs are not designed to efficiently sample surf clams. No evidence is apparent that this important species was surveyed at all for this DEIS.

Page 5-38, 3rd par. "Although northern quahogs (*Mercenaria mercenaria*) seem to account for a low percentage of commercial shellfish landings in Nantucket Sound, they are reported as abundant in shallow coastal estuaries that empty into Nantucket Sound…and are an important fishery within Massachusetts…a heavily populated northern quahog area exists in the shoals to the east of Horseshoe Shoal. This area is referred to as the "quahog grounds," and is specifically targeted by commercial fishers…."

What kind of sampling for northern quahogs was done on the alternate Project sites? As for the surf clam, trawls and Van Veen or Ponar grabs are inappropriate for sampling northern quahogs. Is it not possible—even probable—that *M. mercenaria* occurs in areas other than the "quahog grounds," even if they might not occur at the same densities? No site-specific data seem to be presented in the DEIS.

Page 5-39, 1st par., line 2. "(See Appendix 5.3-C for a detailed field assessment of Lewis Bay)"

The survey conducted in Lewis Bay and described in Appendix 5.3-C is not at all detailed, nor is it adequate for predicting project impacts. Only four stations were sampled. Two were sampled with three methods each; one was sampled with only two methods; and the fourth was sampled using only a single method, because it was considered an "extra" station. Table 1 from Appendix 5.3-C is reproduced as Table 10 of this document to summarize the methods used at each sampling location.

The passage quoted above seems to describe a rather grand program, but the reality described by Appendix 5.3-C is somewhat different. Statistical power increases with the number of locations sampled, and the converse is also true: statistical power decreases as the number of sampled locations decreases. In this survey, the number and locations of sampling locations were inadequate for characterizing the Lewis Bay communities, with only four points directly on the cable route being sampled, and these by variable suites of methods. No transects were employed to assess whether the benthic community was consistent with distance from the cable route.

There was no replication of samples at any station. It is therefore not possible to sort out the degree of station location variation relative to the variation found among the several sampling stations or across the potentially impacted area as a whole.

No sediment data whatever were collected. No water quality data were collected. Poor laboratory procedures were apparently used. This "survey" did not meet even minimum criteria for providing a "detailed field assessment of Lewis Bay."

Page 5-39, 3rd par., lines 3-4. "This portion of Lewis Bay contains some quahogs, scallops, and soft shell clams."

Based on what data? Can a citation be provided? How many is meant by "some?"

Page 5-39, 6th par., lines 9-11. "Results indicated that the diversity and abundance of shellfish and benthic organisms in this bed were comparable to observations by prior researchers at similar sites."

This statement is not supported by the information provided in Appendix 5.3-C. There are few comparisons to other studies that in fact were comparable.

These comparisons should be provided. Without the comparisons, the statement is meaningless, as it is not known what is being compared with what.

Which prior researchers? Why are no citations provided?

Page 5-40, 2nd par., lines 1-3. "Shellfish maps…indicate that the waters surrounding the majority of the submarine cable route through Lewis Bay have been designated as an approved shellfish growing area."

This designation is based on water quality. How does this square with the frequently repeated implication in Appendix 5.3-C that the waters of Lewis Bay are apparently degraded, e.g., on page 5, 4th par., and elsewhere.

Page 5-40, 3rd par., lines 4-5. "…limited localized impacts to the benthic environment are anticipated…."

What will these impacts be, and what is meant by "localized?"

Although this is an introductory paragraph, some more exact estimate of just how long the short-and long-term impacts would last following construction should be given. Are these estimates on the scale of months, years or longer? As with so many other areas of the DEIS, these questions cannot be left unanswered.

Page 5-40, 3rd par., lines 8-9. "...post-construction monitoring to document habitat disturbance and recovery..."

Post-construction monitoring would be greatly enhanced if an adequate baseline survey were available, which is not provided by the Applicant's "survey" of Lewis Bay, as described in Appendix 5.3-C.

Page 5-40, 4th par., lines 6-7. "Jet plow cable embedment technology was selected to minimize seabed disturbance and sediment dispersion during cable embedment."

What evidence is presented to support the contention that jet plow embedment minimizes seabed disturbance and impact? This statement is made frequently throughout the DEIS, but no evidence to support it seems to be presented. Again, the DEIS authors simply jump to conclusions to meet a desired result.

How does the jet plow technology compare, for example, to a towed non-hydraulic plow system with respect to the overall disturbance created? Was this alternative cable laying approach considered? This other approach does not fluidize the bed and may reduce the mortality to the benthos living in the area during these operations.

Page 5-40, 5th par. "…The length of cable necessary to link all of the wind turbine towers to the ESP is approximately 78 miles…. This would result in a combined temporary disturbance of up to 113.45 acres of sea bottom…."

Why are the impact areas for the inner-array cables different in Table 5.3-3 than in Table 3-51?

Table 11

	Table 3-51 (acres)	Table 5.3-3 (acres)
Inner array cables	58.9	56.73
Pontoon impacts	58.9	56.73
Anchoring to install cables	13.4	12.05
Anchor line sweep	579.9	558.46
Subtotal	711.1	684.87

Why are the numbers rounded off differently in the two tables?

This entire discussion assumes that impacts -- even "temporary" impacts -- will be limited to the actual trench and the pontoon areas. It does not consider that any impact whatever will relate to sediment dispersal from jet plowing. This assumption is not supported by evidence in the DEIS.

Section 5.1.4.1 (page 5-16, 2nd par.) maintains that sediments disturbed by cable laying activities are expected to "settle and refill cable trenches and areas immediately surrounding these trenches shortly after installation...based upon modeling described in Section 5.2 and Appendix 5.2-C." Sediment modeling efforts in Appendix 5.2-C was performed, however, to determine only "the extent to which existing wave and current conditions are likely to lift and move sand at the alternative wind farm sites." They were designed, therefore, to examine the transport of sediment and bedload existing in the natural environment, and not the transport of sediments already "fluidized" by a jet plow. This is emphasized by Figure C-4 of Appendix C to Appendix 5.2-A, which refers to lifting forces acting on grains resting on the seabed. It would seem pertinent to also examine the case of jet plowing, where fluidization presumably already provides a lifting force, which probably makes the lifted sediment more susceptible to transport.

Section 5.2 refers to a single simulation of transport from jet plowing conducted by ASA (page 5-23), but it seems appropriate to take advantage of the more detailed modeling efforts of the Woods Hole Group to include the jet plow phenomenon. While the Woods Hole Group's effort describes the natural environment, it appears incomplete to the extent that the specific impacts of jet plowing seem to not have been taken into account.

Calculations of areas affected by installation of cables consider only the direct impacts of trenching and jet plow pontoon impacts. They ignore the potential for transport of sediment from the jet plowing operation to the sides of the trench. No estimates are provided of the amounts of sediment that will be carried out of the trenches and deposited to the sides, or of how deep and how far it will settle. Such "sidecasting" may expand the impact area significantly. The single model run to estimate these factors was conducted assuming conditions occurring in Lewis Bay, and as described in Appendix 5.2-C used a

current speed of 0.6 ft/s (feet per second) to describe the environment of the area in which jet plowing was simulated.

The capacity for water to carry sediment away from jet plowing operations is a function of water movement, a major component of which is current. All else being equal, the faster the current is the greater is the capacity for transporting sediment. The Woods Hole Group measured tidal currents occurring at the potential development sites of Horseshoe Shoal, Tuckernuck Shoal, and Handkerchief Shoal (Appendix 5.2-A, pages 22-29); resulting data are summarized in Table 9..

The actual currents over the offshore development sites are therefore at least 2.3 to 5.8 times greater than the current value utilized in the model run described in Appendix 5.2-C. This is clearly far from representative, and it is clear that this mathematical modeling simulation does not adequately respond to questions that must be asked concerning the amount of sediment transport and relocation that may result from installing cables using a jet plow offshore.

In addition, the model described in Appendix 5.2-C did not consider the potential for sediments to be resuspended by anchor line sweep. The anchor lines are predicted to scrape the bottom to a depth of 6 inches, probably repetitiously, a process that will surely propel sediments into the water column, but no analysis has been done to estimate how much and how far these resuspended sediments may be carried under conditions prevailing at the site. If the sediments contain fines, a risk may exist that the fines will be winnowed away by anchor line sweep, potentially changing the particle size habitat regime, but this potential has not been considered. The modeling effort conducted previously considered only the sediments stirred up by the jet plow itself.

The model also did not consider the potential for additional sediments to be disturbed and resuspended by movement of the jet plow pontoons.

Page 5-41, 1st par., lines 9-12. "...it is estimated that up to 7,230 square feet/mile...would be temporarily impacted from deployment and retrieval of anchors. The anchor impact would disturb the sediment to a depth of 4 to 6 feet...at each anchor deployment, leaving a temporary irregularity to the seafloor with localized mortality of infauna."

What specifically is a "temporary irregularity?" A 4 to 6 ft irregularity (hole?) is a significant change to the sea floor topography, even in area that has many sand waves. Why does this section refer to 4-6 ft holes, while section 3.4.3.4.6 refers to only 4 ft holes (e.g., page 3-167, 6th par.)?

How many of these holes will be created, and what will be their spatial distribution? Having an array of such a deep pockmarks in the project area could potentially be a significant change to the overall nature of the habitat.

No specific estimates or modeling results are provided that assess the rate at which these would fill in.

Also, there is no discussion as to how the benthic and epibenthic organisms would respond to these depressions on both long- and short-term time scales, and how these depressions might affect fishing activities in area and ecosystem processes in general.

Page 5-41, 1st par., lines 12-17. "In addition, the area of seafloor swept by the anchor line…was calculated to be…7.16 acres…per linear mile of cable…sweep impacts would be expected to disturb sediment to a depth of up to 6 inches…this includes the most biologically active zone."

How were these calculations made? It would be helpful if they were provided in the document.

Up to 7.16 acres will be disturbed to a depth of 6 inches during installation of each mile of cable. What kind of physical disturbance is this? How large is the anchor chain? Is it fair to say that anchor line sweep will effectively plow up to 783 acres (from Table 5.3-3, combining inner-array and submarine cable figures) to a depth of 6 inches, just from cable laying? Assuming that anchor line sweep is generated to and fro as the tide or current changes, is it not correct to say that this impacted area will be repeatedly plowed, with the number of plowing events being a function of the duration of each anchor set? What will be the spatial array of these anchor sweep areas? How frequently will the anchors be moved, i.e., for how long a duration will each area be swept?

Assuming that everything within up to 783 acres will be killed, what duration does "temporary" impact mean? How long will reestablishment of a mature benthic community in these areas require, beyond the recolonization by "pioneer" species?

What will be the dimensions of each anchor sweep area, i.e., how will the 311,880 ft^2/linear mile be distributed? Will it be a single large area or multiple smaller areas? Will these areas be long and narrow or have another shape, e.g., square or circular? Do these dimensions affect the speed or quality of recolonization?

Will any submerged aquatic vegetation be impacted? Will any hard bottom or patch reef areas be impacted? Will any glacial till areas (ref. page 3-170, 4th par.) be impacted?

All of these questions need to be answered. The Corps cannot conduct an adequate NEPA/MEPA review by leaving so much to speculation and mere qualitative judgments instilled through a pro-applicant review process.

Page 5-41, 1st par., lines 17-19. "Organisms that would be likely to be impacted by anchor line sweep would include mollusks and other sessile species."

What does "Organisms that would likely be impacted" mean? Define the impact. Does it mean crushed and killed, or does it merely mean the substrate will be disturbed requiring infauna to expend energy becoming reestablished?

Page 5-41, 2nd par., line 11. "temporary impacts associated with the installation of the two circuits…."

Define "temporary." Define "impacts."

Page 5-41, 4th par. "It is anticipated that 4 anchors…at each of the 130 wind turbine locations as well as for each of the 6 ESP pilings…(6,431 square meters)."

What specifically is meant by "temporarily disturbed"? A 4 to 6 ft hole is a significant change to the sea floor topography, even in area that has many sand waves. Why does this section refer to 4-6 ft holes, while section 3.4.3.4.6 refers to only 4 ft holes (e.g. page 3-167, 6th par.)?

This construction will create 544 holes:

(130 WTGs + 6 ESP piles) x 4 = 544

What will be their spatial distribution? Having an array of such a deep pockmarks in the project area could potentially be a significant change to the overall nature of the habitat.

No specific estimates or modeling results are provided that assess the rate at which these will fill in.

Also, there is no discussion as to how the benthic and epibenthic organisms would respond to these depressions on both long- and short-term time scales, and how these depressions might affect fishing activities in the area, and ecosystem processes in general.

Page 5-41, 5th par., lines 1-4. "Anchor line sweep associated with the installation of the 130 pilings and the 6 EDSP pilings…and a total of…114.92 acres (6,431 square meters)."

According to Table 5.3-3, the anchor line sweep area for this construction will be 459.68 acres – not 114.92 acres as stated in this sentence. According to the table, this includes 439.40 acres for the WTGs and 20.28 acres for the ESP piles.

Up to 460 acres will be disturbed to a depth of 6 inches during installation of the WTGs and ESP piles. What kind of physical disturbance is this? How large is the anchor chain. Is it fair to say that anchor line sweep will effectively <u>plow</u> up to 460 acres to a depth of 6 inches? Given that anchor line sweep is generated to and fro as the tide and current change, is it not correct to say that this impacted area will be repetitiously plowed, with the number of plowing events being a function of the duration of each anchor set?

What will be the spatial array of these anchor sweep areas? For how long a duration will each area be swept?

Assuming that everything within up to 460 acres will be killed, what duration does "temporarily" disturbed mean? How long will reestablishment of a mature benthic community in these areas require, beyond the recolonization by "pioneer" species?

Will these areas be long and narrow or have another shape, e.g., square or circular? Do these dimensions affect the speed or quality of recolonization?

Will any SAV be impacted? Will any hard bottom or patch reef areas be impacted? Will any glacial till areas (ref. page 3-170, 4th par.) be impacted?

Page 5-41, 5th par., last 2 lines, continuing through page 5-42, 1st par. "In addition to anchoring and anchor line sweep, the four to six jacking legs of the jack-up barge are anticipated to have pads that contact the sea floor with an area of 172 square feet…each…3.22 acres (13,039 square meters)."

So there will be up to 6 x 136 = 816 holes left from jacking legs, each of 172 ft^2. What are the dimensions of these holes? What will be their spatial distribution?

How deep will these jacking legs penetrate into the sediment, and what will be the depth of the holes left behind? How long will they require to fill? What will be the composition of the fill material?

Page 5-42, 4th par. "Although some mortality of benthos and shellfish residing in the area of temporary disturbance resulting from monopile and cable installation is anticipated, such impacts would be limited because of the relatively small area of sediment disturbance of a commonly occurring habitat type. In general, it is widely recognized that benthic invertebrates are able to opportunistically invade unoccupied areas after disturbance…. For these reasons, the limited area of direct disturbance is unlikely to result in anything more than a localized, temporary impact to the benthic community."

The assessment made in this paragraph is totally inadequate. Not all benthic organisms respond opportunistically to disturbance, in fact some take many years to recover. The statements used to this effect in this paragraph are incorrect and misleading and, as such, do not support the statement that "direct disturbance is unlikely to result in anything more than a localized, temporary impact of the benthic community."

No estimate of what "temporary" means is provided, and although the actual total area of disturbance seems to be small relative to the overall project area, the types of disturbances, in some cases leaving very deep holes, are not considered in the assessment.

What is meant by "some" mortality?

Page 5-42, 5th par., line 1. "Limited long-term (permanent) impacts…."

The DEIS must define the impact. It appears that it will be 100% mortality. What does this equate to in biomass and numbers of organisms?

Page 5-42, 6th par. "Scour protection would be installed…following installation."

It is implied that the synthetic fronds of the scour control mats become totally covered with sediment; they "become buried." However, in previous statements in the DEIS it is not clear that there is 100 percent cover by sediments once the mats are in place.

Also, are there any data available regarding the kinds of colonization that occur into the mat areas and by benthic organisms? The DEIS states that these would be suitable for colonization but no data are provided to support this statement.

Page 5-42, 7th par., lines 1-2. "The vertical structure that would be created from the installation of wind turbine towers is not anticipated to result in adverse impacts to the ecology of the immediate Project area or to Nantucket Sound."

In order to determine the relative impact of the WTG towers in terms of additions to hard substrate habitat in Nantucket Sound it is important to provide an assessment of how much of this habitat is already present in the area of the alternative site and at some distances away. No such assessment is provided. Statements in the DEIS regarding the amount of such habitat in the alternative site areas are very general and no specifics are provided. It is important to do so because if in fact there are very few hard substrate habitats within the boundaries of the alternative site, then the addition of this array of potential hard substrate habitat may be significant in terms of the kinds of organisms that will colonize the substrates and interact with the soft sediment communities that presently dominate the area. Even though each pile may provide what seems to be a small amount of hard substrate habitat, having an array of 130 such habitat islands (even at spacing of 0.34 to 0.54 nautical miles) may result in unanticipated ecological changes.

No quantitative assessment of the actual amount of hard substrate habitat already occurring within the proposed site and the immediate vicinity is provided. Based on general statements in the DEIS, there is not too much of this type of habitat. Therefore, the WTGs might actually be a significant addition of hard substrate to an area that is ostensibly a strictly soft-sediment environment. Without some quantitative assessment of the amount of this habitat, some of the statements made in the DEIS are speculative.

Comparisons to pilings in harbor areas and breakwaters in nearshore coastal areas are not germane to potential impacts at this open water site.

If the pilings are colonized by macroalgae, they might add some measurable (and perhaps significant) amount organic material to the local system.

Page 5-43, 1st par., lines 5-6. "It should also be noted that if invasive species were present in the Project area, these would also need to be included among the list of potential colonizing species."

None of the assessments have addressed invasive species in the region of Nantucket Sound that may colonize the newly available substrates. For example, "Researchers have found what is believed to be an invasive species of sea squirt on the northern edge of Georges Bank, colonizing a 6.5 square mile area about 160 miles off outer Cape Cod, at a depth of just over 150 feet. These siphon-feeding animals form dense mats, made of many thousands of individuals, encrusting and smothering hard sea bottom and organisms attached to it" (NOAA, 2004). The potential for the pilings to support invasive species should be discussed or assessed in more detail.

Page 5-43, 2nd par., lines 1-10. "Several isolated rocks and areas of coarse glacial till do exist in shoal areas throughout Nantucket Sound, and are likely to support benthic communities similar to those that may become established on the WTGs. Although the monopile foundations would create additional attachment sites for benthic organisms that require fixed (non-sand) substrates, the additional amount of surface area being introduced...per tower...would be a minor addition to the hard substrate that is already present. Furthermore, the wide spacing (0.34 to 0.54 nautical mile...apart) of these monopile structures would not result in the creation of a concentrated area of vertical hard substrate that may otherwise act as a larger reef. Therefore, it is likely that these isolated structures would generate a small amount of additional patch reef type habitat, common in the Sound, and would not substantially alter the ecology of Nantucket Sound."

What hard substrate is this? Throughout the benthos discussions, the point is repeatedly made that the bottom consists of sand. When discussing the addition of new hard substrate, hard substrate is common in Nantucket Sound, so the addition will not alter the existing ecology. Patch reef habitat is now said to be common and several areas of coarse glacial till are said to exist in the Sound. If so, then benthic habitat in the Sound would seem to be a bit more variable than implied elsewhere in the DEIS. It would also seem appropriate for the WTG and ESP sites, as well as the routes for all cables, to be surveyed and mapped to accurately inventory the habitat types that will be impacted by construction of the project.

The "common" occurrence of "patch reef type habitat" would also seem to make the California experience with unburied cable more relevant to the proposed project. During consideration of a fiber optic cable installation in the area of Morro Bay, there was concern over the potential for whales and other marine mammals to become entangled in project cables; fourteen cases of sperm whale entanglements in other locations were described.

There was an older cable in the same area laid by AT&T, which was examined to determine whether this potential was real.

Divers found that when the cable was laid over hard bottom structures, the cable did not conform to bottom contours (Morro Group, 2000). Rather, it rests on the bottom in only a few places and is suspended over the bottom, in some places as high as 5 m above the seafloor. This circumstance was regarded as having potential for impacts on marine mammals, and also as having potential for mechanical impacts, such as on boat anchoring and fishing.

Page 5-43, 3rd par., lines 4-6. "In the predominantly sandy sediments, elevated suspended sediment concentrations from the jet plow are estimated to occur in a limited area in close proximity to the cable trench and exist for short durations of less than an hour or so at any fixed location (Appendix 5.2-C)."

Statements as to the amount of suspended sediment that will be generated by the plowing activities, the time it will take these to settle, and the distances from the trench at which most of suspended sediment will settle in the Horseshoe Shoal area are equivocal because the modeling to determine this was based on condition in the nearshore area of Lewis Bay and not on the shoals which is a very different environment. Site-specific model predictions should be generated using data on conditions at Horseshoe Shoal.

Page 5-43, 4th par., lines 2-3. "The magnitude and frequency of sand movements has a marked influence on the structure and abundance of the benthic communities (Appendix 5.3-B)."

The studies and analyses conducted at the site and presented in Appendix 5.3-B do not address the effect of the "magnitude and frequency of sand movements on the...structure and abundance of the benthic communities." It only tested the presence and absence of sand wave fields. Therefore, no direct relationship to the dynamics of the sand waves can be determined.

Page 5-43, 4th par., lines 3-5. "Consequently, most organisms living on or in these sandy sediments are adapted for movement or settlement in sand and recovery from burial and should not be adversely impacted by the Project."

Many of the statements in this paragraph are unsupported by references to the literature. Not all amphipods, polychaetes and oligochaetes are mobile. No evidence is provided to support the statement quoted here. The patterns, types and extent of disturbance that will be created by the Project are different than the prevailing disturbance regimes. Some of the organisms in the area may indeed be able to withstand some of the disturbances associated with the Project, but making blanket statements such as this is incorrect. Also, having good mobility in sandy sediments does not necessarily mean that organisms will be able to withstand conditions amounting to burial.

Page 5-43, 4th par., lines 5-7. "Migration of sand waves across the shoals is not expected to be adversely affected by the presence of the WTGs, which would be widely spaced…and have highly localized connections to the seabed."

What is the basis for this statement? Can it be substantiated?

Page 5-43, 5th par., lines 1-3. "In addition, the naturally dynamic environment of the Project area is already subject to fluctuations in suspended sediment concentrations at the seabed/water interface as a result of relatively strong tidal currents and wind and storm generated waves, particularly in shoal areas."

If this is so, then how is it so certain that suspended and resettled sediments from construction will present no environmental issues?

Page 5-43, 5th par., lines 3-5. "Consequently, benthic organisms in the Project area are adapted to relatively wide fluctuations in water column suspended sediment concentrations and should not be substantially impacted by short-term sediment resuspension associated with project construction."

As noted above, no site-specific modeling was done to predict what changes there might be from baseline suspended sediments during construction activities. Of equal interest is the thickness of resettled sediments that would be expected adjacent to construction activities.

Page 5-44, 3rd par., lines 1-8. "Lastly, the ESP would have a surface area…negligible."

The ESP piles will also provide additional habitat for hard substrate flora and fauna, which was not considered in this section of the DEIS.

Page 5-44, 3rd par., last sentence. "For a discussion of submerged aquatic vegetation (SAV) associated with the Project area see Section 5.8."

Section 5.8 (subsection 5.8.3.1.1) merely states "Mapping indicates that two potential areas of submerged aquatic vegetation occur within the project area, beyond Massachusetts' 3-nautical mile limit." The DEIS does not, however, divulge where these areas are, how large they are, what kind of SAV grows there, their importance or relevance to biological resources, or any other information about this resource, including whether or not it will be impacted by the Project. Considering the great importance of SAV to biological systems, much more information should be imparted about the offshore SAV. Section 6.1.3.1 indicates that maps are available, but it is unclear whether this is only for inshore SAV. It also states that a diver survey was conducted, but no resulting information or data are provided.

Page 5-44, 4th par. "With regard to decommissioning…installation phase."

How will the cables be removed upon decommissioning? What is the process and what will be the impacts?

Page 5-44, 6th par., lines 4-5. "The benthos and shellfish in the shallow waters of Nantucket Sound are continually recovering from some form of recent disturbance and are well adapted to these conditions."

There is no specific information in the DEIS to support this statement. There was no attempt to assess the frequency of any such disturbances at the site and no attempt to examine the state of the benthic community following any such events.

Page 5-44, 6th par., lines 7-8. "Any impacts from construction activities are expected to be localized and temporary."

What is meant by "temporary?"

What is meant by "localized?" An impact affecting the entire City of Boston could be said to be "localized," but it would certainly still be significant.

The impacts still have not been described. That impacts to benthic animals will occur has been acknowledged, but they are not defined, and they have been trivialized and dismissed as "temporary." No serious attempt has been made to forecast benthic community recovery succession, and inappropriate implications are made that all benthic organisms occurring in Nantucket Sound are "pioneer" species, capable of immediate recolonization after any and all kinds of disturbances.

Page 5-45, 1st par., lines 4-5. "...because sediment suspension and deposition impacts from jet plow embedment are minimal and of short duration...."

There has been no substantiation that impacts from jet plow embedment are "minimal." This claim is made many times in the DEIS, but without any study results, monitoring results, or any other documented information to support it. Endless repetition does not necessarily make it true.

There is no specific information to support the statement that impacts will be of short duration. This statement is an untested presumption. Site specific offshore modeling of jet plow effects should be conducted to supplement the modeling simulating the Lewis Bay environment.

Page 5-45, 5th par., lines 5-6. "Jet plow cable embedment technology was selected to minimize seabed disturbance and sediment dispersion during cable embedment." The same comment applies.

Page 5-45, 6th par. "A zone of disturbance between 4 and 6 feet…to bury each of the two submarine cable system circuits.... The pontoon impacts result in a combined temporary disturbance of up to…19.2 acres…."

The zone of disturbance will be approximately 12 feet wide when the width of the pontoons is added. When the layout of the anchors for the barges that would be used for cable laying operations is factored in, the actual zone of disturbance becomes wider still. The estimated overall width of the disturbance zone along the cable routes should be provided and considered with respect to the potential disturbance corridors that these will potentially represent.

Page 5-46, 1st par., lines 1-7. "In addition, the area of seafloor swept by the anchor line as the jetting barge moves along the cable route was calculated to be 311,880 square feet/7.16 acres…per linear mile of cable.... Anchoring and anchor sweep associated with vessel positioning and anchoring during installation of the submarine cable system inside the state territorial limit would result in approximately 4,212,252 square feet/96.70 acres (391,331 square meters) of disturbance…."

This is equivalent to 87.8 football fields of direct anchoring impact within 3 nautical miles of the shoreline. This increases to 105.2 football fields if the trench and pontoon areas directly impacted by jet plowing are added together.

What is the sediment regime through this area? Are there more fines in the sediments than occur farther offshore? If so, what will be the impact of anchor line sweep on turbidity, suspended sediment and resettlement patterns of sediment?

How large is the anchor line or chain? As it scrapes across the bottom, the DEIS estimates that its impact, or digging depth will be 6 inches. Given that anchor line sweep may be generated to and fro during the process, is it not correct to say that this impacted area will be repeatedly disturbed, with the number of disturbance events being a function of the duration of each anchor set? How much will this stir up the sediment? Where will the resuspended sediment go? What will be its effects? What will the swept area be like after the barge passes? Will the cable sweep cause a winnowing of fines from the area and change its particle size distribution characteristics? What will be the impact of that?

What is meant by "temporarily impacted?" This is too general a conclusion. What are the impacts, and how long is each expected to last? Once again, the DEIS leaves critical questions unanswered.

Page 5-46, 2nd par., lines 1-2. "Impacts to shellfish resources in Lewis Bay from jet plowing are expected to be localized, short-term, and minimal."

No estimates as to what "localized, short-term and minimal" might be are given. This provides no basis for assessing what the duration of these impacts might be and the time course over which recovery may take place. This estimate of impacts is much too general.

Page 5-46, 2nd par., lines 2-5. "The direct impacts from jet plow disturbance would be extremely limited in area as summarized above and would be limited to the area within and in the immediate vicinity of the jet plow activity. The indirect impacts from jet plow installation include temporary and localized increases in sediment deposition and suspended sediment concentrations."

The direct impacts of using a jet plow include the area impacted by anchors and anchor line sweep. The former will leave holes or "depressions" in the bottom, while the latter will scrape the bottom to a depth of 6 inches. Depending on the size and weight of the anchor line, the effects of this scraping could be substantial. What is meant by "extremely limited?"

What does "temporary" mean in this case? What does "localized" mean? If the anchor line plows through the bottom to a depth of 6 inches, will it not stir up the sediments? What areas in the cable route have more or less fines? If fines are winnowed away, how long will it take for succession to rebuild a fully functioning benthos community?

If fines are winnowed away by anchor line sweep, how far will they be carried in the currents prevailing along the cable route? The modeling effort conducted previously considered only the sediments stirred up by the jet plow itself. It did not consider effects of anchor line sweep and its potential for resuspending sediments from substantial areas adjacent to the trench.

The model also did not consider the potential for additional sediments to be disturbed and resuspended by movement of the jet plow pontoons.

Page 5-46, 2nd par., lines 14-17. "...clams can use their muscular foot to burrow or bury to retreat from harsh conditions and can 'dig out' when conditions improve.... The cable installation process would be analogous to a storm event, which causes an increase in suspended sediment load for a short period of time for which clams have the ability to close and survive for the duration of such events."

The statement that clams can dig out when they are buried depends on the species of calm and the depth of burial; these factors are not considered relative to the species found in the surveys in Lewis Bay. The cable installation is not analogous to a storm, given the depth to which the plow would be going into the sediment and the fluidization that would be occurring. Similarities to a storm would only occur at some distance from the actual plowing disturbance.

The risk that many surf clams will be killed by jet plowing exists, because these clams have heavy shells and therefore may well settle through the fluidized sediments to the bottom of the cable trench, which will be too deep for them to dig through.

Page 5-46, 4th par., lines 1-2. "Decommissioning impacts associated with the removal of the submarine cable system linking the ESP to the shoreline facilities are expected to result in temporary resuspension of bottom sediments along each cable path…."

What is the process for removing the cables?

Page 5-47, 2nd par., lines 7-9. "In any event, as discussed in Appendix 5.2-C, sediment deposition resulting from the cable installation would be minimal and localized, and would not substantially contribute to any cumulative impact." The same comments as above for page 5-46, 2nd par., lines 2-5 apply to this discussion.

Page 5-47, 5th par., lines 2-5. "While limited localized impacts are anticipated during Project construction and operation, measures would be implemented to prevent and minimize these impacts. These measures include using state-of-the-art hydraulic jet plow (*sic*) for cable installation (see Section 4.0), monopile foundations for WTG towers, and post-construction monitoring to document habitat disturbance and recovery."

Section 4.0 provides additional detail concerning operation of the jet plow, but it still does not provide any documented confirmation that it is environmentally benign.

Implementation of post-construction monitoring is not a measure to "prevent and minimize these impacts." Impacts will already have occurred by the time it is implemented. Rewording is suggested.

Page 5-47, 6th par., lines 2-10. "The Project also minimizes impacts by using jet plow embedment . . . minimizes sediment disturbance and suspension." The same comment regarding documentation of jet plow impact applies here.

Page 5-48, 2nd par. "Scour control around each permanent vertical structure would be achieved through the use of biologically neutral scour control mats. These mats are designed to mimic seafloor vegetation through the use of synthetics fronds. This approach is more consistent with the low relief aspects of the Horseshoe Shoal bottom than traditional high-relief boulder fortification."

The term "biologically neutral" is not appropriate to describe a mat that will smother everything under it?

Are these mats designed to mimic seafloor vegetation, thereby providing frond habitat, or are they designed to act as sediment traps to reestablish infaunal habitat? It is not clear from discussions in the DEIS whether they will become completely covered by sediments

or not. Since they will be placed in scour zones, it would seem that they would not become completely buried. In this case, would they provide hard substrate for attaching organisms, thereby changing the benthic community supported in these scour-protected areas? The Corps must provide answers to these questions.

Page 5-48, 5th par. "The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act...require that an Essential Fish Habitat (EFH) consultation be conducted for any activity that may adversely affect important habitats of federally managed marine and anadromous fish species. The Magnuson-Stevens Act, and the requirements that specifically address benthos and benthic resources with regard to EFH protection, are discussed in Appendix 5.4-C."

Table 2 on pages 10-11 of Appendix 5.4-C indicates that Atlantic surf clams are "very rare" or "not observed" at the proposed and alternative Project sites. These tables do not make it clear, however, that these populations were sampled with an otter trawl, which is patently unsuitable for capturing surf clams. Otter trawls consist of a bag-like net with the leading edge held open by a lead line at the bottom and a float line at the top. The lead line scrapes across the bottom, which is a very efficient means of capturing demersal fish, but not designed to dig into the bottom to gather buried clams. The occurrence of surf clams in these samples would not be expected, and implying that surf clams are rare or non-existent based upon otter trawl surveys is irresponsible and misleading. The Appendix (page 10, par. 1) does state "the gear type (otter trawls) and methods used during the survey are similar to gear used by commercial fishermen and are more effective at collecting demersal and semi-pelagic species. True pelagics (i.e., Atlantic mackerel) and highly migratory species such as Bluefin tuna are not frequently caught in bottom trawls and may therefore be under-represented in the MDMF research trawl data." No mention is made, however, of surf clams. As stated repeatedly above, it is unclear what evidence justifies a conclusion that surf clams are rare in the Project area.

4. Finfish Resources and Commercial/Recreational Fisheries Comments (5.4)

A general deficiency in the DEIS discussion of this topic is that the material on fisheries in Nantucket Sound is inconveniently and confusingly distributed and/or duplicated among three different sections of the DEIS – the summary text sections, the appendices (which are full of figures), and the figures sections. It serves no purpose for the text to keep alternating between referring the reader to the figures section and the appendices, especially since they often have duplicate material – to pick one example, Figure 5.4-2 depicting commercial landings is identical to Figure 3 (b) in Appendix 5.4-A.

Page 5-59, 2nd par. There are several issues here. First, the authors suggest that fish will swim away from areas of noise. Second, they suggest a soft start to pile driving, with the implication that this will result in fishes moving away. There are no data to support either suggestion. Indeed, many fishes are resident to these waters and their normal response is

to stay put when they are frightened by something. Fish exhibiting this behavior will be subject to considerable cumulative exposure to pile driving and potentially result in these animals showing temporary hearing loss (generally called Temporary Threshold Shift, or TTS), permanent hearing loss (Permanent Threshold Shift, or PTS), or perhaps other physiological effects that result in their death or decreased long-term survival, or their reproductive capabilities.

It is likely correct that the WTGs will cause aggregation of fishes. This is no different than what occurs at oil platforms and other similar sites. The concern here is that depending on the level of the sound from the WTG in the water immediately by the device, fish that come to inhabit that region may develop TTS or even PTS because of extended exposure to high levels of sound (there are no data upon which to make predictions other than the work of Smith et al. 2004a, b). Even if there is no hearing loss per se, the sounds from the WTGs would be higher than ambient, and this could result in masking biologically relevant sounds that are important to fish (e.g., sounds of predators or prey), and result in decreased survival.

Based upon an analysis by Wahlberg and Westerberg (in press, MEPS), the zone of interference around a functioning WTG may not be great, but this will depend upon the actual sound levels produced by the devices during operation. These authors suggested that, depending upon the species, the zone of detection of the WTG will be from 0.4 to 25 km at a wind speed of 8-13 m/sec. They also suggest, with numerous caveats about the lack of data upon which to base estimates, that there is likely to be physiological effects on fishes only within a few meters of the source (but, of course, this depends upon specific noise level from the source at different wind speeds).

The DEIS also mixes up vibrations that are detected by the lateral line and signals detectable by marine mammals. Signals low enough to be detected by the lateral line are very unlikely to be detectable by any marine mammal since they are well below 200 Hz. It should also be pointed out that the lateral line is not, as the DEIS suggests, just lengthwise on the fish's body. Instead, it is also found all over the surface (free neuromast system) and on the head where it encircles the eye and runs vertically as well as longitudinally. Finally, there is good evidence that the lateral line only detects signals within a few body lengths of the fish, and has little or nothing to do with signals coming from greater distances.

The results of the modeling differ considerably from the aforementioned ideas proposed by Wahlberg and Westerberg in that they predict a much greater potential zone of detection than suggested here (though it is recognized the Wahlberg and Westerberg were looking at distances over which fish could detect a sound vs. the DEIS which is modeling when the sound gets to ambient levels). What the DEIS does not take into consideration at all is the sounds that fish can detect, and sound detection capabilities of different fish species.

a. Finfish Resources (5.4.3.2)

An analysis of potential impacts to marine resources has to be based on an accurate description of the resources that are present. This section, which should provide an accurate characterization of Nantucket Sound's remarkable diversity and abundance, has so many omissions and equivocations about its own adequacy that it is essentially useless.

A report prepared in 2003 at the request of U.S. Representative William Delahunt (MA 10th District) by the Center for Coastal Studies finds, "Nantucket Sound is situated at a confluence of the cold Labrador currents and the warm Gulf Stream. This creates a unique coastal habitat representing the southern range for Northern Atlantic species and the northern range for Mid-Atlantic species. The transitional ecology of the region ... is characterized by an extreme richness of biological diversity...." The DEIS fails to ever convey this important information. Instead, it is directed at the goal of minimizing the special values of the Sound so that major impacts from the project can be justified. This problem certainly is true for the discussion of fish impacts.

Despite the wealth of fisheries databases available, the section inappropriately limits itself to spring and fall trawling surveys. These trawls by the Division of Marine Fisheries primarily catch slow-moving fish and invertebrates that are present on or near the sea floor during two spring and fall months. These data are not regarded by fisheries managers as stand-alone measures of overall species diversity and year-round abundance. The data are collected to provide information on relative changes in abundance over time of those species most likely to be caught by slow-moving bottom trawls two months of the year. The DEIS acknowledges that the trawl data provides limited information, but no other databases are introduced in order to provide a thorough characterization of finfish resources. The concluding paragraphs provide a sprinkling of statistical data and analysis regarding fish caught per sampling tow. This quantitative data provides no useful information for an understanding of species abundance and diversity on Horseshoe Shoal.

Page 5-48, 8th par., notes that databases from NMFS and MDMF were provided. This is true, however, only the trawl survey data was consulted in putting together this analysis. As a result, these are egregious errors of omission:

> There is no mention of striped bass or bluefish, two species for which the Sound is renowned – or bonito or false albacore, two popular targets of recreational fishermen in the summer and fall.
>
> Alewives, blueback herring, and mackerel – all important forage fish – are listed among "rare and very rare species in trawls" (page 5-52, 5th par.) and it's left at that. Sand eels (or sand lance), another important forage fish, is not mentioned at all. The only reference to Atlantic menhaden is that it is "not observed at all during the fall surveys" (page 5-53, par. 2), despite the fact that Appendix 5.4-A, page 5, 2nd par., says menhaden and butterfish are "ranked as top species in Nantucket Sound."

Other databases that should have been consulted in writing this section of the DEIS include recreational and commercial catches, including the weir and pot fisheries. To estimate the relative abundance of river herring (alewives and bluebacks), to take one example, one can consult with the MDMF's Anadromous Fish Program. A spokesperson says there are 45 active herring runs from Falmouth to Chatham. So the statement that they are rarely caught in trawls is meaningless at best or intentionally misleading.

Page 5-52, 5th par. "Again, it is important to note that... pelagic species are not collected as frequently using otter trawls and the information on these species may not accurately reflect their abundance" (emphasis added). This statement is disingenuous. The drafters must know that the trawl information on abundance is definitely not accurate, and yet they chose not to supplement it, but to leave the reader in the dark.

Page 5-53, 3rd par. The statement that fall CPUEs are an order of magnitude larger than spring CPUEs is not explained and should be. Much of the fall catch consists of young-of-the-year butterfish, scup, squid, and black sea bass. Nantucket Sound is an area of high reproduction for these and other species. These juveniles and the eggs that produced them would be particularly vulnerable to construction impacts. Their increased mortality would reduce the numbers of those surviving to spawn as mature fish, thereby reducing overall productivity.

This critical section therefore needs to be rewritten from scratch, using trawl survey data as only one of many other databases which taken together could provide an accurate characterization of the diversity and abundance of finfish resources in the Sound. A new EIS discussion on these issues must be made available for public comment.

b. Commercial Fisheries (5.4.3.3)

Various catch statistics in this section contradict each other. The total catch figures understate actual catches, sometimes by an order of magnitude. Several reasons for this are noted below. In addition, the section continually implies that limited catch rates are a proxy for limited abundance, which they often are not. Catch rates depend on abundance, quotas, size and bag limits, and seasonal closures, as well as fishing effort. In some cases, the lower catch rate for a particular year is the result of relative abundance, which resulted in overfishing in the previous year and caused fisheries managers to reduce quotas in subsequent years in order to build spawning stock biomass. While populations of individual species vary from year to year, several important species, including striped bass, fluke, scup, and black sea bass have shown significant increases in recent years as a result, at least in part, of fisheries management plans. Data on these fisheries through at least 2002 should be included in the DEIS. It is a serious flaw that there is no attempt to estimate the economic value of the commercial landings. People fish for dollars not pounds.

Pages 5-50, 4th par., and 5-53, 5th and 6th par. This summary seems to have been written by authors who are not familiar with how these fisheries are conducted, or how to interpret

NMFS and MDMF datasets. The DEIS mistakenly equates landings data with the total catch for NMFS area 075 (MDMF Area 10) and as a result underestimates the commercial catch in the Sound. Many fishers working Nantucket Sound land their catch in Vineyard Sound (Area 13) ports, Chatham (Area 9), or elsewhere. Much of the squid catch is off-loaded at Rhode Island processors. Federally permitted boats are required to submit trip reports which indicate the area of the catch, but in-state boats do not, and dealer reports do not say where fish were caught. In fact, dealer reports do not necessarily show where fish were landed, because dealers' business addresses are given, which are often not the same as off-loading locations.

Page 5-53, 5th par. This discussion claims that: "from 1994 through 2001, approximately 4.3 million pounds of finfish and squid were harvested from Nantucket Sound (NMFS vessel trip report data for area 075; Figure 5.4-2)." This total is far too low. It is contradicted on the next page just by the weir landings, which average "approximately 1 million pounds per year" (page 5-54, 2nd par.). One reason for the discrepancy is that the weir figures come from MDMF, while the lower figures come from NMFS, which did not begin including weir catches until 1998 (source, Joan Palmer, Chief, Data Management Systems, NOAA Fisheries, Northeast Fisheries Science Center, oral communication).

Figure 5.4-2 (identical to Figure 3b in Appendix 5.4-A). Common sense says this figure depicting total commercial finfish and squid landings must be in error. The total catch in Nantucket Sound could not possibly have gone from as little as 100,000 pound in 1994 to over 1,400,000 pound in 2000. As stated on page 5-54, 2nd par., weir landings alone averaged "approximately 1 million pounds per year."

Figure 5.4-3. Average annual landings of top 10 species of finfish and squid from 1994-2001 is similarly in error. It shows little more than a half million pounds coming out of the Sound in an average year. The total catch of Atlantic mackerel is said to average just 146,056 pounds and scup 53,429. These figures are contradicted on page 5-54, 2nd par., which states that during the 1900-2000 year period, the average catch of the weirs alone was 432,910 pounds of mackerel and 103,589 of scup.

Black sea bass landings are said to average 63,823 pounds. But according Figure 5.4-6, the potters' landings in 1999 were over 400,000 pound and in 2000 over 300,000. MDMF statistics for 2001 show 267,000 pounds for the potters. Most black sea bass are caught by mobile gear and hook and line, not pots. Therefore, the annual catch is at least several times what is claimed in this figure.

The alleged annual total squid catch of 227,000 pounds is contradicted by NMFS statistics cited below, and by page 5-54, 2nd par., which says the squid catch in the weir fishery alone averaged 386,450 pounds per year. The trawl fishery far outcatches the weir fishery. So again, the alleged totals underestimate the catch by a wide margin.

Page 5-53, 6th par. "A total of approximately 1.8 million pounds of squid were harvested from Nantucket Sound between 1994 and 2001...." This figure is far too low. An indication of how low can be seen in these examples: in 2000 NMFS reports the total catch of loligo squid in Mass. was 2,661,000 pound. In 1999 it was 2,691,000 pounds (source: http://www.st.nmfs.gov/st1/commercial/landings/annual_landings.html). "The majority of squid landings come from the Sound," according to Phil Logan, Head of Social Science Branch of NOAA Fisheries in Woods Hole (email communication). This statement is confirmed by: *The Loligo squid fishery in Nantucket and Vineyard Sound*, 1995. Dan McKiernan, Acting Deputy Director, MDMF and co-author of *TR-1* reports that much of the catch is landed in Rhode Island (oral communication). The squid catch for just 1999 and 2000 was roughly double the 1.8 million pounds alleged for 1994-2001. The total catch between the years 1994 and 2001 was nearly an order of magnitude greater than reported in the DEIS.

Page 5-54, 6th par. This paragraph describes the striped bass fishery as it might be perceived by someone who is unfamiliar with how it is conducted and who believes there are not many stripers around, especially before July and after August. It is noted that landings "appear to be greatest during the month of July.... By September, far fewer striped bass were landed and sold to market...."

Striped bass is a managed fishery whose quotas, size and bag limits, and open fishing periods have changed as the stocks rebounded from very low levels in the early 1980's to "fully recovered" in recent years. MDMF has struggled to limit catch rates to extend the commercial season as much as possible in order to avoid market glut and maximize revenues for fishermen. These regulations have included beginning the season after July 4 (although the fish become plentiful in May) and having closed fishing days or weeks until the quota is taken. The growing abundance of the striped bass stock has largely defeated these efforts, and the quota has generally been taken by August or early September (before the big fall run takes place).

Table 12: Commercial Striped Bass Fishery since 1990 (MDMF)

		Actual				
	Quota	Landings	Size (in)	Bag limit	Season length (days)	
1990	160,000	150,670	36		95	
1991	238,000	234,800	36		59	
1992	238,000	239,100	36		39	
1993	238,000	262,600	36		35	
1994	213,400	199,600	36		24	
1995	750,000	782,000	34		57	
1996	718,000	696,800	34		42	
1997	750,000	785,942	34		42	

1998	750,000	822,000	34		28	
1999	782,000	788,171	34		40	
2000	796,000	779,736	34		36	
2001	802,000	815,054	34		29	
2002	802,000	924,900	34		21	
2003	1,036,880	1,055,400	34	40	21	
2004	1,141,517	1,206,305	34	30	19	

The striper landing rates cited in the DEIS underestimate the actual catch. They represent only Area 10 landings. Many fishermen working Nantucket Sound land their catch in Vineyard Sound (Area 13) ports, Chatham (Area 9), or elsewhere. They and the dealers are not required by state law to report where the fish were caught, and since striped bass is not a federally managed species, the fishermen do not have to submit catch reports with that information. At this time, the commercial quota for the state is about 1 million pounds and may well increase in the future, given the size of the biomass. All that can be said with certainty is that a significant portion is caught in Nantucket Sound and the fish are found in great abundance there. This information is not discernable from the DEIS.

"Commercial Seasons and Gear Types," page 5-55, 1st-4th par. This section is inadequate. It should indicate the multiple gear types used in each fishery (as well as their relative success). Instead, it mistakenly limits itself to what it considers to be the gear type with the highest landings for each species. The result is to minimize the appearance of broad participation.

There is no mention of commercial hook and line fishing. The Cape Cod Commercial Hook Fishing Association (CCCHFA) has more than 250 members who fish Nantucket Sound (oral communication from John Pappalardo, CCCHFA Policy Analyst). They target squid (by jigging), scup, black sea bass, striped bass, bluefish, and other species. The entire striped bass commercial catch is taken by hook and line.

Page 5-55, 2nd par. Worrying over the exact number of trawlers fishing for squid and fluke in Nantucket Sound is irrelevant in a section supposedly providing an overview of gear types in use. It is well known that nearly all of the squid catch caught by trawlers comes out of the Sound, and the fluke boats work Nantucket and Vineyard Sounds.

Page 5-55, 4th par. It is not true that the "preferred methods of fishing for these species [scup and black sea bass] is stationary, i.e., pots and fixed nets." More are caught by mobile gear and hook fishermen. The term "preferred" is misleading because fishermen may prefer to use a gear type that, while not the most efficient for a catching a particular species, enables them to pursue various fisheries and maximize their income. That is why this section should be rewritten to provide a broad overview of all the gear types used in pursuit of the various species.

The following information on 2002 landings compiled by MDMF provides a better thumbnail sketch of the kinds of gear in use and their catches (source: http://www.mass.gov/dfwele/dmf/CommercialFishing/TOTAL_QUOTAS2002.pdf).

> The spring squid fishery involves some 40 permitted draggers, most of which fish in Nantucket Sound, although in some years weir fishermen in the Sound produce the highest landings. In 2002, the total catch of loligo squid was 1,872,000 pounds. (This figure does not include Rhode Island landings. NMFS reports 2,661,000 pound caught in Massachusetts, nearly all of it coming from the Sound.)
>
> In 2002 there were 58 permitted fluke (summer flounder) draggers, most of whom fish in the Sound, and more than 280 hook fishermen targeting fluke. According to NOAA, the catch for Area 538 (Nantucket and Vineyard Sounds and Buzzards Bay) in 2002 was 1,201,000 pounds.
>
> The 32 black sea bass potters working the Sound caught 267,000 pounds in 2001. However, most sea bass are caught by mobile gear and hook and line, not potters. NOAA says 2,637,000 pounds were caught in Area 538 in 2002.
>
> Most scup, like black sea bass, are caught by mobile gear and hook and line. NOAA reports 2,282,00 pounds of scup landed in Area 538 in 2002. A substantial percentage would have come from the Sound.
>
> Eleven of the state's 16 weirs are located in the Sound. Partial landings for 2002 include 445,575 pound of mackerel, 81,000 pound of menhaden, and 51,374 pound of bluefish.

c. Recreational Fisheries (5.4.3.4)

This section is an exercise in obfuscation, the same problem that characterizes so much of the DEIS. It conflates samples with populations, mischaracterizes the MRFSS data, and draws faulty conclusions from the results of a survey of charter and party boat operators. Most significantly, it does not provide what is needed: estimates of the number of participants who might be affected by the Project and their economic contribution to the Commonwealth of Massachusetts.

Page 5-55, 5th par. It is certainly true that Nantucket Sound is "adjacent to several key vacation destinations (i.e., Cape Cod, Nantucket, and Martha's Vineyard) and the waters...support a diverse array of recreational fishing activities." But it must be shown how many people are involved in these diverse activities and what they spend on them, in order to gauge what might be impacted. This information is not in the DEIS.

NMFS estimates 838,000 in-state and out-of-state anglers made 3,694,000 saltwater fishing trips in Massachusetts waters in 1997 and contributed $846,851,000 to the

economy in 1998 (http://www.st.nmfs.gov/st1/index.html). NMFS statisticians should be able to analyze the raw MRFSS survey data and the associated extrapolation factors to determine what fraction of those anglers and expenditures can be assigned to the attractions of Nantucket Sound in more recent years. If the fraction is as small as one-quarter, say, then a couple of hundred thousand anglers spending a couple of hundred millions of dollars a year ballparks the significance of the recreational fisheries in the Project area.

Page 5-55, 5th par. refers to Section 5.4.2.4, which does not exist.

Page 5-55, 6th par. This critical paragraph is fatally flawed. It begins by citing MRFSS raw intercept data, which averages a few thousand interviews a year, then asserts that "true recreational fishing effort would be greater than this" – a monumental understatement – and finally goes on to say that some of the two or three thousand people interviewed might not have fished in Nantucket Sound. No clear picture emerges of the numbers of anglers who fish the Sound. Therefore, it cannot be shown how many people might be affected by the Project – a critical omission.

Page 5-56, 2nd par. This paragraph on MRFSS survey practices around the country is irrelevant and should be excised.

Page 5-55, 3rd par. The sample is not the population. The number of hours fished by survey participants (Figure 5.4-9) is meaningless by itself. This raw data is what MRFSS extrapolates from in order to estimate actual fishing effort in the area. The effect of including this figure and other examples of raw survey data may well be to convince a naive reader that there is very little fishing activity taking place, which is the opposite of the case.

Page 5-55, 3rd par. Reference is made to Figure 5.4-10 which is said to show that "the average number of hours individual anglers engaged in recreational fishing activities does not vary greatly between years." The bar graph purports to show that from 1990-2001 the mean amount of time that individual anglers fished was between three and four hours a year. The MFRSS survey samples people seen in the act of fishing or describing themselves as recreational fishers in lengthy phone interviews. To claim that the average self-proclaimed angler only puts in roughly one half-day fishing a year stands common sense on its head. The DEIS needs to provide a good faith estimate of total recreational fishing activity in Nantucket Sound.

Page 5-55, 6th par. To say that "NMFS survey interviewers observed approximately 10% of the catches reported by anglers..." is meaningless, as is Figure 5.4-12 showing numbers of fish observed and reported. These figures are only the raw data on which NMFS statisticians and economists base their extrapolations. Similarly meaningless statements include, "Anglers fishing from party/charter boats also reported catching large numbers of fish." The annual MRFSS recreational surveys show millions of fish being caught in

Massachusetts waters by hundreds of thousands of anglers. The DEIS should include estimates from NMFS as to what percent of the action is attributable to Nantucket Sound. No "large number" of either fishers or fish is cited in this entire section.

MRFSS statisticians take information from small numbers of people sampled in the field and by phone surveys and extrapolate to arrive at the total estimated recreational catches each year. For 2002, NMFS estimated the following recreational catches for the Commonwealth.

Table 13:NMFS Estimated 2002 Recreational Catch

Bluefish	856,715
Striped bass	6,026,404
Scup	1,854,149
Black sea bass	451,743
Summer flounder	491,631

Based on their geographic distribution, it can safely be assumed that a substantial percentage of each species was caught in Nantucket Sound.

Page 5-57, 1st par. This section and its accompanying Appendix 5.4-B, which describe a survey of 30 party and charter boat operators, while full of graphs, conspicuously avoid estimating the actual number of anglers going out on these boats in a season. According to MDMF's "Massachusetts Saltwater Sport Fishing Guide," there are approximately 90 for-hire vessels operating out of the cities fronting Nantucket Sound. The number of passengers they carry each year and their contribution to the local economy need to be estimated.

Page 5-57, 3rd par. It is noted that "the majority of the party boat and charter boat captains reported that for short (half-day trips) they did not take their anglers to the Proposed Site." The implication is that the fishing around Horseshoe Shoal isn't particularly productive. There are several problems with the quoted statement. First, the geographical distribution of these captains around the Sound is unknown. Most of them may be much closer to the Monomoy and Tuckernut areas, other popular fishing locations. If this were the case, they would be foolish to take extra time and burn extra fuel to steam the extra miles to Horseshoe Shoal for a half-day trip. On the other hand, boats from Hyannis would be expected to favor the nearby Horseshoe Shoal area. In any case, the fact that many or most half-day boats surveyed go to two other sites says nothing about the popularity of Horseshoe Shoal or the abundance of fish on and around it. On page 3-69, 7th par., the drafters noted that for full-day trips "the captains reported fishing the shoal areas around Monomoy Island, Tuckernuck Island, and Horseshoe Shoal." A spokesperson from the Cape Cod Charter Boat Association says the Project area is a prime fishing destination for its membership (oral communication).

d. Essential Fish Habitat Assessment (5.4.4)

Page 5-57, 5th par. It is important to note that the table of EFH species does not include important Nantucket Sound species under ASMFC management, including striped bass, bluefish, and fluke. The addition of these species to the "17 federally managed fish and three federally managed invertebrates" shows that Nantucket Sound is an ecosystem of unusually high species diversity.

The EFH designations of life stages that are present in the area are based on published scientific studies. It is well known from trawl surveys and other sources that additional life stages are present. The common presence of squid egg mops is well-documented in the Sound. Black sea bass, and scup also spawn in Nantucket Sound, which is why the fall trawl surveys are full of their young-of-the-year. Therefore, one presumes their eggs and larvae must also be present earlier in the year.

e. Analysis of Impacts (5.4.5)

Page 5-57, 5th par. refers to Appendix 5.4-C, an EFH Assessment for species in the Project area. This assessment consists of descriptions of the life stages of the various species. Each is followed by the comment that "no adverse impacts are expected from construction/operation" or "no substantial impacts are expected." There is no definition given for the qualifier "substantial" nor any attempt to consider what the cumulative impacts would be for the long list of limited impacts. The word "impacts" in this Appendix is limited to lethal or sub-lethal effects. The dispersal of mobile life stages is not regarded as an impact, although dispersal reduces feeding and spawning opportunities and ultimately reduces productivity. In any case, the conclusions of little or no impact are contradicted by the *HubLine III EFH Assessment* submitted to the Federal Energy Regulatory Commission's Officer of Energy Projects and reviewed by NMFS, CZM, and MDMF. Tables of these likely impacts are included in comments on page 5-59.

Page 5-58, 4th par. The assertion is made that "Benthic habitat is similar throughout Nantucket Sound, and thus demersal finfish in the area of Project construction/decommissioning are likely to be able to find suitable benthic habitat adjacent to the Project area or in other areas of the Sound." There are serious flaws with this statement.

There are, in fact, a variety of benthic habitats in the Sound, and Horseshoe Shoal is an unusual one. The DEIS says so elsewhere: according to page 5-7, 3rd par., "The geophysical data indicates that an underlying topographic high is present below the depth of glacial and post-glacial sediments beneath Horseshoe Shoal itself. This suggests that the Shoal is a relatively stable structural feature...." Material submitted by the applicant during the EFSB hearings was more specific: "The geophysical data indicates that a topographic high, possibly a cuesta [a shoal with gentler slopes on the upstream side and steeper slopes on the downstream side], is present beneath Horseshoe Shoal. This suggests that the Shoal is a relatively stable structural feature..." (page 5-92).

It is well known that underwater structures attract fish. "The presence of structure is obviously a key factor in determining where fish will visit or stay in offshore waters.... They are good places to fish" (*The Fisherman's Ocean*, David A. Ross, Ph.D., 2000, page 108). Horseshoe Shoal is a very large, relatively stable, fish-aggregating underwater structure – a spawning area, nursery area, and feeding area for many species. That is why it is targeted by commercial and recreational fishermen. Other nearby areas are usually less productive.

It is unsupported conjecture on the part of the DEIS that there would be little or no impact from dispersing fish from this underwater structure. Dispersal to other parts of the Sound can reduce feeding and spawning opportunities, thereby reducing reproduction and productivity. Also, the degree of homing behavior during reproduction for the various species is not known. They may spawn in other areas, or when forced away from a preferred area, not engage in reproduction, or be less successful in less optimal areas.

The assumption that dispersal—or the potential aggregation of certain species that is suggested on page 5-61, 7th par.—would cause little or no impact is at odds with the well-established principle of ecology that changes in ecosystem food webs tend to ripple out and affect the entire web of predator-prey relations in unpredictable ways:

> "Random oscillations in population size of some prey species about some equilibrium level will be amplified within the population fluctuations of a predator.... Stochastic fluctuations in population size would be accumulated up the food chain, with less and less predictable behaviour of populations higher up the trophic scale" (*Community Ecology*, R.J. Putnam, 1994, page 43).

Page 5-59, 2nd par. The following statement summarizes the DEIS position on likely impacts to fisheries resources that would be caused by construction and decommissioning activities. This statement is misleading and incorrect. Comments are made below on each of the assertions and conclusions in this paragraph.

> Construction activities associated with installing the monopile foundations, scour control mats, and the inner-array cables and submarine cable system would result in a temporary and localized increase in suspended sediment concentrations.... Due to the predominant presence of fine to coarse-grained sand in Nantucket Sound, localized turbidity...is anticipated to be minimal and confined to the area immediately surrounding the monopiles, the inner-array cables, and the two submarine cable circuits. Sediments disturbed by construction or decommissioning activities are expected to settle back to the sea floor within a short period of time (one to two tidal cycles). In addition, the Project area is situated in a dynamic environment that is subject to naturally high suspended sediment concentrations in near-bottom waters...particularly in shoal areas. Therefore, marine organisms in this area are accustomed to substantial amounts of suspended sediment and should

not be substantially impacted by a temporary increase in turbidity.... No substantial impact to finfish is expected....

Page 5-59, 2nd par. There are repeated generalizations in the DEIS about "the predominant presence of fine to coarse-grained sand in Nantucket Sound." The drafters consistently downplay the occurrence of finer sediments that, when disturbed, produce big turbidity plumes, large areas of sedimentation, and bigger scour pits around structures.

There is considerable evidence for common occurrence of fines (silts and clays):

- Table 5.1-2 provides soil classifications of vibracore data. Four of the eight samples from the "Yarmouth Cable Route" contain silts and clays. Half of the 14 samples taken from the WTG Grid Area also contain silts and clays. The last 14 samples in the table have the generic label "proposed cable route." It is not obvious where these samples came from, but half of them also contain silts and clays.
- Fine-grained material was encountered along the proposed Lewis Bay submarine cable route, and the route was altered to "avoid these fine sediments, to the extent feasible" (page 5-5, 8th par.). The implication of that statement is these fine materials were so widespread it was not possible to completely avoid them. What is the exact meaning of avoiding them "to the extent feasible"? Whatever increases in turbidity plumes may be expected from cable-laying operations through these fine materials is not considered in Appendix 5.2-C, which only models the behavior of sand.
- Table 5.1-3 provides bulk physical analysis of 2001 and 2003 vibracore samples. In 26 samples, silts or clays constituted 10 – 94% of the material.
- There are a number of references to "localized areas" of cobbles, clay, and silt (for ex, Appendix 4.0-A, page 2, 1st par.). Given the limited number of samples taken over the proposed WTG area – apparently about two samples per square mile – the use of the word "localized" must be essentially a guess.
- The revised cable route to Yarmouth has not been bottom sampled.

There needs to be more comprehensive seafloor sediment mapping of the proposed WTG area and the submarine cable route, down to the depths that would be disturbed.

Underestimated Potential for sediment dispersion. Page 5-59, 2nd par. It is claimed that, "Construction activities associated with... the inner-array cables and submarine cable system [i.e., jet-plowing] would result in a temporary and localized increase in suspended sediment concentrations."

The proportion of silt and clay in the sediment encountered, together with the level of bottom disturbance plus wind and wave action, will determine the longevity of the

turbidity suspension and the extent of deposition. The DEIS ignores the presence of fines and their suspension by jet-plowing and provides only a "best case" analysis.

Jet-plow cable embedment is promoted as a construction technique less damaging to the bottom than conventional plowing of trenches. The latter method creates a mechanical crushing impact on marine organisms, whereas the former may dislodge them and blow them aside. However, both methods destroy habitat, relocate benthic epifauna and infauna, and disrupt natural sediment relief. That jet plowing minimizes impacts is asserted, but not supported by evidence. The opposite conclusion was reached for the recent HubLine III gas pipeline project from Beverly, Mass. to Weymouth, Mass. HubLine decided to "use primarily plowing instead of jetting to minimize impacts in response to comments from... NMFS and Massachusetts CZM." That change "reduces the area of potential impacts significantly" (Essential Fish Habitat Assessment, Phase III / HubLine Project, page 59).

The DEIS provides conflicting and erroneous descriptions of the jetting operation. On the one hand, it claims, "the jet plow's hydrodynamic forces do not work to produce an upward movement of sediment into the water column" (page 4-13, 6th par). But this claim is contradicted by Appendix 5.2-C which models sediment deposition and suspension and calculates that 30% of the fluidized sediments would be distributed vertically through the water column, resulting in 0.36 cubic yards of suspended sediment for every foot of cable laid (see paragraph below) – and that calculation is based on the faulty assumption only medium to coarse-grained sand is being jetted, not fines. (When laying cable in softer materials, the depth of jetting is generally increased, which would produce even more suspended sediment per foot of cable length.) The HubLine assessment corroborates the fact that jetting introduces sediments into the water column. It estimated turbidity caused by jetting would "extend up to 200 feet from the trench with accumulations of 1 centimeter up to 55 feet from the trench from jetting..." (page 58).

The DEIS frequently compares the impacts of jet plowing with trawling but in contradictory ways:

> Page 1-8, 2nd par., says that trawling produces suspended sediment concentrations similar to those associated with jet-plowing. But page 5-27, 5th par., says, "it is estimated that approximately 1.32 cubic yards (1.01 cubic meters) of suspended sediment is injected into the water column for every foot of commercial trawling."
>
> Trawling impacts cannot be both "similar to" and 3.67 times greater than jet plowing (1.32 / 0.36). Moreover, the claim of 1.32 cubic yards of suspended sediment produced for every foot of trawling makes no sense if there is only 0.36 cubic yards of suspended sediment expected for every foot of jet plowing. Common sense tells us that the shallow tracks of otter trawl doors on the bottom should have minimal impact compared with the 32 ft^2 cross-section of the cabling trench.

Furthermore, according to D. J. McKiernan, co-author of MDMF *Technical Report TR-1: Loligo Squid Fishery in Nantucket and Vineyard Sounds* (1995), squid trawlers need to move quickly to catch up with their prey, which generally swims a few feet above the bottom, and therefore the trawl doors typically touch lightly on the bottom, if at all. Otherwise, the doors would provide a drag on boat speed, and the net would collect debris. McKiernan said that in all the time he has spent as an observer on trawlers in the Sound, he has never seen a turbidity plume following the boat (oral communication).

Page 5-61, 3rd par. The DEIS states: "The proposed inner-array and submarine cable systems for the Project would contain grounded metallic shielding that effectively blocks any electric field generated by the operating cabling system. Since the electric field would be completely contained within those shields, impacts are limited to those related to the magnetic field emitted from the submarine cable system and inner-array cables." This statement is simply not true.

Page 5-61, 3rd par. The DEIS states: "The magnetic fields associated with the operation of the inner-array cables or the submarine cable system are not anticipated to result in an adverse impact to fish species." That may be true, but what about the AC and DC electric fields (not-mentioned) of the grounded-shield cables? The DEIS must address these impacts as well.

Page 5-66, 3rd and 4th par. The DEIS comment is essentially the same as page 5-61, 3rd par. Comments on this section are essentially the same as the comments on page 5-61, 3rd par.

Page 5-81, 3rd and 4th par. The DEIS says essentially the same as foregoing, but applied to marine mammals or sea turtles. Comments are the same as the foregoing except that marine animals and sea turtles are not known to be as sensitive to electric fields as sharks and rays.

Page 5-89, 2nd and 3rd par. The DEIS says essentially the same as the foregoing. Therefore, comments are essentially the same.

Page 5-91, 2nd and 3rd par. The DEIS says essentially the same as the foregoing, but applied to animals in general. Therefore the same comments apply.

5. Protected Marine Species Comments (5.5)

Page 5-71, 1st par. As written this paragraph seems to indicate that the Biological Assessment summarized in Appendix 5.5-A satisfies the requirements of section 7 of the Endangered Species Act. Formal ESA section 7 consultations apparently have not been initiated with the FWS and NMFS. Normally, this consultation occurs concurrent with the DEIS. The failure to do so further shields the impacts of the project from public review

and comment. If, as seems likely, the agencies find that the proposed action could jeopardize the survival or adversely affect the critical habitat of a listed species, they will be required to prepare Biological Opinions articulating their findings and identifying reasonable and prudent alternatives to avoid jeopardy or adverse effects on critical habitat. The DEIS should have described these requirements and the process more clearly.

Page 5-71, 2nd par. The last two sentences in this paragraph state that

> The MMPA allows the incidental, but not the intentional, "taking" by U.S. citizens engaged in activities other than commercial fishing of small numbers of marine mammals if, after notice and opportunity for public comment, NMFS determines that appropriate regulations have been met. The 1994 amendments to the MMPA provide that this regulation requirement may be waived if the proposed activity results in only harassment, and no serious injury or mortality is anticipated.

These statements do not accurately or fully describe the applicable provisions of the MMPA, suggesting that the author may not have been sufficiently familiar with the MMPA. For example, the MMPA does not allow the incidental taking of marine mammals as is indicated. Rather, it allows the Secretaries of the Interior and Commerce to authorize the taking, including the incidental killing, of small numbers of marine mammals by U.S. citizens…for periods up to five years if the population effects will be negligible, and requires the promulgation of regulations specifying when, where, how, and how many marine mammals may be taken. Similarly, the 1994 amendments do not provide that the regulation requirement may be waived if the proposed activity results in only harassment and no mortality and serious injury is anticipated. Rather, the 1994 amendments allow the Secretaries of the Interior and Commerce to authorize, by streamlined notice and comment rulemaking not requiring the promulgation of regulations, the taking of small numbers of marine mammals for periods up to one year when the taking would be by harassment only and would have negligible impacts on the affected population(s). Thus, a clearer, more complete description of the applicable provisions of the MMPA should be provided. Also, since it seems certain that the proposed action would result in the taking of marine mammals as defined by the MMPA, such incidental take authorization is required. Neither CWA nor the Corps have taken the necessary steps in this regard.

"Studies Completed," pages 5-71 and 5-72. The first two sentences in this section state:

> Review of scientific literature, including stock assessment reports, and consultation with resource management agencies, **suggest that few studies of protected species have been conducted within Nantucket Sound**. A **comprehensive literature search** targeting protected whale, seal, and reptile species in Nantucket Sound and acoustical impacts to marine mammals and reptiles was conducted to obtain information on protected

> marine species in Nantucket Sound and potential impacts of the proposed Project to these resources. (Emphasis added.)

The sentences seem to indicate that, while it was known there was little information about marine mammals and sea turtles in the Sound, a decision was made to do the impact assessment based on the available information, rather than conduct studies to document the seasonal presence, abundance, and activities of these species in the Sound. Also, it is an overstatement to say that a comprehensive literature search was conducted. As pointed out earlier, many relevant publications were missed. Additionally, much of the literature cited is more than a decade old and deals with areas and activities that have questionable bearing on the possible effects of the proposed action on marine mammals and sea turtles in Nantucket Sound. Minimally, an explanation should be provided as to why a series of seasonal surveys were not done to document the use of the Sound by marine mammals and sea turtles, as was done for birds.

"Federally Listed Species Protected under the ESA," page 5-72. See earlier comments on the oft-repeated statements that

> Most whales are found in areas where their primary food source can easily be located. The primary feeding grounds for many whales are located further offshore from Nantucket Sound at Stellwagen Bank, in Cape Cod Bay, and in the Gulf of Maine. The bathymetric and oceanographic features that favor the dense aggregations of whale prey species are not developed in Nantucket Sound to the same extent that they are farther north....

"Gray and Harbor Seals," pages 5-72 and 5-73. As pointed out earlier, seals are much more likely to be affected by the proposed action when they are in the water than when they are hauled-out on land. Without information on the seasonal at-sea movements and feeding areas of the seals, there is no basis for assessing how they could be affected by the proposed action. Without such information, there also is no basis for designing a monitoring program to verify the presumption that any impacts would be negligible.

Pages 5-75 and 5-76. See earlier comments on the species descriptions and review of information concerning harbor porpoise, pilot whales, and minke whales.

"Biological Assessment," page 5-76. As written, this section seems to suggest that the Biological Assessment provided in Appendix 5.5-A satisfies the requirement to consult with the NMFS and FWS pursuant to section 7 of the Endangered Species Act. In fact it appears that no ESA compliance actions have occurred. This Assessment is not adequate for ESA consultation purposes.

"Pinniped Assessment," page 5-76. As pointed out earlier, it is misleading, as is done here, to indicate that a detailed evaluation was done of gray and harbor seals in the vicinity

of the Project area, when there are no data on the in-water movements of these animals in the vicinity of the Project area.

"Acoustic Harassment," pages 5-77 through 5-79. This section repeats nearly verbatim the assessment of the possible effects of construction-related sounds on marine mammals and sea turtles provided in the corresponding section of Appendix 5.5-A. As pointed out in comments on the Appendix, many of the conclusions are little more than optimistic speculation and are not supported by data, analyses, or references to other data sources provided in the DEIS. For the reasons noted there, a clearer and more comprehensive assessment is required.

"Increased Vessel Traffic - Harassment & Vessel Strikes Associated with Construction/ Decommissioning," page 5-79. See earlier comments on the assessments of possible impacts from this source.

"Disturbance of Gray and Harbor Seal Haul Out and Breeding Grounds," page 5-80. As pointed out earlier, gray and harbor seals are more likely to be affected by the proposed action when they are in the water than when they are on land. Thus, while the conclusions here concerning possible impacts at haul out sites are reasonable, they do not address the more likely possibilities.

"Submarine Vibration From WTGs," page 5-80. The statement here that dolphins "would presumably avoid the area if the vibration proved irritating or hazardous" is little more than optimistic speculation and is not supported by the referenced study in the UK. It well could be true that, instead of indicating lack of sensitivity to the vibrations, the study results indicate that the concentration and catchability of prey near the WTGs were sufficiently attractive to the dolphins to override the aversion. In fact it is conceivable that, by attracting dolphins into a zone where they were exposed to relatively high-intensity noise, the WTGs caused the animals to undergo threshold shifts (desensitization, with associated implication for fitness). Of course, this later possibility represents pessimistic, rather than optimistic, speculation. Neither can be ruled out without further study.

"Increased Vessel Traffic - Harassment and Vessel Strikes associated with Operation/Maintenance," pages 5-80 and 5-81. See earlier comments on the assessment of possible impacts from this source.

"Electromagnetic / Thermal Emissions," page 5-81. As pointed out earlier, sea turtles and other marine species may well be attracted to and spend extended periods of time resting and feeding in the vicinity of the monopoles and ESP. Consequently, they could be exposed to EMF levels as high as 473 mG for extended periods of time. There is considerable evidence that loggerheads and leatherbacks use magnetic fields for orientation and navigation. Thus, this is of particular concern for these species.

"Habitat Shift…," pages 5-81 and 5-82. In the second paragraph of this section, it is stated that the movements and populations of marine mammals and sea turtles are not predicted to change substantially following construction of the Wind Farm. As pointed out earlier, it seems more likely that the addition of 130 monopole foundations, the ESP, and the associated scour control mats will have a significant effect on the distribution and movements of both sea turtles and some marine mammals, and in some cases could lead to increases above the equilibrium levels determined by present resource limits.

As described in Appendix 4-A, the seabed scour control units proposed to be installed around each piling would consist of 14, 5.0 by 2.5 meter mats, with buoyant 1.25 meter polypropylene fronds. It is well known, as pointed out in Appendix 5.5-A, that sea turtles, including those known to be present seasonally in Nantucket Sound, can die from eating and becoming entangled in polypropylene and other plastics. However, no studies apparently have been conducted to ascertain the risks that the proposed scour control mats may pose to turtles and marine mammals. If this is the case, studies should be done before considering installation of over 1,820 mats with a combined surface area of over 22,750 m^2.

"Potential Indirect Impacts," pages 5-82 and 5-83. Among other things, this section indicates that marine mammals and sea turtles that feed in the vicinity of the proposed Wind Farm would be able to find suitable prey in adjacent areas if construction activities cause mortality or displacement of prey species. Since the DEIS provides no information on the feeding habits or feeding areas of marine mammals and sea turtles in Nantucket Sound, and no information on the presence, distribution, or abundance of their prey resources in the Sound, the contention is nothing more than optimistic speculation. Similarly, the statement in the last complete paragraph on page 5-83, that marine organisms such as fish and whales are able to "swim away from a spill" of toxic fluids, is a refrain often repeated by the oil and gas industry to allay concern about the possible effects of oil spills. It would make about equal sense to say that, because of their ability to spread across large areas, toxic spills can threaten all life forms across vast areas. The two extremes might be considered offsetting. Thus, because the ways and degrees to which toxic spills threaten wildlife are essentially unforeseeable and intractable, the most reasonable alternative is to focus on steps to prevent toxic spills.

"Removal of WTGs as Fish Aggregating Devices," page 5-83. As pointed out previously, unless the distributions and abundance and factors determining the distributions and abundance of marine mammal and sea turtle prey species in Nantucket Sound are known, there is no basis for concluding, as is done here and elsewhere in the DEIS, that the proposed Project would not provide significant additional habitat for these species and that removal of the structures consequently would have negligible impacts on both predator and prey. Thus, it appears that the only responsible conclusion is that the available data are insufficient to predict the likely effects of the WTGs as fish aggregators.

"WTGs Acting as Fish Aggregating Devices," page 5-84. While this section dismisses the possibility that fish concentrations around the monopile foundations could become magnets for marine mammals, the second to the last paragraph on page 5-80 notes that dolphins have been observed in the UK "congregating to feed around the [windfarm] turbines." As pointed out previously, it appears that, given the available data, the only responsible conclusion is that the effects of the proposed action on marine mammal and sea turtle prey species can not be predicted.

"Cumulative Impacts," page 5-85. For the reasons pointed out in our earlier comments on other sections of the DEIS concerning possible cumulative impacts, the assessment here fails to comply with the CEQ guidelines for impact assessment.

"Acoustic Harassment," pages 5-86 and 5-87. Again, the assessment of the possible nature and effects of acoustic harassment on marine mammals and sea turtles in this section repeats nearly verbatim the assertions and conclusions provided in that section of Appendix 5.5-A dealing with this subject. For the reasons noted in our comments on that section of the Appendix, many of the assertions and conclusions are little more than optimistic speculation and are not supported by data, analyses, or references to other data sources provided anywhere in the DEIS. Clearer, more comprehensive, and better justified assessments are required of the possible effects of acoustic disturbance associated with construction- and decommissioning-activities at this as well as the other possible alternative sites.

"Increased Vessel Traffic - Harassment and Vessel Strikes in State Waters," pages 5-87 and 5-88. The earlier comments on the potential for increased harassment, injury, and death of marine mammals and sea turtles due to increased vessel traffic in Federal waters apply here as well.

"Disturbance of Gray and Harbor Seal Haul-out and Breeding Grounds," page 5-88. This section does not, but should, provide information on the movements and activities of gray and harbor seals in state waters, and an assessment of how they could be affected by Project-related activities in those areas.

"Cumulative Impacts," page 5-91. Like other assessments of possible cumulative impacts, this does not comply with the CEQ guidelines for preparation of impact statements.

"Mitigation," page 5-92. The second sentence in this section states that "[a] Biological Assessment (Appendix 5.5-A) was conducted to determine if the Project is likely to result in adverse effects to threatened or endangered marine species, and informal consultations have been initiated with NMFS and the FWS [and] have occurred to ensure that the protections under 50 CFR Part 402 and the MMPA would be upheld (see Appendix 5.5-A)." The indication that informal consultations "have occurred" suggests that the NMFS and the FWS have concurred that the proposed action is unlikely to have adverse effects on either ESA-listed species or their critical habitat. This is not the case so

far as APNS has been able to determine. It also suggests that the NMFS has determined that the proposed action is unlikely to result in the taking of marine mammals and that no taking authorization consequently is required to comply with the MMPA. If this is the case, the results of those consultations should have been reported in the DEIS. As noted above, such a conclusion would be incorrect.

For the reasons pointed out above, it is clear that there is significant uncertainty concerning the validity of the conclusion that the proposed action would have only temporary and localized (negligible) effects on ESA-listed species and species afforded protection under the MMPA. It also is clear that, if the Project is authorized, the available information is insufficient to design monitoring programs capable of verifying that the impacts are in fact negligible. Consequently, it follows that both formal consultations pursuant to section 7 of the ESA and taking authorization pursuant to section 101(a)(5) of the MMPA would be required before the Army Corps could consider issuing the requested permit.

This section also indicates that measures would be taken to prevent and minimize possible impacts to protected species. Those measures would include:

- posting a NMFS-certified observer on-site during initial construction activities to monitor, and call for suspension of activities if protected species are observed within the proposed 500m safety zone;
- using state-of-the-art hydraulic jet plow technology for cable installation;
- requiring that Project vessels follow NOAA whale watching procedures;
- conducting a "soft-start" to each piling event; and
- underwater sound monitoring during initial monopile construction.

The next to the last sentence in the section states that "[no] **significant** impacts are anticipated during Project operation; therefore no mitigation is proposed" (emphasis added). In context, the sentence indicates that significant impacts are expected during construction and that those impacts would be prevented by the referenced mitigation measures.

As pointed out earlier, there is reason to believe that suspending pile driving when marine mammals are within or approaching the proposed 500m safety zone would prevent permanent hearing damage and possibly other types of physical harm. However, there is no reason to believe that the impulse sounds from pile driving would not cause biologically significant changes in the behavior of some marine mammals at much greater distances. Similarly, there is no reason to believe that implementation of the proposed 500m safety zone would prevent either physical injury or adverse behavioral responses of sea turtles. Further, while this and other sections of the DEIS indicate that an NMFS-certified observer would be on site during the initial construction activities, there is no indication of what is meant by "initial activities," or why it apparently is believed that, after some initial period, marine mammals and sea turtles no longer would be present in or approach areas where they could be affected adversely by the ongoing activities. Also, there is no indication of

where the observer would be stationed and if it would be possible from that location to see 500m and beyond in all directions. Likewise, there is no indication whether multiple observers would be employed if a single one could not effectively monitor the entire safety zone, or if whether the pile driving would be done for more than two or three hours at a time so that observer fatigue would be a worry.

There also is no reason to believe that compliance with the NOAA whale watching guidelines would eliminate or significantly reduce the risk of sea turtles being hit and killed or injured by Project vessels. Similarly, while it commonly is assumed that use of "soft starts" will discourage animals from approaching sound sources close enough to be harmed, there is no evidence that the assumption is valid. In some cases, animals may well be attracted to low-level start-up sounds, increasing the risk that they will be exposed to harmful sound levels. In addition, there is no indication of the nature of the underwater sound monitoring that would be done during the initial monopole construction, the purpose of that monitoring, or what is meant by the 'initial" monopole construction.

At best, it is questionable that these proposed mitigation measures would materially reduce the risk that the proposed action would adversely affect marine mammals and sea turtles. Also as pointed out previously, the available information concerning the marine mammals and sea turtles potentially at risk is insufficient to design monitoring programs capable of verifying that the proposed action, should it proceed, does in fact have negligible effects on these species.

6. Terrestrial Ecology, Wildlife, and Protected Species Comments (5.6)

Page 5-93, 5th par., last line. A reference is made to Section 5.6.6. No such section exists in the DEIS.

Page 5-93, 3rd last par. Appendix 5.6 should be referenced as the location of the correspondence. The "Fact Sheets" from the NHESP should be included in an appendix.

Page 5-93, penultimate par., last sentence. A "Biological Assessment" is not provided at Appendix 5.7-I. A "Biological Assessment" is a term of art defined in the *Final ESA Section 7 Consultation Handbook* (1998) produced by FWS and NMFS. A Biological Assessment is prepared by or under the direction of the appropriate federal agency. In fact, the study itself at Appendix 5.7-I, carefully explains that the information will be used in a Biological Assessment at some future date.

Page 5-94 (5.6.3). This section is very weak. There are more species than simply the "rare" ones. The letter from Thomas French, Ph.D., Division of Fisheries and Wildife, dated October 23, 2003 (Appendix 5.6) identified the "Coastal Plain Pondshore" natural community itself as being "rare." There is considerable information available about the plants and animals of this community type. In fact in 1990, Congress funded a study, *Northeast Coastal Areas Study Significant Coastal Habitats*, which included the Hyannis

Coastal Ponds Complex [Site 37 (MA)], which is located immediately north of the Barnstable Airport and identified as PH 1595 on Figure 5.6-1. Even though the terminus of the transmission line borders this resource unit and the French letter provides a list of rare species for it, it is not discussed at all in the DEIS. The EIS should include them, especially since the transmission line passes between it and PH 1567 and there is liable to be communication between the two by winged invertebrates, avian species and plant propagules. Furthermore, various segments of the transmission line pass through areas that are not intensively developed. Such areas are likely to be important to remnant populations of commoner species. Impacts should be discussed.

Page 5-94, two lists of "rare" species. After each named species there is a classification (e.g., threatened or special concern). These terms have different meanings under federal and state listings. The classification terms should be defined so that the reader understands the relative importance of each. For example, none of the 14 plants or animals listed on this page are federally listed, which means that within the 50 States, the species are secure—it is only in one or more states such as Massachusetts that there is a rarity, and that rarity may be because the species is at a limit of its range. The import of "threatened," "endangered" and "special concern" is different as is the consequence of impacting each. The lists should be expanded to include all of the species identified in the French letter (Appendix 5.6). There are six additional species in PH 1595.

"Road Segment," page 5-94, 1st par. Pitch-pine/scrub oak forest is similar to habitat at the Massachusetts Military Reservation discussed in Section 3. Much more detail was provided on habitat values and wildlife use than is presented in this section.

Page 5-94, last par., last sentence. Contrary to the expectation expressed in the DEIS, both spotted sandpipers and killdeer have been reported to nest in gravelly and/or weedy road shoulders. More critical and totally ignored is the likelihood of breeding migrations by amphibians and reptiles across the roads. This is especially of concern where there are aquatic resources on both sides of the transmission line route.

a. Right-of-Way (ROW) Segment (5.6.3.2)

Page 5-95, 2nd par., last sentence. The Corps needs to develop a specific plan to try to minimize impact by staging construction and to provide daily checks of open trenches to find and remove any trapped organisms.

Page 5-95, 4th par. The DEIS states that "Most of the seven bat species that occur in southeastern Massachusetts are classified as 'uncommon to rare' in the southeastern Massachusetts portion of their ranges, and are not known to spend substantial periods over large bodies of open water such as Nantucket Sound (DeGraaf and Yamasaki, 2001)." "Characteristics" of the seven bat species known from southeastern Massachusetts were summarized in this section. While most of the statements in this section are correct, none of the studies cited in this section refer to studies conducted on bats in southeastern Massachusetts. The report by DeGraaf and Yamasaki (2001) is based on a literature

review, and draws on research conducted at various onshore sites throughout North America. Thus, conclusions drawn from this summary provide no meaningful information on the behavior of local bat populations in the vicinity of Nantucket Sound. As noted by DeGraaf and Yamasaki (2001), "The silver-haired bat migrates along coastal flyways in the northeast to the southern parts of its range before returning in April (Page 5-96, par. 5)." Based on a review of the literature by DeGraaf and Yamasaki (2001), the silver-haired bats have been observed on Martha's Vineyard. This species has also been observed and collected on Nantucket (B. Tiffany, pers. comm.) and Muskeget Island (R.H. Tamarin, pers. comm.).

Page 5-95, 2nd last par., 2nd sentence. The DEIS needs to explain what bats use still water, roads and trails for. These may be areas above which bats hunt.

b. Upland Impacts (5.6.4.2.1)

"Upland," page 5-97. The analysis provided earlier in this section did not discuss much of the potential wildlife interaction with the project. Thus, it is premature to state that impacts will be minimal. Such might be the case, but a more thorough assessment of wildlife use must be presented before the conclusion is valid.

"Road Segment," page 5-97, 1st par. There is no discussion of the construction protocol and whether it has been designed to minimize potential impacts to amphibians and reptiles. For example, from the description of the installation process provided, could be interpreted to describe a process where the trench would be opened for 4 miles before the cable is laid and then backfilled. This would provide a much more severe impediment to amphibian and reptile cross-road migrations than if short sections are excavated in advance of the cable placement and the trench is backfilled immediately after the cabled is placed.

"Road Segment," page 5-97, 2nd par., last sentence. It is assumed that the reference to state-listed species refers to plants. However, there has been no discussion of where trench excavation materials will be placed. Will they be sidecast? Will sidecast piles be on vegetated shoulders?

Page 5-97, ROW Segment, 2nd par., 2nd sentence. As in Comment 12, one interpretation is that the trench could be opened for the entire 1.9 miles which would be a more severe impact to migrating amphibians and reptiles than if it is sequentially opened and closed.

Penultimate sentence. A trench-dewatering plan should be developed in advance of when it is needed. It needs to address both the Road and the ROW segments of the transmission line route. Section 4.3.6 seems to anticipate the need for dewatering in proximity to aquatic resources. Since segments of the trench and vaults may be excavated to –10 feet and the surface of some of the aquatic resources are less than 10 feet below the road surface by comparison of topography in Figure 5.8-2. Handling of any effluent from trench dewatering should have been discussed in the DEIS, especially as it may impact aquatic resources.

Page 5-97, last par. There are inconsistencies between the habitat identification codes in the DEIS, Figure 5.6-1 and the French letter, date October 23, 2003 (Appendix 5.6). On page 5-94, PH 1567 was linked to WH 199. That linkage is consistent with Figure 5.6-1. In this paragraph, PH 1567 is linked to WH 439. In the French letter, WH 199 is linked to PH 1650 and PH 1567 is not listed at all. It appears that the French letter misidentified the PH label for WH 199, because PH 1650 is also linked to WH 466 which is consistent with Figure 5.6-1. All the codes need to be rectified so that they are consistent.

2nd sentence. The DEIS should have referred the reader to the French letter in Appendix 5.6 for the list of the 10 species because they are not provided elsewhere.

Page 5-98, 1st line. The erosion control seed mixture should have specified native species.

Page 5-98, 2nd par. Without specifying the protocol for installation of the transmission line thru the ROW, the impacts upon amphibians and reptiles may be greater than suggested. If construction which apparently will take several months (5 months projected for the upland transmission line in Section 4.3.6) and the trench through the ROW is excavated in its entirety and remains open for an extended periods and the excavation coincides with the breeding period for amphibians and/or reptiles that need to cross the ROW to reach Long Pond, the effect could be greater than suggested and may affect the population for a longer period of time. This potential problem should be addressed in a supplemental EIS and a suitable protocol developed to minimize the potential adverse impacts.

c. Bats (5.6.4.2.3)

Pages 5-98 and 5-99. This detailed discussion of bat species was inserted into the DEIS apparently at the request of the FWS. Most of it deals with the impact of the wind generator turbines in Nantucket Sound itself – not with potential impacts from the upland transmission line installation. The entire "no impact" to bats discussion is expressed in the last two sentences of the penultimate paragraph on page 5-99. The fact is, however, that a number of the bat species have preferred forage habitat that coincides with the conditions in the ROW, yet there is no discussion of the potential impacts from the trenching operation in the ROW. Furthermore, bats have been known to hunt insects in proximity to streetlights which may be associated with the roads within which the trenching will take place. The DEIS is silent about any potential impacts.

Page 5-98. The premise of this section is based on the statement that "Due to their generally robust populations throughout their ranges, none of the seven bat species that occur in southeastern Massachusetts (see Section 5.6.3.2) are listed on the Massachusetts or federal lists of rare, threatened, or endangered species." Again, the information drawn from previous sections is repeated here, stating that all seven species are "uncommon in the southeastern Massachusetts portion of their ranges and are not known to spend substantial periods over large bodies of open water such as Nantucket Sound (DeGraaf and Yamasaki, 2001; Kurta, 1995)." The conclusion drawn from these and similar statements

in the DEIS is that "the number of bats likely to be at risk of collision with wind turbines in the Nantucket Sound project area is extremely low" (DEIS, page 5-98, 5th par.). While this could be the case, no field studies have been conducted in southeastern Massachusetts to validate this conclusion. The absence of empirical studies on bats in southeastern Massachusetts to document relative numbers of bats and their seasonal activity raises serious questions about conclusions that can be drawn with respect to commonness or rarity, and whether these bats fly over open water frequently enough to be at risk from wind turbines.

The DEIS refers to a study by Johnson et al. (2002) in stating that "Bat echolocation and collision mortality studies suggest that only a small fraction of detected bats passes near turbines result in collisions" (DEIS, page 5-98, 6th par.). This conclusion was based on studies conducted in the western and mid-western United States, based, in part, on faulty assumptions about the detection range of ultrasonic bat detectors. Recent information available on the functional range of bat echolocation, and on recent reports of the bats being killed in 2003 and 2004 by wind turbines in West Virginia (Mountaineer site) and Tennessee (Buffalo Mountain site) contrast with this statement. The assumption "that bats can detect large landscape and background features using echolocation at distances up to 328 feet (100 meters)(Griffin, 1970 and Suthers, 1970)..."(DEIS, page 5-98, par.6) is incorrect, based on recent research (Brigham et al., 2004). Echolocation provides information to flying bats for no more than 5 meters (Fenton, 2004; M.B. Fenton, pers. comm.) under typical nighttime environmental conditions where relative humidity is high. These conditions would reduce the ability of bats to detect objects in their flight paths with echolocation. The authors of this part of the DEIS state that "it seems unlikely that foraging bats would be unable to detect turbines." Judging from the functional echolocation ranges of bats recorded for southeastern Massachusetts, it is unlikely that the local bats species could detect the presence of a wind turbine using echolocation until they were within a few meters from the rotors or the pole. It is more likely that they would detect the turbines by vision, but motions blur from moving turbine blades and darkness at night would likely limit the ability of bats to visually detect turbines if they were in their flight paths. Although hoary bats, and other species, may be able to use echolocation to detect moving objects in a laboratory better than they can detect non-moving objects (the DEIS cites Jen and McCarty, 1978), as noted in the DEIS, the conclusion that bats crossing Nantucket sound would be able to detect wind turbines with echolocation is unfounded based on recently published information (Brigham et al., 2004).

Page 5-98, 6th par. The DEIS study cited evidence from a study conducted on foraging bats at the National Wind Technology Center in Golden, Colorado, and in a European Study (Bach, 2002), stating that bats were observed flying within one meter of an operating wind turbine, with no mortality being reported. Notwithstanding, recent studies at onshore sites in eastern North America (summer 2003 and 2004) have clearly documented turbine-related fatalities of large numbers of red bats, hoary bats, and silver-haired bats—based on direct impact with turbine blades (J. Horn, pers. comm.). Thus, the

conclusion in the DEIS that bats can detect turbines with echolocation and thus avoid wind turbines is unfounded by recent evidence.

The DEIS bases its case for limited risk of fatalities by referring to reports produced in 2001 and 2002 that bat mortality at several on-shore wind turbine sites is minimal to "non-existent." This conclusion may be valid for the study sites that were being evaluated (see review by Johnson et al., 2004), but more recent studies in West Virginia (Kearns and Kerlinger, 2004 and Kearns et al., in prep.), and in Tennessee (Nicholson, 2003), point to higher bat fatalities at wind farms located on forested ridges in the eastern United States than what was reported at wind farms in grassland habitats in the western U.S. and Midwest (Johnson et al., 2003a, 2003b, 2003c, 2004, in press). These contrasting findings clearly indicate that one cannot draw conclusions by extrapolating results from one region to another with respect to impacts of wind turbines on bats (or birds). Variations in location, habitat, and species composition make it imperative to conduct empirical studies at each site where wind farms have been proposed.

The DEIS refers to the report by DeGraaf and Yamasaki (2001) as the definitive work relating to bat populations in southeastern Massachusetts, yet the information presented in this review is based on a partial review of the available literature from other regions of North America. It is important to note the information summarized by these authors is based on the empirical research or others in other parts of the species' range. None of the findings presented are based on research in southeastern Massachusetts, including Nantucket Sound.

d. Mitigation (5.6.5)

Page 5-100. Remedies for all of the potential ills associated with installation of the transmission cables in the uplands are handled in this one paragraph by stating that plans for everything *will be* developed in the future. Needless to say, such a vague assertion is not sufficient of EIS sufficiency purposes.

In summary, Section 5.6 is weak. It does not discuss many potential impacts associated with the transmission line installation and relegates any remedies for potential problems to future actions.

7. Avian Resources Comments (5.7)

Page 5-101. The concept of a "flyway" for birds is grossly outdated (and wrong) and should not be applied here. Birds migrate on a broad front.

"Overview," page 5-101. Red-breasted Merganser should be added to the list of abundant sea-ducks in Nantucket Sound.

Page 5-102, 1st full par. The definition of landbirds is extremely vague; a taxonomic definition (e.g. "passerines" or "songbirds") would be much clearer.

Page 5-103, 3rd par. The DEIS reads: "Collision mortality has been studied intensively at approximately 12 onshore wind farms located in the United States." The DEIS cites the Kerlinger and Hatch (2001) Preliminary Avian Risk Assessment (ARA) for this sentence. Kerlinger and Hatch only cited 10 wind mortality studies, so apparently the Corps has added two wind mortality studies that have occurred since 2001—these are presumably the TVA study at Buffalo Mtn. Tennessee (Nicholson, 2003) and the Backbone Mountain wind mortality study in West Virginia (Kerns and Kerlinger, 2004). The Corps also added the adverb "intensively". Kerlinger and Hatch do not use the adverb "intensively" in describing the existing avian wind plant mortality studies. It is doubtful that Kerlinger would use such a modifier to describe the mortality studies in the United States. Kerlinger was the author of three of the 12 studies (Searsburg, VT; Somerset Co., PA; Tucker Co., WV). None of his studies checked for mortality more than once a week. His study in Somerset County, PA did not even include a surveyor efficiency or scavenger removal rate evaluation. These latter evaluations are standard practices recommended by the wind industry (NWCC metrics and methods, 1999).

The Corps is correct that there are "approximately 12 mortality studies" in the United States, but one could certainly not call these studies *intensive*. The bulk of the existing studies were not geared toward detecting songbirds and used search routines (search frequency and methods) that spawned from western mortality studies where attention was primarily geared toward finding raptors (larger birds whose remains would not disappear as quickly and would be easier to find).

Only two of the 12 studies conducted mortality searches more than once a week and over multiple years—Howes et al. (2001) and Nicholson (2003). The other ten studies typically involved weekly or bimonthly carcass searches, and about half these studies were at older wind plants with turbines only in the 200-ft agl range (i.e., Algona, IA; Tug Hill, NY; Searsburg, VT; Princeton, MA studies). None of the 12 studies manicured the grounds underneath their respective turbines in order to make it easier to find small carcasses. In most cases there was tall grass or farm crops such as alfalfa under the turbines making it highly unlikely that small songbird carcasses might be found. Lessons from 50 years of bird mortality surveys at communications towers were certainly not heeded in the existing avian mortality studies at wind plants. For the Corps' reference, the 25-year communications tower mortality study initiated by Herb Stoddard at the Tall Timbers Research Station near Tallahassee is an example of an *intensive* mortality study (Stoddard and Norris, 1967).

Page 5-103, middle of 3rd par. The DEIS cites Erickson et al. (2001) that "changes in the design in the wind turbines would reduce collision risk over that documented for the older technology evaluated." This statement is incorrect. Changes from lattice towers to tubular towers and to slower rotor speeds has not been demonstrated to reduce mortality for night migrating songbirds. Songbird risk is likely directly related to the shear size (height and breadth) of the obstacle. Since the size of windmills has been tending to grow over time, the risk to night migrating songbirds is likely to increase with the new designs.

Page 5-105, top. How are shoals known to be preferred by foraging terns? The DEIS needs a citation; otherwise this is nothing more than a sampling design that may be biased in this direction (towards shoal waters). The exclusion of waters within 2 km of shore from the sampling scheme is questionable. Certainly this is where many of the Roseate Terns will be, and all of the Piping Plovers. Also, 1.2 miles from Muskeget would be within ~ 3.5 miles of Horseshoe Shoal, so it would seem that such an area should not be excluded from a survey designed to test the impact or wind turbines placed on Horseshoe Shoal.

Page 5-105, 3rd full par. "A sample size of 19% is sufficient for estimating population densities." This is an absurd statement, in the absence of preliminary data to give some idea of variance.

Page 5-106, 2nd complete par. "It (radar) is unable to determine what the target on the screen represents." This is an extraordinary statement, in light of the fact that this very DEIS uses radar to quantify bird abundance over Horseshoe Shoal. Radar can be used to estimate bird abundance, but this topic needs more substantial coverage to enable the reader to evaluate the data provided.

Page 5-110, top. The statements about eiders, coupled with the distributional maps presented, support what has been said in these comments about the South of Tuckernuck site having far more birds than other areas. Part of the reason the DEIS surveys don't show this may be that large flocks of eiders in the area "were not counted completely" (line 3).

Page 5-110, 1st par. Common Eiders have only nested at Muskeget since about 1997 (not 1973-1975 – that was the Elizabeth Islands).

For this entire section, Nantucket Sound has been divided into zones and birds apportioned to zones. This is misleading, because if a huge flock of Common Eiders was located 10 feet away from Horseshoe Shoal, the flock would be recorded as "not associated" with the proposed wind turbine area. A more appropriate statistical analysis would be a regression of abundance versus distance from the proposed site (e.g. Horseshoe Shoal).

Page 5-112, bottom. The methods used by Mass Audubon are perfectly appropriate for measuring bird densities, or certainly as appropriate as those methods described here.

"Shorebirds," page 5-114. There are no "concentrated flightlines" of shorebirds anywhere. Shorebirds migrate on a broad front. None were observed from aircraft surveys as the majority initiate migration at night. Substantial numbers undoubtedly occur, given the large aggregations reported from Monomoy and elsewhere along the Massachusetts coast. The statement about Monomoy birds passing east of the study area is unlikely given that numerous radar studies have demonstrated that shorebirds (and other nocturnal migrants) migrate on a broad front.

"Raptors." Peregrine Falcons are frequent migrants across Nantucket Sound, as evidenced by the high counts recorded at Martha's Vineyard.

"Radar studies," page 5-115. The radar studies provide a very interesting perspective on abundance of migrants over Nantucket Sound, and should be continued if possible. The one puzzling aspect of the results is that in spring, there were twice as many echoes recorded during the daytime than at night. For fast tracks, this could be explained if the targets were scoters or other ducks that usually migrate during the day. But there were twice as many slow tracks (presumably passerine birds) recorded during the daytime. Maybe they are diurnal migrant swallows or kingbirds, but even so it is very surprising that such birds were not overwhelmingly outnumbered by other nocturnally migrating passerines. The vast majority of passerines nesting north of Cape Cod are nocturnal migrants. There is a clear need to evaluate these radar data in a new EIS subject to public review, after adequate additional studies have been conducted.

Page 5-116, 5th par. "Results of the applicant's studies indicate that the offshore areas of Nantucket Sound have relatively few species of seabirds and that most landbird migrants pass overhead at high altitudes." This statement is not representative of the material contained in Section 5. Twenty species is a rather sizable community, and furthermore the number of species present is not the issue at hand. What matters is which species are present, and in what numbers, and whether those species have threatened or endangered status. The altitude issue has already been addressed; mortality occurs at man-made structures when birds are *not flying at average height, but are forced down* by fog or rain.

Page 5-122. Higher mortality rates from other sources are used to minimize the effect of added mortality from the proposed action. Hunting is specifically named as one of these other factors, but is a particularly bad example. In huntable populations of waterfowl for instance, seasons are set, bag limits are imposed, and even sex of species is regulated such that the population is not adversely impacted by compensatory mortality. Hunting regulations are reevaluated and adjusted regularly based on population and harvest monitoring. Controlled depredation activities are another example given without account for the specifics of such controlled mortality. No such targeted management of mortality is possible within the proposed action.

Page 5-122, 2nd to last par. Mention of data from beach searches in this European study is misleading and provides no useful information for this DEIS. Such beach searches have never been demonstrated to be effective indicators of windmill mortality. The primary problem is that small carcasses of songbirds are often eaten by gulls or fish soon after they hit the water in coastal areas. Also, connective tissue that binds passerine primaries and tail feathers to the songbird carcass rapidly deteriorates in salt water, usually within 24 hours. Remains of passerines that die offshore typically wash up not as carcasses but as individual primary or secondary wing feathers, or tails feathers. The remains from a single bird may disperse widely at sea and wash up over a wide coastal area. It certainly would

not be possible to assess mortality at windmills in Horseshoe Shoal by surveying local beaches. In review, this English study provides no useful or credible information on the collision risk for the proposed project and only serves to mislead casual readers.

"Turbine spacing," page 5.124. In the issue of turbine spacing, there is much inconsistency in the document. Risk is defined in paragraph 5.7.1 by the "industry standard" as no. birds/unit area/unit time or the proportion of time spent in the rotor swept zone. This may be a valid correlative index of relative risk but does not account for avoidance behaviors and other factors. The DEIS goes on in paragraph 5.7.2.2.1 to imply that this site will be less risky than the Altamont Pass (CA) site because the spacing of turbines is greater at the proposed site. Spacing should be independent if one accepts the risk model presented as industry standard. Only frontal surface area would have an impact in such a case. In 5.7.3.2.1, the DEIS acknowledges that spacing effects are unknown and that wider spacing also could have negative effects.

"Rotor RPM," page 5-124. The Applicant states that "larger, slower rotating turbines seem no more risky…than smaller and faster rotating turbines…" and acknowledges more study is needed. In subsection 5.7.4.5, they state that larger, slower-turning rotors are recommended for reducing potential collisions by birds and that the project will utilize such rotors to "help reduce blade impacts to bird species." The document is inconsistent in this aspect.

Page 5-124. The issue of lighting of turbines is critical with regard to potential songbird mortality. CWA has proposed an aviation obstruction lighting system that appears to follow lighting practices that some evidence suggests may not induce congregation of songbirds. The crux of this argument appears to be that large kills have not been documented at inland wind plants with the red strobe-like lights and that there have been no differences between the mortality rates at unlit and red strobe-like lit turbines (Kerlinger 2004b); also that there is "no evidence that red flashing, strobe-like lights on wind turbines attract any type of birds."

There are several problems with this argument. First, there are no conclusive studies that red strobe-like lights do not induce some congregation. There simply has not been enough study to rule out a *congregation factor* for red strobe-like lights. The only study to directly compare attraction of strobe versus permanent aviation obstruction lights is the Gauthreaux study cited on page 5-124. This incomplete study in fact found that white strobes cause *less* attraction than towers with permanent red sidelights (L-810) and flashing red beacons (L-864). It is likely that red strobes would cause somewhat more attraction than white strobes because red strobe-like lights are in fact not true strobes. The duration of the on-time for the red "strobes" is significantly longer than the on-time for white strobes which emit a seemingly instantaneous short burst of light. It is also worth noting that nothing in the Gauthreaux study determined whether the color of light played a role in congregation.

The issue of songbird attraction to the amber marine navigation lights is not addressed by the Corps in the DEIS. It was dismissed in the applicant's ARA with the statement that "standard ship navigation beacons have not been demonstrated to attract birds and, therefore are not likely to increase risk." Again, here is a case where there has never been a study to determine whether such marine navigation lighting may cause congregation. So, it is unknown whether they do or do not cause congregation.

The fact is that the FAA lighting and the marine navigation lighting cannot be treated separately. Both these lighting systems would be operating at the same time and it is the sum of these lights that songbirds would have to contend with. The CWA project would be introducing a new lighting system on turbines – two flashing amber lights and two flashing red strobe-like lights. It is difficult to evaluate the risk (*congregation factor*) for this lighting system because no details are provided on the dynamics of the system. Will the lights flash simultaneously? How long is the on-time for each lighting system?

One of the biggest concerns here is that such lighting may induce different congregation behavior at sea than inland. Unlike inland turbines, there will be significant reflection of the light off the ground (the water) up into the atmosphere. This may not be very apparent from the sea surface but it likely will be noticed by birds flying at rotor height. This has the effect of introducing addition sources of light, albeit strobe lighting. The other dynamic at sea is that there are fewer light sources for birds to orient on. In low cloud ceiling situations, any such lighting may serve as a point of orientation for birds that are disoriented. It has been demonstrated in European studies that red wavelengths of light may interfere with bird's geomagnetic navigation system. This is the system that many songbirds use when flying under cloud cover when their stellar navigation system is not useful. The point here is that any amount of disorientation at sea under cloud conditions may be more critical for songbirds than it would be inland. Birds that become disoriented inland at least have the option to land on the ground. This is not the case at sea.

The DEIS addresses the risk to night migrating songbirds with the dismissive presumption that no congregation is likely to occur at the CWA Horseshoe Shoal wind energy project. The reasons discussed above cast significant doubt on this assumption. While the lighting system proposed for the turbines might in fact not cause significant congregation events at inland wind plants, there are grounds to suspect that the *gestalt* of the lights with the sea environment may lead to significant congregation behavior.

"Lighting," page 5-124. The DEIS often discusses songbirds as being "attracted" to lights. Technically this is incorrect. The mechanism of bird congregation around lights is not known. It is not known whether birds are in fact attracted to the lights or whether the congregations arise because birds that happen to enter the lighted area lose their orientation (because of the lights) and end up trapped in the lighted area for lack of stronger navigational impulse.

It should also be clarified that a red flashing L-864 light can refer to an incandescent light or a "strobe-like" light. The red flashing, incandescent L-864 lights are still believed to be a culprit in bird congregation, while the red flashing, strobe-like L-864 lights are believed to cause less congregation because the duration that the light is on is shorter than the red flashing, incandescent L-864.

Page 5-127. The percentages of birds flying in rotor swept zone are not meaningful unless stated with respect to number of foggy or rainy migration nights (when probably 100% would be within this zone).

Page 5-128. The DEIS states that "Mortality rates for the 12 on-shore facilities studied ranged from 0 to 2.8 fatalities/turbine/year." Yet on page 5-127 (2nd to last paragraph), the DEIS states, "The highest fatality rates at onshore wind power facilities in the United States have been about 3 to 7 night migrating songbirds killed per turbine per year (Kearns and Kerlinger 2004, Nicholson 2003)." This is an example of contradictory information that pervades the DEIS avian discussions, generally presented to bias the analysis in favor of the project. This instance is particularly important because the DEIS uses the figure of 2.8 fatalities/turbine/year to "conservatively" estimate that 364 birds could be killed per year (DEIS, page 5-130, top).

This estimate is based on inland turbine mortality. As discussed in our comments about p.5-103 and 5-124, there are substantial reasons why it is unrealistic to use mortality figures at inland wind energy facilities to project mortality at this proposed offshore project. Furthermore, if one were to make such comparisons then one would equally have the right to use the Chestnut Ridge fire tower bird kill figure (see our discussion of p.3-134) in making projections. In this case a 100-ft fire tower killed 73 birds in a night. Extrapolating to 400-ft and considering scavenging losses and birds missed by the searchers, one could easily imagine that more than 100 birds would have been killed on this night by a wind turbine that similarly had no lighting.

The fact is that there is nothing in the literature than suggests that each wind turbine in the proposed project turbine could not kill 100+ songbirds in a night if the right foggy or drizzly weather coincide with significant bird migration. That could be 10,000+ killed by the project in a single night. Right now no one can prove that such events (or larger ones if significant congregation is involved) will not happen. It is known that low cloud ceilings can concentrate a whole migratory flight of songbirds under the cloud level. If cloud levels are at turbine height or below, this brings the whole flight into the path of the turbines. These birds are certainly not expecting tall man-made structures in such flat sea habitat. Birds might be more likely to perish from collisions with the turbine support tower as with impacts from the spinning rotor. In reference to the DEIS's frequent assertions that windmill mortality is small with regard to other mortality, the question arises as to what other source of mortality in the state of Massachusetts might kill 10,000+ birds in a single night?

In summary, the mortality risk for night-migrating passerines at the proposed Horseshoe Shoal wind energy project is totally unknown. Without knowing the potential for congregation of night-migrating songbirds at the structures, one cannot even guess the order of magnitude of actual mortality that will occur at the operational project.

Page 5-131. In discussions about how many terns are likely to occur near any of the proposed wind turbine sites, remember that ~ 30% of any seabird population is made of immature and non-breeding adults (even during the breeding season). Large numbers of these birds are present in the Nantucket Sound area every year (e.g. 3500 at Fernando's Fetch off Muskeget in early August 2001). Thus birds potentially passing Horseshoe Shoal do not consist only of breeding adults traveling to and from their colonies (as implied here).

"Monitoring," page 5-139. The fact that more detailed plans for mortality studies are not included in the DEIS is of concern. These study plans should be formulated before the project is approved. Monitoring mortality at an offshore windfarm is very challenging and to do a good job would require the use of nets that could catch objects the size of a hummingbird. Thermal imaging is also recommended as well as impact sensors on the turbine structure.

In order to obtain a statistically valid measure of bird passage rates and usage of the area, a three year study is recommended to account for inter-annual variations. While it may not provide a valid measure of inter-annual variance, an absolute minimum of one year is needed to account for seasonal variance over a full annual cycle.

Research needs to be carried out on the extent to which such offshore turbine structures and their lighting systems will induce congregation of night migrating songbirds. Such study could be carried out at "dummy" sites in the Sound that were outfitted with similar lighting as proposed for the turbines in the proposed project. Songbird congregation at these dummy sites would be compared with songbird congregation at reference sites with no lighting and at reference sites with lighting that is known to induce bird congregation. At least one full spring and fall migration season would be needed. The success of the study would be dependent on the occurrence of appropriate weather conditions overlapping with nights of significant songbird migration.

Coordinated radar and acoustic studies need to be carried out to monitor tern usage of Horseshoe Shoals at night and in the dawn and dusk periods when risk of collision with the turbines is the greatest.

8. Coastal and Freshwater Wetland Resources (Section 5.8)

The title to Section 5.8 is misleading. It apparently uses the term "Wetland" as construed in the Mass. Wetlands Protection Act. This Act should specify "Wet Land," i.e., two words indicating some type of aquatic resource—not necessarily vegetated. The

discussion extends beyond the Corps' definition of "wetland," which requires emergent or woody vegetation growth. Thus, p.5-139, 2nd par.under 5.8.1., 3rd sentence suggests that the definition of "wetlands" are the same in the context of 13 different regulatory authorities. Yet the term has different connotations within the various regulations. Since the first sentence of the Executive Summary states that the DEIS was prepared to meet the Corps requirements, then it should use the concept of wetlands consistent with Corps usage. This seems to be a clear indication that the DEIS was prepared by a third party (permissible under Corps regulations (33 CFR 325 Appendix B(f)(1) and (2)). However, consistent with the last sentence of 33 CFR 325, Appendix B(a)(2), "[I]n all cases, the district engineer should document in the record the Corps independent evaluation of the information and its accuracy as required by 40 CFR 1506.5(a)." [See also RGL 88-15.] If some other definition is intended as the basis for discussion, then it must be specified. This section deals with land under the ocean, coastal banks, coastal beaches and tidal flats, coastal dunes, barrier beaches, rocky intertidal, salt marshes, land under salt ponds, Designated Port Areas, land containing shellfish, and land on the banks of fish runs. As such, a more appropriate title might be "Coastal and Freshwater Aquatic Resources."

Page 5-139, sec. 5.8.1, bullets. No "Coastal Wetlands Restriction Act" or any other statute at M.G.L. c. 131, Sec. 105 can be found. There is a Marine Fish and Fisheries Act at M.G.L. c. 130, Sec. 105: Protection of Coastal Wetlands, which deals with coastal wetlands restriction. It is unclear why the ESA and the Mass. Endangered Species Act are listed. They are not wetland statutes.

Page 5-140, 1st par. The EIS is relying upon the fact that the cable will be installed with a hydraulic jet plow and that the HDD offshore pit will be allowed to fill itself by natural sediment movement to state that no 404 permit is needed. Apparently, there was personal communication with someone at the Corps in 2002 indicating that these activities do not require 404 permits. Again, this seems to indicate a third party and it is unclear whether the Corps has actually approved the DEIS and adopted it. It would not be unreasonable for such a determination to be made. Nevertheless, it is a challengeable determination and weak because the level of authority that made the determination is not known and apparently is not in writing. The cofferdam pit will be substantial – 65' by 45' by at least 10' deep, with an estimated 840 cy of material removed (Section 4.3.5). The process of construction of the coffer dam is to drive sheet-metal piles into the seabed at the terminus of the HDD, excavate the seabed sediments, haul them away to an upland site, apparently for complete containment (i.e., there can be no return water because it would require a 404 permit). However, it states in Section 4.3.5., that the seaward end of the coffer dam will be left open. It is unclear, how this will contain turbidity with an opening in it. Finally, when all the cables are run, the cofferdam will be removed and the pit allowed to refill on its own from normal littoral drift. This is a big hole. There is no estimated time period for it to refill. In the meantime, it will act as a sump and is unlikely to provide shellfish habitat. It appears, that the main reason that they do not intend to refill this hole is to avoid Section 404 authority.

Page 5-140, last par. before Sec. 5.8.2., last sentence. The referenced Sec. 5.8.6 does not exist.

Page 5-141, Sec. 5.8.3.1.2. "Waters of the U.S." are not defined as stated. The seaward extent is the same as Section 10 (without the extension of review for effects on navigation under the OCSLA), i.e., from the baseline seaward three nautical miles. This boundary has, of course, been recognized now to extend into the midst of the project itself. Landward they extend to the high tide line, not the annual high tide line. Tidal measurements are actually based upon an 18.6-year cycle – not an annual cycle.

Page 5-142, 2nd bullet, penultimate sentence. Why do field investigations to determine the extent of only mapped SAV beds? If you are doing field investigations, you should determine the extent of all SAV beds – whether mapped or not.

Page 5-143, 2nd bullet. The name *Morella caroliniensis* is arcane. Northern bayberry is *Myrica pensylvanica.*

Page 5-143, last bullet, Figure 5.8-3. The proposed cable route should be indicated on this figure and on Figure 5.8-4.

Page 5-144 – 5-145, Wetlands 1 thru 6. In each case, the DEIS states as a certainty under what authorities the wetlands are regulated. However, there is no indication that the wetland delineations have been approved, i.e., that there are final jurisdictional determinations (JD). If the Corps has not formally adopted the DEIS as accurate, then all boundaries are suppositional until there is an approved JD. If JDs exist, then they should be referenced and attached as appendices.

Page 5-144, penultimate par. What is the date of the "current" USGS map, is there a reason why the stream no longer may be perennial and what were the climatic conditions during Oct. 2001 and Dec. 2002?

"Wetland 5," page 5-145, and Figure 5.8-2: Sheet 7 of 8. In the fifth paragraph, the date of the USGS map should be provided. The southern end of the delineation on Figure 5.8-2 terminates before it should. It is quite possible that the wetland extended further to the south parallel to the road and, therefore, more buffer would be impacted.

"Wetland 6," page 5-145. Since the vegetation parameter was questionable at this point and the authors relied upon evidence of hydrology and hydric soils and used an MADEP criteria rather than Corps 1987 Manual, it is even more important that a JD be obtained before a definitive statement is made about regulatory authority. It seems unlikely that the Corps would have used the MADEP criteria when arguably the 1987 Manual would have covered this situation.

Page 5-147, last par., last sentence. To be consistent with Corps terminology the phrase "wetland resources" should be changed to "water resources."

Page 5-148, 1st par., last sentence. To be consistent with Corps terminology the phrase "wetland resources" should be changed to "water resources."

Page 5-148, 5.8.4.2.1 Lewis Bay, 2nd sentence. It is unclear how the cable "route" inside the 3-mile limit can be "similar in nature" to the route outside the limit? At each increment, no matter how small, the "route" is different. Is it meant that the direction is similar? The impacts "along" the route are similar? The installation technique is similar? The sediments "along" the route are similar?

Page 5-149, 3rd par. Does this paragraph indicate that all SAV beds have been examined—not just those mapped (see previous comment on page 5-142)? If so, that is as it should be. While the intent is expressed to modify the cable route, there is no indication of whether or not modification was necessary and whether it occurred. This also counters the statements made at p.1-14 to 1-15, last bullet that indicated a post-construction monitoring plan would be implemented which indicated a lack of avoidance.

Page 5-149, 5th par., 1st sentence. There is more discussion of the HDD pit without any discussion of its depth (see comment on page 5-140). In the 3rd last sentence of the paragraph, the depth is finally specified. The depth is at least as important as the length and width and should be specified each time the length and width is.

Page 5-149, 6th par., 3rd sentence. Specifying that a depression "could be several feet deep" after the cofferdam is removed is inadequate. It seems that at the center of the pit, the depression may be almost 10 feet deep, depending upon the angle of repose of the sediments. How long is it anticipated that the depression will exist after the cofferdam is removed. What will happen to any invertebrates including shellfish that colonize the sands while it is a deep depression if the depression refills rapidly during a storm event? Does the Corps consider this to be an appropriate means of restoring a temporary impact since the obvious reason it is being proposed is to avoid a 404 discharge. This is certainly not consistent with restoration as discussed in many of the NWPs (e.g., 3, 12, & 33) for temporary impacts. The Corps has the authority to require refilling under Section 10.

Page 5-151, 3rd last par. It should be a requirement that no excavated soil will be temporarily stockpiled within the buffer zones unless specifically permitted by the regulatory authority.

Page 5-152, ROW Route, 1st par., 3rd sentence from end. Reseeding should be done with a native plant mix.

Page 5-152, ROW Route, 2nd par., 1st sentence. The term "laydown areas" is unfamiliar. If this does not refer to the location of sidecast materials, then there must be a discussion of sidecast material placement.

Penultimate sentence, Figure 5.8-2. Sheets 2 to 8 show that the road, and thus, the cable placement intersect buffer zones for every wetland along the route. How can the only place where work might impact the buffer zone be at Wetland 6? It appears that the buffer zones at all the wetlands will be invaded during cable placement since the roads themselves are in the buffer zone. Any work that is not on the road surface itself will intrude into the vegetated portion of the wetland buffer zones.

Page 5-152 (5.8.5.), last par., 3rd sentence. How can this project be water dependent? It is wind dependent. There is an upland alternative possible and there are numerous wind farms on land throughout the U.S. and the world. The assumption should be that it is NOT water dependent: it does not REQUIRE access or proximity to water – only to the wind. It is very unlikely that the Corps could find this project to be water dependent. The discussion must then be expanded to include the ramifications of a determination of non-water dependency.

Page 5-158, Coastal Wetlands Restriction Act. As discussed in the comment on page 5-139, Section 5.8.1 bullets, the referenced citation should probably be "M.G.L. c. 130, Sec. 105" and the name more appropriately may be "Protection of Coastal Wetlands."

Page 5-158, last par., 1st sentence. Specify the depth of the pit.

Page 5-159, 1st par. Requirement of a water quality certification is discussed in the comment on page 5-139 continuing to 5-140.

Page 5-159 to 5-160, last par., 2nd sentence through end of par. Has the proponent sought a determination by the Yarmouth Conservation Commission? If not, why not and when will they? If so, what is the status?

Page 5-161, 3rd par., 1st sentence. Will there be any stockpiling of materials in buffer zones or other sensitive areas? If so, where, what and why can't it be avoided?

Page 5-161, 5th par., 1st sentence. Why has not CWA already requested Limited Project Status and when will it do so?

Page 5-161, last par., last sentence. The document should specify native species for reseeding.

Page 5-163, 3rd par., 2nd sentence. This states that the entire route is not within 35 feet of a wetland, yet based upon Figure 5.8-2, it appears wetland 1A is close to the 35 ft zone and wetlands 2, 2A, 3 and 5 are within the 35-ft zone.

Page 5-163, penultimate par., 2nd sentence. What construction techniques will be used in those areas where the transmission line will be below the water table? Will the trench be pumped during construction? If so, where will the pumped water be discharged?

Page 5-163, last par. This paragraph seems to contradict the statement made on p.5-152, ROW Route, 2nd par., penultimate sentence. After review of Figure 5.8-2, it appears that the transmission line will intersect the 100-ft buffer zone at almost all wetlands.

9. Cultural and Recreational Resources and Visual Studies Comments (5.10)

The importance of aesthetic value has been asserted by some as being of secondary importance to people, or that aesthetics is too subjective to evaluate. In both cases, this position is mistaken. The public consistently gives a very different response when asked. For instance, the survey for the Massachusetts outdoor recreation plan found that the primary reason for being satisfied with a recreation area is its "attractiveness" (DSC 2000, p. 38). This and many other studies indicate that we ignore the importance of aesthetic value at our peril. As for evaluating subjective values, such as aesthetics, this is done all the time since it is the basis of a market economy. The concern lies with whether the evaluation is valid and reliable, not whether the attribute being evaluated is subjective (Palmer and Hoffman 2001), and systematic methods have been developed to evaluate landscape aesthetics (e.g., Smardon et al. 1988).

The CWA DEIS acknowledges the legal authority of 33 CFR Part 320 over the project (page 7-2). The DEIS further acknowledges that this legal authority requires a public interest review: "All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people" (DEIS page 7-3 and 33 CFR Section 320.4(a)). Of particular relevance to section 5.10 of the DEIS is that aesthetics, recreation, and historic properties all must be evaluated. Historic properties are not given priority in this list, though they hold equal importance with all other concerns. It is also important to note that "visual" is not the relevant factor; rather it is "aesthetics." From Webster's Dictionary (1971, p. 15) aesthetics is "1: a branch of philosophy dealing with the nature of the beautiful and with judgments concerning beauty, 2: the description and explanation of artistic phenomena and aesthetic experience by means of other sciences (as psychology, sociology, ethnology or history)". It is unfortunate that the DEIS chose to use the word "visual" as a synonym for the mandated factor "aesthetics." It is the responsibility of the DEIS to evaluate the "aesthetic factors" associated with the project, and "visual" must be treated as a synonym for aesthetic concerns, not simply visible effects.

Section 5 of the DEIS "describes the existing environmental conditions for the Applicant's proposed action at Horseshoe Shoal, and examines the potential impacts resulting from the construction, operation/maintenance and decommissioning of the proposed wind park..." (page 5-1, paragraph 1). The Corps fails to fully consider aesthetics because of two inappropriate decisions. First, it limits the DEIS to impacts from (or to) historic properties. There is no basis in the regulations for such limitation. In the context of the culture and economy of Cape Cod and the Islands, aesthetics is clearly a much larger concern than can be represented by historic properties. Second, the DEIS substitutes the word "visual" (i.e., visible) for "aesthetics" (i.e., judgments concerning beauty) and describes the visual effects primarily by creating photographic quality visual simulation from selected views. Well developed techniques (Smardon et al. 1984) and procedures (e.g., Smardon, et al. 1988; USDA 1996) exist to evaluate aesthetic impacts and they should be used in the DEIS. This failure is conspicuous, since the Corps' own *Planning Guidance Notebook* (2000) requires the use of such a process and recommends the use of Smardon, et al. (1988). The presented consideration of aesthetic concerns is inadequate, primarily because it limits the Area of Potential Effect (APE) to historic properties, presents only visual effects, and fails to systematically document and evaluate aesthetic concerns in any way. A comprehensive study of aesthetic impacts is warranted because the aesthetic experience is one of the foundations of the culture and tourist economy of Cape Cod and the Islands. A detrimental impact to this foundation could have devastating effects on the public's needs and welfare.

The DEIS fails to recognize the adverse impact of the large wind farms on recreational boating, particularly sailing. Although Nantucket Sound is known as one of the premier sailing areas in the world, the DEIS seems to limit adverse effects to only one sailboat race event, the FIGAWI. This overlooks the fact that recreational (non-racing) sailors will also have to cope with the wind eddies and current variations caused by the towers. DEIS Section 4.1.2 mentions placement of the wind turbines to minimize energy losses due to lower wind speeds in the wakes of upstream wind turbine generators, but no mention is made of the adverse effect of wind wakes on sailing conditions. The DEIS (Section 3.4.3.2.13) also mentions that currents up to 2 knots are present in the area, so the tower bases will also leave water wakes.

Sailboats sailing into the wind must tack (turn 90 degrees left or right) periodically to make headway upwind, and the problems of sailing and tacking back and forth in an array of turbine columns with their wind eddies and current wakes will make the area essentially useless for recreational sailing. The well-known fog conditions present on the Sound will further diminish effective use of the area by all recreational boaters in the wind farm areas. The fact that this will clearly impact the reputation and economic viability of the Sound as a premier sailing venue is not addressed in the DEIS. The EIS should address the economic impact of diminishing the desirability of the area as a boating venue, including inability to host an America's Cup racing series and other effects on the recreational boating industry.

The DEIS fails to consider impacts from the project to aesthetic and recreation experiences at non-historic sites. The magnitude of this failure is enormous, since the area of non-historic properties that provide high quality aesthetic and recreation experiences is much larger than the area of historic properties. However, this failure is particularly troubling for two critical resources that have special scenic protection: the Waquoit Bay Area of Critical Environmental Concern [301 CMR 12.12] and the Monomoy National Wilderness Area [16 U.S.C. s. 1133(b) (1988)]. This failure must be corrected.

Page 5-173, 2nd par. Section 5.10 "describes historic properties, including archaeological sites, and recreational resources identified within and in the vicinity of the Project area, and describes the Project's potential effects, including visual effects, on these resources." The DEIS is responsible for evaluating aesthetic factors, not visual effects, under its public review responsibility [33 CFR Part 320 Section 4(a), and DEIS page 7-3]. It is also relevant that it is the policy and requirement of the "Federal Government to use all practicable means…to assure for all Americans…aesthetically and culturally pleasing surroundings" [NEPA Section 101 (b)]. Aesthetics involves making "judgments concerning beauty" (Webster's 1971, p. 15). It is also noted that "visual effects" (or aesthetic impacts) are not an impact on "resources" but on the people who are experiencing the landscape. In the context of this project, the DEIS fails to describe the aesthetic impact that these "visual effects" have on the experience of residents, tourists, and others.

Page 5-173, 3rd par. The visual documentation and analysis reported in section 5.10 places an unwarranted restriction to "representative views of…historic properties." No such limitation is implied in 33 CFR Part 320 Section 4(a).

There is little to no evaluation of the "Project impacts on local character and culture, tradition, and heritage" described beyond that to historic properties. Just as historic properties in an inadequately represents all possible aesthetic impacts, it is also inadequate to represent the local character and culture, tradition, and heritage of Cape Cod and the Islands, which are the general area impacted by this project.

Page 5-173, 5th par. In the area of "aesthetic factors," a simple characterization as "temporary or permanent, and determined both individually and cumulatively to have either no effect, no adverse effect or an adverse effect" is inadequate because it gives no indication of the cause or magnitude of the several components that contribute to such a decision. An aesthetics assessment procedure must be used that documents the results at each stage (e.g., Smardon et al. 1988). This documentation is important to demonstrate (and for critics to test) the reliability and validity of the analysis (Palmer and Hoffman 2001).

Page 5-173, 8th par. The project's Area of Potential Effect (APE) is inappropriately limited to historic properties. "The Project's APE for visual effects includes those historic properties…from which open views of the visible components of the Wind Park (aboveground and above water) would be available" (page 5-173, paragraph 8). Historic

properties are important and have special requirements [36 CFR Part 800 Section 16(d)], but this does not supercede the more general public review requirements for aesthetics required by 33 CFR Part 320 Section 4(a). The appropriate APE for visual aesthetic impacts is the potential viewshed of the project (i.e., the area that may potentially view the project) during construction, operation, maintenance, and decommissioning. A potential viewshed is calculated using only topography, and does not consider screening effects of elements such as vegetation or buildings that may be removed by human or natural causes.

Page 5-174, 1st par., line 1. It is inadequate to simply assert, "it was found during field reconnaissance that open views were generally limited to historic properties in the immediate vicinity (within approximately 300 feet (91.1 m)) of the shoreline)." This is stated again, more clearly on page 5-204, paragraph 5: "the visual APE defined as 300 feet from the shoreline". A viewshed analysis and documentation of systematic fieldwork are required further action on this application.

Page 5-174, 1st par., line 4. In the field of visual aesthetics analysis, "potential views" includes viewpoints that would have a view if only topography were concerned, without the screening effect of vegetation and other elements that could be removed by human or natural causes. In the case of historic properties the potential viewer should be considered standing in an upper story window or widow's walk, since such locations were frequently designed for optimal viewing of the sea. Potential views clearly were <u>never</u> the focus of the DEIS, which is limited to ground level views from primarily historic properties within an arbitrary band of 300 feet from the shoreline. A potential visibility assessment of the project, using GIS software, needs to be conducted. This assessment should be used to help identify additional viewpoints for simulations, and analyze the extent of aesthetic impacts from the project.

Page 5-174, 4th par. This paragraph implies that all cultural resources are historic properties, particularly as described in the National Historic Preservation Act. However, the cultural resources of Cape Cod and the Islands are much more extensive than this. Cultural resources are one aspect of the context that is necessary to evaluate aesthetic impacts. The DEIS recognizes in passing throughout the document that Cape Cod and the Islands are dominated by a maritime culture that supports tourism and other activities (e.g., "Maritime interests and prosperity increased, defining part of the historic character of the Cape and Islands that continues to be recognized today" (p. 5-182). "Whether associated with early settlement, fishing, coastal trading, whaling, summer resort, or as a Summer White House, all the properties assessed in the VIA are linked to the proximity of coastal waters" (page 5-204)). It is the responsibility of the DEIS to describe this culture and its visual characteristics. For example, O'Connell (2003) and York (2004) do this. Studies by Palmer (1993, 1997, 2004) have found that residents of Dennis, Massachusetts culturally identify beaches with Cape Cod, and that the beaches are among the highest scenic value landscapes. The Project will change the focal view toward the sea from a unified natural seascape to one with an industrial intrusion that the VIA determines to be "adverse" in all 10 scenes it evaluated. The failure of the DEIS to evaluate this change is essentially

asserting that the landscape character and aesthetic values for which people come to Cape Cod and the Islands are not important. However, they are important and a comprehensive analysis is needed.

Page 5-174, 4th par. The relevant Federal regulation governing public review of aesthetic and recreation impacts the Project is 33 CFR 320. This is inappropriately ignored throughout this section.

Page 5-175, 9th par. The Visual Impact Assessment is inappropriately limited to historic properties, and is not adequate to meet the requirements of NEPA or 33 CFR 320.

Page 5-176, 2nd par. The Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation must be met, but they are not sufficient to conduct an adequate Visual Impact Assessment of the Project under NEPA and 33 CFR 320.

Page 5-178, 2nd par. The DEIS assertion that a list of "Known historic properties in communities within potential visual range of the offshore turbines were compiled" is unsupportable without a visibility viewshed analysis. Such an analysis was not conducted.

Page 5-178, 8th par. Recreation resources also come under 33 CFR 320 public review (DEIA p. 7-2).

Page 5-178, 8th par. No visibility or viewshed analysis of the project is presented. Therefore the assertion that "the Project would not have long-term visual or physical effects on inland recreation resources" is unsupportable. In addition, it is aesthetic impacts, not visible effects that are of concern.

Page 5-178, 8th par. Limiting the search for recreation resources to the MassGIS recreation layer is inadequate. For instance, there are likely school play areas, retail facilities near the shore, and public parks not identified in this list. An aesthetic experience may play an important role in the quality of all these areas. In order to evaluate the impacts to recreation and tourism experiences, the DEIS must characterize the various recreation experiences people have on Cape Cod and the Islands, and their sensitivity to impacts from the project. Further, the DEIS fails to identify the number of people having recreation and tourism experiences who may be impacted.

Page 5-179, 1st par. While this section is titled "Visibility Study," there is no information about visibility presented. Rather, it declares that the CWA and MHC staff agreed upon 12 viewpoints that were "representative" (page 5-179, paragraph 8, line 1) and were to be used "to assess potential visual impacts to known historic properties, and to provide a sense of anticipated change in the seascape at other sensitive locations, such as nearby recreation resources (primarily beaches) within the viewshed" (Page 5-179, paragraph 1, lines 3-5). No scientific sampling procedure to assure representativeness is described. Nor is there any attempt to represent the full range of sites that must be considered under 33

CFR 320 public review. However, if the sites evaluated in the VIA are "representative," then the severity of the aesthetic impacts make the Project unacceptable. All 10 evaluated sites were found to have "adverse" impacts, even when visible from as far away as 15 miles (e.g., viewpoint 1, Nobska Point Light Station, and viewpoint 26 Monomoy Point Light).

Page 5-179, 6th par. (and other locations). A viewshed is the "surface areas from which a critical object…is seen" (Smardon et al. 1986, p. 322). The expedient of defining the viewshed as including "the area within 300 feet (91.5 meters) of the perimeter" of the site is unjustified. This is particularly so, since MassGIS data and the GIS software to access it are used elsewhere and could have been used to calculate potential visibility. The potential viewshed should be identified using only topography and without considering screening elements that may be removed for development purposes or natural causes. A second analysis considering screening effects may be conducted to identify the existing viewshed.

Page 5-181, 3rd par. Were the proposed nighttime lights installed on the SMDS tower? If so, the Corps must provide nighttime photographs and a high-resolution digital-video of the lights.

Page 5-181, 6th par. "Cultural context" is not synonymous with historic properties. Therefore this section provides an incomplete description of existing conditions. This general problem is discussed above.

Page 5-185, 1st par. It is people, not resources, that are the target of aesthetic and recreation impacts. The DEIS fails to provide any information about the number of people using the recreation resources within the viewshed of the Project. It also fails to describe the nature of the recreation experience and its sensitivity of impacts from the project. Leeworthy (2001) prepared a special report of 1999 coastal (saltwater) recreation participation by residents of the 24 coastal states. Massachusetts had the ninth largest population and ranked ninth among these states for the number of residents visiting beaches (2,779,169). However, Massachusetts placed a disproportionately high emphasis on coastal viewing activities, which includes bird watching, viewing other wildlife and viewing or photographing scenery, where it ranked third (2,143,198). The study only sampled American residents, and only asked in which state they lived, not which coastal areas they visited. So these numbers do not include foreign visitors or visitors from other states, which in the case of a major tourist and vacation destination like Cape Cod and the Islands will raise these numbers substantially. Even a conservative estimate would place the annual number of people seeking a "natural nearshore southern New England seascape" (page 5-185, 6th par.) experience who would be adversely affected by the Project will be in the millions. The failure to provide this information not only is a serious flaw in the DEIS, it also disables the Corps from making a public interest evaluation because this critical information is missing.

Page 5-185, 1st par. Estimates for recreational boating within Horseshoe Shoal are presented in Section 5.16 (page 5-265). However, there is no indication of the number of recreational boats using the channels, or other areas in Nantucket Sound. This boat traffic is the source of a large number of people experiencing the "natural unified nearshore Southern New England seascape" (page 5-185, 8th par., with similar characterization for State waters on page 5-186, 6th par.) of Nantucket Sound and includes recreation boaters, fisher people, and people on the ferries to Nantucket and Martha's Vineyard. How does the Project impact their experience? The DEIS is silent about this point. While there is no documented description of the "visual effect" of the Project for these people, there is an indication in Appendix 5.10-F. In the Appendix to this Appendix, there is an undocumented visual simulation from the ferry between Hyannis Port and Nantucket. This simulation is from viewpoint 25, which is not referenced in the DEIS, and is labeled "Figure 5.10-3 Sheet 13 of 13." However, it does not appear in the DEIS's "Figure 5.10-3," which now only has 12 sheets. No reason is given for its omission (or mistaken inclusion in Appendix 10.5-F). Based on the other determinations made in the VIA, a view from this distance must have a hugely "adverse effect."

Page 5-186, 3rd par. A partial list of recreation activities is given, but no attempt is made to describe the numbers of participants, or characterize their recreation experience. Without such a description, it is impossible to determine the impacts from the Project.

Page 5-186, 6th par. It is recognized that "summer tourism is a major economic force," but what does "enhancement" mean in this context, and what does it have to do with characterizing the visual character and setting in State waters? This admission also highlights the problems presented by the Corps' public review procedure, structured to occur during the off-season when this sizable summer population was not available to participate effectively or conveniently.

Page 5-189, 2nd par. It is recognized that the Nobska Light "is important for its scenic qualities." However, there is no characterization of these scenic qualities, which are important for determining aesthetic impacts.

Page 5-189, 3rd par. The photograph and simulation appear to be taken from the "base" of Nobska Light. However, the Project is more visible from atop the light. The character of historic properties is protected whatever their ownership. The DEIS recognizes elsewhere that "views are likely available…especially from the upper stories" (p. 5-190, line 1). Since structures on Cape Cod and the Islands are commonly designed to take advantage of views toward the water from upper stories, these views must be considered. This comment applies to all the historic properties discussed, "regardless of ownership" (DEIS page 5-204), and many other properties as well.

Page 5-189, 4th par. This paragraph is representative of the characterization of the 12 historic properties. While it is an improvement of previous descriptions, it still fails to explicitly address aesthetic/scenic character and qualities. This comment applies to all the

historic properties discussed. No attempt is made to classify and characterize Cape Cod and the Islands, except for these 12 historic properties.

Page 5-190, 1st par. The DEIS recognizes elsewhere that "views are likely available from many of the large shoreline homes, especially from the upper stories." Since this is so, and since these structures were often designed to take advantage of views to the water from the upper stories, the DEIS must analyze the aesthetic qualities of these views and the impacts to them from the project.

Page 5-190, 2nd par. The Cotuit Historic District and several other of the 12 historic properties were place on the National Register because of their "feeling and association." This feeling and association needs to be described in the DEIS, and the potential impact to it from the Project analyzed.

Page 5-190, 9th par. How is it possible that viewpoint 6 is taken from "the Wianno Historic District [which is] in the Village of Osterville" and that "no views toward the water to the south were found in the Village of Osterville"?

Page 5-191, 2nd par. While "the structures on the bluff at VP 7 have not been determined eligible for listing on the National Register" it is still an important and highly aesthetic seashore view, and a viewer's aesthetic experience will be significantly impacted by the proposed Project. It was inappropriate to remove consideration of this view from the VIA study.

Page 5-195, 7th par. The DEIS must present recreation participation statistics for recreation activities and areas that are potentially impacted by the project. It is impossible to fully determine the impacts to the recreation experience without these figures.

Page 5-196, 5th par. The Waquoit Bay Area of Critical Environmental Concern is afforded special protection for its scenic resources. The Massachusetts Area of Critical Environmental Concern Regulations [301 CMR 12.12] states: "(1) All EOEA agencies shall take action, administer programs, and revise regulations in order to: … (c) ensure that activities in or impacting on the area are carried out so as to minimize adverse effects on: …6. scenic and recreational resources… (2) All EOEA agencies shall subject the projects of federal, state, and local agencies and private parties to the closest scrutiny to assure that the above standards are met for any action subject to their jurisdiction." The DEIS is deficient because it does not consider these efforts.

Page 5-197, 4th par. The Monomoy National Wilderness Area is afforded special protection for its scenic resources. One public purpose of all wilderness areas is to provide "scenic" use [16 U.S.C. s. 1133(b) (1988)]. The potential aesthetic impacts from the Project shall have been analyzed in the DEIS.

Page 5-198, 6th par. It is inappropriate to substitute "historic properties" for "cultural resources." A complete analysis of impacts to all cultural resources, including but not limited to aesthetic and recreation resources, must be made.

Page 5-198, 6th par. No study of "visual impacts on recreational uses" is conducted, so these impacts cannot be described. The VIA is specifically limited to 10 historic properties. The 2 viewpoints that were removed from the original 12 were done so because they are not from historic properties listed in the National Register.

Page 5-198, 5th par. While no study of aesthetic impacts is conducted for recreation resources, one simulation of the project from the water is included in the Appendix to Appendix 5.10-F. This simulation is what a recreational boater or person on the ferry going or returning to a vacation on Nantucket might see. Compared to the 10 views evaluated and found to have an "adverse effect" by the VIA study, the presence of the turbines in this view is overwhelming. While 10 of the 10 representative views from historic properties were found to have "adverse effects" from the Project, it is very clear that these pale in comparison to the impacts from this non-historic property viewpoint. The DEIS must complete a comprehensive analysis of Project impacts to aesthetic and recreation experience. This must include an estimate of the potential number of people so affected.

Page 5-198, 6th par. The assertion of an 8-mile zone of significant influence has not been supported or otherwise justified by in the DEIS. The VIA study's finding of adverse effects at Nobska Point Light Station (14.1 miles to the project) and Monomoy Point Light (14.9 miles to the project) demonstrates the inappropriate arbitrariness of this limit.

Page 5-200, 2nd par. "The Project would add a built element to existing daytime views of the seascape, and would cause a change in daytime views of the Horseshoe Shoal area as presently experienced by recreational boaters." This sentence is indicative of the neutral statements of "visual effects." However, to determine aesthetic impacts, which is the responsibility of the DEIS, one needs to consider the aesthetic qualities of the seascape (the DEIS states that it is a unified and natural marine environment), the recreational boaters' experience (which the DEIS fails to document), and their compatibility with an industrial facility composed of 130 vertical elements as high as 127 meters and as wide as 104 meters, spread over a 24 square mile area. The failure to characterize these qualities makes it impossible to analyze the impacts to aesthetics and recreational experience.

Page 5-200, 5th par. This section on Cumulative Impacts does not address the serious problem that once a prized landscape is degraded by one large project, that degradation is used to justify further degradation. The logic is the same as used to describe the impacts of the MMR Alternative Site: "The existing built features already in the viewshed result in less visual contrast when the turbines are added in the landscape than for the offshore Alternatives" where there are no built structures present (page 3-202, 3rd par.). The

cumulative impact threat is that once defiled, Nantucket Sound will continue to be sacrificed to protect other areas.

The cumulative impacts to aesthetics and recreation experience are not presented in this section. There is a valid concern that a project of the size and incompatible character of the proposed wind energy plant will set a precedent that could lead to all of the Nantucket Sound alternative sites being developed for wind energy. What is keeping such development from happening is regulations that seek to maintain environmental (including aesthetics and recreation) quality (e.g., NEPA). The effectiveness of these regulations becomes undermined once one major project degrades that quality. If this first significant affect is not stopped, then future projects cannot be resisted on this basis. If this assertion is true, then poses a serious threat to the tourist economy of this part of Cape Cod and the Islands, since they are based largely on the promise of high quality and unique aesthetic and recreational experiences. This is the cumulative threat that the DEIS must address.

Page 5-203, 1st par. Noise impacts are a reasonable concern to the aesthetic and recreational experience. However, section 5.10 does not characterize noise and its impacts, therefore this paragraph should be removed from this section. However, the DEIS should address the impacts of noise to the aesthetic and recreational experience.

Page 5-203, 2nd par. The selected viewpoints may or may not be the "worst case" portrayal of visual impacts. The DEIS characterizes the 12 selected viewpoints as "representative", and should be held to this characterization, or should be required to conduct a thorough analysis of aesthetic and recreational experience impacts. It is insincere to avoid a responsibility and then complain that such avoidance creates an unfair representation of the actual conditions.

Page 5-203, 3rd par. The DEIS is responsible for analyzing impacts. To do this, it needs to identify days when there is some visibility of the project, not the number of days when there may be obscured visibility at some point during the day.

Page 5-203, 6th par. The DEIS states that "The daytime simulations were constructed to incorporate a variety of lighting conditions." It then indicates that front lit or backlit conditions accentuate the visual effect, and gives examples. The DEIS then asserts "when the structures are sunlit from the side, turbine color blends well with the surrounding seascape." Which of the 12 simulations, all of which are determined to have adverse effects, are representative of this lighting condition?

Page 5-203, 8th par. The DEIS states: "A Visual Impact Assessment (VIA) was conducted by an architectural historian at PAL, to provide a professional assessment of the Project's effects on historic properties…." The architectural historian may have been qualified to conduct a review under Section 106 of the NHPA and related historic preservation regulation. However, there is no indication why this person would be professionally

qualified to conduct an analysis of landscape aesthetic impacts of the sort required by 33 CFR 320.

Page 5-204, 2nd par. This paragraph describes why only 10 simulations were evaluated in the VIA study, when simulations were created for all 12 original views. "The Craigville Historic District *(Viewpoint 5) was not found to have Project visibility* and was not included in the VIA" (emphasis added). First, Cotiut Historic District is viewpoint 5, and Craigville Historic District is viewpoint 7. Second, the VIA states "This visual impact assessment addresses 10 of the 12 total viewpoints in the EDR simulation study. In accordance with the methodology established in Chapter 2, which limits the visual impacts assessment to designated historic properties, one viewpoint from the Craigville area (not in any historic district) in Barnstable (Viewpoint 7), and one from Tuckernuck Island (a State Register, but not National Register, property) near Nantucket Island (Viewpoint 24) are not included in the visual assessment" (Appendix 5.10-F p. 33). Third, a look at the Craigville simulation (Figure 5.10-3 Sheet 4 of 12) shows a clear view of the Project, similar to the view from other views with an adverse effect.

Page 5-204, 4th par. The DEIS states that "The resolution of adverse effects takes place through development of a Programmatic Agreement," a draft of which is included as Appendix 5.10-G. The agreement does not do anything to eliminate, minimize or mitigate the aesthetic impacts one can infer from the simulations. All suggested mitigations are already portrayed in the simulations. In all 10 views evaluated, these impacts were found to be adverse. In addition, there is no recognition of the responsibility to eliminate, minimize or mitigate the aesthetic impacts to all properties on Cape Cod and the Islands.

Page 2-08, 7th par. The DEIS states "night time visibility of the FAA aviation warning lights…is not greatly affected by distance under clear sky conditions." The stars of the night sky are an important cultural resource that is a particularly important part of the experience of natural areas, such as those available on Cape Cod and the Islands (Borden 2004; IDA 2004). To simply state that the condition exists is not an analysis of its impact, which is required as part of the DEIS. How important is the experience of the starry night sky over Nantucket Sound? What is the quality of this experience? How may people come to Cape Cod in part for this experience? How will the introduction of numerous flashing and colored lights into this night view affect this experience? Answering these questions puts us on the track of understanding the nighttime impacts of the project on people who come to the Cape and Islands for a natural seascape experience that includes enjoyment of the starry sky over the Sound.

Page 5-209, 6th par. This section on Cumulative Impacts does not address the serious problem that once a prized landscape is degraded by one project, that degradation is used to justify further degradation. The logic is the same as used to describe the impacts of the MMR Alternative Site: "The existing built features already in the viewshed result in less visual contrast when the turbines are added in the landscape than for the offshore Alternatives" where there are no built structures present (page 3-202, 3rd par.). The

cumulative impact threat is that once defiled, Nantucket Sound will continue to be sacrificed to protect other areas.

Page 5-209, 9th par. The DEIS states that "The visual impacts on onshore recreational resources from development of the Project would be essentially the same as those described for onshore historic sites." However, it never states what those impacts are. The Project had an adverse effect on all (100 percent) of the evaluated views, and the area of tourism and recreation oriented properties far exceeds those for historic properties. Such impacts to the tourism and recreation economy of Cape Cod and the Islands could cause a significant economic hardship for which CWA is responsible.

Page 5-210, 8th par. The DEIS section on mitigation does not mention recreation and tourism properties, which are the foundation of the Cape Cod and Islands economy.

Page 5-211, 2nd par. All of these mitigations are represented in the visual simulations. No new approaches are offered to mitigate the adverse effect portrayed in the simulations.

Page 5-211, 3rd par. This paragraph is in error and misleading. The parenthetical phrase "(no effect, no adverse effect)" in the first line is unrelated to any finding and can only be included here in an effort to mislead readers. The second sentence suggests that there were evaluated sites that were found not to have adverse effects from the Project. This is false; the VIA report prepared by PAL evaluates only 10 sites, and all were found to have an "adverse effect" from the Project. The draft Programmatic Agreement offers no way not already represented in the simulations to eliminate, "minimize, or mitigate any adverse visual effects to historic properties." The proposed agreement does nothing to resolve the adverse effects identified by the VIA report. In addition, the proposed agreement fails to acknowledge responsibility to non-historic properties, such as the recreation and tourism resources upon which Cape Cod and the Islands' economy is based.

10. Noise (5.11)

On the bottom of page 5-218 the authors dismiss the sound from vibratory sheet-pile driving as being "low-noise." However, such pile driving can make significant sound at frequencies to which some fish may be sensitive. Measurements are being conducted of vibratory pile driving at other sites. If protected species of fish are expected at the ocean end of the boreholes, then sound and vibration measurements should be made when cofferdam construction begins to confirm that the levels are not harmful.

Clearly the authors of the DEIS should look at the three NRC reports on underwater sound, and particularly the 2003 report (cited in the reference list below). This gives a far better explanation of underwater sound (using the dB re 1 μPa reference value) and noise variability over the oceans.

The DEIS talks about levels at 500 m from the source for the pile driving operation, and this is a level that gets up to 172 dB (also section 5.11.2.9). This is well within the hearing sensitivity of many fishes, and numerous fishes will be living much closer to the source than 500 m. (It should also be noted that the maximum signals from the pile driving are right within the range of hearing of the majority of fish species.) Thus, there will be many fishes that are exposed to what is sure to be a much higher sound level for this size pile, significantly above 180 dB re 1μPa). Since fishes, unlike marine mammals, cannot be seen from the surface, there is no way for an observer to potentially stop pile driving when fish are close to the source. And, unlike marine mammals (for which the 500 m limit may be derived), fishes cannot move from the source too quickly. Thus, if they near the source at the initiation of pile driving, they will be exposed to very high levels for an extended period of time. Moreover, fishes that are resident are not likely to move from their residence (this is normal fish behavior) and thus be subject to continuous ensonification for the duration of the pile driving.

In essence, the 500 m limit is not useful for fish. Moreover, the 180 dB sound level has been shown to cause significant temporary hearing loss in hearing specialist fishes (some of those that are potentially in the region of the pile driving include alewives, herrings, menhaden, Atlantic cod, and related species) even with exposure as short as 10 minutes (Smith et al. 2004a, b). Moreover, hearing loss increases with duration of exposure, and can result in long term hearing loss. It should be pointed out that the Smith et al. (2004a, b) data are not directly comparable to effects from pile driving since the studies were done with continuous noise under controlled situations (but at lower sound levels than even the 180 dB limit). Moreover, the evidence is that fish recover from the exposure in the Smith et al. studies. At the same time, recovery can take hours or days, and if a fish has a temporary hearing loss for this time period it may be more subject to predation than non-affected fish (see Popper 2003; Popper et al. 2004). During the period of temporary hearing loss (often called Temporary Threshold Shift – TTS), fish might have a harder time finding prey, communicating with conspecifics, etc. As a consequence of TTS, survival of fish may decrease relative to normal animals.

While the results for the fish observations at the pile driving operation at the San Francisco-Oakland Bay Bridge (SFOBB) has some problems, it is clear from these studies (see references in reference list provided) that fishes close to at least some pile driving operations are killed by the sounds produced by pile driving. The extent of kill is not clear, nor is there any good correlation between size and type of pile and the extent of fish kills, but this is an issue that must be considered in the DEIS. Moreover, the nature of a kill may be related to the specific species (e.g., there are some data suggesting that fishes without a swim bladder are less likely to be affected by high intensity sounds, and explosions, than fishes with a swim bladder).

Evaluation of the actual effects of pile driving on fishes is complicated by the nature of the sounds produced by pile driving. The SFOBB studies used caged fishes to ascertain effects on fishes at different distances from the source. However, what was not taken into

consideration was the issue that sound from pile driving not only carries through the water directly from the pile, but also through the substrate as the pile is pounded into the bottom. The signal through the substrate can enter the water, and it can interact with the signal coming directly from the pile (via the water). As a consequence, the sound level at a distance from the pile can be higher than the sound level closer to the pile.

11. Transportation and Navigation Comments (5.12)

There is little new information or data presented in Section 5 that has not already be reported and commented on in the proceeding sections. Since much of the data on marine transportation and navigation is repeated in Section 5, our earlier comments apply equally to this Section.

A report by The McGowan Group and its conclusions regarding navigation and marine pollution risk of the Nantucket Sound site has been overlooked or ignored in this DEIS (McGowan Group Report, 2004). The report's conclusion that the Nantucket Sound project is incompatible with the marine transportation needs of the area, creates unacceptable risks to the environment and shipping and is fatally flawed due to the failure to perform a rigorous navigation risk assessment remains unanswered by the DEIS.

CWA's proposed Horseshoe Shoal location is at odds with common international practice and threatens disruption of the Main Channel as a marine transportation route. The Tuckernuck Shoal and Handkerchief Shoal alternative sites face similar risks and pose the same potential disruption of marine traffic.

CWA's proposal for a Nantucket Sound site is fatally flawed in that it appears incompatible with marine transportation activity and poses unnecessary and unacceptable risks to cruise liner, ferry vessel, oil transport, fishing and recreational users. A vessel traveling at 12 knots that leaves the Main Channel due to machinery failure or human error would strike the bordering WTG in approximately 40 seconds.

The DEIS's use of detailed discussions of the responsibilities of mariners operating vessels, the rules of the road (COLREGS) and observations such as "This would provide mariners with ability to navigate through the area by maintaining an <u>essentially straight course</u> that passes <u>easily</u> between the WTGs" (emphasis added) convey a fall sense of security about the risks that WTGs pose to ships, boats, passengers and to the environment. The DEIS's flawed navigation assessment, Appendix 5.12-B dismisses the real risks inherent to vessels which get blown off course, whose machinery fails and lose steering or whose operators make mistakes and unknowingly break the rules. It ignores the reality that 130 immovable concrete/wood and or steel caissons will be placed as close as 800 feet from the intended path of ships and boats. Finally the DEIS refuses to measure or assess the fact that ships and boats will collide with WTGs, that the collisions could be violent enough to sink the vessels threatening their crew and passengers and that pollution will result if ships sink or a tanker using the Main Channel is holed. A new, complete and

rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices, identified before an EIS is issued.

One hundred and thirty WTGs are obstructions to navigation that must be marked as private aids to warn mariners and boaters of their presence. They will be no more of assistance to any mariner or boater than any other hazards placed 800 feet from the Main Channel of Nantucket Sound. They will be especially dangerous and heighten the current risk for mariners and boaters during times of poor visibility when they go undetected or are detected too late to avoid collision or loss of control.

The applicant's assessment fails to explore the negative impact to the Nantucket Sound fishing industry by acknowledging that these projects will effectively cut-off all trawling/dragging within the confines of the wind farm.

Recent information has come to light that sheds further doubt on the transportation and marine safety and pollution conclusions reached in this DEIS:

- A review of existing offshore wind facilities revealed that, in contrast to the Nantucket Sound proposals, offshore wind facilities worldwide have been purposely located miles away from any active shipping channels. The Horseshoe Shoal proposal is placed directly adjacent (offset 800 feet) the Nantucket Sound Main Channel. In this location no protection is afforded, as is repeatedly claimed in the DEIS, to prevent large ship and tanker collisions with the many WTGs to be built along the Main Channel. A large vessel traveling at 12 knots in the Main Channel losing power or steering control or misdirected by human error would collide with the adjacent WTG in approximately 40 seconds.

- The United Kingdom's Maritime and Coastguard Agency completed an analysis of the effect of offshore wind facilities on navigation and communication systems. (MCA, 2004) This UK Coastguard report concludes that the presence of a wind facility produced strong marine radar distortion not only for vessels operating within the wind facility but also for vessels operating approximately 1½ nm (3,000 yards) distant from the periphery of the wind facility.

Page 5-22. The FAA did not conduct an adequate evaluation regarding, electromagnetic, or line-of-sight interference on existing or proposed air navigation, communication, radar, and control systems facilities.

Page 5-224, last par., and Appendix 5.12-B, Navigational Risk Assessment, all. There is no indication that the statement "The Navigational Risk Assessment (dated August 18, 2003) has been reviewed by the USCG" is accurate. The Coast Guard reviewed a <u>draft</u> navigational assessment and reported its opinion to the Coprs on 7/31/03. This confusion

should be resolved and any pertinent correspondence and or e-mails included in Appendix 5.12-A.

The DEIS appears to say that the navigation risk assessment (Appendix 5.12-B) is complete; the Coast Guard has accepted it and nothing more needs to be done. The Corps' recent letter of February 14, 2005 confirms that this is not the case. In addition, the McGowan Group report, provided a detailed critique of the shortcomings and oversights found in its review of Appendix 5.12-B. The McGowan Group report was provided to the Army Corps of Engineers and to the Coast Guard Marine Safety Office which evaluated the navigation, marine safety and marine environmental aspects of this project. The report and its conclusions regarding navigation and marine pollution risk to the Nantucket Sound sites has been overlooked or ignored in this DEIS. The report's overall conclusion that the Nantucket Sound project is incompatible with the marine transportation needs of the area, creates unacceptable risks to the environment and shipping and is fatally flawed due to the failure to perform a rigorous navigation risk assessment remains unanswered by the DEIS. The McGowan Group report reached several other major conclusions:

- CWA's proposed Horseshoe Shoal location is at odds with common international practice and threatens disruption of the Main Channel as a marine transportation route. The Tuckernuck Shoal and Handkerchief Shoal alternative sites face similar risks and pose the same potential disruption of marine traffic.
- CWA's proposal for a Nantucket Sound site is fatally flawed in that it appears incompatible with marine transportation activity and poses unnecessary and unacceptable risks to cruise liner, ferry vessel, oil transport, fishing and recreational users.
- The applicant's assessment fails to explore the negative impact to the Nantucket Sound fishing industry by acknowledging that these projects will effectively cut-off all trawling/dragging within the confines of the wind farm.
- Recent information has come to light that sheds further doubt on the navigation assessment in this DEIS:
    - A review of existing offshore wind facilities revealed that, in contrast to the Nantucket Sound proposals, offshore wind facilities worldwide have been purposely located miles away from any active shipping channels. The Horseshoe Shoal proposal is placed directly adjacent (offset 800 feet) the Nantucket Sound Main Channel. In this location no protection is afforded, as is repeatedly claimed in the DEIS, to prevent large ship and tanker collisions with the many WTGs to be built along the Main Channel. A large vessel traveling at 12 knots in the Main Channel losing power or steering control or misdirected by human error could collide with the near-by WTGs in approximately 40 seconds.
    - A major ship classification and standards setting body, Det Norske Veritas (DNV), published the first standards for the site selection and construction of offshore wind facilities. DNV first issued the draft standards in January 2004 and published the final standard in June 2004 (DNV, 2004). These

> standards define the basic elements of a navigation risk assessment including a detailed survey of the ships using the waterway, their routes and frequency, and finally, the computation of the risks and frequency of collisions and pollution incidents due to the presence of a wind facility and the probability for ship machinery malfunctions and human error.

A new, complete and rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices, identified before an EIS is issued (McGowan Group Report, 2004). Separate casualty and marine pollution analyses should be performed for each of the offshore alternatives since vessel traffic, routes and frequency of usage as well as vessel casualty and marine pollution history vary widely. The Coast Guard should perform a complete review of the new risk assessments and consider using the expertise of the Coast Guard Marine Safety Center.

"Marine—Existing Conditions" (5.12.3.1), page 5-225, bullets at top. The capacity of the Main Channel in Nantucket Sound is determined by the designation of Cross Rip Shoal as a federal project for 30 feet in depth. As reported in the McGowan Group report Nantucket Sound's Main Channel has consistently been classified and maintained under the Coast Guard Waterways Analysis and Management System (WAMS) as "Environmentally and Navigationally Critical." Coast Guard evaluations note that "in the event that the Cape Cod Canal is closed due to ice, fog or marine incident, Nantucket Sound is the primary route along with Martha's Vineyard Sound that vessels use to transit around the Cape," (USCG, 1996).

Page 5-225, 3rd par. Anchorages "H" and "J" also surround and lie adjacent to the wind facility Horseshoe Shoal site. These clarifications should be made prior to the issuance of an EIS.

The DEIS states: "There do not appear to be historical records on the frequency of sea ice events in Nantucket Sound. The National Weather Service in Taunton, MA stated that they do not keep sea ice records, and are not aware of other agencies that maintain such records in Nantucket Sound (NWS 2003)." The United States Coast Guard District One in Boston (USCG D1) maintains a sea ice-reporting database for sea ice in the entire District (i.e., New England and eastern New York State), including Nantucket Sound. This ice-reporting database is formally known as IRIS. This dataset has been compiled since 1991. The DEIS further states: "The Coast Pilot makes one passing reference to ice in Nantucket Sound, when it mentions that northerly winds keep the north shore of the Sound free from drift ice (NOAA, 1994); this further suggests that sea ice events in Nantucket Sound do not occur with any regular frequency. Anecdotal evidence suggests that large-scale sea ice events have occurred less frequently in Nantucket Sound during the past decade. However, sea ice was common in Nantucket Sound during the winters of 2002-2003 and 2003-2004."

The DEIS erroneously interprets an obsolete (out-of-date) version of the NOAA Coast Pilot. The 2005 NOAA Coast Pilot 2 covering Nantucket Sound (especially Chapter 4, Outer Cape Cod and Nantucket Sound describes numerous instances where harbors and bays along the south shore of Cape Cod as well as Nantucket Harbor and northeastern Martha's Vineyard harbors and the Sound itself experience icing. Icing in harbors and bays having a direct hydrologic connection with the Sound serve as major sources and sink of sea ice in the Sound. Accordingly, the Coast Pilot describes several locations within the Sound and connected bays and harbors where sea ice regularly occurs:

- Chatham Harbor may be closed by ice for short periods of time.
- Hyannis Harbor: Ice seldom closes or interferes with vessel traffic since prevailing northerly winds keep harbor clear. However, during severe winters and persistent southwest winds, harbor may be closed to navigation.
- West Bay at Osterville may be closed for up to two months in the winter.
- Centerville/Craigville Beach: Ice closes harbor in winter.
- Cotuit Bay: Ice closes bay in the winter.
- Nantucket Harbor: Except in severe winter, Nantucket Harbor is seldom closed by local ice formation. However, this harbor is frequently closed by drift ice from Nantucket Sound, which packs the harbor and remains across its entrance during periods of northerly winds.
- Edgartown Harbor: Harbor is normally closed by ice during January and February. Drift ice from Nantucket Sound is driven into Harbor entrance by wind, obstructing entrance to sailing vessels. However, Chappaquiddick Ferry Channel is usually kept open.
- North Channel, which leads along the north side of Nantucket Sound, on either side of Bishop and Clerks, northward of Horseshoe Shoal, is frequently used by vessels bound through the open sound during winter months when the prevailing northerly winds keep the north shore of the sound free from drift ice. The least depth in the channel is about 16'. Lighted and unlighted buoys mark the channel.

In fact, ice can freeze up south facing Cape Cod and Island bays and harbors connected to the Sound as described above with frequency, serving as a source (and sink) of drift ice and ice floes during significant ice events. According to USCG IRIS data, since 1991 significant (albeit partial) or complete freeze-up of many of these bays and harbors occurred during:

December 1995;
January 1996;
January 1997;
February 1997;
January 2004; and
February 2004.

Thus, significant icing events occurred during 4 of the 14 years (29%) that ice records have been kept in the Nantucket Sound region by USCG D1; and 4 of the past 10 years (40%) of

the time in the past decade (December 1995-December 2004). United States Coast Guard IRIS ice data set for 2002-2003 was unavailable, so icing for this year could not be verified. Assuming the DEIS is correct regarding the occurrence of a significant ice event during the winter of 2002-2003, then the percentage of icing incidents in the past decade would increase further. Moreover, it can not be confirmed that the level of significant sea ice events is lower in the past decade than previously; however, these sea ice data show the frequency of large-scale sea ice events continues to be significant.

During serious icing events, sea ice forms well past the mouth of both Cape Cod harbors (e.g., Hyannis Harbor) and Nantucket Harbors, expanding miles out into the Sound. During especially harsh winters this expansion has resulted in extensive sheet icing over much (or all) of the Sound from the Cape to Nantucket, according to several area vessel pilots with expertise in Nantucket Sound waters. Additionally, drift ice traveling from the south shore of Cape Cod southerly across Nantucket Sound by prevailing northerly winds and east-west traveling drift ice carried by tidal currents serve to increase the amount of ice the can be found in open Nantucket Sound waters.

Finally, the DEIS states: "According to ferry operators and others interviewed, ice does not appear to affect navigation in Nantucket Sound with any regular frequency." Discussions with current and retired Steamship Authority personnel and other local pilots revealed that seasonal sea ice does interfere with navigation in Nantucket Sound, requiring aggressive ice breaking activities during significant ice events. For example, ice blocked Nantucket Harbor, shutting down ferry service to the island in as recently as January 2004 (Dooley 2004). Given the random nature of weather, there is no way to predict the frequency of ice impacts on navigation. However, the frequency of significant ice events in the past decade (40% or higher) implies that problems with sea ice in Nantucket Sound are not a rare event. Even when water is open in the middle of the Sound, drift ice is frequently present, jamming vessel engine intakes, and making navigation difficult. Also, localized releases of sea ice from the proposed offshore wind-generated power plant structures, coupled with existing drift ice in the area, could make portions of the Main Channel difficult to navigate on an incidental basis, forcing, for example, additional usage of the North Channel in winter, a channel with substantially less least depth relative to the Main Channel. Further, under severe icing events, navigational aids at facility structures may become covered in ice and snow, resulting in partial or full occlusion of ATON; hence, increasing navigational difficulties for vessel plying waters immediately proximal to the WTGs.

Given substantial ice occurrence in Nantucket Sound, the likely rafting of ice around the offshore structures (and between them during especially harsh winters), partial or full ATON occlusion, and the immediate proximity of the proposed offshore wind-generated power plant to the Main Channel (as well as proximal ferry routes), project proponent should identify and detail strategies for managing sea and depositional ice at the facility that pose risks to the facility and hamper, and potentially endanger, proximal vessel navigation, fishing and facility personnel before a supplemental EIS is issued.

"Aeronautical—Existing Conditions" (5.12.3.2), page 5-225. This section inadequately describes the aeronautical activities in and around the alternative sites being considered, the DEIS tends to describe airways and air navigation fixes as points in the sky. The airways, airports, and navigation fixes do have a defining latitude and longitude or appear as a point or line on a map; however, they all occupy a larger volume of airspace. For example, the Massachusetts Military Reservation (MMR) is described as being 12.75 miles west of Barnstable Municipal Airport.... The MMR is over 21,000 acres of real estate with special use airspace that extends to 18,000 feet above mean sea level in some cases. Barnstable Airport is considered Class C airspace with the volume of a cylinder approximately 5 statute miles in diameter and a height of 2500 feet. An airway is a rectangle of airspace four (4) nautical miles on either side of the centerline of the airway that extends 18,000 feet. This is meant to illustrate that if there is interference with air traffic radar, and communications, the potential conflicting area is greater than described in the DEIS.

The Authorities of the Massachusetts Military Reservation, as an alternative site, made a convincing argument about the incompatibility of the wind farm on the Reservation with their military activities. The DEIS does not adequately quantify the aviation activity using the airspace in the alternative sites. During most of the year, all of the alternative sites are among the busiest aviation and shipping routes in the United States. For identical reasons cited by MMR Authorities, Cape Cod civilian business and pleasure activities will be disrupted, diminished, or eliminated if one of the alternative sites is utilized. The EIS should not be released until the full impact of the proposed wind facility on air navigation has been examined.

"Marine Impacts, Operation and Maintenance" (5.12.4.1.1), page 5-227, all; and "Navigational Risk Assessment" (Appendix 5.12-B), all. There is no indication that the statement "The Navigational Risk Assessment (dated August 18, 2003) has been reviewed by the USCG" is accurate. The Coast Guard reviewed a draft navigational assessment and reported its opinion to the Corps on 7/31/03. This confusion should be resolved and any pertinent correspondence and or e-mails included in Appendix 5.12-A.

The Marine analysis of the DEIS is based on a flawed navigation risk assessment, Appendix 5.12-B. The McGowan Group report, provided a detailed critique of the shortcomings and oversights found in its review of Appendix 5.12-B. The report's overall conclusion that the Nantucket Sound project is incompatible with the marine transportation needs of the area, creates unacceptable risks to the environment and shipping and is fatally flawed due to the failure to perform a rigorous navigation risk assessment remains unanswered by the DEIS.

A new, complete and rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices, identified before an EIS is issued. Separate casualty and marine pollution analyses should be

performed for each of the offshore alternatives since vessel traffic, routes and frequency of usage as well as vessel casualty and marine pollution history vary widely. The Coast Guard should perform a complete review of the new risk assessments and consider using the expertise of the Coast Guard Marine Safety Center.

The new risk assessment called for above should begin with a detailed survey to determine the number, types, routes and frequency of vessels that use the waterways adjacent to each of the proposed wind facilities. The superficial survey performed in Appendix 5.12-B was seriously deficient as reported in the McGowan Group report.

"Planned Configuration," page 5-227, all. The DEIS's use of detailed discussions of the responsibilities of mariners operating vessels, the rules of the road (COLREGS) and observations such as "[t]his would provide mariners with ability to navigate through the area by maintaining an essentially straight course that passes easily between the WTGs" (emphasis added) convey a fall sense of security about the risks that WTGs pose to ships, boats, passengers and to the environment. The DEIS's flawed navigation assessment, Appendix 5.12-B dismisses the real risks inherent to vessels which get blown off course, whose machinery fails and lose steering or whose operators make mistakes and unknowingly break the rules. It ignores the reality that 130 immovable concrete/wood and or steel caissons will be placed as close as 800 feet from the intended path of ships and boats. Finally, the DEIS refuses to measure or assess the fact that ships and boats will collide with WTGs, that the collisions could be violent enough to sink the vessels threatening their crew and passengers and that pollution will result if ships sink or a tanker using the Main Channel is holed. A new, complete and rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices, identified before a supplemental EIS is issued (McGowan Group Report, 2004).

Small and large vessels attempting to transition the WTG area or pass near it can directly collide with a WTG base or, they can drift into a WTG after losing power. The DEIS mentions that there are currents of up to 2 knots in the area, implying that a leak caused by even a small collision has the potential of traveling up to 2 nautical miles before a clean-up crew (traveling 15 miles from the nearest port at 15 knots) can arrive on the scene. By that time, the slick may have been split into two or more slicks by other WTG towers in the wake.

"Planned Configuration," page 5-228, last par. Based on the minimal information presented in the DEIS the following concerns are noted related to the "scour analysis" and scour protection: The estimated bedform height from the remote sensed data is unverified by in situ measurements.

- How are the cables going to be buried if they are traversing a bedform field with sand waves up to 4.6 m high?
- Anchoring of the scour pads is unspecified. What is the type of anchor being emplaced to hold the scour pads? What is their weight and configuration? Have

these anchors and pads been tested under extreme conditions (combined strong tidal currents and a storm wave condition)? How deeply buried will the anchors be? How will the divers install the anchors?

- If the scour pads fail and are transported away during a 100-year storm, will the depth of the foundation design incorporate this worst-case scenario. For example, it is stated that there may be up to 2.5 m of scour, will the foundation withstand during maximum wave conditions.
- What will happen to the scour pads and anchoring system when a 4.6 m high sand wave field migrates through the area?
- The combined tidal and storm-generated currents appear very low in light of Mariners tidal current tables.
- Has consideration been given to the migration of extreme sand wave troughs (4.6 m high bedform) through the study area in the depth of scour calculations?
- How will the divers drape and install the scour pads when the seabed may exhibit large amplitude sand waves.
- The arrangement of the scour pads indicates zones of vulnerability where there is no covering. Therefore, the sand may be subjected to potential scour leading to the collapse of adjacent pads and failure of the anchors. Extreme storm waves can come from any direction.

To adequately quantify the effects of the bedforms, sediment transport, and effects to scouring, a more complete survey is needed concerning the morphology and behavior of the sand wave field. This survey and model should be completely re-assessed and analyzed prior to the issuance of a supplemental EIS.

"Ice," page 5-228, 2nd through 4th par. There is insufficient discussion of the WTG rotor emergency shutdown system. Nantucket Sound is frequently used by vessels with masthead heights exceeding 75 feet that could become severely damaged by the turning blades if they approach or are set down by the elements on the WTG foundations (McGowan Group Report, 2004). In severe ice formation conditions, ice "chunks" could threaten passing vessels until the blades were shut down. The emergency shutdown system needs to be described. Its characteristics should be compared to a known standard, e.g., the DNV standard or UK MCA requirements, (DNV, 2004) and (Maissan, 2001) respectively. The UK MCA standard requires the blades be stopped within 60 seconds and 5 degrees of arc as controlled by a manned operating 365 X 24.

Additional comments regarding the subsection of Section 5.12.4.1.1 that addresses ice issues can be divided into comments about ice rafting, rotor blade icing, and risks from thrown ice fragments. These ice issues are individually discussed below.

Ice rafting is not adequaely addressed. The DEIS states that, "The large spacing between WTGs, combined with the natural tidal circulation in Nantucket Sound, will prevent

rafting of ice between WTGs. Localized rafting of sea ice around individual WTGs may occur if weather conditions permit. However, such events are expected to be infrequent." As described in comments for Section 4.1.3.3, the lateral loading analyses significantly underestimated the ice loading resulting from ice formed on the proposed offshore structures. Further, vessel pilots in the area have reported ice floes over a square mile in size with extensive sheet ice cover in the open sound during very harsh winters. Even during relatively mild winters substantial drift ice occurs in the open sound due to ice that has broken off from ice sheets formed on the south shore of Cape Cod (especially, in bays and harbors) as well as drift ice flowing in an east/west direction with the tides, creating areas of relatively heavy drift ice loads in the open sound. Significant ice loads from 1) ice formed on the proposed offshore structures; and 2) ice rafts from drift ice and large ice floes during harsh winters present significant lateral loads on the proposed offshore structures. In some cases ice floes could be large enough to raft between proposed offshore structures. Accordingly, a rigorous lateral ice loading modeling effort as described in our comments to DEIS Section 4.1.3.3 is required to determine the level of loading required to withstand local sea ice conditions. The ice loading analysis alluded to in Section 4.1.3.3 appears to significantly underestimate ice loads likely to occur in, especially, significant ice events. This rigorous sea ice loading analysis and corresponding validation of the foundation design to ensure that the proposed offshore structures can withstand a worst case sea ice lateral load should be completed and reported prior to the publishing of a supplemental EIS.

Rotor blade icing is another issue not adequately addressed. Comments on rotor blade icing issues were previously made in response to DEIS Section 4.1.1.2 (Wind Turbine Generators/Rotor) and are summarized here for convenience. The DEIS states that WTGs would be shut down if vibrations sensors detected temporary ice. This ice management solution is surprising and rudimentary given accepted industry strategies for managing rotor blade icing. Such strategies can be classified into two categories: passive and active. Passive icing prevention methods rely on the physical properties of the blade surfaces to prevent ice accumulation (e.g., anti-adhesive coatings such as Teflon that blend with natural setting). Active de-icing technologies consist, for example, of thermal, chemical and impulse de-icing methods (Lacroix et al, 2000). The rotor blades discussion described in the DEIS does not address the complexities of safely and effectively operating in seasonally cold and icy climate such as Nantucket. Specifically:

- Is the fiberglass-reinforced epoxy composite used in the rotor blades effective at the large temperature range in Nantucket Sound?
- Does the fiberglass and epoxy in this composite have similar expansion coefficients, hence limiting stresses?
- Is this composite susceptible to stresses at lower temperatures such as (micro) cracking?

- The rotors, as described in the DEIS, have neither passive nor active ice prevention technology to counter the frequent icing events (glaze or rime) that occur in Nantucket Sound. What is the rationale for having no ice prevention technology, especially given the high frequency of glaze icing events during the winter in the Nantucket Sound region, 30-59 days per year and exacerbated by frequent ocean effect winter storms carrying heavy freezing precipitation (Bennett, 1959)? The lack of such ice management technologies can significantly impede the ability of the proposed offshore wind-generated power plant to produce electricity for a significant period of the year. If active ice prevention technology is adopted for rotor blades, how would this system be powered? Would additional diesel be required to be stored on the ESP? Also, do ice prevention technologies limit radar capabilities in the area? If so, managing these impacts should be addressed.

Further, the DEIS states that, "Temporary icing of a rotor blade would activate vibration sensors causing turbine shutdown in order to prevent rotor damage or hazard to Project maintenance staff or others from falling ice." Given the notable frequency of seasonal icing in Nantucket Sound described by (Bennett, 1959) the DEIS does not address important aspects of ice sensing on the rotor. For example, what type (make/model) of vibration sensor is proposed to monitor for seasonal ice? Has it been tested for offshore application? Will it work as effectively for both glaze and rime ice? What is the anticipated life cycle for the proposed vibration sensor? The effectiveness of ice sensors cannot be assumed to be effective. Ice detectors supplied with turbines have been found not to be effective and were removed from the control circuit, (Maissan, 2001) Also, is a vibration sensor the best type of ice sensor for this application (Morgan et al, 1998) found that rime ice formation appears to occur with remarkable symmetry on all turbine blades with the result that no imbalance occurs and the turbine continues to operate. In other words, a vibration sensor may not activate a shut down if the icing on the rotor is balanced, hence, minimizing vibration.

The risks from thrown ice fragments are not addressed adequately. The DEIS does not provide any substantive supporting evidence that ice that forms on rotor blades will not present a risk to vessel traffic plying the nearby Main Channel (i.e., 800 feet from nearest WTG) and facility operations personnel. Project proponent simply states that turbines shall be shut down if vibration sensors detect ice, and formed ice will melt off rotor blades as air temperature warms. It is not clear how well these vibration ice sensors function (see above) under offshore, cold conditions. In addition, one ice type that forms in freezing weather, rime ice, has been observed to form with remarkable symmetry on all rotor blades with the result of no rotor blade imbalance (Morgan et al, 1998). It is unclear whether the vibration sensor would adequately detect ice under such circumstances, potentially resulting in continued operation.

Further, the high frequency of local glazing events (freezing rain/drizzle) makes rotor icing a probable and frequent event during late fall, winter and early spring in Nantucket Sound.

Given that fragments of ice on rotors have been observed to have masses up to 2.2. lbs (1 kg), and the fact that it is common practice for wind farm operators to accelerate the process of thawing ice sensors and restarting the turbine with ice still on the rotor, leading to heavy shedding of ice, (Morgan et al, 1998), there is potential that rotor ice may act as potent projectiles from the rotor blades, presenting a potential risk to nearby vessel traffic and human safety. Further, fisherman may be precluded from fishing within the confines of the 24 square mile proposed offshore facility site due to these safety considerations, causing commercial fisherman loss of income.

Accordingly, it is recommended that the Corps require CWA to initiate a more rigorous and quantitative modeling of ice trajectory prediction from especially the closest WTGs to the Main Channel and anywhere else that WTGs are proximal to shipping lanes or routes. For example, (Morgan et al, 1998) reports having developed a risk assessment model for assessing risk of incident from thrown ice from rotor blades. This model takes into account a number of parameters affecting thrown ice trajectory, including:

- Blade azimuth at the instant when the fragment is released;
- Radial location of the fragment on the blade at the instant of release;
- Any radial sliding velocity developed by the fragment prior to release (the 'slingshot'effect);
- Turbine dimensions and rotor speed;
- Gravity;
- Fragment dimensions;
- Aerodynamic drag;
- Aerodynamic lift; and
- Mean downstream wind speed.

If proponent does not conduct a defensible, quantitative risk analysis, then a standard protective safety zone around the facility should be required. For example, The United Kingdom's Maritime and Coastguard Agency (MCA) has established such standards for wind farms. These "Area to be avoided (ATBA)" are established around wind farms up to 500 meters (1,640 feet) from the extremities (MCA, 2003) Due to unquantified risks (since a quantitative risk assessment has not been completed), the width of this safety zone should be towards the upper limit (i.e., 1,640 feet) to ensure safety to nearby vessel activity. The use of such a zone calls into question the viability of the project because of its proximity to the main channel.

Finally, the DEIS does not adequately addresses unique aspects of operating the proposed offshore wind-generated power plant in seasonal cold climate conditions. In order for the facility to properly function, a number of factors should be taken into account. For example, low temperatures can damage the electrical equipment such as generators, yaw

drive motors and transformers. When power is applied to these machines after they have been standing in the cold for an extended period, the windings can suffer from a thermal shock and become damaged. Gearboxes, hydraulic couplers and dampers suffer from long exposure to cold weather. As the temperature goes down, the viscosity of the lubricants and hydraulic fluids significantly increases up to a point where at –40 degrees F; a chunk of heavy gear oil could be used to pound nails (Diemand, 1990). Damage to gears will occur in the very first seconds of operation where oil is very thick and cannot freely circulate. In addition, due to an increase in internal friction, the power transmission capacity of the gearbox is reduced when the oil viscosity has not reached an acceptable level. Also, seals, cushions and other rubber parts lose flexibility at low temperatures. This may not necessarily result in part failure but can cause a general decline in performance. A typical rubber part can see its stiffness augmented by a factor of 8 at a temperature of –40 degrees F and brittleness also increases which changes impact resistance and makes the part prone to cracking (Brugada, 1989).

Pages 5-228 and 229, all par. The DEIS is deficient in its discussion of navigation aids. The following questions should be answered before an EIS is issued:

- How will vessels or boaters identify a WTG in fog or poor visibility when their alphanumeric designation can't be seen?
- How will boaters who have no radar detect a WTG in fog or poor visibility?
- Will four fog horns with a ½ nm range be sufficient to warn vessels or boaters in the 24 square mile facility area of a WTG in fog or reduced visibility?

How will boaters be warned of potentially treacherous eddies and swirling currents caused by the WTG foundations? The DEIS states that no interference with marine radar is expected from the wind facility and cites tests conducted at the Horns Rev wind facility. No data is supplied to substantiate this claim.

The United Kingdom's Maritime and Coastguard Agency (MCA) completed an analysis, (MCA, 2004) of the effect of offshore wind facilities on navigation and communication systems. This UK Coastguard report concludes that the presence of a wind facility produced strong marine radar distortion not only for vessels operating within the wind facility but also for vessels operating up to 1 ½ nm (3,000 yards) distant from the periphery of the wind facility. The study also noted that the wind facility interfered with the Automatic Radar Plotting Aid (ARPA), a collision avoidance feature, on marine radar and expressed concern that mariners may be unable to comply with international requirements governing its use. The radar interference was found to depend on the height of the WTG and rotors. The WTGs and rotors for the proposed offshore sites are larger than the facility tested in the UK. The MCA's study found these severe navigation problems affecting vessels up to 1 ½ nm from the wind facility. The MCA has recommended a follow-on study to further examine this interference with marine radar and to recommend minimum distances that wind farms should be located from navigation channels and shipping routes.

The Nantucket Sound alternatives have been placed within 800 feet of the Main Channel and less than a mile from heavily traveled ferry boat routes now transited by high-speed ferries.

The issues of marine radar and ARPA interference must be addressed as well as reevaluating the minimum distance that an offshore alternative should be set back from channels and shipping routes before an EIS is issued.

"Collision Risk," page 5-229, all. The DEIS's claim "that the risk of a vessel colliding with a WTG is low" and its qualification that the wind facility is "located away from typical vessels routes" has no substantiating data and is in conflict with the reliable facts available.

The navigation assessment, Appendix 5.12-B, contains neither a calculation of the risk of collision or pollution nor an assessment of the damage to a ship, boat or tanker that does collide with a WTG. The navigation assessment is fatally flawed. The conclusions that this DEIS reaches based on that assessment are invalid and inaccurate (McGowan Group Report, 2004).

A review of existing offshore wind facilities revealed that, in contrast to the Nantucket Sound proposals, offshore wind facilities worldwide have been purposely located miles away from any active shipping channels. The Horseshoe Shoal proposal is placed directly adjacent (offset 800 feet) the Nantucket Sound Main Channel. In this location no protection is afforded, as is repeatedly claimed in the DEIS, to prevent large ship and tanker collisions with the many WTGs to be built along the Main Channel. A large vessel traveling at 12 knots in the Main Channel suffering a steering or propulsion failure, or misdirected by human error, would collide with the adjacent WTG in approximately 40 seconds.

The DEIS also claims that "physical water depth restrictions…limit the potential for a vessel to collide with a WTG." In fact, nearly 80% of the WTGs are in deep enough water to be struck unimpeded by deep draft vessels with drafts up to 18 feet. One of those deeper draft vessels is a tankship that is certified to carry 30,000 bbls of oil.

Finally, it appears that the DEIS has been carefully worded to declare that "neither a drifting nor a moving vessel <u>of the size that frequents the Wind Park area, or would be used for construction</u>, would result in collapse of a WTG after impact" (emphasis added). In fact, use of the structural analysis contained in Appendix 5.12-B, indicates that a WTG tower, rotor or both would collapse from collision with any moving vessel larger than the Steamship ferry EAGLE. The McGowan Group report concludes that "The Cape Wind navigation safety risk assessment and Nantucket Sound project proposal is fatally flawed due to its failure to…[p]ropose a tower structure whose strength was sufficient to withstand a collision without complete failure of the tower and blade and/or the tower foundation….

A new, complete and rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices, identified in the McGowan Group report before a supplemental EIS is issued. Separate casualty and marine pollution analyses should be performed for each of the offshore alternatives since vessel traffic, routes and frequency of usage as well as vessel casualty and marine pollution history vary widely. The Coast Guard should perform a complete review of the new risk assessments and consider using the expertise of the Coast Guard Marine Safety Center.

Search and Rescue; pages 5-229 and 5-230, all. This DEIS discussion while presenting facts that are based on data obtained from the Coast Guard circumvents a singular central issue. There will be clear identifiable conditions and circumstances, such as high winds and waves, when the mere presence of the WTGs of the wind facility will preclude a SAR response and rescue by a Coast Guard helicopter. This will likely delay both the search and the rescue response within the 24 square mile area of the wind facility until a Coast Guard boat can arrive on scene only to be faced with radar, VHF tracking and possible communication interference attributable to the WTGs.

The DEIS states that "[t]he Wind Park is not *anticipated* to have negative effects on SAR operations in the area of Horseshoe Shoal." It then goes on to say that of 50 SAR operations in the area, 19% were not by sea; presumably these were by helicopter. SAR operations in the area are the responsibility of the US Coast Guard. The height of the wind turbines and potential problems associated with wind and water wakes during helicopter search and rescue operations are not addressed by the DEIS. The US Coast Guard uses a requirement to maintain minimum altitude clearance of 500 feet above obstructions for search and rescue operations. The minimum height in the areas of the turbines is therefore 917 feet. Aircraft flying under VFR (visual flight rules) will also have to maintain a minimum altitude of 1000 feet over the Sound, which can lead to difficulties in the case of bad weather, where low cloud cover would otherwise dictate lower altitudes. This would prohibit flight operations for aircraft and pilots not qualified for IFR (Instrument Flight Rules) operations when the ceiling is below 1000 feet.

It should be noted that SAR operations are often, if not usually, conducted under adverse weather conditions. The DEIS does not address the ability of the Coast Guard to effectively conduct SAR operations in the area of the wind turbine farm due to rotor height and wakes due to the turbine blades and towers. Strong currents in the area will further complicate the situation if they sweep disabled vessels into and through the wind farm. When ground fog obscures the WTGs, no helicopter SAR operations will be possible.

The assertion of "no negative effects on SAR" is clearly in error. This should be clarified before a supplemental EIS is issued.

Pages 5-230 and 5-231, "Submarine Cable System," demonstrated in regards to the anchoring of large vessels that a margin of safety of 2 feet may be insufficient and lead to

damage of the buried cables, to anchoring vessels, to trawling fishing vessels, etc. (McGowan Group Report, 2004). A detailed study modeling and accounting for the scouring effect of bottom currents and margin of error in laying/burying the cables should be performed to determine the safe and adequate depth for burying the inner-array and submarine cable systems before a supplemental EIS is issued.

"Navigation Rules," page 5-231, 1st par. This section of the DEIS provides a discussion of the requirements for vessels and mariners under the Rules of the Road (COLREGS). It erroneously concludes with the pronouncement that: "Risks and impacts associated with failure to comply with the COLREGS or unsafe vessel operation cannot be evaluated and are beyond the scope of this assessment."

This conclusion conveys denial, profound ignorance or misunderstanding of the basic principles of risk management including risk assessment and risk mitigation. This DEIS does not include a navigation risk assessment that predicts the increase in vessel accidents and casualty rates, the increase in pollution incidents or the increase in injuries to passengers and loss of vessels and boats that strike a WTG. That is precisely the problem with this section, Section. 3.4.3.2.10 and Appendix 5.12-B of the DEIS.

The initial Coast Guard requirements, Appendix 5.12-A, the best practices identified in The McGowan Group report, the new DNV industry standards (DNV, 2004), and the UK Maritime and Coastguard Agency regulations (MCA, 2003), all call for a navigational risk assessment that includes pollution incidence in addition to safety or collision incidence. The heart of any navigation risk assessment is the application of the probability of not only human error (COLREGS violation, losing the "way" in fog) but also of machinery failure (engine or rudder breakdown) and finally of environmental factors (wind, current, wave) driving a vessel or boat where it should not go.

The DEIS does not address the serious problem of the consequences of having a rotor break or a WTG monopole failure. If these events are truly impossible, the EIS should so state and provide appropriate technical data. If not impossible, analysis to define a safe "keepout" zone is required. For example, if a rotor blade should break off the hub at a given point in its rotation, where would it end up? It would seem hazardous to allow any vessels within a given radius of the WTG; the radius should be based on the longest possible trajectory of a blade plus a safety factor. The rotor blades are 164 feet long and the span is longer than a football field (328 feet). When launched, they would have momentum from the rotation and start from a hub height of 105 feet. If a sailboat with a 60 foot mast is the potential victim, it is difficult to imagine a keepout radius of less than 500 feet.

In other parts of the DEIS, it is stated that vessels can pass within 22 feet of the tower. This seems to imply that it is impossible for a blade or a rotor to fall off. This is a serious issue that needs to be addressed so that the builder can guarantee that all access by boats to the WTG farm area is not prohibited for safety reasons. Furthermore, if there is a safety

"keepout" radius about the base of the tower, how will it be marked so vessels can avoid it?

If the case can be made that the blades are asserted to be truly indestructible, adverse effects on the nerves of skippers who would otherwise use the area must be considered. Most prudent skippers will probably choose to avoid the area entirely, so the area would effectively be cut off to many recreational and commercial vessels that would otherwise be able to enjoy the area.

The analysis of this section of the DEIS is based on a flawed navigation risk assessment, Appendix 5.12-B. The McGowan Group report, provided a detailed critique of the shortcomings and oversights found in its review of Appendix 5.12-B. The report's overall conclusion that the Nantucket Sound project is incompatible with the marine transportation needs of the area, creates unacceptable risks to the environment and shipping and is fatally flawed due to the failure to perform a rigorous navigation risk assessment remains unanswered by the DEIS.

A new, complete and rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices, identified before an EIS is issued. Separate casualty and marine pollution analyses should be performed for each of the offshore alternatives since vessel traffic, routes and frequency of usage as well as vessel casualty and marine pollution history vary widely. The Coast Guard should perform a complete review of the new risk assessments and consider using the expertise of the Coast Guard Marine Safety Center.

"Marine Impacts" (5.12.4.1.1), page 5-232; "Marine Mitigation" (5.12.5.1), page 5-236; and "Navigational Risk Assessment" (Appendix 5.12-B), all. The conclusion reached in the DEIS that the siting of a Horseshoe Shoal wind facility and its WTG spacing will not interfere with navigation, recreation, commercial fishing etc. is based on an erroneous analysis, Appendix 5.12-B. An EIS should not be issued until a full, realistic risk assessment is performed accompanied by mitigation recommendations addressing marine transportation, marine safety, marine pollution, boating safety and the predicated impacts on commercial fishing interests that trawl or drag in the vicinity of Horseshoe Shoal.

"Aeronautical Impacts" (5.12.4.12), pages 5-233 and 5-234. This section of the DEIS relies on assertions that "the FAA has determined that the Nantucket Sound Alternative as proposed does not present a hazard to air navigation" and lists seven areas where there was deemed to be no adverse impact. However, none of the seven areas specifically mention the adverse impact of the radar returns from the WTG farms on the effectiveness and efficiency of FAA Airport Surveillance Radars in the area, or on the Air Force and FAA users of the Air Route Surveillance Radar located on Cape Cod. The documents cited were produced by the New England Regional Office of the FAA rather than by FAA Headquarters; it is not clear that the New England Regional Office has the in-house

technical expertise necessary to make an adequate assessment of the complex issues involved.

Several airport managers in the Nantucket Bay area are appealing the "No Hazards" determination.

Information produced in the United Kingdom indicates that the government has serious concerns over the effects of WTGs on civil and military radar operations and has initiated serious technical studies of the problems. Results of these investigations were published in November 2004, after the DEIS was issued, so they could not have been considered in the DEIS.

The fact that the DEIS does not devote a numbered paragraph to the important issue of interference of the WTGs to critical radar functions performed by the FAA and military in the Cape Cod area is clear evidence that this important issue has not been properly considered in the DEIS and requires much more attention in the EIS. It is important that these serious issues be properly resolved before the WTGs are installed because to do otherwise leaves the project at risk of being delayed or restricted in operation. This could lead to investor default and the legacy of a non-producing and abandoned eyesore on Nantucket Sound.

The DEIS cites "No Hazard to Air Navigation" determinations by the FAA New England Regional Office as the sole and final word that the proposed wind turbine generator farms offer no hazard to air traffic control operations. However, the FAA determinations (reproduced in DEIS Appendix 5.12-C) do not clearly enumerate the scope of the investigation performed by the FAA New England Regional Office, particularly with regard to potential radar problems associated with the wind turbine generator farms. It is not clear that the New England Regional Office has the technical resources to make such a complex determination regarding radar interference issues without outside technical support, and there is no evidence in the DEIS that FAA headquarters has reviewed and concurs with these findings.

The four FAA determination letters refer to Horseshoe Shoal (4/9/2003), Monomoy-Handkerchief Shoal (7/21/2003), Tuckernuck Shoal (8/5/2003), and South of Tuckernuck (5/17/2004). The memos apparently allow installation of wind turbine generator farms at any one or all four sites, without regard to the aggregate effects if all four sites are populated with wind turbine farms. Thus, the FAA determination appears to allow installations at all four of the sites mentioned.

The four FAA determination letters make no mention of adverse effects on radar-based air traffic control, although the 5/17/2003 and 3/26/2004 letters have the following additional stipulation: "However, should spurious electromagnetic noise or aggregate noise from multiple wind turbines adversely cause Electro-Magnetic Interference (EMI) to an FAA facility, the proponent agrees to cease operations of the wind turbine(s) until such EMI is

mitigated." This means that wind farms could be shut down indefinitely should problems occur. An indefinite shutdown could lead to bankruptcy of the proposed project and a legacy of unused derelict wind turbine generators in Nantucket Sound. Clearly, these issues need to be resolved before the wind turbine generators are installed.

The most important omission in the FAA determinations is that they were issued before publication in November 2004 of a significant body of relevant material produced by government agencies and contractors studying this problem in the United Kingdom, (DNV, 2004, FAA, 2004; UK Dept of Trade et al). This information conflicts with the conclusion that there will be no adverse effects on radar-based air traffic control or air defense operations, and it is therefore strongly urged that the EIS be brought up to date by considering this material and re-assessing the conclusion of "no hazard" issued by the FAA's New England Regional Office.

Due to these omissions, the DEIS tends to ignore one of the most important aspects of the project - that of air safety. It is recommended that the following elements be added and addressed in depth in the EIS.

At a minimum, the EIS should be required to specifically address potential adverse effects of the wind turbine generator farms on electromagnetic systems that fall into the following six categories:

- Reflection of primary radar signals that can cause false targets to appear on air traffic control radar, air defense radar, and shipboard navigation radar;
- Reflection of secondary radar (beacon transponder signals) from aircraft that can cause false targets to appear on air traffic control systems and airborne collision avoidance systems;
- Reflections leading to interference with instrument landing systems (ILS);
- Physical blockage leading to potential attenuation and/or garbling of signals for radar, air traffic control beacon transponders, Global Positioning System (GPS) and LORAN navigation receivers, and voice communications and data links;
- Radiated electrical noise emissions associated with rotating electrical machinery that can cause interference with receivers operating in the frequency bands in which the noise is generated; and
- Radiated electrical fields associated with the power transmission lines.

Page 5-236, (5.12.5.1), 3rd bullet. The DEIS is deficient in its discussion of navigation aids. The following questions should be answered before an EIS is issued:

- How will vessels or boaters identify a WTG in fog or poor visibility when their alphanumeric designation can't be seen?
- How will boaters who have no radar detect a WTG in fog or poor visibility?
- Will four fog horns with a ½ nm range be sufficient to warn vessels or boaters in the 24 square mile facility area of a WTG in fog or reduced visibility?

- How will boaters be warned of potentially treacherous eddies and swirling currents caused by the WTG foundations?

12. Electrical and Magnetic Fields Comments (5.13)

Page 5-238, 2nd par. The DEIS states: "The EMF analysis discussed in this section includes an assessment of anticipated EMF from WTGs, the associated 33 kV cables, and the 115 kV transmission lines. This section also identifies populations that could be exposed to 60-Hz EMF greater than 85 milliGauss (mG)." This discussion is limited to 60-Hz electromagnetic fields. No mention of DC electric and magnetic fields at all. Although sharks and rays are the only animals in the wind-farm region known to have a highly developed electric sense, they are categorically considered irrelevant.

Page 5-239, 2nd par. The DEIS states: "Power frequency fields are very low frequency fields.... They carry very little energy and cannot break chemical bonds or heat living tissue." The energy quanta of low-frequency electromagnetic fields are small, but that does not mean that the fields are weak. Moreover, strong with respect to what? The fields may not be able to break chemical bonds, but it does not need much energy to change the open-time of the voltage-sensitive ion channels upon which life is founded.

Page 5-242, 2nd par. The DEIS states: "However, the proposed cable system would be shielded to effectively block the electric field produced by the conductors." After having seen this so many times in the DEIS, one would almost believe it, but it is not true.

Page 5-242, 3rd par. The DEIS states: "Animals and species with special sense organs (i.e., ampullae of Lorenzini) may require special consideration of possible EMF effects on behavior." This is true, but not only for the 60-Hz fields produced by the wind farms.

Page 5-242, last par. The DEIS states: "The primary consideration is for organisms that may have magnetic sense organs. The current opinion as to how animals use the earth's magnetic field for magnetic orientation is that such sensing is due to a 'compass needle' mechanism." That is not the case for sharks and rays, the magnetic sense of which is based on their keen electric sense.

Page 5-243, 1st par. The DEIS states: "However, nobody has demonstrated an effect on animal orientation by AC fields." It is questionable whether this strong statement should be made categorically. It ignores the many effects of DC electric and magnetic fields.

Page 5-243, 2nd par. The DEIS states: "Based on the body of scientific literature examined there are no anticipated adverse impacts to the marine environment from the 60-Hz magnetic fields associated with the operation of the Project." The qualification "literature <u>examined</u>" and "<u>60-Hz</u>" render this statement perhaps true to the letter, but utterly inadequate for a "<u>comprehensive</u>" analysis.

Page 5-245, 5th par. The DEIS states: "...the proposed submarine cable system for the transmission line would contain grounded metallic shielding...there are no electric fields to be calculated." This is not true. Such fields should be calculated.

Page 5-246, par. 6. The DEIS states: "The high-voltage conductors are enclosed in a shielded cable, and no external electric field is produced." This statement is not true.

In summary, the above section is incomplete in that it denies any 60-Hz electric fields in the water outside the cables, does not mention the DC electric and magnetic fields associated with the CWA project, and fails to consider the whole class of sharks and rays, even though they do have a DC/low-frequency electric sense.

Seismicity is discussed briefly in Section 3.0, alternative sites. It seems the same text occurs elsewhere. The paragraph reviews earthquake history in the area and nearby bedrock faults, but does not reach any conclusion.

The FEMA Coastal Construction Manual, Third Edition, provides guidelines from the International Building Code (IBC) for determining seismic loads for any proposed structure in the coastal zone. It would seem that this is a reasonable guideline for structures in the shallow nearshore. Section 11.10 [Seismic Loads] identifies "Maximum Considered Earthquake Ground Motion" maps in the Earthquake Loads section of Chapter 16 of the IBC. As well, a Site Class can be determined to establish the susceptibility of the materials in the site using geotechnical analyses that measure the site soil shear wave velocity, penetration resistance, and/or unconfined shear strength. Both the seismic potential for the site, and the seismic susceptibility of the site are fundamental factors necessary to evaluate a project of this magnitude.

13. Telecommunications Systems Comments (5.14)

Page 5-251, last par.; page 5-252, last par.; and Appendix 5.14-B, all. This section mentions three studies—a search of microwave communications licenses (Appendix 5.14-A), the FAA Aeronautical Survey letter from the FAA New England Region (DEIS Appendix 5.12-C), and the radar/radio interference studies performed at the Horns Rev facility in Denmark (DEIS Appendix 5.14-B).

Neither the FAA letters nor Horns Rev reports provide any technical detail that would indicate a "study" had been performed. A proper study would involve a thorough technical (analytical and experimental) evaluation of the effect of wind turbine farms on radars of the type that are in the field of view of the project.

The DEIS conclusions in this area are further flawed in that they ignore a large amount of credible technical information that has been generated in the United Kingdom. This is the result of a joint cooperative effort by the wind industry and by the government to identify

the adverse effects of wind turbine farms on air traffic and defense radar and to determine methodology to mitigate these effects by techniques including physical separation and modification of the WTG's and radars.

There are serious flaws in Horns Rev Report (DEIS Appendix 5.14-B). The Horns Rev report is clearly anecdotal, using terms such as "during the construction phase no difficulties with VHF communications were observed." The report also addresses only one type of radar interference ("shadows on radars from rotating turbine blades") and fails to mention the strong returns that are produced on shipboard radar by the wind turbine base. These strong returns produce radar returns in the sidelobes of the radar antenna, so that the turbine base returns will appear at angles to each side of the turbine base, where there should be no return. These require that the radar gain must be reduced to avoid blooming and sidelobe returns, thereby reducing detection sensitivity everywhere on the display. This appendix also fails to mention the problems caused by the wind turbine bases to shipboard automatic tracking systems that provide collision avoidance. Consequently, the DEIS conclusions based on the Horns Rev report are simply not credible.

There are also difficulties associated with "no hazard" determination letters by FAA New England Regional Office (DEIS Appendix 5.12-C). The FAA determinations do not clearly enumerate the scope of the investigation performed by the FAA New England Regional Office, particularly with regard to potential radar problems associated with the wind turbine generator farms. It is not clear that the New England Regional Office has the technical resources to make such a complex determination regarding radar interference issues without outside technical support, and there is no evidence in the DEIS of such technical support or that the FAA headquarters has reviewed and concurs with these findings. It is our understanding that three airport managers in the region have appealed this determination to FAA headquarters (Refer to case #04-AWA-OE-24, Mr. Gerald Sonders, 202-267-8783).

The four FAA determination letters refer to Horseshoe Shoal (4/9/2003), Monomoy-Handkerchief Shoal (7/21/2003), Tuckernuck Shoal (8/5/2003), and South of Tuckernuck (5/17/2004). The memos apparently allow installation of wind turbine generator farms at any one or all four sites, without regard to the aggregate effects if all four sites are populated with wind turbine farms. Thus, the FAA determination appears to allow installations at all four of the sites mentioned, comprising 351 turbines over an area of 75 square miles.

The four FAA determination letters make no mention of adverse effects on radar-based air traffic control, although the 5/17/2003 and 3/26/2004 letters have the following additional stipulation: "However, should spurious electromagnetic noise or aggregate noise from multiple wind turbines adversely cause Electro-Magnetic Interference (EMI) to an FAA facility, the proponent agrees to cease operations of the wind turbine(s) until such EMI is mitigated". This means that wind energy plants could be shut down indefinitely should problems occur after the facility is installed. An indefinite shutdown could lead to

bankruptcy of the proposed project and a legacy of unused derelict wind turbine generators in Nantucket Sound. Clearly, these issues need to be resolved before the wind turbine generators are installed.

Key technical studies are available but were not considered in the DEIS. The DEIS authors were either unaware of, or failed to cite the large amount of highly relevant information that has been generated and published in the United Kingdom (UK) by the government, the UK wind industry, and private companies contracted by these agencies. This information is particularly significant because much of it was produced in a non-adversarial manner by the British wind industry and the government with the goal of ensuring that wind turbines and critical radar systems can both operate successfully without causing interference. This is done in the UK mainly by ensuring adequate physical separation between critical air traffic and air defense radar and wind turbine farms. These reports are briefly summarized below to show that the UK reports address many adverse effects of WTG's on radar that were missed by the DEIS.

One such study is the *Wind Energy and Aviation Interests - Interim Guidelines*, Wind Energy, Defence & Civil Aviation Interests Working Group, Report ESTU W/14/00626/REP (ESTU Report).

A working group that included the British Wind Energy Association, the Ministry of Defence, Department of Trade and Industry, the Civil Aviation Authority, and the National Air Traffic Services produced this report. It provides a thoughtful overview of the interaction of WTG's with virtually every other facility in the U.K and a detailed list of procedures required to ensure that wind farms can co-exist successfully with other things that may be affected by WTG installations. They also commissioned:

(1) A model to predict the effect of WTG's on radar installations in the area of interference with radar; and
(2) An investigation of measures to reduce the potential effects of WTG installations on radar installations.

A summary of the findings in this report is provided in the comments associated with DEIS section 5.14.4, Analysis of Impacts.

Another important study is the *Feasibility of Mitigating the Effects of Windfarms on Primary Radar*, by M.M. Butler and D.A.Johnson, Alenia Marconi Systems Limited, ETSU W/14/00623/REP, DTI PUB URN No. 03/976, 2003.

The British Wind Energy Association funded Marconi Systems to quantify the adverse effects that WTG's might cause for radars and to investigate the feasibility of modifying radars in some way to reduce or eliminate these effects. They state "there is evidence that unwanted effects do occur, reports from the operators of a number of radar systems that currently operate in the vicinity of wind turbines have identified problems."

They generated a mathematical model of a WTG and generated a number of interesting characteristics. They concluded that "[t]urbines cause two principal effects: Doppler modulation of the reflected signal at frequencies similar to those from aircraft and very high potential reflection levels causing limiting and numerous other effects in the radar signal processing."

Yet another key document is the *Letter from Julian Chafer FRICS MAPM Head of Safeguarding* To Clifford Carroll, November 12, 2004.

The Ministry of Defence (MOD) assesses the impact (WTG) turbines on Air Defense, Air Traffic Control, and weather radar that are proposed to be located within the line of sight of the radar. Initially, they only considered turbines within 40 nautical miles but the initial findings of recent research indicated that the 40 nmi threshold should be increased pending assessment of their final report. The letter lists effects of turbines on radar that have been experienced in the UK including overhead obscuration of aircraft flying over wind farms, which is a problem for 2-D radars that use an antenna that has a fan beam in elevation (such as the ASR's used at Falmouth/Otis and Nantucket), clutter caused by the rotating blades, dependent on their speed, angle, and relative position, and shadows in radar coverage immediately behind the turbines.

A final critical report is *Results of the electromagnetic investigations and assessments of marine radar, communications and positioning systems undertaken at the North Hoyle wind farm by QinetiQ and the Maritime and Coastguard Agency*, by Martin Howard and Colin Brown, QINETIQ/03/00297/1.1, MCA MNA 53/10/366, 22 November 2004, Proprietary to QinetiQ and MCA.

Results of this report show that there are adverse effects of WTGs on maritime radar on the North Hoyle Wind Farm in the UK. The adverse effects mentioned in the report are summarized in the comments for DEIS section 5.14.4, Analysis of Impacts.

In the UK, several offshore wind energy projects have been canceled, denied or delayed because of interference with defense surveillance radar and air traffic control systems. The UK Ministry of Defence (MOD) has blocked five offshore wind energy plants because they could interfere with military aviation radar and the flight paths of nearby bases.

New information regarding the potential adverse effects of WTG plants on civil and military radar and communications has become available. The UK MOD assessed the impact of wind facilities proposed to be located within the line of sight of air defense, air traffic control, and weather radar. Based on the results, the UK has established a list of safeguarded sites, consisting of 40 airports and military sites, where the authorities must formally review any proposed WTG installation.

Pages 5-252 and 5-253, "Analysis of Impacts" (5.14.4). The DEIS fails to adequately address the impact of wind turbine generator farms on electromagnetic systems that provide key services to aviation safety, air defense and homeland security, and commercial and recreational maritime interests. Constructive comments on what should be included and considered in the EIS are provided below.

At a minimum, a supplemental EIS should specifically address the following six general categories of interference:

- Reflection of primary radar signals that can cause false targets to appear on air traffic control radar, air defense radar, shipboard navigation radar and anti-collision systems (ARPA), and USCG helicopter Search and Rescue radar;
- Reflection of secondary radar (beacon transponder signals) from aircraft that can cause false targets to appear on air traffic control systems and airborne collision avoidance systems;
- Reflections leading to interference with instrument landing systems (ILS);
- Physical blockage leading to potential attenuation and/or garbling of signals for radar, air traffic control beacon transponders, Global Positioning System (GPS) and LORAN navigation receivers, and voice communications and data links;
- Radiated electrical noise emissions associated with rotating electrical machinery that can cause interference with receivers operating in the frequency bands in which the noise is generated; and
- Radiated electrical fields associated with the power transmission lines.

A representative list of the impacts of WTG's on radar included can be summarized as follows.

- The wind turbine generators (WTG) produced blind and shadow areas in which other turbines and vessels could not be detected unless the observing vessel was moving (MCA, 2004).
- Detection of targets within the wind farm was also reduced by the cross and down-range responses from the WTGs which limited range and bearing discrimination (MCA, 2004).
- There were large displayed echoes of WTGs on the radars due to the vertical extent of the turbine structures (MCA, 2004).
- Strong responses were experienced from sectors of the main beam outside the half power (-3dB) points and the side lobes outside 10° from the main beam.
- If such spurious echo effects are limited by reducing receiver amplification (gain), this will reduce the amplification of other targets, perhaps below their display threshold levels (MCA, 2004).
- Sea and rain clutter will present further difficulties to target detection within and close to wind farms (MCA, 2004).
- Shore based radar performance - Larger vessel detection - A larger vessel was easily detected within and beyond the wind farm. However, while it was

broadside on to the direction of the shore radar, reflections from the turbines produced strong multiple echoes. At an oblique aspect to the radar, multiple echoes did not occur, but some reflected echoes were observed (MCA, 2004).

- Radar and ARPA carried on larger vessels - As with small vessel radars, range and bearing discrimination were affected by the response from the WTGs. Definition was less on S band radar than on X band. Numerous spurious echoes from side lobes and reflections were reported by MV "Norbay" starting at a range of about 1.5 nm. The ship's ARPA had difficulty tracking a target vessel within the wind farm due to target swap to the stronger response. This substantiated a similar report with respect to the BHP Billiton radar's own tracking system (MCA, 2004).
- There are concerns about the use of both shipborne and shore based radar as an effective aid to both vessel and mark detection and, consequently, for ship-to-ship collision avoidance in the proximity of wind farms. Wind farm structures generally have high vertical extents and therefore will return very strong responses when observing radars are close. The magnitude of such responses will vary according to transmitted radar power and proximity to the structures but can prevent both the visual detection of targets and the effective operation of automatic radar plotting aids (ARPA). These effects can be mitigated by vessels keeping well clear of wind farms in open water or, where navigation is restricted, keeping the wind farm boundaries at suitable distances from established traffic routes, port approaches, routing schemes, etc. (MCA, 2004). The DEIS fails to make allowances for keeping the wind energy plant boundaries at suitable distance from established navigation routes, indicating a lack of understanding of the area in which hazards to safe navigation are posed by the wind energy plant.

The EIS should be required to address potential adverse effects on all civil and military radar sites in the Nantucket Sound area that are potentially vulnerable to interference (Figure 1). The FAA provides Terminal Radar Control (TRACON) and En-Route control services in the area. Radar sites are marked with solid red balls and airports are marked with red circles. Aircraft operating under Instrument Flight Rules (IFR) file a flight plan and receive continuous positive control by air traffic controllers. All other aircraft use Visual Flight Rules (VFR), and may request services but are not required to do so.

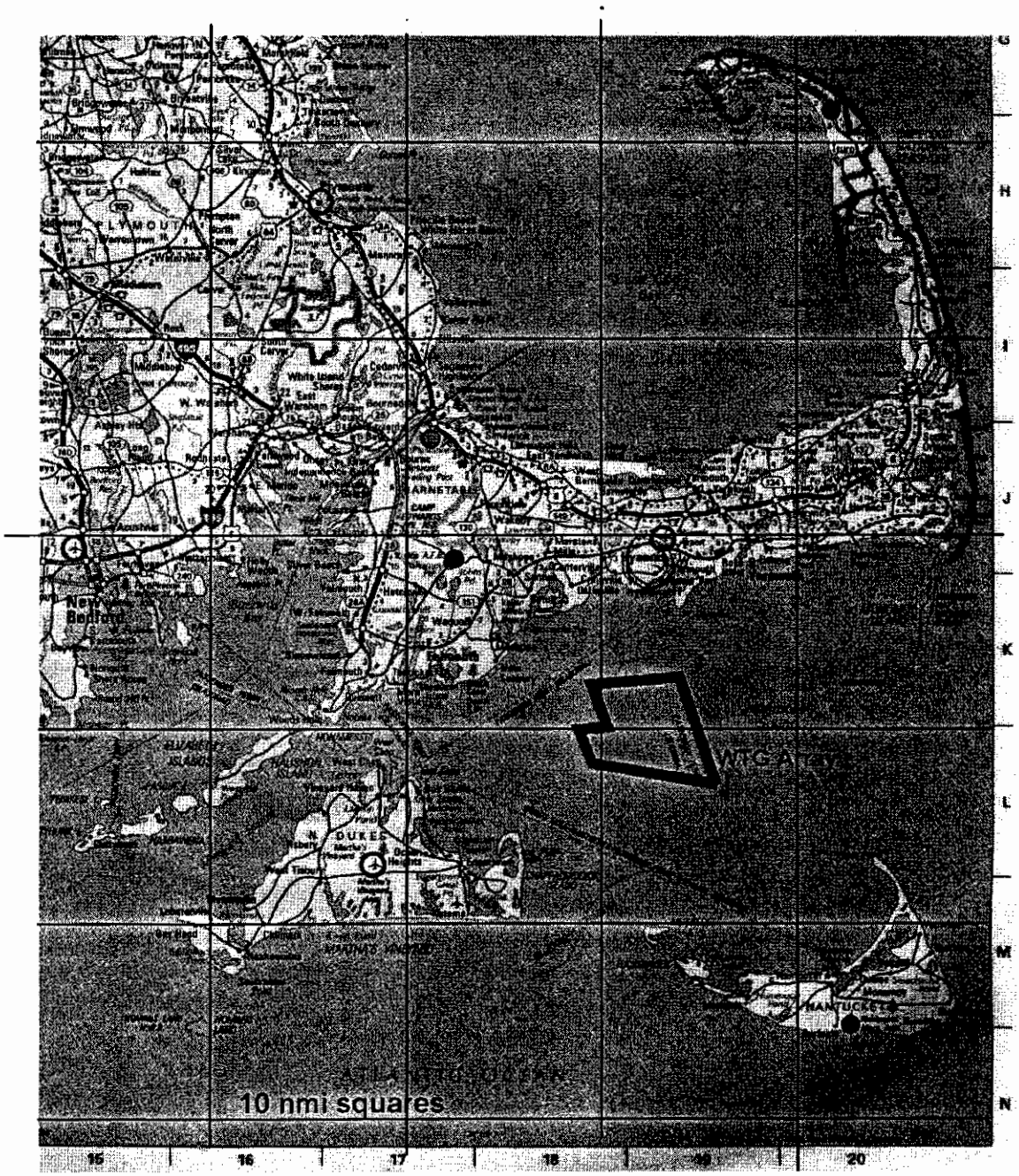


Figure 13. Air radar facility locations.

Cape TRACON (K90) in Falmouth handles about 400,000 flight operations per year, as summarized in the Table below. (Letters in parentheses indicate the FAA designations for the facilities mentioned.) It provides terminal approach control services to the airports at:

- Nantucket (ACK)
- Hyannis/Barnstable (HYA)
- Martha's Vineyard (MVY)
- Falmouth/Otis Air National Guard base (FMH)
- Plymouth (PYM)
- New Bedford (EWB)
- Provincetown (PVC)

As discussed above, Chapter 3 of the DEIS Cape TRACON also provides control for aircraft transiting the area using IFR and, on request, assists aircraft in the area that are using VFR. IFR minimum altitude is 1200 feet in the area. This information is repeated here for Chapter 5 comments.

At least seven more (small) airports in the area are not shown in Table 4; aircraft using these facilities also contribute to the workload of Cape TRACON. These services are provided using radar data from the radar installations at Nantucket and Falmouth/Otis.

Aircraft position location for local air traffic control is provided to Cape TRACON by an ASR-9 airport surveillance radar at Nantucket and an ASR-8 radar at Falmouth/Otis. These are 2-D radars that do not provide aircraft altitude information. In addition to the ASR "primary" radar, each radar installation includes "secondary" radar, an ATCBI-4 air traffic control beacon interrogator that transmits a signal that causes a transponder on the aircraft to respond. In normal operation, the beacon system (secondary radar) is preferred for traffic control because the beacon response provides aircraft altitude and a means of identifying the aircraft. However, the primary radar alone allows detection of aircraft that have no transponder, or a transponder that is turned off, and can provide weather information. These systems have an instrumented range of 60 nautical miles. The Horseshoe Shoals site is located about halfway between the two ASR locations, about 15 miles from each radar.

The ARSR-4 is part of the nation-wide surveillance system that is used by the Air Force for detection of potentially hostile or hijacked aircraft. This mission relies on the ARSR-4 primary radar, rather than the beacon interrogator, because threat aircraft must be detected when they are not using transponders. This radar is located near the tip of Cape Cod, as indicated by the purple dot in Figure 1.

It is likely that data from both the ARSR and the ASR's would be used to support detection of aircraft that might be hijacked or seem to have hostile intentions. The Air Force users of the ARSR data would be responsible for vectoring fighter aircraft to investigate suspicious targets, particularly unidentified aircraft that lack beacon responses. Most of these fighters have to rely on ground control to vector them to intercept the suspicious aircraft.

PAVE PAWS is a very long-range early warning radar system located at Cape Cod Air Force Station, 15 miles northwest of the proposed project (see green dot in Figure 1). Its mission is to search for sea-launched and intercontinental ballistic missiles. It has a range of 3000 miles. Because of its strategic and tactical importance, the impact on this radar should certainly be considered in the EIS. Although the minimum elevation angle of the PAVE PAWS antenna beam is 3 degrees, the radar is still subject to sidelobe interference caused by the strong return from the WTG towers.

The ARSR is the primary means of tracking aircraft transiting the Atlantic between the US and Europe and as such is an important asset to the national air traffic control and air defense systems.

Due to the height of the wind turbine generators (417 feet above mean sea level) and the height of the radar antennas (towers) used for the ASR's, ARSR, and Pave PAWS, the wind turbine blades and most of the supporting structure will be within the field of view and therefore visible to all of these radars.

The terminal radars (ASR's) have fan beams that are wide in elevation and therefore will display the returns from the WTGs merged with the returns from aircraft at higher altitudes. The ARSR and the PAVE PAWS have narrower elevation beams and can discriminate in elevation, although they are still vulnerable to returns from the vertical sidelobes of the antenna. UK studies indicate that the returns from the base of the wind turbines are substantial at the frequency band used by the ASR and are much stronger at the lower frequencies used by the ARSR.

The Doppler processors used in these radars should greatly reduce the returns from the base of the wind turbine generators as long as they do not saturate the receivers. However, the rotation of the blades will produce Doppler offsets that will be passed through to the displays.

Finally, the DEIS makes no mention of the instrument landing systems (ILS) installed at the above airports and does not address whether or not the WTG farm will interfere with these systems. Since these are the primary guidance method used by aircraft landing in foul or foggy weather, any interference with any of the local airports' ILS systems will have immediate tragic consequences.

Serious safety issues are presented as well. These issues are discussed previously under the comments on Chapter 3, and are set forth here again for the applicant's preferred project site. Three proposed turbine arrays in Nantucket Sound are located within 2 to 3 miles of the three alternative WTG farm sites; the minimum altitudes for these flight paths range from 1,700 to 2,000 feet. The DEIS concludes that since the turbine arrays are not located in the flight paths of any low altitude IFR routes, no problem exists. On the contrary, there are potential hazards caused by the close proximity of aircraft to the turbine

arrays. These are track confusion and/or beacon transponder reflections that can adversely affect air traffic control operations.

Figure 3-21 of the DEIS shows Instrument Flight Rules flight paths in the vicinity of the proposed locations in Nantucket Sound. Flight paths V141 and V167 come within 3 miles of the Horseshoe Shoal Alternative and V141 comes within less than a mile of the Monomoy-Handkerchief Shoal Alternative. The close proximity of these flight paths to the large radar returns from wind turbine generators is not addressed as a concern in the DEIS. In particular, there is a possibility of generating the appearance of a potential flight conflicts due to false radar tracks generated by the wind farms.

Radar trackers used by FAA air traffic control correlate aircraft primary and secondary (beacon transponder) radar returns from each scan of the radar antenna. Each new scan produces a series of new target returns, and each new return has to be associated with the set of previous tracked points of a particular aircraft. This is accomplished by deducing the speed and heading of the aircraft and predicting where the return on the next scan will occur. If the new return falls within a reasonable distance of the predicted return, the track is updated and a new prediction is made. If the aircraft turns or if there are multiple returns in the vicinity of the predicted position, confusion can occur.

For example, V167 executes an abrupt 80-degree turn to the left at its closest point of approach to the Horseshoe Shoal site. At that point V167 is within 9 miles of intersecting V141. A radar track of an aircraft on V167 would be extended along a straight line up to and beyond the turning point. When the aircraft makes its turn, the radar tracker is vulnerable to generating a track correlation with a primary radar return from the Horseshoe Shoal wind farm, which is in the direct path of the previous tracks from that aircraft. The false track would indicate a potential conflict with aircraft on V141 and vice versa. False tracks and/or track bifurcations of this type can lead to confusion or the possibility of missing a hazardous situation and should be addressed in a supplelmental EIS.

The same type of confusion can occur with marine radar-based automatic radar plotting aids systems (ARPA). These are required equipment for ships over a certain tonnage operating in US waters and are used for ship-to-ship collision avoidance. The basic problem is the large number of returns generated by the WTG bases can confuse the automated tracker, and it is compounded because the large returns from the WTG towers can cause blooming (saturation and display of returns from the radar sidelobes) on the display unless the radar gain is reduced when near the towers. When the radar gain is reduced, radar performance is reduced because there is a loss of sensitivity for all targets.

Returning to the aviation case, it should be noted that beacon transponder information (secondary radar returns), when present, allows tracks to be associated with the correct aircraft by using identity codes and altitude information transmitted by each equipped aircraft. However, the DEIS should address the potential for confusion that arises when one of the aircraft transponders is not operating. In addition, the possibility of strong

reflections of the beacon transponder signal from the wind turbine generators could lead to further confusion in air traffic control and this is also not addressed in the DEIS.

VHF communications are line of sight, which places the turbines directly between two surface vessels attempting communications. Because the extremely large returns caused by the turbine tower bases will force a reduction in sensitivity of shipboard search radar operating near the turbines, it is critical that surface vessels are able to communicate effectively in the vicinity of the turbine array, particularly in the frequent fog conditions found in the area. Oil spills due to even minor ship collisions can result in serious pollution.

The assertion in DEIS 3.4.3.4.9 that "[a]ccording to US Coast Guard personnel it is unlikely that the turbines would impact communications from the Coast Guard Communications Center at MMR because the majority of their signals are transmitted to the east, away from the proposed turbine locations" is confusing and possibly misleading. If the Coast Guard thinks that there will be interference, how will they communicate with vessels in the vicinity of the WTG array and how will they provide Search & Rescue operations in the Sound?

It is well known that helicopters can be recognized on VHF radios because they provide a distinctive sound on VHF radios due to the modulation introduced by rotor blades. Similar effects would be expected for the rotating turbine blades, except that there will be many more blades in the line of sight and they are turning more slowly. The DEIS needs to address the potential adverse effects of this on bridge-to-bridge, search and rescue, and other VHF communications. The DEIS quotes the Horns Rev Wind Farm report to assert that there were no reports of problems with VHF radios. However, a close reading of this report (in the DEIS as Appendix 5.14A) reveals that these results are anecdotal rather than quantitative measurements. The EIS should include a detailed measurement of the effects of the WTG's on VHF radio signals trying to propagate through the WTG farm.

The McGowan Group report pointed out that VHF Direction Finding equipment carried in lifeboats did not function correctly when within about 50 meters of turbines and the BHP telemetry or short range radio link to and from its deployed RIB (rigid inflatable boat) was similarly reported to suffer interruptions.

The DEIS fails to adequately address the impact of wind turbine generator farms on electromagnetic systems that provide key services to aviation safety, air defense and homeland security, and commercial and recreational maritime interests. These critical impacts must be thoroughly addressed before an EIS is issued.

Page 5-251, last par., Page 5-252, last par., and Appendix 5.14-B, all. The DEIS states that no interference with marine radar is expected from the wind facility and cites tests conducted at the Horns Rev wind facility. No data is supplied to substantiate this claim.

The United Kingdom's Maritime and Coastguard Agency (MCA) completed an analysis, of the effect of offshore wind facilities on navigation and communication systems (MCA, 2004). This UK Coastguard report concludes that the presence of a wind facility produced strong marine radar distortion not only for vessels operating within the wind facility but also for vessels operating up to 1 ½ nm (3,000 yards) distant from the periphery of the wind facility. The study also noted that the wind facility interfered with ARPA and expressed concern that mariner's may be unable to comply with international requirements governing its use. The radar interference was found to depend on the height of the WTG and rotors. The WTGs and rotors for the proposed offshore sites are larger than the facility tested in the UK. The MCA's study found these severe navigation problems effecting vessels up to 1 ½ nm from the wind facility. The MCA has recommended a follow-on study to further examine this interference with marine radar and to recommend minimum distances that wind farms should be located from navigation channels and shipping routes. The Nantucket Sound alternatives have been placed within 800 feet of the Main Channel and less than a mile from heavily traveled ferry boat routes now transited by high-speed ferries.

The issues of marine radar and ARPA interference must be addressed as well as reevaluating the minimum distance that an offshore alternative should be set back from channels and shipping routes before an EIS is issued.

Other findings (MCA, 2004) are summarized as follows:

- VHF and other communications:
    - The VHF Direction Finding equipment carried in the lifeboats did not function correctly when very close to turbines (within about 50 metres) and the BHP telemetry or short range radio link to and from its deployed RIB (rigid inflatable boat) was similarly reported to suffer interruptions.
- Small Vessel radar performance:
    - The wind turbine generators (WTG) produced blind and shadow areas in which other turbines and vessels could not be detected unless the observing vessel was moving.
    - Detection of targets within the wind farm was also reduced by the cross and down-range responses from the WTGs which limited range and bearing discrimination.
    - The large displayed echoes of WTGs were due to the vertical extent of the turbine structures.
    - The strong responses from sectors of the main beam outside the half power (-3dB) points and the side lobes outside 10° from the main beam.
    - Although such spurious echo effects can be limited to some extent by reducing receiver amplification (gain) this will also reduce the amplification of other targets, perhaps below their display threshold levels.
    - Sea and rain clutter will present further difficulties to target detection within and close to wind farms.
- Shore based radar performance - Larger vessel detection:

- A larger vessel was easily detected within and beyond the wind farm. However, while it was broadside on to the direction of the shore radar, reflections from the turbines produced strong multiple echoes. At an oblique aspect to the radar, multiple echoes did not occur, but some reflected echoes were observed.

- Radar and ARPA carried on larger vessels:
  - As with small vessel radars, range and bearing discrimination were affected by the response from the WTGs. Definition was less on S band radar than on X band. Numerous spurious echoes from side lobes and reflections were reported by MV "Norbay" starting at a range of about 1.5 nm. The ship's ARPA had difficulty tracking a target vessel within the wind farm due to target swap to the stronger response. This substantiated a similar report with respect to the BHP Billiton radar's own tracking system.

There are concerns about the use of both shipborne and shorebased radar as an effective aid to both vessel and mark detection and, consequently, for ship-to-ship collision avoidance in the proximity of wind farms. Wind farm structures generally have high vertical extents and therefore will return very strong responses when observing radars are close. The magnitude of such responses will vary according to transmitted radar power and proximity to the structures but can prevent both the visual detection of targets and the effective operation of automatic radar plotting aids (ARPA).

Defence & Civil Aviation Interests Working Group, Report ESTU W/14/00626/REP, (ESTU Report), enumerates adverse effects of WTG's on radar that should be considered in a supplemental EIS and include the following:

> Masking - The casting of shadows behind a WTG may lead to missed detections of targets that fall within the shadow for military, civil air traffic control, and weather radars.
>
> Radar Returns / Clutter - These unwanted returns may mask targets of interest, particularly in the case of radars with a wide elevation antenna beam width that are trying to detect aircraft flying over WTG farms, as is the case with the ASR's at Nantucket and Falmouth/Otis. A target that continually appears in one place causes much less trouble than when the target is intermittently detected, because an intermittent return is more likely to represent a maneuvering or unknown aircraft. This is the case with WTG's, which can appear only on one of every 6 radar scans due to the fluctuating nature of the fan-blade returns. The problem becomes much more difficult when there are more than a very few WTG's. Multiple WTG's will present several returns during every radar sweep, causing a "twinkling" effect. If the radar system interprets them as one or more moving objects and initiates a track on the returns, the radar track processor can become overloaded.
>
> Scattering, Refraction, and False Returns - Effects discussed in the report include

multiple false returns, display of radar returns from genuine aircraft in an incorrect position, and garbling or loss of SSR radar (beacon transponder) information due to reflections of the airborne transponder from the WTG's. This effect would occur when an aircraft is near the WTG farm. Each aircraft's transponder is interrogated by all the air traffic control radar beacon interrogators in the vicinity (60 mile radius) on every scan, and it radiates omni directionally. The transponder signal can bounce off a nearby WTG and be received by the interrogating radar as a response that is at a longer range and a different bearing than the aircraft. This signal will usually be weaker than the original. Airborne collision avoidance systems that rely on detection of beacon transponder signals from other aircraft could generate false collision warnings if this occurs.

Doppler processing will not remove the return from the WTG rotor blades, but the report states that this is not a serious problem if there are only one or a few WTG's. It points out that WTG farms containing a large number of WTG's (as in Nantucket Sound) can produce the appearance of multiple unknown aircraft moving around the WTG farm and states that military systems may automatically start tracking the activity.

When an aircraft is under automatic track, the position of the aircraft on the present scan and its smoothed velocity are used to predict a "basket", i.e. where to look for the return associated with that target on the next scan, 4.8 seconds into the future. Ideally, the radar blip from that target on the next scan will fall into the basket and will be the only blip to do so. If the target is over a WTG farm and is being viewed by a 2-D radar, the WTG returns can confuse the tracker and cause multiple tracks to be generated.

The report also points out that controllers can simply ignore returns from the WTG area by keeping all aircraft 5 miles away from it, or limit service (calling out potential conflicts) when aircraft are in the vicinity of the returns from the WTG farm. They also point out that the significance of unwanted returns from WTG farms will depend not only to the type of airspace they are within or underneath, but also on their proximity to traffic patterns and routes.

Feasibility of Mitigating the Effects of Windfarms on Primary Radar, by M.M. Butler and D.A.Johnson, Alenia Marconi Systems Limited, ETSU W/14/00623/REP, DTI PUB URN No. 03/976, 2003 (ETSU, 2003) is a report funded by the British Wind Energy Association. Marconi Systems was tasked to quantify the adverse effects that WTG's might cause for radars and to investigate the feasibility of modifying radars in some way to reduce or eliminate these effects. They state "there is evidence that unwanted effects do occur, reports from the operators of a number of radar systems that currently operate in the vicinity of wind turbines have identified problems". They concluded that "[t]urbines cause two principal effects: Doppler modulation of the reflected signal at frequencies similar to

those from aircraft and very high potential reflection levels causing limiting and numerous other effects in the radar signal processing".

Radar reflectivity is measured in terms of a target's radar cross section (RCS) in square meters (m^2). The radar cross section of the tower portion of a WTG is proportional to the square of its height and can be as large as 1,000 m^2 at the ARSR frequencies (L-Band) and about 100 m^2 at the ASR frequencies (S-Band). A large airliner is roughly 20 m^2 nose-on and 1000 m^2 broadside, while a small general aviation aircraft is 1-5 m^2 nose-on. An air traffic control radar's Doppler filters ("Moving Target Indication" processing, or MTI) can remove the tower returns from the display only if they do not cause limiting in the receiver. If the receiver gain is manually reduced to avoid limiting, the ability to detect aircraft is reduced at all ranges.

The second effect pointed out in the study is that the motion of the WTG blades "produce directional reflections and their rotation causes RCS (radar cross section) flashes" and generate a false Doppler return that fools the radar's Doppler filters: "Because of the nature of the movement of the turbine blades, these filters will pass their signals causing the radar to present the Air Traffic Controller with false information." Because these individual targets have Doppler offsets but do not have realistic motion, the study correctly points out that the radar scan-to-scan tracking filters (which correlate radar blips from scan to scan based on possible motion of aircraft over the 360° scan time of 4.8 seconds) can be modified to avoid false track generation on WTG returns. However, this assessment seems to deal with only one WTG, rather than multiple WTG installations as in the proposed project. In a 130-WTG wind farm, there is a possibility that returns from different WTG's will correlate when viewed on subsequent radar antenna scans because their distance between scans is comparable to aircraft motion over 4.8 seconds. Based on the WTG X and Y separations of 600 and 1000 meters, the equivalent aircraft speeds for a 4.8-second scan rate are approximately 250 and 400 knots. This range encompasses speeds that could be employed by aircraft overflying the area or intruder aircraft.

Another complication for the scan-to-scan tracking filters is that the WTG's will generate intermittent strong flashes. For the proposed project, there will be 130 x 3 = 390 possible broadside flashes from the blades. However, only a fraction of these (those where the blade is parallel to the radar polarization vector) will be visible on any one pass. This means that there will be a large number of new targets appearing in different places within the wind farm on each subsequent scan, so the tracking filter must be able to handle a large number of new targets on each scan without running out of capacity to detect new targets.

It should also be noted that marine radars do not use Doppler filtering and will therefore need to have enough dynamic range to pass both a WTG return and a smaller ship return. If the receiver gain is set at its highest value, the WTG return will bleed into the antenna sidelobes and obscure smaller targets near the WTG farm, and if the gain is reduced, the smaller targets at all azimuths may fall below the threshold of detectability.

The DEIS fails to adequately address the impact of wind turbine generator farms on electromagnetic systems that provide key services to aviation safety, air defense and homeland security, and commercial and recreational maritime interests. These critical impacts must be thoroughly addressed before a supplemental EIS is issued.

14. Socioeconomics (5.16)

a. General

The DEIS's analysis of the socioeconomic impacts of the Cape Wind Project, per se, lacks a comprehensive, analytical framework. The ECONorthwest report describes an appropriate framework drawing on the analytical standards expressed by the U.S. Water Resources Council, the Corps' own manuals, the U.S. Environmental Protection Agency, and the National Research Council.

To satisfy these standards, the EIS must fully consider and measure all the factors that would determine the Project's economic impacts, if it should be implemented. It must estimate economic conditions without the Project, estimate conditions with it, and compare the two. The analysis must fully examine all relevant evidence regarding all factors that would affect the Project's benefits and costs. It must fairly consider all the significant benefits and costs: those accruing to the Project Sponsor plus those accruing to others. It must provide a comprehensive description of the economic costs that could materialize if things should go wrong.

The DEIS violates the standards on all counts. It does not conduct a with-vs.-without analysis, it fails to consider all relevant evidence and factors, it gives more analytical weight to the Project's potential benefits than to its potential costs—especially the costs that would accrue to parties other than the Project Sponsor—and it fails to provide a comprehensive description of the economic risks inherent in the Project.

The ECONorthwest report shows that a careful, with-vs.-without analysis probably would conclude that the Project's economic benefits would materialize at levels far below those represented in the DEIS. Such an analysis also probably would conclude, contrary to the DEIS, that the Project would impose significant costs on the commercial fishing industry, recreationists and tourists, and on property owners. A careful, thorough analysis also probably would conclude that the Project would generate several types of costs that received no attention in the DEIS: it would consume resources owned by the public; diminish the ecosystem's non-use values; and jeopardize state, local and private investments in the ecosystem. In addition, a careful, thorough analysis would go far beyond the DEIS in identifying things that might go wrong, if the Project were implemented and describing the costs that would materialize if they did. Such an analysis probably would conclude that there are significant costs associated with the risks of technological failure, financial risks to the Project Sponsor, economic aspects of ecological risk, and navigation risk.

b. Electricity, Rates, and Reliability (5.16.4.2)

Pages 5-267 through 5-269, first paragraph, Appendix 5.16-B. This section of the DEIS measures the Project's potential impacts on the electricity system, relying on a study prepared for the Project Sponsor by a consulting firm, La Capra Associates (Appendix 5.16-B). This study incorporates several, unsubstantiated assumptions, foremost among them: that electricity from the Project would displace electricity that otherwise would be generated by burning fossil fuels. Based on this assumption, the DEIS attributes to the Project the set of economic benefits identified by La Capra Associates: savings of $25 million per year for electricity consumers; reduced emissions; improved reliability of the electricity system; help meeting the renewable-generation requirements of Massachusetts and Connecticut; and diversification of the region's mix of electricity generators.

The ECONorthwest report demonstrates, however, that the DEIS did not go far enough in its investigation of this assumption. It did not look to see if these same benefits, more or less, would exist even if the Project were not implemented. If they would, then the DEIS erred in attributing these benefits to the Project.

The ECONorthwest report explains that electricity from the Project would not compete in the overall, open market, but in a niche, submarket market created by Massachusetts' Renewable Portfolio Standards (RPS). The niche market is somewhat distinct from the overall electricity market in that only renewable energy sources can compete within it, and the pricing of electricity generated within this niche market is different from the pricing of electricity generated outside it. The EIS should fully evaluate the Project's economic benefits looking at its impacts on the niche market rather than assuming that its impacts would materialize directly in the larger overall market. Evidence shows that the project, by competing in the niche market, probably would displace another, renewable source of electricity rather than electricity derived from fossil fuels. The EIS should fully investigate this potential outcome. If it should materialize, then the DEIS' estimates regarding all of the Project's electricity-related benefits are way off-target. The Project would not yield annual savings to consumers of $25 million annually. Instead, it might yield no savings at all or it might even increase consumers' costs. If the Project were to displace another, renewable source of electricity, rather than electricity derived from fossil fuels, then the Project would not yield the emissions-related benefits—for reductions in emissions harmful to human health or for reductions in emissions of greenhouse gases—reported in the DEIS.

c. Public Health Benefits and Associated Costs (5.16.4.3)

Pages 5-269 to 5-270, first paragraph. This section of the DEIS builds directly on the analysis of the Project's impacts on electricity markets. The DEIS assumes that the electricity from Project would displace an equal amount of electricity from generators burning fossil fuels. The displacement would result in a reduction in air emissions, with resulting positive impacts on human health, which the DEIS values at $53 million per year. This is the single largest component Project's economic benefits, according to the DEIS.

The ECONorthwest report demonstrates, however, that the assumptions underlying DEIS' estimate of human-health benefits and, hence, the estimate itself are unreasonable. The Project is more likely to displace electricity from another renewable source of energy. If it were to do so, there would be minimal, perhaps zero impact on air emissions from the electricity system.

Even if the Project were to displace electricity from generators burning fossil fuels, however, evidence discussed in the ECONorthwest report indicates the DEIS overstated the amount of pollution that the Project would displace. This overstatement arises because the DEIS assumed production from the Project would displace electricity from the dirtiest power plants in New England, Salem Harbor or Brayton Point, with emissions at past levels. If the Project were to displace any electricity from a fossil-fuel-burning generator, it probably would displace electricity from other plants with much lower emission rates. Moreover, even if the Project were to displace electricity from a fossil-fuel-burning generator with lower, marginal emissions, the impacts on national human-health benefits might be minimal. This outcome seems likely, insofar as cap-and-trade programs for SO2 and NOx would allow any reduction in emissions resulting from the Project to be offset by increased emissions elsewhere, until total regional and national emissions are at the maximum allowed by each cap.

d. Local Economy (5.16.4.4)

Pages 5-270 through 5-273, and Appendix 5.16-A. The DEIS estimates positive impacts on jobs, incomes and tax revenues stemming from the proposed project. The ECONorthwest report demonstrates, however, that these estimations fail to account for negative impacts that would materialize elsewhere. Such displacement would occur, for example, as investment in the project displaced investment elsewhere, or as its operation and maintenance activities attracted workers from other jobs. To correct this deficiency, the EIS must develop two forecasts, not just one, of jobs, incomes, taxes, economic output, etc. One forecast must predict what the future levels of these variables would be without the proposed project. The other must repeat the exercise assuming that the project would be implemented. The impact of the Project would equal the difference between the two forecasts.

Page 5-274. The DEIS's analysis of the Project's "Economic Benefits at the National Level" consists of a single paragraph that reports an assessment by the U.S. Department of Energy. The ECONorthwest report explains that this assessment is at odds with common principles of economic analysis. Whereas it is standard practice when analyzing the benefits and costs of a project, such as this one, to consider the initial capital investment as a cost intended to increase the subsequent output of goods and services, which are considered benefits, the DOE turns this reasoning on its head and counts the project's initial investment, about $500 million, as a benefit, not a cost. The DEIS also reports that DOS assumes that the proposed project would occur during "a slow economic period" implying that, absent the project, there would be no other opportunity for investing the $500 million. This assumption contradicts standard analytical practice and is inconsistent

with current economic conditions. The EIS should evaluate the Project's impacts on the national economy in a manner consistent with widely accepted professional standards.

e. Housing and Coastal Property Values (5.16.4.5)

Pages 5-274 to 5-276, top par. The DEIS indicates that the proposed project should have no negative impact on the values of housing and coastal properties. It bases this conclusion on its assessment of studies of wind farms elsewhere, plus information from assesors and real estate agents familiar with four projects in the northeastern U.S. The ECOnorthwest report shows, however, that the DEIS has relied on only a narrow selection of the literature and evidence regarding the Project's potential impacts on property values. It failed to recognize that, for the most part, the literature and evidence are inapplicable to this setting., because they address wind generators located in areas where the natural-resource amenities significantly contribute to property values. Moreover, the Corps disregarded studies and evidence indicating that, because of the particular characteristics of Nantucket Sound, the Project may have a non-trivial, negative impact on the value people place on the area's natural resources. If such a negative impact should materialize, property values in the area might decline.

The Project could depress property values in the area through several mechanisms. If the Project should result in fewer tourists visiting the area, then the demand for tourist-oriented services would decline and, in turn, so too would the prices of tourist-oriented properties. A similar outcome could materialize if the Project did not affect the number of tourists, but caused some to enjoy their visits less and to spend less while in the area. The Project's negative impact on recreationists and tourists also could result in lower prices for residential properties, insofar as reduced demand for tourism-oriented services would lower the demand for labor and, hence, induce some workers to look elsewhere for employment. Or, the Project's impact on residential properties could be more direct. Some people willing to pay a given amount for property with a view of Nantucket Sound as it is today, for example, might be willing to pay less if the view were cluttered with industrial development.

The EIS must expand its analysis to embrace a broader consideration of all the relevant literature before it can justifiably claim that it has estimated the Project's impacts on property values with reasonable certainty.

f. Tourism and Recreation (5.16.4.6)

Pages 5-276 to 5-278, fifth paragraph. Deficiencies in the DEIS's analysis of recreation and tourism are similar to those in its analysis of property values. The ECONorthwest report demonstrates that the DEIS fails to consider all the factors that will determine the Project's impacts on tourism and recreation. The DEIS relies on a selective reading of the relevant literature, considering only reports that found no adverse impacts on tourism and recreation, and overlooking those to the contrary. Considerable evidence, including evidence derived from a study specific to the Project, indicates there is a non-trivial probability that the Project, if implemented, would have a negative impact on the value

recreationists and tourists place on the natural resources of Nantucket Sound. The EIS should fully investigate this probability and estimate the associated loss in consumer's surplus.

g. Fishing (5.16.4.8)

Pages 5-279 to 5-280, second paragraph. The DEIS concludes that the Project would have no substantial, negative impacts on commercial fishing. The ECONorthwest report shows, however, that this conclusion is contradicted by evidence offered by boat captains and others. This evidence indicates that the Project would interfere with fishing activities and pose a substantial hazard. The EIS should fully consider all the evidence regarding the Project's potential impacts on the fishing industry.

E. Comments on DEIS Section 6 (Comprehensive Environmental Monitoring Program)

APNS Comments on this section because of its serious deficiencies. To the extent this chapter is concerned with long-term monitoring of the project, however, it is irrelevant. As discussed at length in these comments, there is no basis upon which to issue the permit. The CWA project will never become a reality at this location, and the Corps should regard this chapter of the DEIS as hypothetical.

1. Benthos Studies

The benthos surveys discussed in this DEIS should be redesigned and redone to correct fundamental underlying flaws in study design and execution, so that solid and factual information may be produced to enable legitimate evaluation of Project impacts. This DEIS fails to provide the needed information. It will also be important to monitor impacts to and recovery of benthic ecosystems.

Page 6-1, 1st par., lines 2-3. "A detailed CEMP [Comprehensive Environmental Monitoring Plan] will be developed and implemented, after consultations with appropriate agency staff, to assess pre-construction and post-construction conditions in the Project Area."

Pre-construction baseline conditions should have been assessed <u>prior to this point</u> in order to properly develop this DEIS. This has not been done in the case of benthic communities and impacts. Benthos samples were so poorly collected that they disqualify <u>any</u> statistical analyses that are needed for an adequate EIS. Because the field personnel collected only 1 qt of sample and discarded the remainder when more than 1 qt was captured by the grab sampler, took a variable amount from the top layer (1.5 – 2+ inches), grossly dug this subsample with a "gloved hand," screened the rest of the sample through a different sized and very coarse mesh, used photo analysis for the "deeper" screened sediments, and had "residual" sample in the grab samplers, no quantitative use can be made of these samples. This discussion does not even consider laboratory analytical methods, which were also highly questionable.

Therefore, these surveys should be redesigned and redone to correct fundamental underlying flaws in the study design and execution, so that solid and factual information may be produced.

It is further recommended that the applicant enlist the assistance of an appropriately experienced benthos scientist to consider comments on this DEIS and to restructure the sampling design, provide improved sampling and analysis protocols, and supervise the surveys. Like many aspects of the DEIS, this section appears to have been the result of a generalist consulting firm charged with the project advocacy. The Corps' failure to manage the DEIS compounded this problem. It would also be helpful, and probably would facilitate the review process if the restructured scope of sork and protocols were reviewed by the reviewers of this DEIS before implementation of the repeat surveys. It is suggested that these surveys might profitably be coordinated with the detailed multibeam/backscatter surveys suggested in comments to Subsection 6.1.1.

These measures, including a reanalysis of impact using the new data, should be taken before approvals for this proposed Project are awarded.

Page 6-1, 2nd par., lines 4-5. "Preliminary guidance for development of this outline was provided during meetings and consultations with cooperating agencies (see Section 10.0)."

Section 10 lists all "Federal, state, and regional entities…invited to participate as cooperating agencies in the preparation of the Corps of Engineers Environmental Impact Statement in accordance with the National Environmental Policy Act" (emphasis added). It does not indicate that all of these agencies and entities actually did participate, or to what degree they participated.

Which agencies and individuals actually participated in developing preliminary guidance for development of this outline of a CEMP? What was their degree of involvement? Did they approve of the results, and are approvals documented? A supplemental DIES should reveal this information.

2. Pre-Construction Monitoring Comments (6.1)

This section of the DEIS noted that "Extensive literature review, agency consultations, and field sampling and survey programs have been conducted for the Project to assess existing conditions within and in the vicinity of the Proposed Alternative and other alternative sites." It further notes that "Resource types and conditions that have been identified in the Project Area include…fisheries, birds, sea turtles and marine mammals." However, no mention of bats was included in this section.

a. Noise Monitoring

In some sections of the DEIS, bird resources refer to birds and bats. In the two sections noted above, reference is made explicitly to birds, thus it is assumed that no bats were included in these studies. In section 6.1.2.4, it was noted that "field surveys were conducted between July 2001 and February 2004 to quantitatively assess bird resources within and in the vicinity of the Project Area," and surveys were to have spanned "a 12-month period to capture variability in seasonal use." From a review of the DEIS, no field studies of bats were conducted in or near Nantucket Sound, and the seasonal data for birds is inadequate to detect seasonal variability of bats. Moveover, given expected inter-year variability in weather patterns and the influence of these patterns on animal behavior, one 12-month period is inadequate to evaluate variability to assess fatality risks from wind turbines or similar installations.

b. Biological Monitoring

Page 6-2, 1st par., line 1. "Pre-construction conditions were assessed for biological resources…."

At least the benthic resources were inadequately assessed. Please see the comments concerning page 6-1, 1st par., above. These assessments should be redesigned and repeated before approvals for this proposed project are awarded.

Page 6-2, 2nd par., lines 2-4. "The mapped [submerged aquatic vegetation] resources were then reviewed relative to the bathymetric survey results to document pre-construction SAV conditions, as described and presented in Section 5.8."

The pre-construction condition of these SAV resources has <u>not</u> been documented. The DEIS states in Section 5.1.3.2 page 5-9 that submerged aquatic vegetation (SAV) may occur in the development area and refers the reader to Section 5.8.3.1.1. That section merely states, however that "[m]apping indicates that two potential areas of submerged aquatic vegetation occur within the project area, beyond Massachusetts' 3-nautical mile limit."

The DEIS does not, however, divulge where these areas are, how large they are, what kind of SAV grows there, their importance or relevance to biological resources, or any other information about this resource. Considering the great importance of SAV to biological systems, much more information should be imparted about the offshore SAV. Section 6.1.3.1 indicates that maps are available, but it is unclear whether this is only for inshore SAV. It also states that a diver survey was conducted, but no resulting information or data are provided. This is inadequate, and constitutes a DEIS deficiency.

Page 6-2, 2nd par., lines 4-5. "To supplement this existing information, a diver survey was conducted…to locate SAV limits and densities for representative areas."

Where is this information documented? It is not provided in the DEIS. No maps are provided to indicate SAV limits, nor are densities provided. Even species are not mentioned, or the type of substrate. These data are not provided even for the nearshore SAV.

Page 6-2, 2nd par., lines 5-7. "Prior to the start of installation of the submarine cable system, an additional pre-construction SAV survey will be conducted to verify the limits of SAV previously surveyed in July of 2003."

Where are these surveys? What will the new surveys be compared against? SAV has not been documented.

Page 6-2. This section states that:

> An extensive literature review and series of agency consultations were conducted to assess sea turtle and marine mammal resources within and in the vicinity of the Project Area. The presence or absence of sea turtles and marine mammals in the project Area was also documented during boat and aerial surveys that were conducted in the project area to collect benthic samples and/or avian data. Any further observations will be documented during other additional pre-construction field surveys that may be conducted for other reasons. No additional monitoring of sea turtles and marine mammals is proposed to document pre-construction resources in the Project Area.

As pointed out earlier, the literature review missed many relevant publications and relied heavily on sources that were more than a decade old and that had questionable relevance to marine mammals and sea turtles in and near the Project Area. Further, the observational data on marine mammals and sea turtles reportedly collected during the referenced benthic and avian surveys are not provided in the DEIS. Also as pointed out earlier, the information on marine mammals and sea turtles provided in the DEIS clearly is insufficient to do a meaningful impact assessment. Thus, the conclusions regarding the potential impacts of the proposed action on marine mammals and sea turtles are little more than optimistic speculation. The available information also is insufficient to design monitoring programs capable of verifying that the predicted impacts are correct. A minimum of three years of seasonal surveys and behavioral studies would be required to reasonably document and provide the basis for monitoring the seasonal variation in the presence, movement patterns, abundance and activities of cetaceans and sea turtles in and near the proposed Project Area. Tagging, tracking, and diet studies would be required to determine the likelihood that the proposed project would affect the in-water movements, feeding habits, or principal feeding sites of the local harbor and gray seals.

"Biological Monitoring of Protected Marine Species," page 6-3. As pointed out earlier, there is reason to believe that posting an NMFS-approved observer on-site during pile

driving activities would reduce the risk of causing marine mammals permanent hearing damage and other physical injuries. However, there is no reason to believe that the proposed 500m safety zone would prevent harm to sea turtles or adverse effects on biologically significant behavior of either marine mammals or sea turtles. Also, it is not evident what is meant by "initial" construction activities, or why the Applicant and the Army Corps apparently believe the risk of adverse effects would be deminimus after the initial period.

"Sea Turtles and Marine Mammals," page 6-4. This one sentence section states that: "[t]he presence of sea turtles and marine mammals in the Project Area and observed reactions of these animals to the Project will be documented during post-construction field surveys." As noted previously the DEIS provides no information on sea turtle or marine mammal observations made during the boat and aerial surveys carried out to obtain benthic samples and avian information before initiating the impact assessment. Consequently there is no basis for determining the types or adequacy of marine mammal and sea turtle data that might be obtained by post-construction field surveys of birds. Also, it is clear that the available data would be inadequate to determine whether any observations of sea turtles or marine mammals made during the post-construction period indicated a project-related impact or lack thereof.

Page 6-3. With respect to biological monitoring, no monitoring is proposed as to the effects of the various electric and magnetic fields of the wind farm known to compete with the natural electric and magnetic fields that the sharks and rays in the regions heavily rely on.

Page 6-2, 3rd par., lines 1-2. "Pre-construction benthic invertebrates and shellfish resources have been assessed through field sampling within and adjacent to the Project area."

Shellfish resources have <u>not</u> been assessed through field sampling, because the sampling method used is not appropriate to assessing them. No trawl data were presented to describe densities of large epifauna, such as whelks, crabs, etc. No data were presented from trawl surveys ESS said they were conducting (Hertz, 2002). Van Veen and Ponar grabs are not appropriate for quantitative sampling of large clams.

There are numerous problems with the data collection and analyses associated with the assessments of benthic communities and habitats, as discussed in comments on all sections dealing with benthos. The reports provided are inadequate to assess potential impacts and recovery scenarios associated with this project. These surveys should be redesigned and redone prior to awarding approvals for this proposed Project.

Page 6-2, 3rd par., lines 2-5. "This field effort included grab sampling, identification, and characterization of benthic invertebrates and communities. The results were used to quantitatively assess the benthic invertebrate communities associated with the various benthic habitat areas or types, as described and presented in Section 5.3."

Benthic invertebrate communities were not quantitatively characterized or assessed. Methods used were not quantitative, and it is therefore not possible to perform quantitative comparisons using these data.

Benthic invertebrates associated with various habitat types were not assessed, because sampling was intentionally restricted to sandy areas, with no known sampling conducted in glacial till, cobble, submerged aquatic vegetation, or patch reef areas.

There are numerous issues concerning the fundamental design of these surveys, some of which are described here below.

A key design problem in the DEIS is the lack of sample replication. Usual accepted practice in benthos studies of this nature is to first adequately characterize benthic population characteristics for each sampling location, and then to compare and contrast populations among locations and across study sites. Analyses between and among locations are inappropriate and undependable if the individual sampling locations are inadequately characterized.

Attempting to characterize populations at a sampling location with a single sample is precarious at best, because individual samples are imperfect. Different microhabitats within a location frequently support differing assemblages. Many species occur in groups, or "patches," within locations, and since they are not uniformly or homogenously distributed throughout their habitat, single samples frequently provide varying results. Sampling systems do not operate uniformly in all cases. For example, if the Van Veen or Ponar Grabs used in this study are deflected by striking a rock, they may take a glancing bite of the bottom, whereas if they miss the rock, the sample may be more direct and representative. A piece of shell caught in the jaw may cause the loss of some sediment as the grab is raised through the water column. A passing surface wave can cause the grab to partially upend on its way to the bottom, causing a less than perfect sampling event. For all of these reasons and others, it is usual accepted practice to take multiple samples at each sampling location so that such sampling issues may be statistically evened, resulting in a more accurate representation of the actual benthos community at the location.

A USEPA (1987) methods document states: "Given the potentially large within-station variability of benthic macroinvertebrate assemblages, it generally is advisable to use more than one sample to represent a station…Swartz (1978) recommends that five replicates be collected at each station, if possible, and that the minimum number of replicates per station be three. Most historical studies in Puget Sound that have used variance-related statistical analyses have collected four to five replicate samples per station."

EVS (1993) makes further recommendations, stating "Statistical power concepts are used to develop and evaluate study designs. After determining the location and number of sample sites or times, the investigator must determine the number of samples (replicates)

collected at each site or time. Typically, 3-5 samples per site or time are used as a rough compromise between precision and costs."

The surveys described in Appendices 5.3-A and -B, however, took only one sample at each station. There was no replication of samples at any station. It is therefore not possible to sort out the degree of within-station variation relative to the variation found among the several sampling stations or across the potentially impacted area as a whole. Discussions of results are presented, however, as if this were not an issue; within-station variability is utterly and totally ignored. The study purports to characterize the benthos communities in the Project area, but it does not, nor does it, by virtue of the lack of surficial sediment and water quality data, provide any enlightenment concerning microhabitat variability or the likely characteristics of benthic populations that will ultimately occupy impacted habitats.

Another serious study design flaw is the use of atypical and inappropriate sampling methods. The sampling method used in this survey is utterly inappropriate for a survey purporting to provide quantitative data. The field team apparently (Appendix 5.3-A, Page 2, par. 1-2) was supplied with a single pre-labeled 1-qt jar for each sample. If the volume of sediment captured by the grab was <1.0 qt, the entire sample was placed into its jar. However, if the volume exceeded 1.0 qt, then "a gloved hand was used to remove at least the top 1.5-2 inches of sediment from the grab." The remaining material was then discarded, presumably because there was nothing to put it in.

A cardinal rule in quantitative sampling is that all samples <u>must</u> be treated alike, so that when comparisons are made among them there is a reasonable likelihood that differences found are real, and not merely residual effects caused by variations in the sampling itself. In this case, materials >1.0 qt were discarded and disallowed from the sample.

Also, that a "gloved hand" was used to remove "<u>at least</u> the top 1.5-2 inches of sediment from the grab," demonstrates further variability (emphasis added). These depths were not measured; they were estimated. In actuality, they apparently varied from about 1.5 to 2+ inches of the top sediments, because the indication is that they were "at least" 1.5-2 inches deep.

No indication is made that the entire layer in the top 1.5 – 2 inches within the grab was collected, or if only some part of it was taken. This creates yet another level of variability.

Procedures used also assume that all samples brought into the boat accurately represented the "lie" of the sediments in nature. If the grab took a glancing bite of the bottom, however, as is quite common as they frequently have problems taking a sample that is plane to the seafloor and dig into the bottom at an angle, then the sediments sometimes re-sort by gravity during retrieval of the grab to conform to the bottom of the grab and to present a relatively level surface at the top. This does not necessarily mean that the surface one sees in the grab is the same as the surface occurring on the bottom. Therefore, to the extent that such re-sorting occurred, a fourth layer of variability is introduced.

These multiple sources of serious sampling variability invalidate any resulting data for use in subsequent quantitative analyses, relegating this entire effort to the compilation of a species checklist of organisms residing in the benthos. It cannot even claim to be a comprehensive checklist effort, because of the methods subsequently used in the laboratory to separate and identify organisms in the samples.

Still another study design problem is the use of atypical and non-quantitative laboratory methods. The sorting technique utilized to analyze benthos samples in the laboratory is not at all typical of standard accepted practice or appropriate for yielding dependably quantitative results. Even if the field samples had been collected properly, the laboratory methods would have created reservations about the quantitative validity of resulting data.

Per page 2 of Appendix 5.3-A (3rd par., lines 7-15), "The rinsed material retained in the sieve was then washed into a grid-lined tray and the sieve was checked carefully to ensure no organisms remained; any found were picked off carefully with tweezers and added to the tray. The sample material was then spread evenly throughout the tray and sorted through with fine tweezers.... Each section of the grid marked on the tray was sorted through until 100 organisms had been picked out, or until the entire sample had been sorted if less than 100 organisms were present. The organisms found were removed with the tweezers [and subsequently taxonomically identified]."

Although the sample material may have been spread evenly, the organisms in the sample may not have been. Typically, the whole sample would be counted. The reasons for using the method described in this Appendix are obscure, but in cases where this method is used, such as in some plankton studies, random number coordinates are usually used to generate the order of the specific grids from which organisms are picked. This is regarded as necessary to avoid non-randomness introduced by technician bias and habit, but no mention of random number generation is mentioned in this Appendix.

It is also unclear how resulting data were used to generate abundances per m^2. From the methods descriptions, it appears that all materials retained in the 500 μm sieve were washed into the grid-lined tray. Then 100 organisms were counted and identified, and then this subsample was preserved for later analysis. The remaining sample was presumably discarded, as it is not mentioned again.

These 100 organisms were then labeled, with the label indicating "the corresponding fraction of the sample that had been sorted," (page 2, par. 3, last line) but there is no indication of how this fraction was determined. Did they count all of the organisms in the entire sample to define what percentage the 100 represented? It does not appear so. Did they keep track of the amount of material in the grid tray and estimate how much had been sorted *versus* how much had not been sorted to provide the percentage sorted? If so, then the use of random number grid generation is virtually eliminated, because this would

require segregation of sorted from unsorted materials in the tray, which would be very difficult and tedious if random grids throughout the tray were examined individually.

The means of calculating these density numbers must be clarified. As the methods descriptions stand, these numbers would be highly suspect even if the original samples had been properly collected, which they were not.

Another problem with identifying only the first 100 organisms in each sample is that the more rare species are liable to be missed entirely. Any claims that the samples were reexamined to identify the missed rare species to avoid this problem immediately negate claims of randomness in the counts. One cannot have it both ways. Either you count the first 100 organisms you encounter, thereby risking missing the less common (but not less important to the ecosystem) species or you selectively search for species you have not encountered, thereby destroying randomness. This is one of the reasons why typically accepted practice requires analysis of the entire sample.

c. Limited Sediment Analysis and Habitat Correlation

Analysis of sediment grain size distributions occurring in benthos sampling areas is extremely important for the characterization of the types of biological communities living in the sediments. These organisms are collectively termed "infauna," defined as organisms living in the sediments, as opposed to those living on the sediments, which are termed "epifauna." The grain sizes and the percentage of each grain size occurring in the top few inches of bottom sediment has a great deal to do with what organisms live there.

The DEIS purports that the vibracore samples collected in coordination with benthos grab samples fulfill this need for sediment analyses to correlate with benthos results. Unfortunately, these samples are inappropriate and inadequate for the benthic analysis.

One important issue is that the core samples were composited prior to analysis of sediment characteristics. Vibracores take samples through several feet of sediment, and these long cores were sectioned for analysis. The top section of each core was either 5 ft or 10 ft long when composited, i.e. the top 5-10 ft of the core was taken from the remaining length of core. This material was composited, and a subsample of the resulting mixture was submitted for analysis. Regardless of what analysis was conducted on these samples, the resulting data reflect the average occurring throughout the 5-10 ft length of core. Thus if sediment particle size characteristics were being measured, results would indicate the average sediment type mix over 5-10 ft of depth into the sediment. These results do not reflect the top few inches of sediment where benthic infauna live, and therefore are irrelevant to the analysis of the benthos community.

A second important issue is that these composited sediment samples were analyzed for only two size groups (DEIS Table 5.1-3), namely the % passing a No. 4 sieve and the % passing a No. 200 sieve. The mesh size of a No. 4 sieve is 4.750 mm (equals 0.475 cm, which equals 0.19 inch, or 3/16 inch), which is a rather coarse sieve capable of separating

rocks, pebbles, large pieces of shell and similar sized materials from the sample. A No. 4 sieve has a mesh size of 0.075 mm, which is very fine; silts and clays are frequently characterized as having particle sizes smaller than 0.063 mm, hence a No. 4 sieve is separating most silts and clays, or "fines," as they are collectively termed.

A typical benthos study uses many more particle size categories for correlation with benthos communities. Two typical examples from Buzzard's Bay are studies by Sanders (1958 and 1960), who used 13 and 14 categories, respectively. Sanders also used 12 categories in Long Island Sound studies (Sanders, 1956), and 9 size groups were used to analyze benthic communities for a jet plow installation of cable in California (Morro Group, 2000). Battelle Ocean Sciences used 8 size groups for particles greater than 62 µm (0.062 mm) in diameter, with further fractionation of silts and clays by pipette analysis (Battelle, 1991). Mote Marine Laboratory of Sarasota, Florida routinely uses 90 groups (measured electronically as opposed to sieve measurements) in their benthic surveys (Culter, *personal comm.*)

The reason these particle size breakdowns are so important may be illustrated by Figure 1 from McNulty *et al.* (1962), reproduced previously.

This figure illustrates the components of benthic communities occurring in areas with slightly different sediment grain size distributions in bottom sediments. Note the fall in deposit feeders, for example, when median grain size changes from 0.2 mm to 0.35 mm; it drops from peak occurrence to virtual zero. The other examples in this figure are similarly dramatic.

The DEIS makes no distinction whatsoever of sediment grain sizes falling between 4.750 and 0.075 mm, and therefore is incapable of detecting any benthic community characteristics as illustrated by McNulty's classic figure.

Even Sanders (1956), who is frequently cited in the DEIS, provides a rather extensive discussion of benthic infaunal feeding types and their relationships and community variations relative to amounts of silts and clays in sands occurring in Long Island Sound. Sharp changes in benthic community types based upon sediment characteristics are clearly reflected in the tabular summary of his findings, Table 3 of this document (Sanders Table IX). Such data are useful for forecasting the types of benthos that will become established in disturbed areas.

So even if the sediment samples had been taken from the top few inches of bottom sediment, which they were not, the analyses made in this 2001 survey would have been virtually irrelevant to the benthic community analysis.

These distinctions are important, because they provide an opportunity to predict the impacts of Project development on benthic communities. Modeling studies are capable of forecasting potential changes in mean sediment particle size, as for example, in the jet-

plowed cable-laying trenches. If the DEIS had information concerning sediment grain size characteristics *versus* benthic community types occurring in the development area, then some forecasting may reasonably have been made concerning impacts. For example, if we were to use McNulty's figure again, and we make the determination that in some unit area of bottom, the mean grain size was going to change from 0.2 mm to 0.45 mm, we could infer that deposit and detritus feeders would be virtually eliminated from that area, and the resulting community would be dominated by filter feeders. The converse prediction could be inferred if the grain size were expected to decrease from 0.45 mm to 0.2 mm. We cannot use McNulty's figure for purposes of predicting the impacts from the proposed project, because his data were collected in a different area. Unfortunately, the DEIS fails to provide analogous data for the proposed development site.

The DEIS states that sample sediment types were visually characterized (page 5-4, 2nd par.), and imply that these observations are sufficient (page 5-10, 8th par.). The small variances shown by McNulty's figure to be significant are, however, very difficult to identify visually, and these results are therefore not credible. Further doubt on their credibility is cast by the DEIS itself.

On page 5-11 of the DEIS (1st par.), seven core samples are identified, and it is noted that of the seven, three were "selected due to the visual observation of greater than 50% fine material at the time of sample collection." The seven samples mentioned are listed in the following table, along with the amounts of materials in these samples passing through No. 4 and No. 200 sieves (data from DEIS Table 5.1-3).

Table 14

Sample Designation	% passing No. 4 Sieve	% passing No. 200 sieve
VC01-G1*	100	3
VC01-G4*	100	7
VC01-G11*	98	15
VC01-G3	100	4
VC01-G5	100	1
VC01-G13	99	2
VC01-MT1	100	0
* indicates samples said to have >50% fines based upon visual estimate		

It is clear from these analyses that none of the samples actually had >50% fines, as determined by visual observations, indicating that visual observation of sediment characteristics are unreliable for correlation of sediment type with benthic infaunal communities. Indeed, these analyses are clearly incapable of differentiating sample VC01-G1 from any of the samples said to have less than 50% fines from visual estimates, further illustrating why they are inadequate for discriminating benthic community analysis.

Interestingly, Table 2 of Appendix 4.0-A (Scour Analysis) refers to median grain sizes in its analysis of potential scour events. The table presents median grain size as "d_{50}" in units of feet. The source of these data is unclear. They may, however, be transformed to mm using the following formula:

$$\text{ft} \times 0.3048 \text{ ft/m} \times 1000 \text{ mm/m} = \text{mm}$$

The values for d_{50} presented in Table 2 are provided in the following table:

Table 15: d50 values in Table 2

d_{50}	Mm
0.0007	0.21
0.0010	0.30
0.0011	0.34
0.0012	0.37
0.0016	0.49

Comparison of these d_{50}, or median grain size values with McNulty's figure clearly indicates the potential for benthic habitat variations within the development area. It is unclear, however, exactly what these data represent, as this appendix elsewhere states that d_{50} values ranged from 0.279 and 0.508 mm within the WTG array area (Appendix 4.0-A, page 2, 1st par.), as opposed to the range of 0.21-0.49 presented in Table 2 of the same appendix. Nevertheless, these values are of little use for the benthos analysis because they apparently represent the median grain size of composited samples rather than from the top few inches of sediment where benthic infauna live.

d. Nematodes in the Analyses

Nematodes should be deleted from this survey because they are considered meiofauna (Coull, 2004), which is smaller than the macrofauna that is the objective of the survey. Meiofauna are considered animals of microscopic size (Meiofauna Marina, 2004), although specific size definitions vary a bit. Coull (2004) defines meiofauna as animals passing through a 0.5 mm (500μm) sieve and retained by a 0.063 mm (63μm) or 0.045 mm (45μm) sieve, while Brave New Biosphere (2004) defines meiofauna as animals passing through a 1.0 mm (1,000 μm) sieve and being retained on a 0.042 mm (42μm) sieve.

The sieve used in this survey was 0.5 mm (500 μm), which is far larger than the lower mesh size defining meiofauna regardless of which definition is employed. Nematodes are long and very thin, and while many are entangled by larger sieves, many also pass through. Because the numbers retained *versus* those passing through are not controllable, resulting data become non-quantitative. Although nematodes were found in abundance, they are likely greatly underestimated at all sites. The inclusion of such meiofauna therefore causes quantitative variability and uncertainty, and should not be included in the analysis of macroinvertebrates, as this survey professes to be.

Also, despite their being underestimated, nematodes are captured in high numbers, which tends to obscure differences in the remaining fauna, i.e., the macrofauna captured with them. Because nematodes are generally regarded as ubiquitous and abundant, their inclusion in the analyses adds little value to discerning differences meaningful to evaluating impacts of the proposed Project.

Page 6-2, 3rd par., lines 5-7. "A shellfish survey was conducted as part of the benthic organism survey during the summer of 2003 to describe shellfish occurring in Lewis Bay within the Town of Yarmouth recreational shellfish area that would be crossed by the proposed cable route (Appendix 5.3-C)."

This was an inadequate survey. Only four stations were sampled. Two were sampled with three methods each; one was sampled with only two methods; and the fourth was sampled using only a single method, because it was considered an "extra" station. Table 1 from Appendix 5.3-C is reproduced as Table 10 of this document to illustrate that three methods were not uniformly used at each sampling location.

The passage quoted above seems to describe a rather grand program, but the reality described by Appendix 5.3-C is somewhat different. Statistical power increases with the number of locations sampled, and the converse is also true: statistical power decreases as the number of sampled locations decreases. In this survey, the number and locations of sampling locations were inadequate for characterizing the Lewis Bay communities, with only four points directly on the cable route being sampled, and these by variable suites of methods. No transects were employed to assess whether the benthic community was consistent with distance from the cable route.

There was no replication of samples at any station. It is therefore not possible to sort out the degree of within-station variation relative to the variation found among the several sampling stations or across the potentially impacted area as a whole.

No sediment data whatever were collected. No water quality data were collected. Poor laboratory procedures were apparently used. This "survey" did not meet even minimum criteria for adequately characterizing "all components of the benthic community" in Lewis Bay.

Other issues exist in regard to this survey. Please see comments on Appendix 5.3-C.

Page 6-2, 3rd par., lines 7-8. "No other quantitative benthic invertebrate or shellfish monitoring is proposed to document pre-construction resources in the Project area."

The benthos surveys should be redesigned and redone. The existing surveys are inadequate for providing information upon which to determine expected environmental

impacts or to allow competent policy decision-making concerning the project benefits *versus* environmental costs.

3. Construction and Post-Construction Monitoring Comments (6.2)

These sections are not sufficiently developed to allow assessment of the efficacy of the methods proposed for monitoring possible fatalities of either birds or bats during construction or in a post-construction period. As noted above, there is no basis upon which the permit can be issued, so once again these studies are irrelevant and hypothetical.

The construction monitoring of underwater sound needs to be done at different distances to adequately characterize the sound field and determine the zone of possible injury to one protected species or another. This includes close-in measurements at distances of 100 m or less. The hydrophone should be at least 10 m deep or within a meter of the bottom in shallower water.

The goal is to monitor the sounds during and after construction. However, as described for other sections, just monitoring at 500 m is not sufficient for fish, and monitoring much closer to the source should be included.

Post-construction monitoring should be done as comprehensively as the construction monitoring, making measurements over a range of distances to characterize the sound field.

Page 6-4, 7th par., lines 1-3. "Should SAV beds be identified in the vicinity of the proposed submarine cable system route, a post-construction monitoring plan will be developed to document potential indirect impacts from cable embedment and subsequent habitat recovery."

It should be a function of the DEIS to describe accurately these resources, and that the locations of these important ecosystem resources would be identified and spatially related to proposed project activities in this DEIS. They are not, however.

This statement also seems to assume that all potential impacts on SAV will be indirect. If the DEIS authors do not know where they are, how do they know that construction will not occur right through or on SAV beds, with immediate and direct impacts? This points to a fundamental recurring problem with the inadequate baseline information in the DEIS.

SAV resources should be identified and characterized, and any potential impacts should be identified and thoroughly discussed, before permits for proceeding with this proposed Project are awarded. Construction activities should be designed to preserve these SAV resources by detouring around them, not to monitor their recovery after possible habitat destruction.

Page 6-4, 7th par., lines 3-4. "Habitat recovery would be considered successful if it is found that SAV has migrated back to the site of disturbance."

This is an inadequate definition of recovery. If an area of SAV meadow is destroyed, the successful establishment of a single sprig of new SAV does not constitute recovery of the habitat and the community it supports. This is akin to claiming recovery of a clear-cut forest community just because a few new seedlings are found.

Discussions in this DEIS concerning SAV are utterly inadequate. The locations and their extent are not well described. The species of SAV are not even identified, nor is their density estimated. No data are provided concerning the benthos they support. We can make no judgment about potential impacts on SAV, because we have no information on SAV.

Page 6-4, 7th par., line 4. "Should the habitat not recover naturally, the disturbance will be mitigated by replanting."

Mere replanting does not always mitigate impacts. Replanted SAV frequently fails to become established. This is an area of active research, and failures still occur. Monitoring after replanting is required for several years, because subsequent replantings are often needed.

In addition, replanted SAV meadows often fail to support as diverse a biological community as did the natural system. Replanting SAV is not a perfect science, and the preferable alternative is to identify SAV areas and to avoid impacting them to begin with.

Page 6-4, 8th par., lines 1-2. "Shellfish beds disturbed by project activities in Lewis Bay will be re-seeded as discussed with the shellfish constable for the Town of Yarmouth."

There is no indication that benthic communities will be monitored following construction. This is absolutely necessary in order to determine the extent to which benthic communities have been impacted and to assess the recovery process. It is recommended that monitoring should include samples from the cable trench areas, from the scour pads and WTG/ESP piles, anchor holes and anchor line sweep areas throughout the Project area, and undisturbed areas within the WTG area as well as from at least one control area outside the Project site. This should also be done for the Lewis Bay area.

The need to assess post-construction impacts on soft-sediment benthic communities and new communities that will develop on hard substrates introduced into the area cannot be overstated. Monitoring of soft-sediment communities should begin just after completion of construction activities and continue for several successive months. Twice annual monitoring (e.g. late spring/early summer and late summer/early fall) should continue until the communities recover to ambient conditions. Communities developing on the pilings and scour mats should be monitored every year (once in the early to mid summer) during

the lifetime of the project. The survey design should be based on habitat analyses derived from the recommended multibeam surveys and the recommended resurveys of pre-construction benthic communities.

F. Comments on DEIS Section 7 (Regulatory Permitting Authorities and Regulatory Reviews)

As discussed in detail in Volume I of these comments, there are numerous serious deficiencies in the regulatory approach followed by the Corps in the review of this application. Those comments are not repeated here. The discussion in this section of the APNS comments addresses only the serious mischaracterization of the EFSB process now underway for this project and several specific issues corresponding to statements set forth in Chapter 7 of the DEIS.

1. Description of EFSB Proceeding

In Section 7.3.2.1 of the DEIS, CWA characterizes the "current review status" of the Energy Facilities Siting Board's review of the project as follows:

> [CWA] and Commonwealth Electric Company d/b/a NSTAR Electric have filed a joint Petition to the EFSB on September 17, 2002, for an approval of construction for the construction of a new electric transmission line.
>
> In their July 2, 2004 Tentative Decision, the Energy Facilities Siting Board approved the joint petition of [CWA] and NSTAR Electric interconnection [sic] for the wind farm based upon a series of findings, set forth here, that specifically included a determination of coastal zone management consistency and a finding supporting the necessity within the coastal zone for construction of the transmission lines....

CWA's description of the status of the EFSB proceeding is grossly inaccurate and misleading. The EFSB has not "approved" CWA's petition for approval of the transmission line that would be required to interconnect the wind farm to the regional grid. In fact, the Board itself considered the project for the first time at a public meeting held on November 30, 2004, several weeks after CWA released the DEIS. (The action taken by the Board at the November 30 public meeting will be discussed in further detail below.)

The document released on July 2, 2004 was a "tentative decision" that was drafted entirely by EFSB staff without input from the actual members of the Board. Under EFSB regulations, the day-to-day functions of investigating petitions filed with the Board are delegated to the Siting Board's Director and staff pursuant to 980 C.M.R. 2.05:

> (2) Director. The Director shall be appointed pursuant to M.G.L. c. 25, § 12N to direct the work of the facility siting division of the Department of Telecommunications and Energy and to conduct the day-to-day business of the

Board. The Board or the Chairman may delegate to the Director Board-specific responsibilities other than the responsibility for the final decision in any matter listed in 980 CMR 2.04(6)(a).

(3) Staff. The Chairman may appoint such other persons to the facility siting division staff as may be required to assist the Board in performing its functions. Staff functions shall include, among others: conducting adjudicatory, rulemaking, or factfinding hearings for the purpose of creating a record; rendering tentative decisions; and intervening in the proceedings of other agencies. The Chairman may authorize the Director to appoint a Presiding Officer for an adjudicatory or other proceeding conducted under 980 CMR.

At the conclusion of the adjudicatory process, the EFSB staff prepare a tentative decision that is released for comment to the parties in the case and which is then presented to the Siting Board for consideration in a public meeting of the Siting Board held pursuant to 980 C.M.R. 2.04:

(2) Tentative Decisions.

(a) A written tentative decision shall be issued on each matter adjudicated by the Board unless a quorum of the Board has heard the matter or has read the evidence.

(b) A copy of any tentative decision shall be sent to each party and limited participant in the proceeding. The Presiding Officer shall designate a comment period, extending at least seven days from the issuance of the tentative decision, during which parties and limited participants may file written comments regarding the tentative decision.

(3) Final Decisions.

(a) Every final decision of the Board in an adjudicatory proceeding shall be issued following a vote taken at a meeting of the Board conducted pursuant to 980 CMR 2.04.

(b) If a tentative decision was issued in a matter, the Board shall meet following the comment period to vote on the tentative decision. At such meeting, parties and limited participants may be afforded an opportunity to present oral comments under such conditions as the Board may provide. The Board shall render a final decision after considering the tentative decision, all timely-filed written comments and any oral comments permitted. The Board need not consider written comments received after the close of the comment period.

(c) If a quorum of the Board has heard a matter, the Board may at its discretion render a final decision without first issuing a tentative decision pursuant to 980 CMR 1.08(2).

In this case, Siting Board staff conducted an adjudicatory proceeding in connection with its investigation of the CWA petition. The record in that proceeding was closed on December 17, 2003. On July 2, 2004, Siting Board staff released a tentative decision regarding the CWA petition. A public meeting of the Siting Board was later scheduled for November 30, 2004, at which the actual members of the Siting Board would consider the CWA petition for the first time. Several weeks before the public meeting, CWA released the DEIS. This prompted the Alliance to file on November 24, 2004 a motion seeking to reopen the record in the EFSB adjudicatory proceeding to admit the DEIS and all comments on the DEIS that would be filed with the Army Corps and MEPA.

At its November 30, 2004 public meeting, the Siting Board considered both the tentative decision rendered by staff and the Alliance's motion to reopen the record to admit the DEIS and comments filed thereon. At the conclusion of the meeting, the Siting Board voted 4 to 1 to refer the Alliance's motion back to staff for further briefing and a ruling by the Presiding Officer. The parties filed briefs on the motion on December 30, 2004 and January 14, 2005. The Presiding Officer has not yet released a ruling on the motion.

The CWA petition before EFSB has hardly been "approved." If the Alliance's motion is granted, there will be further proceedings on the matter, and a final decision of any kind will not be made for many months. Moreover, even if the Alliance's motion is denied, and the Siting Board conducts a second public meeting to consider the tentative decision, the Siting Board is free to accept, modify, or decline the recommendations of staff that are contained in the tentative decision. The Alliance believes that there are substantial defects in the tentative decision ("Decision") that should lead the Siting Board either modify the Decision substantially or deny the CWA application outright.

There are four such defects that warrant further discussion. One defect relates to the Decision's treatment of the Massachusetts Ocean Sanctuaries Act ("MOSA"). The other three relate to the Decision's formulation and application of the standard of review in this case.

a. The Decision disregards the statutory provisions in the Massachusetts Ocean Sanctuaries Act ("MOSA") that would prohibit cables to offshore generation stations

In its initial and reply briefs to the Siting Board, the Alliance demonstrated that (a) through MOSA, the Legislature intended to ban power plants of all kinds, including offshore wind plants, from the Massachusetts Ocean Sanctuaries, including the Cape and Islands Ocean Sanctuary where this project would be located; (b) MOSA also generally prohibits "the building of any structure on the seabed or under the subsoil" in an ocean sanctuary; (c) the Legislature did not intend through any of the exceptions to MOSA to allow the construction of transmission cables the only function of which would be to interconnect a power plant that would be forbidden by MOSA if it were located in state waters; and (d) the Legislature also did not intend through any of the exceptions to MOSA to allow the construction of transmission cables the only function of which would be to interconnect a

power plant located in Nantucket Sound regardless of whether the plant was in state waters Alliance Initial Brief at 4-30; Alliance Reply Brief at 43-45. The Decision fails to address the heart of the Alliance's contention with respect to MOSA: the stated policy of the Massachusetts Legislature is that offshore electric generating stations should be banned from Nantucket Sound, and MOSA, when read in its entirety, empowers and requires the Siting Board (and other state agencies charged with enforcing MOSA) to reach that result with respect to any cable connecting to the proposed CWA electric generating station notwithstanding its location beyond the three-mile limit of the Commonwealth's direct jurisdiction.

To avoid addressing this contention, the Decision relies on two exceptions to MOSA's Section 15 prohibitions, both of which are inapposite. The Alliance showed in its initial brief that the exception in Section 16 for "the planning, construction, reconstruction, operation, and maintenance of industrial liquid coolant discharge and intake systems and all other activities, uses and facilities associated with the generation, transmission, and distribution of electrical power" is an exception for ancillary facilities that support onshore (but not offshore) electric generation stations. Hence, the exception does not apply to the proposed underwater transmission cables. Alliance Brief at 14-19. The Alliance also showed that the exception in Section 16 for "the laying of cables approved by the department of telecommunications and energy" would also not apply to the proposed underwater transmission cables, which would exist only to allow what would otherwise be an activity intended to be prohibited, namely the construction or operation of an offshore electric generating station in Nantucket Sound. Alliance Brief at 19-22.

Moreover, it is absolutely clear that the denial of approval for the portion of the proposed cable located in the Cape and Islands Ocean Sanctuary would not violate (or be preempted by) any federal law even though its effect would be to prevent the proposed offshore power plant. Alliance Brief at 22-30. For the convenience of the Siting Board, the analysis of the MOSA prohibitions and the absence of federal preemption are summarized in the attached Appendix I.

On a more technical but none-the-less significant process matter, the Decision's application of the exception for "the laying of cables approved by the department of telecommunications and energy" ignores the plain language of the statute, as the cables in question have <u>not</u> been approved by the Department. The Department's review of the cables pursuant to G.L. c. 164, § 72 has been bifurcated from the Siting Board's review pursuant to G.L. c. 164, § 69H, *et seq*. by a decision of the Presiding Officer. <u>See</u> Ruling Re Sequencing of Decisions, March 16, 2004, at 2-4. The Department's § 72 review will not be completed until the project's Environmental Impact Report is approved by the EOEA and published in the administrative register. If the Siting Board is to rely on this particular exception in MOSA § 16, it must hold its resolution of the MOSA issue in abeyance until the Department takes final action on the application for § 72 approval.

b. The Decision applies a new standard of review for determining the need for the project that is announced for the first time in the Decision itself

Pursuant to G.L. c. 164, § 69H, the Siting Board "shall review the need for, cost of, and environmental impacts of transmission lines" in order to carry out its statutory mandate to "provide a reliable energy supply for the commonwealth with a minimum impact on the environment at the lowest possible cost." The appropriate standard of review in determining the need for this particular transmission project, which would interconnect an offshore generating station that is not within the borders of the Commonwealth or any other state, has been an issue in this case for well over a year. The Alliance raised the issue directly on May 20, 2003, in its Reply Brief in Support of Motion to Suspend, in which the Alliance urged the Siting Board that if it were to establish a new standard of review, the Board should do so only after ensuring that basic due process requirements had been met:

> Any changes in the Siting Board's standard of review should be articulated by the EFSB only **after** the Siting Board has the benefit of full briefing by the parties and **before** the completion of the Petitioner's direct case, the completion of responses to interrogatories, the submission of direct cases by other parties, and the holding of evidentiary hearings. Any doubt about the standards of review being applied as the parties go forward will only lead to costly and confusing evidentiary and procedural chaos.

Alliance Reply Brief in Support of Motion to Suspend at 2-3.

The Presiding Officer denied the Alliance's request to disclose the standard of review that would be applied to the evidence in this case <u>before</u> that evidence was adduced, and the chaos predicted fifteen months ago has now come to pass. After many months of discovery, procedural motions, the preparation and submission of pre-filed direct and rebuttal testimony, hearings, and briefing, the parties to the case first learned of the standard of review that would be applied in this case on July 2, 2004 when the Decision was released. The parties had no prior notice of this new standard of review, no opportunity to introduce evidence relevant to the new standard, and no opportunity to present arguments to the Siting Board in briefs regarding either the appropriateness of the new standard of review or the manner in which the standard should be applied to the evidence in the record.

Reasonable notice of the issues is an essential element of due process in administrative proceedings. The State Administrative Procedure Act enunciates the requirement of reasonable notice in clear terms:

> Reasonable notice of the hearing shall be accorded all parties and shall include statements of the time and place of the hearing. <u>Parties shall have sufficient notice of the issues involved to afford them reasonable opportunity to prepare and present evidence and argument</u>. If the issues

> cannot be fully stated in advance of the hearing, they shall be fully stated as soon as practicable. In all cases of delayed statement, or where subsequent amendment of the issues is necessary, sufficient time shall be allowed after full statement or amendment to afford all parties reasonable opportunity to prepare and present evidence and argument respecting the issues.

General Laws c. 30A, § 11(1) (emphasis added).

The standard of review that will be applied to the evidence in a case is a critical part of an administrative proceeding because the standard defines the main issues that are central to the review. A party has an absolute right to be informed of those issues before the case proceeds, not after the case concludes. "Due process requires that, in any proceeding to be accorded finality, notice must be given that is reasonably calculated to apprise an interested party of the proceeding and to afford him an opportunity to present his case." LaPointe v. License Bd. of Worcester, 389 Mass. 454, 458, 451 N.E.2d 112 (1983), citing Konstantopoulos v. Whately, 384 Mass. 123, 133, 424 N.E.2d 210 (1981). In this case, the Alliance and other parties had no opportunity whatsoever "to prepare and present evidence and argument respecting the issues" because it did not know what the Siting Board considered the issues to be until the Decision was released on July 2, 2004.

The Decision's proposed remedy for this denial of due process is wholly inadequate. Conceding that "parties developed a record and briefed the case assuming the use of a standard similar to that used in two earlier cases, Turners Falls and MECo/NEPCo," the Decision provides an analysis of the "need for the proposed transmission lines using Turners Falls and MECo/NEPCo as guidance." Decision at 135. The ineffectiveness of this action in curing the denial of due process inherent in the Decision is conceded in the next sentence: "While the Siting Board did not rely on this analysis in reaching its decision in Section IV, above, the Siting Board adopts the analysis and findings below for use in the event that a reviewing Court deems it appropriate to use Turners Falls/MECo/NEPCo as guidance." Id. (emphasis added). Parties have a right to present evidence and argument that is relevant to the standard of review the Siting Board will rely on, not one the Siting Board admits should be irrelevant to the outcome of the case but has been devised solely as an attempt to avoid reversible error on appeal. It would be a colossal mistake to approve the CWA project on the basis of a standard of review that is considered inappropriate and obsolete by the agency whose responsibility it is to formulate and apply the standard.

The only remedy for the denial of due process discussed above is to remand this case for further proceedings, including the opportunity for all parties to present evidence and argument relevant to the new standard of review announced in the Decision for determining the need for a transmission facility pursuant to G.L. c. 164, § 69H. The need for further proceedings is especially compelling where a new standard is one that may vary "on a case-by-case basis," as the Decision makes clear is true of the new standard announced in the Decision.

c. The Decision's formulation of the new standard of review is inconsistent with the Siting Board's statutory mandate

The Decision announces a new standard of review that will be "broad enough to encompass both transmission lines serving generators subject to the Siting Board's jurisdiction, and transmission lines serving generators that are too small to be subject to our jurisdiction, generators that are located in another state, or generators that are located in federal territory." Decision at 15. Under the new standard, "the Siting Board will require an applicant seeking to construct a transmission line to interconnect a new or expanded generating facility to show: (1) that the existing transmission system is inadequate to interconnect the new or expanded generator, and (2) that the new or expanded generator is likely to be available to contribute to the regional energy supply." Decision at 16. Where the generator is planned but not subject to the Siting Board's jurisdiction, the showing of "availability may be made on a case-by-case basis based on indicators of project progress (e.g., progress in permitting or in obtaining project financing)." Id.

The Siting Board's revision of the standard of review for transmission lines in light of changes to the generation market brought about by the Restructuring Act of 1997 (the "Restructuring Act") is fatally misguided because the new standard:

- ignores the 1997 legislative determination that transmission facilities would continue to be subject to regulation as the monopoly enterprises they continue to be;
- fails to take into account the unique jurisdictional nature of the CWA generating plant; and
- disregards specific statutory requirements for determining need.

In short, under the guise of harmonizing the review of transmission facilities with the changes wrought by the Restructuring Act, the Decision in adopting the new standard has assumed a role that only the legislature can play.

The Restructuring Act altered significantly the Commonwealth's regulatory oversight of electric generating plants, and created a new, limited review process for generating plants that are subject to the Siting Board's jurisdiction. As the decision acknowledges, however, the Restructuring Act did not alter the Siting Board's statutory mandate to "review the need for, cost of, and environmental impacts of transmission lines…." G.L. c. 164, § 69H.

At the core of the Restructuring Act is the determination that the market (i.e. individual developers and investors) should determine the need for additional generation facilities. Also at the core of the Restructuring Act is the determination that individual developers and investors should not be delegated the power to determine the need for transmission facilities because they continue to be fully regulated as monopoly facilities. The new standard (unlike the old standard) reverses this legislative decision because the critical part of it – the existence of a new or expanded generation facility – is to be decided as a

practical matter exclusively by individual developers and investors. Any such change must be undertaken by the legislature.

Moreover, in attempting to harmonize the new review process for jurisdictional generating plants, pursuant to G.L. c. 164, §§ 69H and 69J, with the review process for transmission facilities, the Decision ignores the unique nature of the CWA generating plant. The proposed 420 MW generating plant is not a "generating facility" for purposes of § 69H or § 69J; it lies outside the borders of the Commonwealth and is not subject to the Siting Board's direct jurisdiction. Thus, nothing about the Restructuring Act's treatment of "generating facilities," as defined in c. 164, compels any change in the Siting Board's review of transmission facilities that would interconnect non-jurisdictional generating plants. Without some further analysis and justification, it would be a legal error to apply a standard of review to the transmission facility at issue in this case that is derived from statutory changes that are, by definition, not relevant to the proposed project. The CWA generating plant is either a "generating facility" for purposes of the Siting Board's enabling statutes, or it is not. The plant cannot be a "generating facility" for some purpose but not others.

That is not to say that a new or revised standard of review is inappropriate in this case. As it argued in response to the Presiding Officer's briefing questions, the Alliance recognizes that the projects in Turners Falls/MECo/NEPCo are different from the proposed project. In Turners Falls, the generating plant to be interconnected was located in Massachusetts but was below the minimum size for Siting Board jurisdiction. In MECo/NEPCo, the generating plant to be interconnected was subject to the Siting Board's jurisdiction at the time it was reviewed by the Siting Board. The proposed project fits neither paradigm. CWA proposes to use a jurisdictional transmission line to interconnect a generating plant that lies outside the borders of the Commonwealth (or any other state, for that matter) but in an area of extraordinary historical, ecological, economic, and cultural value to the Commonwealth. Nantucket Sound is sufficiently important to Massachusetts that the Commonwealth fought the federal government for ownership of and control over the Sound for over a decade.

By using this case as the vehicle to fashion a broad-based standard of review that would apply in a wide range of circumstances, the Decision ignores the unique nature of this project and the critical location of the proposed CWA generating plant. There is no precedent for this project, and the Siting Board should remand this case in order to do what should have been done immediately after CWA filed its application. The Siting Board should answer three questions about this project before formulating (much less applying) the standard of review for this project under G.L. c. 164, § 69H *et seq.*: (1) What should the Siting Board do to carry out the legislature's intent to prohibit electric generating stations in all of Nantucket Sound? (2) What should the Siting Board do to carry out its statutory mandate with respect to a transmission facility that would interconnect a generating plant located in federal waters? and (3) What can the Siting Board do,

consistent with its statutory mandate and the supremacy clause of the United States Constitution, to protect the Commonwealth's vital interests in Nantucket Sound?

This inquiry should go beyond just the question of the appropriate standard of review for determining whether a transmission line that would interconnect a generating plant located in federal waters is needed pursuant to G.L. c. 164, § 69H. The unique nature of this project also implicates the Siting Board's statutory obligations pursuant to G.L. c. 164, § 69J. The Alliance thus believes the Siting Board should take the following actions in considering the CWA Petition:

- The Siting Board should address the three questions set out above relating to a new standard of review by facilitating the taking of evidence and the submission of briefs.
- If "availability" is to be an element of showing the need for a transmission line, the Siting Board must give a clearer statement of what this concept encompasses where the transmission line is inextricably tied to a complex and expensive generating project over which the Commonwealth has little or no direct regulatory authority. For example, the Decision states that the showing of "availability" for a generating plant that is not subject to the Siting Board's jurisdiction "may be made on a case-by-case basis based on indicators of project progress (e.g., progress in permitting or in obtaining project financing)." Decision at 16 (emphasis added). Yet the decision ultimately focuses only on progress in permitting and is silent with respect to obtaining project financing: "As the wind farm is not yet under construction, and is not subject to the Siting Board's jurisdiction, we consider its availability based on its progress in permitting." Decision at 16. The Decision provides no reasoning to support its finding that "progress in permitting" is the core element of "availability" for this project, and its implied finding that "obtaining project financing" is irrelevant.[1] Additional proceedings on the appropriate meaning of "availability" will be especially important in this case where (1) the developer of the project will be responsible for the ongoing operation and maintenance of the portions of the jurisdictional transmission line that lay outside the NSTAR ROW; (2) the developer will be financially responsible for NSTAR's operation and maintenance of the portions of the jurisdictional transmission line within NSTAR's ROW; and (3) before the project is available to contribute even one electron to the regional energy supply, CWA must secure approximately $700 million in financing for a project that will rely on inherently risky sources of revenue, including hourly wholesale energy prices and government subsidies such as the currently-expired federal production tax credit.

[1] Here again, it is critical that parties know what standard of review will be applied to a particular application before, not after, evidence is taken and arguments made. The evidence relevant to "progress in permitting" would be very different from evidence relevant to "obtaining project financing." The Siting Board's apparent desire to retain significant flexibility in fashioning a standard of review on need for particular projects cannot trump a party's right under G.L. c. 30A to adequate notice of the issues involved in an administrative proceeding.

- The Siting Board must make findings under sec. 69J that the plant is "consistent with the current health, environmental protection, and resource use and development policies as adopted by the Commonwealth". Yet, the Decision totally ignores the legislature's determination when it enacted MOSA – namely that as a policy matter electric generating stations are an improper resource use of Nantucket Sound and that the Sound should not be developed for such use. It is also absolutely clear, moreover, that the legislature intended to prohibit electric generating stations in all of Nantucket Sound. The decision is totally silent on these legislative determinations.
- Where the non-jurisdictional generating plant that would be interconnected by a transmission facility lies outside the borders of the Commonwealth but in an area of vital importance to the Commonwealth, the Siting Board can and should satisfy itself, to the full extent of its ability to do so consistent with the Supremacy Clause of the United States Constitution, that the generating plant itself is "consistent with current health, environmental protection, and resource use and development policies as adopted by the Commonwealth." G.L. c. 164, § 69J. Essentially, this would mean taking into account the impacts of the non-jurisdictional generating plant in dealing with the jurisdictional transmission line for purposes of § 69J. Such an application of § 69J might be inconsistent with the Commerce Clause of the United States Constitution if the non-jurisdictional generating plant were located in another state, and would be inconsistent with the Siting Board's statutory mandate if the non-jurisdictional generating plant were located within the state but was below the minimum size for Siting Board jurisdiction. There is absolutely no statutory or constitutional impediment, however, to the Siting Board applying its statutory authority over a jurisdictional transmission line in a manner that protects the Commonwealth's vital interests in Nantucket Sound. This would mean, among other things, examining whether the United States Supreme Court's holding in U.S. v. Maine establishing that the Federal government holds title to the center of Nantucket Sound constrains the Commonwealth's scope of review or otherwise restricts its ability to make a permitting determination with respect to the portion of the cable located in state waters.[2]

The Decision's failure to address in a comprehensive and systematic manner the fundamental issue of the extent, if any, that federal ownership of the center of Nantucket Sound and the location of the proposed generating plant in federal waters affects the Siting Board's authority and scope of review to directly regulate the jurisdictional transmission line is inexplicable. At the beginning of the case, the Siting Board adopted, without further analysis and without seeking the input of other parties, CWA's view that the proposed

[2] As discussed above, in its Initial and Reply Briefs, the Alliance showed that the Siting Board (or any other agency as directed by G.L. c. 132A, § 18) can and must effect the explicit goals of MOSA § 15 by denying CWA's application for permission to build a transmission line that would allow for construction of an offshore generating stations in Nantucket Sound. In addition, this activity would clearly be inconsistent with the "environmental protection, and resource use and development policies as adopted by the Commonwealth."

location of its generating plant in the "hole in the donut" rendered the Siting Board powerless to protect the Commonwealth's vital interests in Nantucket Sound. As the Alliance has compellingly shown on many occasions, this is simply not the case. See Alliance Brief at 22-30 and Appendix at 4 for outline of absence of federal preemption.

d. The Decision's analysis using a previous standard of review is actually the application of another new standard that is not supported by the evidence and relies at least in part on matters outside of the Siting Board's jurisdiction

In an appendix to the Decision, the Siting Board provides an analysis of the proposed project under the Turners Falls/MECo/NEPCo standard of review. Decision at pp. 135-189.[3] From the beginning, this attempt to provide the Siting Board with a fallback position goes awry.

The standards of review in the Turners Falls and MECo/NEPCo cases were not identical, and the Alliance and the applicant offered different formulations of a standard of review using the two cases as points of departure. The Appendix thus begins with an attempt to restate, reformulate, and modify the old standard of review, which will be used if the new standard of review is invalidated. This newly-modified old standard of review grafts the Turners Falls standard (the proponent can show a need for the power from its generating plant on reliability, economic, or environmental grounds) to part of the MECo/NEPCo standard (the proponent should show that the existing transmission system is inadequate to support the new generating plant and that additional energy resources are necessary to accommodate it), and then adds a wild card that is not found in either the Turners Falls or MECo/NEPCo standards. "In addition, the Siting Board will consider other bases for establishing need for the power from the wind farm, examining on its merits any argument that does not fit easily into the three established bases for a finding of need." Decision at 137.

By the third page of the Appendix, it is clear that there is no old standard; there is only another new standard, which includes a catchall provision that allows the proponent to make any argument about need and have it be judged "on its merits." The parties had no more notice of this standard than they did of the other new standard announced in Section II.A.1 of the Decision. The Appendix thus does not cure but rather highlights and exacerbates the fundamental procedural defect in this case. Despite being asked to do so by the Alliance before the hearings in this case commenced, the Siting Board refused to give the parties sufficient direction with respect to the standard of review that would be applied in determining whether the proposed transmission facility is needed pursuant to

[3] The Decision makes clear that "the Siting Board did not rely on this analysis in reaching its conclusion" regarding the need for this project, and it is difficult to imagine the circumstances under which the analysis would ever be used. For example, it is unlikely that, as a remedy for the Siting Board's denial of due process with respect to the standard of review it applied in this case, the Supreme Judicial Court would remand the case with directions to apply a standard of review the Siting Board itself considers to be inappropriate and obsolete. Bad substance is not a particularly effective remedy for bad process.

§ 69H. Rather than continue the illusion that the Appendix cures this defect in the Decision, the Siting Board should strike it in its entirety. The Decision must stand or fall on the basis of the standard of review that was applied in this case, not on the basis of a standard of review that was not applied.

In the event the Siting Board does not strike the Appendix in its entirety, the Alliance does note several substantive deficiencies in the alternative analysis provided in the Appendix.

In applying the modified Turners Falls/MECo/NEPCo standard of review, the Siting Board determined that the power from the proposed non-jurisdictional generating plant is needed on reliability, economic and other grounds, and the existing transmission system is inadequate to interconnect to the proposed generating plant and thus additional energy resources are necessary to accommodate this new plant. Decision at 188-189. The "other grounds" establishing a need for power from the proposed generating plant refer to the Siting Board's finding that there is a need for additional renewable resources to meet the requirements of the Massachusetts Renewable Portfolio Standard ("RPS") beginning in 2006; that the full renewable output of the plant will be needed to meet the requirements of the Massachusetts RPS beginning in 2010; and the renewable resources provided by the generating plant will be needed to meet regional RPS beginning in 2006.

These findings are insufficient to show that there is a need for the power that might be generated by the proposed generating plant for the following reasons.

Reliability

With respect to reliability benefits, the Siting Board's findings fail to address adequately the intermittent and unpredictable nature of the power that would be produced by the CWA plant. In fact, the Siting Board simply ignores the consequences of these characteristics, treating the projected 100 MW of summer capacity from the wind farm as it would 100 MW of capacity from a fully dispatchable plant. Decision at 141. While it is true that "all generating facilities are subject to unplanned outages," it is an error in logic to equate the periods of time during which the wind farm would deliver little or no power with unplanned outages experienced by a conventional plant. When a conventional plant is "available," i.e., when it is not experiencing either a planned or an unplanned outage, it can be dispatched by ISO-NE at any level required to meet the requirements of the system operator, typically up to and including the nameplate rating of the plant. The evidence presented by CWA itself shows that even when the plant is "available," i.e., not experiencing a planned or unplanned outage, the plant cannot be dispatched by ISO-NE, which must take whatever the plant produces, which might be nothing on a hot summer day.

This is a critical distinction that the Siting Board glosses over: the 100 MW projected for the wind energy plant are not the same for reliability purposes as 100 MW from a fully dispatchable plant. The key question, which the Decision does not attempt to answer, is to

what extent will the ISO be able to count on those 100 MW of projected capacity when it needs them most? The clear answer is that the ISO cannot count on those 100 MW at all; the applicant's own evidence shows that there is a very good chance that at any given time during peak summer load, the plant will not be producing any power at all.

The Decision in fact avoids a reliability analysis by reasoning that: (1) there is a regional need for additional Installed Capacity (ICAP); (2) the proposed plant will add some amount to total system ICAP; and (3) therefore the CWA plant will add to system reliability. But every generator adds some amount of ICAP no matter how unreliable. In fact, under this standard, the less reliable a proposed plant is, the larger the nameplate capacity that is justified in the name of reliability. The proposed plant proves the absurdity of the reasoning. The Decision justifies a plant with a nameplate capacity of 420 MW on the basis of a summer regional capacity need of 100 MW when even the 100 MW is not dispatchable power. Clearly, the Decision eliminates any vestige of a reliability standard.

Moreover, the Siting Board's proposed findings regarding possible adverse effects of the CWA plant on system reliability are wholly unsupported by the evidence. The Siting Board found that "the variability or unpredictability of the energy generated by the wind farm is unlikely to affect the reliability of the electric system" immediately after also finding that "the record indicates that any reliability issues will be identified in the forthcoming System Impact Study, and . . . the wind farm will not be permitted to interconnect to the New England transmission grid until it is shown that interconnection will not adversely affect the reliability of the transmission grid." Decision at 150-151. It is appropriate to also note that the intermittent and variable nature of the wind farm's output is not the only possible negative effect the interconnection of the wind farm could have on system reliability.

Thus, the Siting Board is in no position to conclude that the wind farm will not have an adverse effect on the electrical grid when the ISO itself has made no such finding. At the very least, the Siting Board should hold any findings on system reliability in abeyance until the ISO releases the System Impact Study for review by the Siting Board and the parties. Based on the record in this case it is impossible to conclude that the proposed project will have a net beneficial effect on reliability.

Economic Efficiency

The Siting Board found that the proposed plant "would provide average annual savings of $25 million for New England customers, including $10 million annually for Massachusetts customers, during the first five years of operation." Decision at 161. This finding relies on another finding, that "the Siting Board accepts the assumption that the wind farm will be a price taker in the energy markets, and thus will fall at or near the bottom of the regional dispatch queue whenever it is operating." Decision at 160. The net result of these two findings is extraordinary. Any proponent could show "economic benefits" by asserting that it would be a price taker in the ISO-NE markets and, thus, the power from the

proposed plant would be found to be "needed" even without any evidence that the plant would be able to remain in operation and bring those "benefits" to the state and region.

The Siting Board has misapprehended the Alliance's argument regarding economic efficiency. The Alliance does not believe that the Siting Board must reach determinations of economic efficiency on the basis of marginal cost analyses in all cases. Rather, the Alliance believes that a proponent such as CWA (a price taker) should have to provide some evidence that it will be financially capable of providing the promised benefits – i.e. that its projected revenue as a price taker will cover its long run marginal costs. The proponent of the plant at issue in ANP Blackstone, 8 DOMSB 1, provided such evidence in the context of the dispatch model relied upon by the Siting Board. The bid price for the plant used in that case was, in fact, a price that presumably would allow the plant's owner to recover its costs. There is no such evidence here, since the proposed plant will have a bid of zero in the ISO-NE markets. If CWA's gamble does not play out, and it cannot subsist on a diet of hourly clearing prices, RPS credits, and the federal production tax credits (if reinstated and if applicable to the CWA plant), neither the state nor the region will enjoy the purported benefits from the plant. Based on the record in this case, therefore, it is impossible to conclude that the proposed plant will contribute to economic efficiency. If the applicant's showing is sufficient in this regard, then this economic efficiency requirement has also been effectively eliminated, as any plant can meet it by taking the position that it will be a price taker in the ISO-NE energy markets (a representation the Siting Board has no power to enforce).

Impact on RPS

The Siting Board also found that the proposed plant would provide "other benefits" due to its potential impact on the renewable portfolio standard set forth in G.L. c. 25A, § 11F. Decision at 153-155. With this finding, the Siting Board has overstepped its authority. The Siting Board found that "[b]ecause the RPS is an energy policy of the Commonwealth, established by statute, with clear relevance to the Siting Board's mandate to provide for 'a reliable energy supply for the commonwealth with a minimum impact on the environment at the lowest possible cost', the Siting Board concludes that it is appropriate to examine the need for renewable energy to meet the requirements of the Massachusetts RPS." Decision at 154. This finding ignores both the Siting Board's statutory mandate and the DOER's statutory mandate with respect to the RPS. Neither G.L. c. 164, § 69H, which was modified by the Restructuring Act, nor G.L. c. 25A, § 11F, which was created by the Restructuring Act, directs the Siting Board to take any action with respect to the RPS. It is clear that if the Legislature desired to change the Siting Board's mandate with respect to examining the need for new energy facilities in order to give an additional preference for renewable power, it would have done so. The Legislature, however, placed authority for administering the RPS with the DOER, not the Siting Board, and declined the clear opportunity to further modify G.L. c. 164, § 69H to make it easier for proponents of renewable projects to make the requisite showing of need. The Decision enacts a *de facto* revision of § 69H that the Legislature itself declined to make.

Moreover, this part of the Decision demonstrates a fundamental misapprehension of the RPS. The RPS, as administered by DOER, creates a financial incentive – nothing more, nothing less – for the development of new renewable power projects in the region. It gives the owners of renewable plants an additional source of revenue that should, on the margin, allow some plants to operate profitably where they could not otherwise. The RPS does not require that any particular plant be built, nor does it even require that a specific level of renewable generation be reached without regard to cost, as load serving entities are allowed to cap their financial exposure to RPS compliance costs through the alternative compliance mechanism. The RPS serves this function through the creation of a "product" – green credits – that exists entirely apart from the energy markets in which the electrons produced by renewable plants will be sold.

Nothing about this system for providing a financial incentive to renewable producers could be construed as allowing (much less requiring) any state agency other than DOER to take it upon itself to change the standard under which it reviews a power project that involves renewable power. The financial incentive provided by the RPS exists regardless of whether the Siting Board or any other agency provides an added boost to such projects by loosening their statutorily mandated standards. The Siting Board must await additional statutory authority from the Massachusetts Legislature before acting on its own to provide further assistance to a certain sub-group of power projects.

The Alliance raised these and other substantive issues before the Siting Board in pre-filed testimony filed on June 20, 2003. The Alliance filed the following five pieces of testimony in the EFSB proceeding:

- Richard S. LeGore, Ph.D., testified regarding the potential impacts of the project on the benthic community in Nantucket Sound, and the appropriate methods for investigating and assessing such potential impacts;
- Mark Weissman testifed regarding the potential impacts of the project on fisheries in Nantucket Sound and placed the project within the broad historical and regulatory context of fishing in Nantucket Sound;
- Jeff Byron testified regarding the purported economic benefits of the project and the superior economics of a number of alternatives to an offshore wind development in Nantucket Sound;
- Erich K. Bender, Ph.D., testified regarding the potential noise impacts of the proposed project, including the potential impacts upland from the beach areas that were the focus of CWA's modeling; and
- Michael L. Morrison, Ph.D., testifed regarding the potential impacts of the proposed projects on avian species in the affected area, and the appropriate methods for investigating and assessing such potential impacts.

This testimony is attached as an exhibit to these comments.

The Alliance believes strongly that the Siting should and will weigh carefully all of the matters raised above when it re-convenes at some future date to consider the CWA petition. Proper consideration of these matters would result in either further substantive proceedings on the CWA petition or its outright denial. The EFSB proceeding is far from over, and the Petition has certainly not been "approved" as stated in the DEIS.

2. Specific Comments on Other Permitting Requirements

Page 7-1, 7.1 5th par., 3rd sentence. At the federal level, there needs to be a lead agency. This sentence suggests that the Corps is another cooperating agency. If no agency claims lead, then the proponent is really driving the show, as APNS has repeatedly argued and as the result-oriented nature of this DEIS itself shows. If the Corps is the lead, as it claims, then the Corps will have to adopt the EIS as its own, certifying the accuracy of the document (see 33 CFR 325, Appendix B). APNS advises against such action due to the multiple searing defects in this document.

Page 7-2, 3rd par. This paragraph would seem to fit more appropriately within Section 7.2.2.1. than in the general discussion of an EIS process. The Corps' primary regulation for a regulatory EIS is Appendix B to 33 CFR 325. Part 230 of 33 CFR is primarily for the construction of an EIS for one of the COE's own civil works projects. The major deficiency of this DEIS is that it does not comply with 33 CFR 325, Appendix B-1; it is overly wordy with many redundancies and in desperate need of a streamlining. The sheer volume of the document contravenes the fundamental purpose of an EIS – to provide information to the decision maker (in this case the NED District Engineer) in a fashion that is clear and concise. That volume, plus the multiple defects, havew given rise to the need for extensive comments such as these. It is most improbable that the District Engineer will read the document, as evidenced by this effort to plow through it with dozens of reviewers. Hopefully, there is at least one person that will read the entire document and all the reviewers' comments to try and glean inconsistencies and deficiencies in the document and recognize how seriously flawed this DEIS is.

Page 7-3., 2nd par., 3rd sentence. Section 403 of the CWA is implemented by EPA, not the Corps and thus should be discussed in Sec. 7.2.2.4.

Last sentence. The statement that section 403 review does not apply is erroneous. The interpretation of Sections 402 and 403 are that a NPDES permit would be required if any drilling mud (bentonite) escapes during the HDD operation. Since the DEIS recognizes and has planned for the likelihood that bentonite drilling muds will be released when the HDD enters the submarine pit that will be excavated, a 402 permit should be sought and that EPA will need to apply the 403 guidelines in its evaluation of authorization under Sec. 402. All of this should be discussed in Sec. 7.2.2.4.

"Project Activities Subject to Jurisdiction" (7.2.2.4), page 7-5, 3rd par. This is the first place that the need for an NPDES permit is acknowledged. As discussed in comments on

page 7-3 above, in addition to activities conducted in the upland, the release of drilling mud at the terminus of the HDD will require a 402 permit.

Page 7-5 (7.2.2.5). The discussion in this entire section belongs under Section 7.2.2.1 as part of the Corps review process. The HHPA is not an agency that it should be separated out into its own section. The Corps' implementing regulations are at 33 CFR 325, Appendix C which should be the primary document that the Corps follows. Part 800 of 36 CFR is incidental to the Corps compliance process, yet it is repeatedly given "first billing."

G. Comments on DEIS Section 9 (MEPA Draft Section 61 Findings (M.G.L.C.30 § 61)

"Mitigation for Potential Impacts to Protected Marine Species," page 9-3. Comments provided on section 5.5.7—the proposed means to mitigate impacts to marine mammals and sea turtles in Federal waters—are equally applicable here.

"Mitigation for Potential Fisheries Impacts" (9.3). While the approaches described here are perhaps suitable for parts of the study, there is no discussion of mitigation of sounds produced during pile driving or operation of the WTGs for signals within 500 m of the source. Although there are few, if any, data in the literature (peer-reviewed or gray) relevant to this question, it is important that this be considered for the survival of fish.

"Mitigation for Potential Impacts from Noise" (9.10). The fourth bullet, beginning "Noise measurements comparable to those conducted to assess pre-construction conditions will be conducted...," is inadequate. Pre-construction measurements did not have or need a distance component. Noise monitoring during construction and operation should include measurements at different distances to characterize the sound levels and frequency characteristics from close ranges, even 20 m if possible, to distances sufficiently great that the project sources are no longer detected in the background.

Relative to fishes, comments on this section are the same as those for Section 9.3.

"Mitigation of Potential Transportation Impacts" (9.11). CWA's proposal for a Nantucket Sound site is fatally flawed in that it appears incompatible with marine transportation activity and poses unnecessary and unacceptable risks to cruise liner, ferry vessel, oil transport, fishing and recreational users. A vessel traveling at 12 knots that leaves the Main Channel due to machinery failure or human error would strike the bordering WTG in approximately 40 seconds. Normal mitigation measures commonly used at other international wind facilities are overwhelmed by this close proximity and minimum reaction time.

The DEIS uses detailed discussions of the responsibilities of mariners operating vessels, e.g., the rules of the road (COLREGS) and observations such as " This would provide mariners with ability to navigate through the area by maintaining an <u>essentially straight course</u> that passes <u>easily</u> between the WTGs." (emphasis added) to convey a false sense of

security about the risks that WTGs pose to ships, boats, passengers and to the environment. The DEIS substitutes assurances of mariner responsibilities for the conduct of a rigorous risk analysis and proposal of realistic mitigation measures.

Page 9-7, all. The McGowan Group report provided a detailed critique of the shortcomings and oversights found in its review of Appendix 5.12-B. The McGowan Group report was provided to the Corps and to the Coast Guard Marine Safety Office which evaluated the navigation, marine safety and marine environmental aspects of this project. The report and its conclusions regarding navigation and marine pollution risk to the Nantucket Sound sites has been overlooked or ignored in this DEIS. The report's overall conclusion that the Nantucket Sound project is incompatible with the marine transportation needs of the area, creates unacceptable risks to the environment and shipping and is fatally flawed due to the failure to perform a rigorous navigation risk assessment remains unanswered by the DEIS (McGowan Group Report, 2004).

The mitigation actions listed in this and in the previous sections should flow from a rigorous risk assessment and be tailored to reduce the specific risks identified. Threats to Nantucket Sound, to shipping and to boating interests that should be subject to a risk assessment include: collision by a ship/tanker/fishing vessel/ferry with a WTG, a ship or boat's anchor strike of a submarine cable or inner array cable, oil and/or other contaminants entering the Sound's waters due to tanker/ship collision, a fishing vessel's trawl entanglement with a WTG foundation, scour mat, or cables, a small recreational boat caught in the WTG foundation eddies, and a search and rescue incident within the wind facilities field to name a few.

The single most effective mitigation action that can be taken to reduce the risk of marine casualties and pollution incidents is to choose a site for the CWA project that is far removed from shipping lanes and routes. The next most effective measure would be to provide sufficient separation between the WTGs and shipping channels or routes to permit sufficient time for a ship, tanker or boat to take evasive action to avoid collision with a WTG. The current distance of 800 feet with a minimum reaction time of 40 seconds (at 12 knots) is so grossly deficient as to appear cavalier with the loss of life, injury, damage and pollution that would result from such a mishap. CWA's proposed site seriously fails any test for reasonableness.

This section needs to specify a minimum burial depth for the inner array cables in addition to the submarine cables.

"Mitigation for Potential EMF" (9.12). The DEIS states, "All of the proposed transmission cables contain grounded metallic shields, therefore they will not produce electric fields." This is not true.

The DEIS states, "As a result of designing the Project to effectively eliminate electric fields and because economically and environmentally viable and prudent steps to reduce

magnetic fields have been utilized ... no additional mitigation is required." Various kinds of electric and magnetic fields, even mentioned, are known to compete with the natural electric and magnetic fields that sharks and rays in the region of the wind farm rely on for prey detection and orientation.

H. Comments on DEIS TABLES, FIGURES, APPENDICES

1. Table 3-15a: Finfish and Shellfish Resources within the Offshore Alternatives

There are several taxonomic misspellings in this table:

Busycon caria should be *Busycon carica*
Myoxocepalus octodecimspinosus should be *Myxocephalus octodecemspinosus*
Ammodytes clubius should be *Ammodytes dubius*
Meruccius bilinearis should be *Merluccius bilinearis*
Cyroscion regalis should be *Cynoscion regalis*

2. Tables 3-16, 3-17 and 3-18

It is notable that in all three tables the counts of nematodes are low, ranging from <1 to $9/m^2$, unlike the high counts found in the 2001 and 2002 ESS surveys. This is because Theroux and Wigley (1998) used a 1.0 mm sieve which passes most nematodes, while ESS used a 0.5 mm sieve, which retained a number of nematodes. The ESS samples are very likely under-counted, however, because many nematodes also pass through a 0.5 mm sieve. For this reason, nematodes are usually regarded as components of the meiofauna rather than of the macrofauna. Because nematodes numbers are probably under reported, and because the high numbers that were nevertheless retained tend to mask statistical relationships among other components of the benthos community, nematodes should be ignored in consideration of the benthos data reported in this DEIS.

How were the "relative dominance" calculations made to present the numbers in these tables?

Tables 5.8-1 and 5.8-2. The left column should be labeled "Resource" since they are not all wetlands as the Corps defines and this is a Corps EIS. 2nd left column: There could be federal jurisdiction in all of the rows. Coastal Bank is Corps jurisdictional below the high tide line under Sec. 404 and below the mean high tide under Sec. 10 and in non tidal below the OHWM. The Corps would regulate any wetland or stream in the 100-year Floodplain. The Corps would regulate all Coastal Beaches to the mean high water under Sec 10 and to the high tide line under Sec. 404. The Corps would regulate all Land Subject to Tidal Action.

3. Table 5.1-2: Suitability of Coring Data

The depth of these cores reported in Table 5.1-2 ranges from 8 to 22 ft, with a majority 10 feet or less. Two measures for the depth of cores are provided in Table 5.1-2. Core Penetration (which one understands is how deep the core was driven beneath the surface) and Core Recovery (what length of core comes out of the coring device). Two of the cores reported recovering more core than the depth of penetration, which is suspect.

Frequently, cores recover less material than penetration for a variety of reasons. Recovering more materials raises questions of accuracy of the core data: One core that penetrated 20 feet is reported to recover 22.1 feet of core, and another 20 foot penetration recovered 21.5 ft of core.

The depth of these cores does not address the design, stability, or suitablility of the proposed monopiles. The DEIS established that pre-construction surfaces vary up to 15 feet vertically, so that these cores give no information on geotechnical properties for foundation design. The analyses were composited over 5 ft long core sections, so the results are not useful to determine the nature of the subsurface: (i.e. sand sheet, marine muds, glacial pavement, glacial till, tidal deposits) which would be useful to understand the stability of the subsurface, suseptibility to scour, susceptibility to suspension if disturbed, etc.

4. Table 5.3-1: Summary Statistics for Invertebrate Data

This table purports to provide quantitative information, which is misleading and incorrect, because it is based upon quantitatively invalid methods and procedures, as discussed in detail by comments on Appendices 5.3-A & B.

5. Table 5.4.5: Summary of Studies on Acoustic Impacts to Fish

This table is woefully incomplete in terms of literature citation, suggesting that the authors of the DEIS have not looked at (or are unaware of) the available literature on the potential effects of aspects of pile driving on fishes. The table combines both peer-reviewed work and gray literature. It also combines different types of signals (pure tones, transient signals). Depending on what is needed, there are probably 50 or more papers that are missed here, including critical ones by McCauley et al. (2003), Smith et al. (2004a, b), Popper and Clark (1976), several other papers by Scholick and Yan, etc. In addition, the table should include work on pile driving per se, and none of these are included. At least five experimental papers on pile driving as well as numerous reports on the effects of pile driving on fish have been done. Moreover, the description of the results from the various studies is inadequate, and lacks the caveats often provided by the authors on extrapolation of data from one species or experiment to other species.

A number of references are included below on the effects of sound on fishes that are not included in the DEIS and which may have an impact on the arguments provided by the authors. Note that this list is *not* intended to be a complete review of the literature on noise effects, nor an assessment on the quality of any of these papers. Anyone looking at these should be especially critical of the non peer-reviewed literature.

Several of the references are primarily germane to marine mammals, and are included here in case the authors are not familiar with those reports.

There are a number of specific problems with the table and the studies cited.

The column labeled sound level and frequency generally does not include the frequency range of the signal.

While the intensity of the signal is given, it is very likely that there are substantive differences in the effects of continuous signals as compared to transient signals with rapid on-times (e.g., from pile driving, airguns, explosions) and this is not taken into account in the table or report. This is a fundamentally important question. There is also considerable discussion, albeit in meetings on the effects of sound on fishes (and marine mammals) as to the proper way to evaluate the signals that could be affecting any animal. There seems to be a consensus that the critical factor may be the sound exposure level (SEL) which integrates sound level and time of exposure. Alternatively, one potential criterion that has been discussed is peak sound energy (and not the RMS sound levels that are given for most of these references). This issue is in need of clarification, but until that happens (and there is a NMFS panel that is currently examining this issue and attempting to set noise exposure standards for fishes, just as another NMFS panel is attempting to do for marine mammals), just presenting data as in this table is almost meaningless.

There are several specific problems. The work by Hastings (1995) has never been published and the authors of the DEIS need to look at that data critically. The hair cell damage in Enger (1981) and Hastings, et al. (1986) is to a limited number of cells and not to all of them. A critical companion paper is McCauley et al. (2003), the reference for which is given below. The hearing loss reported by Scholik and Yan (2001) is for hearing specialists, and there are several additional papers on this topic as cited below. The work by Smith et al. is particularly critical since it relates sound levels and hearing loss. At the same time, the authors of the DEIS must take note of when fish are hearing specialists vs. non-specialists (generalists!) since the effects are likely to be very different for these animals.

Another issue is the duration of exposure, and how long fishes might be exposed at a pile driving operation. If fishes (or their eggs and larvae) can move away from a site, this will cut down on effects, but if the fish are resident, and there are eggs and/or larvae, there may be a long term impact, especially if they are near the source. Again, the issues are very complex, and treated in the DEIS in the most superficial way.

Some of the references that might be examined include:

Abbott, R., and Bing-Sawyer E. (2002). Assessment of pile driving impacts on the Sacramento blackfish (*Orthodon microlepidotus*). Draft report prepared for Caltrans District 4.

Anderson, J.J. (1990). Assessment of the risk of pile driving to juvenile fish. In: Frauenheim, J.L., ed. *Lessons of the 80's - Strategies of the 90's; proceedings of the 15th annual member's conference, Deep Foundations Institute. October 10-12, 1990 - Seattle, Washington.* Hawthorne, New Jersey: Deep Foundations Institute, 1991.

Bonar, D. B. (1995). Juvenile salmonid outmigration at the Everett homeport: effects of shoreline shading and offshore pile driving activities. Aquatic Environmental Services report to Washington Dept. of Fish and Wildlife.

Caltrans (2001). Pile Installation Demonstration Project, Fisheries Impact Assessment. PIDP EA 012081, Caltrans Contract 04A0148. San Francisco - Oakland Bay Bridge East Span Seismic Safety Project.

Caltrans (2004). Fisheries and Hydroacoustic Monitoring Program Compliance Report for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. Prepared by Strategic Environmental Consulting, Inc. and Illingworth & Rodkin, Inc. June.

Feist, B. E. (1992). Potential impacts of pile driving on juvenile pink (*Oncorhyncus gorbuscha*) and chub (*O. keta*) salmon behavior and distribution. MS Thesis, University of Washington.

Hastings, M. C., Popper, A. N., Finneran, J. J., and Lanford, P. J. (1996). Effect of low frequency underwater sound on hair cells of the inner ear and lateral line of the teleost fish *Astronotus ocellatus*. J. Acoust. Soc. Am. 99, 1759-1766.

Jensen, J. O. T. and Alderdice, D. F. (1983). Changes in mechanical shock sensitivity of coho salmon (*Oncorhyncuus kisutch*) eggs during incubation. Aquaculture 32, 303-312.

Jensen, J. O. T. and Alderdice, D. F. (1989). Comparison of mechanical shock sensitivity of eggs of five Pacific salmon (*Oncorhyncus*) species and steelhead trout (*Salmo gairdneri*). Aquaculture 78, 163-181.

Keevin, T. M., Hempen, G. L., and Schaeffer, D. J. (1997). Use of a bubble curtain to reduce fish mortality during explosive demolition of Locks and Dam 26, Mississippi River. In Proceedings of the Twenty-third Annual Conference on Explosives and Blasting Technique, Las Vegas, Nevada, International Society of Explosive Engineers, Cleveland, OH, pp. 197-206..

Legardère, J.-P. (1982). Effects of noise on growth and reproduction of *Crangon crangon* in rearing tanks. Mar. Biol. 71, 177-185.

Legardère, J.-P., and Régnault, M. R. (1980). Influence du niveau sonore de bruit ambient sur la métabolisme de *Crangon crangon* (Decapoda: Natantia) en élevage. Mar. Biol. 57, 157-164.

McCauley, R. D., Fewtrell, J., and Popper. A. N. (2003). High intensity anthropogenic sound damages fish ears. J. Acoust. Soc. Am. 113, 638-642.

National Research Council (NRC). (1994). Low-Frequency Sound and Marine Mammals: Current Knowledge and Research Need. National Academy Press, Washington, DC.

National Research Council (NRC). (2000). Marine Mammals and Low Frequency Sound: Progress Since 1994. National Academy Press, Washington, DC.

National Research Council (NRC). (2003). Ocean Noise and Marine Mammals. National Academy Press, Washington, DC.

Pearson, W. H., Skalski, J. R., and Malme, C. I. (1992). Effects of sounds from a geophysical survey device on behavior of captive rockfish (*Sebastes* ssp). Can, J. Fish. Aquat. Sci. 49, 1343-1356.

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Popper, A. N., Fewtrell, J., Smith, M. E., and McCauley, R. D. (2004). Anthropogenic sound: Effects on the behavior and physiology of fishes. MTS J. 37, 35-40.

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6. Table 5.11-11

There are no data presented here or in the text to indicate how these data were measured. Nothing about water depth, type of hydrophone, bandwidth of the signals, etc. There

would be benefit in knowing the spectrum of the signal being recorded vs. the spectrum of the background signals in order to assess whether fish can detect signals above ambient.

7. Tables 5.13.1-8 and 10

There is an abundance of 60-Hz magnetic-field data, but NO 60-Hz electric-field data, NO DC magnetic-field data, and NO DC electric-field data.

8. Tables 5.13.9

From the tabulated range in strength of electrical forces in living systems, one would have to consider the electric sense of sharks and rays mere magic, as it operates at force levels at least four orders of magnitude lower than 1 pN.

9. Figure 3-26: New Bedford Harbor Superfund Site

Description: Figure 3-26 is a map of the New Bedford Superfund Site Operable Units (i.e., Upper Harbor, Lower Harbor and Outer Harbor). This figure further shows that the New Bedford alternative CWA project site coincides with the southern portion of the Other Harbor Operable Unit.

Concurrence: New Bedford alternative does appear to be (at least partially) located within the Outer Harbor Operable Unit. This review was unable to verify precisely how much of the New Bedford Alternative overlaps with this unit, but it appears to be substantial, if not completely within the Outer Harbor Operable Unit boundaries (see #3 below). This being the case, there is agreement with the following passage in the DEIS: "The [New Bedford Harbor] Superfund Site contains sediments contaminated primarily by metals and organic compounds, including PCBs (MCZM, 2002). These characteristics, coupled with the proximity of fish spawning grounds and shellfish beds (see Sections 3.4.3.4.5 and 3.4.3.4.6), raise concerns about the mobilization of these sediments during construction and decommissioning." (DEIS, Page 3-149, paragraph 4).

To support the review of Figure 3-26, the current (November 2004) DEIS addresses the location of the New Bedford/Buzzards Bay Alternative Site in relation to the New Bedford Superfund Site: "The Alterative Site is within the Outer Harbor Operable Unit of the 18,000-acre (73 km^2) New Bedford Harbor Superfund Site…" (November 2004 DEIS Page 3-53, paragraph 6). In addition, the southern boundary of the Outer Harbor Operable Unit likely has not changed since the Superfund Site source map data was produced by MCZM in 2002. Therefore, it is likely that the version of Figure 3-26 used for this review is accurate.

10. Figure 4-19

This figure shows a plan view of the mat layout around each pole. There will be 6 mats totaling over 800 sq ft per pole = ~2.4 acres for 130 poles.

11. Figure 5.6-1

The typeface of the legend should be increased in size so that it is readable. The legend indicates a symbol labeled as "Certified Vernal Pool" it is difficult to know what the symbol is and more difficult to identify any vernal pools on the figure.

12. Figure 5.8-2.

The legends need work. The heavy green line is labeled "GPS Flag Delineation." It would be better labeled "Wetland Delineation" after all, who cares about GPS flags? But speaking of GPS, what was the accuracy of the equipment used to survey the wetland boundaries? Was it resource grade (sub-meter accuracy)? Because of the proximity to buffer zones (see comments above), the heavy green line labeled "1200' Buffer Zone" should have at least two segments so that people realize it is a broken line. There are a lot of lines on the map that look like property lines but could fit the legend as "Access Roads" or "Gravel Roads." There are red lines that indicate beaches but there is no designation in the Legend. Increase the font point so that the legend can be read easier.

13. Figures 5.8-3 and 5.8-4

If the transmission line route is shown on these figures, it is not readily discernable. It would also be good to increase the font point on these so the legend can be read more easily.

14. Figure 5.12-2: Aeronautical Navigation Features

This graphic does show the major air routes in the Cape Cod area. There are numerous other aeronautical navigation features, including intersections, initial approach fixes, final approach fixes near the proposed wind farms that are vital to the safe navigation of IFR flights.

15. Appendix 3-A: Wind energy as a siting criteria

The pertinent information as to the siting of the wind farm in the Nantucket Sound area comes from a Department of Energy Study by Elliot et al. (1987) in which wind energy in the area falls between categories 5 and 6. From an economic standpoint, offshore wind generators deployed in areas with these average wind strengths are viable. The relevant section from Elliot et al. is:

Wind measurements up to 46 m (150 ft) above ground have been taken at four DOE-installed tower sites along the northeastern Atlantic coast—Nantucket Island and Provincetown, Massachusetts; Montauk Point, New York; and Block Island, Rhode Island. Long-term data (5 yr) from both Block Island and Montauk Point indicated class 4 annual average wind power at 50 m (164 ft) for those areas. Limited data (2 yr) from Nantucket Island and Provincetown indicated that these outer areas could have class 6 or better annual average wind power at 50 m (164 ft). At 10 m (33 ft), the annual average wind power varied considerably among these four sites and was only class 2 at Block Island and Provincetown. These data provide excellent examples of how local roughness features such as vegetation and buildings can reduce the wind power at levels near the ground and how near surface (10-m or 33 ft) data may not provide a realistic indication of the wind power at 50 m (164 ft).

There is a substantial west to east increase in wind power predicted by this study but it relies almost entirely on the two years of measurement at Nantucket and Provincetown as compared to the five years of data at Block Island and Montauk Point. The Block Island and Montauk observations extended from about 1977 to the middle of 1982 while the Nantucket and Provincetown observations started near the beginning of 1981 and lasted for a year to a year and a half. Examination of the climate indices on the Canadian MEDS web site (www.meds-sdmm.dfo-mpo.gc.ca) show that during the period of wind observation there were substantial variations in the North Atlantic Oscillation (NAO) and correlated variation in monthly anomalies of horizontal wind speed at Yarmouth NS. Wind speeds were lighter than usual during 1977-1978 and built to larger than usual values by 1982. Although Yarmouth is a long ways from Nantucket Sound, it is not unreasonable to suppose that similar long-term variations occur throughout a large portion of the east coast of North America. Thus, it is possible that at least a portion of the perceived west to east wind power gradient reported in Elliot et al. may be related to the difference lengths and times of the wind observations.[4]

16. Appendix 3-G: Marine Protected Species Descriptions

a. Section 1.0 Introduction

Here and elsewhere the DEIS indicates that the marine protected species considered "could occur in the three offshore alternative sites." All of the marine species considered in the DEIS have been observed at least occasionally in Nantucket Sound and adjacent areas. Therefore, it is misleading to say that they could occur, rather than they do occur or have been seen, in these areas. Such misleading statements should be corrected everywhere they occur.

[4] Elliott, D. L., C. G. Holladay, W. R. Barchet, H. P. Foote, and W. F. Sandusky. 1987. Wind Energy Resource Atlas of the United States. DOE/CH 10093-4, Solar Energy Research Institute, Golden, Colorado.

b. Section 2.1 Humpback whale (Megaptera novaeangliae)

Page 1, 1st and 2nd par. Here and elsewhere the DEIS indicates that the distributions of humpback whales and other cetacean species are determined by the distributions of their prey species. Although it certainly is true that all species feed where they can find suitable food, their distributions are determined by a suite of factors, only one of which is the distribution of their prey. As examples, most of the large whales migrate annually between winter calving/breeding areas and summer feeding areas. Only the summer feeding areas are correlated with the presence and abundance of preferred prey. Further, radio-tagging studies (e.g., Mate, et al. 1997) indicate that animals may move large distances during the summer feeding seasons for reasons which are uncertain. The indications here and elsewhere that cetacean distributions are determined by prey distributions should be corrected accordingly.

On a related matter, the last sentence in the second paragraph states that "[s]ince 1988, a dramatic decline in the use of Stellwagen Bank by adult humpback whales has occurred, apparently due to the decline in sand lance populations in the area, a primary food source (Weinrich, et al. 1993)." Although it may not have been intended, the statement implies that the decline is continuing or that there is no more recent information concerning the use of Stellwagen Bank by humpback whales. Both implications are misleading. For example, Weinrich et al. (1997) provide additional data on shifts in humpback distribution in response to prey availability. Also, there are a number of post-1994 papers that are at least generically relevant. Examples include Clapham and Mead (1999), Smith, et al. (1999), and Stevick et al. (2003)

Page 1, 3rd par. The first three sentences in this paragraph state that

> Very few whales are sighted within Nantucket Sound itself, in the South of Tuckernuck area, or in Buzzards Bay (Figure 1). Most whales are found where their primary food sources can be easily located. The offshore alternative sites do contain some of the bathymetric and oceanographic features that favor dense aggregations of humpback whale prey species but they are not developed to the extent that they are further north around Stellwagen Bank, Jeffreys Ledge, Browns and Bacaro Banks and in the Great South Channel (Kenney and Winn 1986).

The last sentence in the paragraph states that "[h]istorically and at present, none of the three offshore alternative sites **appear** to be an important area for humpback whales (emphasis added)."

These statements are not supported by data, analyses, or references to relevant publications in the DEIS. As examples, there is no indication of the relative cetacean sighting or survey effort in the various areas so that it is questionable whether the perceived paucity of whale sightings in Nantucket Sound and adjacent areas is due to the scarcity of whales in these areas or to differences in the survey methodology or effort. Also, there is no indication as

to whether "very few whales", means one or two, ten or twenty, a small fraction of the New England population, or something else. Similarly, the bathymetry, oceanographic conditions, and presence of preferred prey species in the Sound and areas farther north are not described and compared -- the reader is asked to simply accept that the prey resources in the Sound are negligible and unimportant compared to those in the noted areas farther north. Further, there is no description of what humpback whales eat. And, as pointed out earlier, prey abundance is not the only factor that affects the distributions and movements of whales. Finally, no data are provided anywhere in the DEIS on the actual numbers of humpback and other whales that occurred in the alternative sites historically or that occur there currently -- again, the reader is asked to simply accept that none of the three alternative offshore sites have been or are important to humpback whales or other cetaceans. Without supporting evidence, such statements must be viewed as questionable presumptions.

Page 2, Figure 1. The distribution of humpback whale sightings shown in this figure can not be assumed to accurately reflect the actual distribution of the whales unless the sighting effort and methodology in the various areas were similar. As pointed out earlier, the DEIS should have, but did not, provide descriptions and assessments of the survey methodology and effort used to generate the data reflected in this and other figures purportedly showing the relative abundance of cetaceans in Nantucket Sound and adjacent areas. Also, the distributions presumably differ seasonally and from year to year, neither of which can be ascertained from this figure or data provided elsewhere in the DEIS.

Pages 2 and 3. The paragraph beginning at the bottom of page 2 and continuing at the top of page 3 indicates that ice entrapment, predation by killer whales, and fluctuating prey populations due to events such as El Nino may be causes of natural humpback whale mortality. Although these are known or suspected causes of mortality in the Pacific and in sub-Artic waters, they would be rare at best in New England waters. Thus, clarification should be provided here and elsewhere in the DEIS where such statements are made. Also, a reference should be provided for the event cited in this paragraph of a "large kill of humpbacks thought to be attributable to ingestion of prey contaminated with phytoplankton toxins." It also should be noted that some of the whales died or washed-up on beaches in northern Nantucket Sound, as well as in Cape Cod Bay. Further, this event and the subsequent reference to possible bioaccumulation of contaminants should be described in greater detail since the proposed action might increase both possibilities.

c. Section 2.2 Fin whale (Balaenoptera physalus)

Page 3, 2nd par. The first sentence in this paragraph gives an abundance estimate from Hain et al. (1992) of 5,000 fin whales in the western North Atlantic. Waring et al.(2001), cited in the reference list for the Appendix, gives an abundance estimate of 2,814 (CV=0.21). The latter figure is more recent and may be more accurate.

Page 4, 1st and 2nd par. These paragraphs described what is known of the seasonal movement patterns of fin whales. More is known about the seasonal movement patterns of

humpback whales than of fin whales (cf. Clapham and Mayo 1990, Palsbell, et al. 1995, Clapham 1996). This knowledge was not, but should have been, included in the preceding description of the natural history and presence of humpback whales in the vicinity of the proposed Wind Farm.

Page 4, 3rd par. This paragraph repeats nearly verbatim what is said in paragraph 3 of section 2.1 about the presence of humpback whales in Nantucket Sound, the South of Tuckernuck area, and in Buzzards Bay. As pointed out in the comments on the earlier paragraph, the statements, while possibly true, are not supported by data, analyses, or references to relevant publications provided in the DEIS. Without supporting evidence, such statements must be viewed as nothing more than supposition.

Page 4, 5th par. The first sentence in this paragraph indicates that "[t]here have been 72 verified strandings and nine 'floaters' of fin whales along the U.S. Atlantic coast during this century (Hain et al. 1992)." The reference to "this century" presumably means the 20th century, not the 21st century. Also, there is additional, more recent information on human sources of mortality, including information on ship strikes and entanglement in fishing gear (e.g., Waring et al. 2001, Laist et al. 2001). Further, there is not even mention of the many thousands of fin whales killed in the 20th century by catcher boats from whaling stations in Nova Scotia, Newfoundland/Labrador, and the Gulf of St. Lawrence (Mitchell 1974), many or most of which may have been from the western North Atlantic population. Likewise, there is no mention of the continuing hunting of fin whales in Greenland. As pointed out elsewhere, such sources of mortality must be taken into account in the assessment of the possible cumulative impacts of the proposed action.

d. Section 2.3 Northern right whale (*Eubalaena glacialis*)

There are several recognized populations of right whales in the Northern Hemisphere. The population of concern regarding the proposed action is the western North Atlantic population. Thus, here and elsewhere the references to Northern right whale should be changed to the western North Atlantic right whale.

"Seasonal Distribution and Known Mortality Factors," pages 5 – 7. The distribution, movements, natural history, and status of western North Atlantic right whales are of particular importance regarding this proposed action because (a) these are by far the most endangered marine mammal that could be affected by construction and operation of the Wind Farm, (b) right whales are known to often enter shallow inshore waters, and (c) the National Marine Fisheries Service has determined that the PBR (potential biological removal) level of this population is effectively zero so that loss of a single animal would constitute a biologically significant impact and further jeopardize the population's continued existence (cf. Waring et al. 2001 listed in the bibliography for this appendix). Therefore, it is essential that all relevant and the most up-to-date information be considered. In this regard, the following publications, which either were not considered or were published after this synthesis was written, contain additional or more up-to-date information: Winn, Price, and Sorensen (1986), Reeves, Breiwick, and Mitchell (1999),

Reeves, Rolland, and Clapham (2001), Knowlton and Kraus (2001), IWC (2001a and b), and Kenney, Mayo, and Winn (2001).

It is unacceptable, as is done here and elsewhere in the DEIS, to simply say that very few right whales occur in areas where they could be affected by construction or operation of the proposed energy plant. Minimally, this section should identify (1) the current size and growth rate of the population; (2) factors that led to the endangered status of the population and that are preventing or impeding its recovery; (3) the feeding habits and principal prey of right whales; (4) the distribution and abundance of the principal prey species in Nantucket Sound and adjacent areas, (5) the numbers, age or size and sex, locations, and activities of right whales that have been observed or found dead in Nantucket Sound and adjacent areas historically and in recent years; and (6) the reliability of the numerical and other data. If reliable data are not available on the numbers, age/sex composition, and movement patterns of right whales in Nantucket Sound and adjacent areas, or on the possible effects of extended multiple exposures to construction-related sounds on right whale survival and reproduction, the only responsible conclusion is that the possible effects of the proposed action on right whales can not be predicted from the available data.

"Sea Turtles," pages 7-11. This section does not, but should, include a description of the green sea turtle (*Chelonia mydas*). Figure 5 of Appendix 5.5-A shows a green turtle stranding on the north coast of Nantucket Island. Further, Lazell (1980) states that a significant population of sub adult green turtles summers in Nantucket Sound. The fact that green turtle strandings have been reported in areas both north and south of Nantucket Sound -- e.g., in Cape Cod Bay (Still et al. 2002), and in Long Island Sound (Morreale et al. 1992) -- also suggests that green turtles may occur in areas where they could be affected by construction and operation of the wind energy plant.

e. Section 2.4 Loggerhead turtle (*Caretta caretta*)

Page 8, 3rd par. The first sentence in this paragraph indicates that "[s]trandings, entanglements, mariner reports, and the U.S. Coast Guard suggest that loggerheads can be expected to **occur rarely in Nantucket Sound** as well [as in Long Island Sound, the Gulf of Maine, and Cape Cod Bay], in the summer and fall months, though no systematic surveys have been conducted in the Nantucket Sound area" (emphasis added). There is no indication here or elsewhere in the DEIS of what is considered a rare occurrence—e.g., a single documented occurrence every two or three years, two or three documented occurrences every year, or something else. If there are not reliable data indicating when, where, why, or how many individuals are likely to be present in areas where they possibly could be affected by construction and operation of the wind energy plant, as appears to be the case for this species and many others, the uncertainty should be acknowledged. Also, as in this case, it should be explained why systematic surveys were not conducted as part of the effort to compile information needed to do the impact assessment. In this regard the Army Corps and other responsible entities should be aware that, without better baseline information, it would be impossible to design monitoring programs capable of detecting possible unanticipated adverse effects on this or other listed species.

f. Section 2.5 Kemp's ridley turtle (*Lepidpchelys kempii*)

The first paragraph in this section states:

> The Kemp's ridley turtle is the most endangered sea turtle in the world. The entire Atlantic population, consisting almost exclusively of juveniles, probably does not exceed 500 individuals (Carr and Mortimer 1980). The total world population of adult ridleys, mostly in the Gulf of Mexico, is approximately 2,200 individuals, down from an estimated 162,400 adult individuals in 1947 (Marquez 1989).

Then, among other things, the fourth paragraph indicates that

> each year between November and January when ocean water temperatures are falling, **small numbers** of ridley turtles become stranded and die on beaches of the north and east shores of Long Island and Cape Cod Bay, due to cold stunning (NOAA 1991; Morreale and Standora 1992). A total of 115 ridley turtles stranded on Cape Cod beaches between 1977 and 1987 (Denton and Prescott 1988). For the period of 1990 to 2000, between nine and 216 ridley strandings were reported in Massachusetts waters, and one ridley stranding was reported in Rhode Island waters... (emphasis added).

If the entire Atlantic population does not exceed 500 individuals, there would seem to be no justification for concluding that annual strandings from 10 or less to more than 200 in Massachusetts waters constitutes small numbers. Either the cited numbers or the conclusion presumably is wrong. Also, there is no indication of the number of individuals or the proportion of the Kemp's ridley population that may actually occur in areas where they could be affected by construction and operation of the wind energy plant. Both additional information and clarification of the apparent discrepancies are needed to provide an adequate basis for assessing the possible effects of the proposed action on this as well as the other species discussed earlier.

g. Section 2.6 Leatherback turtle (Dermochelys coriacea)

Among other things, this section indicates that Leatherback turtles are common in New England waters during the summer and that "[s]ightings, strandings, or entanglements have been observed along the Cape Cod shoreline, in Nantucket Sound, and in Buzzards Bay." Like the previous sections of the Appendix concerning other ESA-listed species, this section provides no information on the actual numbers of Leatherback turtles that occur in areas where they could be affected by construction and operation of the proposed project. Also, while it indicates that "[a]dults migrate extensively throughout the Atlantic basin in search of food", it does not identify the preferred foods or their presence and relative abundance in the vicinity of the proposed energy complex. The same is true regarding the assessments of the other sea turtle species known to occur in Nantucket Sound. Without such information, there is no basis for accurately assessing possible impacts or for designing a monitoring program capable of detecting unanticipated adverse effects.

h. Sections 3.1, 4.1, 4.2, and 4.3 (Gray, Harbor, Harp, and Hooded Seals)

Seals are much more likely to be affected by construction and operation of the proposed Wind Farm when they are in the water feeding, searching for food, or moving from area to area, than when they are on land resting, pupping, or nursing young. However, neither here nor elsewhere in the DEIS is any information provided on the movements, feeding areas, preferred prey, or presence and abundance of preferred prey species in areas where they could be affected by construction and operation of the proposed project. Without such information there is no basis for reasonably assessing the possible impacts of the proposed action on these species, or for designing monitoring programs capable of detecting possible unforeseen adverse impacts. If such information is not currently available, appropriate studies, taking into account possible seasonal and annual variation in feeding habits, feeding areas, etc., should be carried out to obtain the information before the impact assessment is finalized.

i. Section 4.4 White-sided dolphin (Lagenorhynchus acutus)

It would be more accurate to refer to this species as the Atlantic white-sided dolphin. Also, it would be more accurate to indicate that its range extends to the "sub Arctic", rather than "polar waters". Likewise, it would be more accurate to indicate that "it can be assumed that white-sided dolphins may occur in the vicinity of all of the alternative offshore sites," rather than "it could be assumed that white-sided dolphins have the potential to occur in any of the three offshore alternative sites."

j. Section 4.5 Striped dolphin (Stenella coeruleoalba)

For the reasons noted in the first paragraph of this section, it would be more accurate to refer to this species as the western North Atlantic striped dolphin. Also, it would be less ambiguous to state that "it can be assumed that stripped dolphins may occur in all of the offshore alternative sites," rather than "it could be assumed that striped dolphins have the potential to occur in any of the three offshore alternative sites."

k. Section 4.6 Common dolphin (Delphinus delphis)

The currently accepted common name of this species is the short-beaked common dolphin. As pointed out regarding the three preceding species descriptions, it would be more accurate to assume that this species may occur in all of the alternative offshore sites, rather than it could have the potential to occur in these sites.

l. Section 4.7 Harbor porpoise (Phocoena phocoena)

Among other things, this section indicates that an estimated 381 harbor porpoise were killed in U.S. fisheries in 1999 and that, from 1994 to 1999, 691 harbor porpoises were found stranded on beaches, many in Massachusetts. Given that this stock was a candidate for ESA-listing and the National Marine Fisheries Service has devoted much effort to determining the boundaries and size of the stock, and the effects of fishery related mortality, it seems likely that there are more data on the presence of harbor porpoises in Nantucket Sound and adjacent areas than are reported here. Also, since harbor porpoises

are known to occur in nearshore waters, including Nantucket Sound and adjacent areas, it is misleading to say as it does in the last sentence in the first paragraph of this section that "it could be assumed that harbor porpoises have the potential to occur in any of the three offshore alternative sites." More complete and less ambiguous descriptions of the distribution, natural history, and presence of this species in areas where it could be affected by construction and operation of the proposed project seem both possible and necessary.

m. Section 4.8 Long-finned pilot whale (Globicephala melas)

This section indicates that both long-finned and short-finned pilot whales occur in the western North Atlantic and that the two species are difficult to distinguish in the wild. It is not clear why the section provides information on the long-finned species only, when both species apparently can and presumably do occur in areas where they could be affected by the proposed project. Also, for the reasons pointed out in comments on preceding sections, it is misleading to say, as it does at the end of the first paragraph in this section, that "it could be assumed that pilot whales have the potential to occur in any of the three offshore alternative sites." In the absence of more definitive information, it clearly would be more accurate to say "it can be assumed that pilot whales may occur in all of the alternative offshore sites."

n. Section 4.9 Minke whale (Balaenoptera acutorostrata)

This account is outdated in a number of respects. Two species of minke whale are currently recognized worldwide. Only the common minke whale occurs in the North Atlantic Ocean. Therefore, it would be more appropriate here and elsewhere to refer to this species as the common minke whale.

Among other things, the first paragraph in this section indicates that

> Minke whales may occasionally visit Nantucket Sound, but in general, very few whales are found in Nantucket Sound, even though the Stellwagen Bank feeding grounds are in adjacent waters. Most whales are found in areas where their primary food sources can be easily located. Nantucket Sound does not support these food sources because of its shallow nature and sandy bottom.

As pointed out in our comments on some of the previous species descriptions, it is not evident what constitutes a few or a very few whales, or what is meant by occasionally visit. If there are records indicating that this and other protected species occur occasionally in areas where they could be affected by construction and operation of the proposed project, it should be possible to indicate when, where, and how many animals are known to have been in these areas. If such data are not available or are equivocal, there is insufficient basis for doing a reliable impact assessment, and no basis for designing a monitoring program capable of detecting possible unforeseen adverse effects. Further, if the available data are insufficient for these purposes, appropriate studies should be carried out to resolve the uncertainties before finalizing the impact assessment.

Also as pointed out in earlier comments, the presence of primary prey species is but one of a suite of factors that determine the distribution and movements of whales and other protected species. Further, neither here nor elsewhere in the DEIS is the primary prey of minke whales identified. Likewise, there is no indication of the bathymetry and oceanographic conditions in which these prey species occur. Thus, the reader is asked to simply accept that minke whales seldom occur in Nantucket Sound because their primary prey are rare there, or are more common in other areas. Data or references to appropriate publications are needed to justify these apparent presumptions. If the available data are insufficient for these purposes, appropriate studies should be designed and carried out to resolve the uncertainties before finalizing the impact assessment.

17. Appendix 3-H: Essential Fish Habitat (EFH) Designation Descriptions

This section is merely a verbatim regurgitation of information published by NOAA.

18. Appendix 5.2-A: Analytical modeling of alternative wind farm sites – Existing Conditions from the Woods Hole Group's studies

Ocean wave data comes from Corps-WES Wave Informational Study data from the east of Nantucket Sound. These data are the result of hindcast modeling rather than direct observation. Those results are similar in amplitude to those from the south of Tuckernuck but the directions to the south show a more westerly component.

Current measurements consisted of repeat surveys over or around the shoals using shipboard ADCP conducted during a single semi-diurnal tidal cycle. This type of short-term survey would lead to a qualitative assessment of the current at best.

Wave modeling was for locally forced, fetch limited waves using winds from Nantucket airport. Maximum wind speeds were all less than 30 mph so the impacts of major winter storms of hurricanes were not included in the locally driven seas. Only average ocean wave heights were included in the analysis and only those from the east through the Monomoy Channel. Again there is the potential for missing major storm effects and waves from the south.

19. Appendix 5.2-B: Coastal Engineering design parameter analysis Phase I – Preliminary from the Woods Hole Group, March 2004

The ACES model addresses only wind-generated waves and does not account for the effects of refraction, diffraction and non-linear effects. This model produces wind waves that only depend upon average water depth, fetch and wind speed.

Generalized Extreme Value methodology used to generate extremal wind conditions. Return period wind speeds for the Horseshoe Shoal site range from 47 mph for a 2 year

return period, to 74 mph for a 100 year return period. The latter speed is only just above hurricane strength and it seems unlikely that there haven't been higher hurricane force winds in the Sound in 100 years.

The extremal locally generated wave heights based upon the extremal winds and extremal storm surges appear relatively conservative given the limitations of the method. Ocean wave extrema were estimated for a site SE of Nantucket which yield very large return period wave heights, up to 42' for the 100 year return period. The Corps data was for a site that was offshore of the most of the shoaling around Nantucket and so the waves that impacted that site are not particularly subject to dissipation as they would be if propagated into the Sound. Therefore these extremal ocean wave height numbers seem very conservative.

Maximal spring tidal current is estimated to be 2.85 ft/sec which seems reasonable but was obtained using a rather ad-hoc approach and thus leaves some room for doubt. A maximal current estimation process used a simplified numerical model of a rectangular basin with an elliptical shoal forced by maximal winds using the Large and Pond drag coefficients. These are at best order of magnitude estimates since the model does not make allowance for flow into and out of the Sound.

20. Appendix 5.3-A: Benthos Assessment of 2001

See previous discussion on problems with benthic analysis.

In addition to the general concerns previously stated, the following deficiencies exist in this Appendix.

Page 1, 2nd par., lines 1-2. "One surface grab benthic sample was obtained from locations consistent with each of the 46 sediment core sampling locations."

There is no reason the benthos stations should have been taken at the same locations as were the vibracores, which provide construction- and engineering-related information. The data provided by the vibracores are patently unsuited for correlation with benthos analysis. Please see the "Source of Sediment Samples" discussion under "Limited Sediment Analysis and Habitat Correlation," above.

No replicate sampling was conducted at any of the sampling locations. Therefore, it is not possible to sort out the degree of local variation relative to the variation found across the entire Project area. No measures of variation are provided in the analyses to get some ideas of how different the communities are across the site. The data presented in Table 1 of the Appendix suggests spatial variation was significant, but the lack of replicate sampling does not allow us to know how significant it is.

A primary objective of this effort should have been to characterize the benthos community at each station relative to that station's environmental characteristics. Because of significant small-scale variability, as clearly identified in this same Appendix (page 5, par. 1), replicate sampling should have been conducted at each station to overcome sampling variability, and sediment and water quality characteristics should have been measured to gain an understanding of causes of spatial variability, which would have provided a basis for predicting Project impacts. They were not.

Page 1, 4th par., line 1. "The Van Veen grab sampler (measuring 12" x 12.5")...."

The usual measure of a grab provides the dimensions of its jaw opening to indicate the area of bottom it is capable of sampling. In this case, however, this is apparently the gross size of the entire grab. If this description were of the jaw opening, then the grab would sample 150 in^2 of bottom (12" x 12.5" = 150 in^2). However, reference is made in Appendix 5.3-B (page 5, lines 1-2) to different dimensions used to describe the Van Veen sampler used in this 2001 study, saying that it sampled 72 in^2. In either case, however, these dimensions lead to serious questions of clarity.

In the normal case, calculations of organisms/m^2 are made by simply multiplying the number of organisms found in a sample by a factor relating the dimensions of the sampled area to 1.0 m^2. For example, if a grab samples one-tenth or 0.1 m^2, and 1 specimen of species *x* is found in the sample, this is then multiplied by 10 to conclude that there are 10 of species *x*/m^2 in the sampling station area. If 2 are found, then there would be 20/m^2, and so on.

If, as indicated in Appendix 5.3-A (page 1, par. 4, line 1) the grab samples 150 in^2, then the multiplying factor would become 10.3, because:

$$\text{Grab dimensions} = 12'' \times 12.5'' = 150\ in^2$$

$$1.0\ m^2 = 39.37'' \times 39.37'' = 1550\ in^2$$

$$150\ in^2/1550\ in^2 = 0.0968\ m^2 = \text{grab dimension}$$

$$1\ m^2/0.09688\ m^2 = 10.3 = \text{conversion factor}$$

If the same calculations are performed for the 72 in^2 dimension provided by Appendix 5.3-B, the conversion factor becomes 21.5:

$$72\ in^2/1550\ in^2 = 0.0465\ m^2$$

$$1\ m^2/0.0465\ m^2 = 21.5$$

So this yields two possibilities for conversion factors for converting actual organism counts to organisms/m^2: 10.3 and 21.5.

However, reference to Table 1 of Appendix 5.3-A indicates that designations of organisms/m^2 appear in multiples 25 or 31 (one at 21), neither of which correspond to the stated dimensions of the Van Veen grab. Also disturbing is that the conversion factors actually used were not consistent, without explanation.

Quantification has reached yet another level of uncertainty or unclarity.

Page 1, 4th par. Van Veen grab samplers without some kind of frame often have problems taking samples that are plane to the seafloor, and often dig into the sediment at an angle. The grab used in this survey did not have a frame, as indicated in Figure 2. This fact emphasizes the need for replicate samples.

Page 2, 1st par. "Once the grab sampler had been retrieved, field descriptions of the sample were made including: ...depth and area of sediment removed from the dredge. The depth and area of sediment removed from the grab sampler was measured since the volume of the bottom materials collected often exceeded the volume of the sample container or, in some instances, would be less than the full size of the grab when the sampler was deployed in areas of harder substrates or on sloping bottoms."

How exactly were the estimates of sample area and sample depth made? Were the sediments cohesive enough to allow an undisturbed block of sediment to be released from the grab? What were the actual "sizes" of the samples and how did they vary?

How can it be shown that the volume of the sample, which is reflected in the area and depth in the grab, actually represents the "area sampled?" If the grab encounters harder substrate and therefore penetrates only an inch as opposed to the normal, e.g. 3-4 inches, the area of bottom sampled may be the same even though the volumes of the samples vary.

The methods used to "quantify" these parameters are therefore obscure and should be explained.

Page 2, 2nd par., lines 1-2. "In all instances when less than the full grab was placed into the sample jars, a gloved hand was used to remove at least the top 1.5 – 2 inches of sediment from the grab."

This overall sample collection approach is inconsistent and therefore renders estimates of abundance and species composition among sites highly equivocal, and likely inaccurate. In some cases it appears that only the top sediments were sampled, whereas at other sites it appears that a smaller area of upper sediment layers was taken but more sediment was taken from deeper portions of the grab. Therefore in some locations the data provided are biased to organisms living in the upper sediments, and at other locations it may represent a greater portion of deeper living fauna.

Each sample appears to have been treated differently, violating basic, fundamental principles of statistically valid sampling. The reference to "at least the top 1.5 – 2 inches" clearly reveals that this depth was not measured, but was merely roughly estimated by whichever technician was assigned to collect the sample.

Methods used should be more clearly described if these objections are inaccurate.

Page 2, 3rd par., lines 4-15. "The solid portion of each sample…was then emptied into the …500μm sieve and gently washed with tap water to eliminate all traces of formalin…. The rinsed material retained in the sieve was then washed into a grid-lined tray and the sieve was checked carefully to ensure no organisms remained…. The sample material was then spread evenly throughout the tray and sorted through with fine tweezers…. Each section of the grid marked on the tray was sorted through until 100 organisms had been picked out, or until the entire sample had been sorted if less than 100 organisms were present. The organisms found were removed with the tweezers, placed in a separate jar of 70% ethanol and labeled with the date…and the corresponding fraction of the sample that had been sorted."

These sorting techniques utilized to analyze the benthos samples in the laboratory are not at all typical of standard accepted practice or appropriate for yielding dependably quantitative results. Even if the field samples had been collected properly, the laboratory methods would have created reservations about the quantitative validity of resulting data.

Please see the discussion titled "Atypical and Non-Quantitative Laboratory Methods" under "Study Design Issues," above.

Page 2, 6th par., line 2 continuing onto Page3, 1st par., lines 1-3. "The quality check [on laboratory analyses] included both the sorting and identification phases of the analysis to ensure that no organisms or groups of organisms were being inadvertently excluded in the sorting process and to ensure that all organisms were being properly identified.

How was this done exactly? Were all organisms from the entire sample sorted, identified and counted and then compared to the subsample to make sure that "no organisms or groups of organisms were…excluded?" Or was only the subsample reanalyzed? This is unclear and the procedure therefore cannot be assessed.

Page 3, 2nd par., line 1. "In the sorting phase, the QA/QC reviewer checked the sample material for any remaining organisms."

Which sample material, the entire sample or the subset of 100 organisms?

Page 3, 2nd par., lines 1-6. "If the QA/QC reviewer found that more than 10% of the total number of organisms found by the sorter still remained, then four (4) additional samples

were to undergo quality assurance checks. If the percent error in these additional samples was also found to be more than 10% then all samples sorted by the original processor were to be reprocessed."

This description is not clear. To what does the 10% refer? Does this say that if more than 10 organisms remained in the total sample after the sorter picked out 100, this defined a QC deficiency? Or does this mean that if the sorter missed more than 10 of the 100 organisms he/she was to identify and count there was a deficiency? Or does it mean something else entirely?

If they "still remained" . . . remained where?

Page 3, 2nd par., lines 5-6. "In this study, the QA/QC reviewer never found that more than 10% of the organisms were missed."

If 10% of the 100 organisms in the subsample of 100 is meant here, we would certainly hope not! If this is the parameter that is meant, this is hardly a stringent QA/QC parameter. If this parameter is being misinterpreted, however, it requires clarification.

Page 3, 7th par., lines 2-3. "In general, the data from these previous researchers is consistent with the data collected in this study."

This statement needs to be substantiated with specifics. As stated, it has little meaning.

Page 3, 8th par., lines 1-3. "The sandy sediments of Buzzard's Bay, Vineyard Sound, and Nantucket Sound were previously reported to support mixed populations of three species of *Ampelisca* and the closely related amphipod *Byblis serrata* (Sanders, 1958)."

This is a misuse of this citation. All of the work in the cited study was conducted in Buzzard's Bay; none was done in Nantucket Sound or Vineyard Sound. Indeed, Nantucket Sound is not even mentioned in the cited work, and the only mention of Vineyard Sound is on a map as a location adjacent to the study site.

Page 4, 2nd par. "Faunal density is the number of individuals found per unit area. In this and most other benthic studies faunal density is the measure of the abundance of invertebrates within a square meter of bottom area. Faunal density is an important indication of external impacts on a site because, under certain stresses, the density of standing crops (numbers or biomass) of benthic organisms may increase or decrease according to the type of stress and the tolerance of the study species...."

This assertion makes the uncertainty regarding density estimates important. Please see comments concerning Page 1, 4th par., line 1 in this document.

Page 4, 2nd through 6th par. Most of this section on faunal density must be interpreted with some skepticism given the sampling and sorting problems noted previously. In addition, the inclusion of nematodes in the tallies greatly and inappropriately increases the overall "densities" reported here. Please see the discussion titled "Nematodes in the Analyses."

Page 5, 1st par., lines 1-2. "It also follows that this environmental variability on a localized basis typically translates into a high sample-to-sample variability in total macroinvertebrate abundance."

It is difficult to understand why, if the authors' understood this issue, this study included no replicate samples at each sampling location to somewhat overcome the variability in their characterization of benthic communities. This variability is among the prime factors underlying the need for replication. Please see the discussion titled "Lack of Sample Replication" under "Study Design Issues," above.

Page 5, 1st par., lines 2-7. "These same conclusions were also drawn by more recent researchers that documented the benthic community of Nantucket Sound to be highly variable from season to season and location to location (Avery *et al.* 1996). It is believed that the patchy nature of "microhabitats" (defined as, the specific combination of habitat elements in the place occupied by an organisms for a specific purpose) in terms of such parameters as depth, substrate type, temperature, light penetration, food availability, shelter, disturbance, currents, and predation, could be the reason for such variability (DeLeuw *et al.*, 1991)."

This passage further strengthens the argument for replicate sampling, which was not conducted.

Page 5, 1st par., lines 8-10. "However, no obvious relationship between the variations in invertebrate abundance and the depth or substrate type data collected or other patterns were identified in the results of this study."

Patterns cannot be identified if they are not looked for. This statement is unsubstantiated because it appears that no such analyses were conducted. Conversely, no analytical results are presented to show lack of relationships either. No appropriate substrate data were collected. No water quality data were collected. No water temperature data were collected. No light penetration or food availability measurements were taken. We cannot expect that any relationships would be identified under these circumstances.

Page 5, 7th par. "It should also be noted that *Nepthys picta* (red lined worms), although only ranking fourth in abundance per square meter among the Polychaete worms, comprised more than 50% of the Polychaete taxa at five of the 45 sites, contributing a maximum of 64% at site BG-P4. They were also the second most common of the Polychaete worms, being present at 18 out of the 46 sites and ranked fifteenth in average faunal density overall (Table 3)."

Although this report provides descriptions of the dominant taxa here and elsewhere in the report, no analyses are performed (e.g. abundance biomass curves, dominance diversity curves or even simple diversity statistics) to explore the degree of dominance among sites statistically to indicate spatial trends and which areas may be potentially more dynamic with respect to bottom disturbances. This is odd given the statement on Page 5 (paragraph 2) that such an assessment can yield important indications of the status of the communities and populations.

Page 6, 3rd par., lines 1-2. "Of the 44 sites at which Crustacea (*sic*) taxa were present, the four-eyed amphipod comprised greater than 50% of the Crustacea (*sic*) taxa at six of these 44 sites, contributing a maximum of 100% at site BG-MT1."

Statements like this call into question what is different at these six sites to make them so amenable to this particular species and to favor their competitiveness with other species. Understanding such relationships would assist the forecasting of environmental impacts. Unfortunately, no such correlations are possible without supporting data, such as sediment particle size profiles.

Page 6, 4th par., lines 1-3. "The fouling amphipods, also known as tubicolous (*sic*) amphipods, comprised greater than 50% of the Crustacea (*sic*) taxa at only two of the 44 sites found to have Crustaceans (*sic*), contributing 100% at site BG-C6."

How is it that a relatively uncommon species, found at only 5 sampling sites, were so prevalent at the sites where they occurred? This is important. Suppose that, hypothetically, the redistribution of sediments from jet plowing the cable trenches created habitat similar to that occurring at these five sites. Would we then see an explosion of these amphipods? Would that be good? Would that be bad? Why or why not? We cannot answer these questions, however, because no appropriate sediment data were collected.

Page 6, 6th par., lines 5-6. "In general, this family of amphipods is known to burrow in fine or sandy mud bottoms…."

This comment is repetitious, and knowledge like this should have encouraged analyses of surficial sediments at the benthos sampling stations. The repetitious presentation of such statements compels repetitious comment.

Page 7, 1st par., lines 1-2. "In general these snails [*Crepidula convexa*] are found attached to almost any available hard object, often arranged in small to large sacks, common especially along protected bays and sounds…"

Does this mean that when piles are driven, providing hard substrate, that there will be an explosion of *C. convexa*?

"Sacks" should probably be "stacks."

Page 7, 3rd par. "It should also be noted that the Class Nematoda, although dominant at only one site BG-C8, were still the fifth most abundant taxa (*sic*) overall throughout the study.... They were also the most common taxa (*sic*), being found at 39 out of the 46 sites sampled. Nematoda are generally known to be the most numerous marine invertebrates and are adapted to live literally everywhere."

Because they are so common and adapted to live literally everywhere, nematodes provide very little value in these attempts to differentiate communities and environments. Furthermore, including the Nematoda in this analysis is potentially misleading given that they are part of the meiofauna and likely under-sampled at all the sites. They are also very abundant and even though they were under-sampled, the high abundance that is recorded is readily capable of masking trends in the abundance patterns or trends of the macrofauna.

Please see the discussion titled "Nematodes in the Analyses," above.

Page 7, 4th par., lines 1-2. "Overall, most of the benthic macroinvertebrate taxa documented during this study were also reported in earlier studies of Nantucket Sound with similar patterns of community composition and abundance."

The statement that the communities found in this survey were similar to those reported previously in Nantucket Sound is misleading or unclear as some of the studies cited were not done in Nantucket Sound, or only a few samples were taken in Nantucket sound and no information was given as to how data specific to Nantucket sound were extracted from these studies in order to make these comparisons.

Page 7, 4th par., lines 2-3. "The variability between the current study and previously cited studies is most likely due to natural variance in physical and biological factors . . ."

They must be. What is left beyond physical and biological factors? What variability is being discussed? More specificity is needed.

Page 7, 4th par., lines 6-7. "However, no obvious patterns among macroinvertebrate abundance and sample depth or substrate type were identified as part of this study."

These patterns would indeed be obvious if they were discerned in the absence of analysis. No appropriate substrate samples were collected, so no analyses are possible.

Questions arise as to statistical method concerning depth/biota relationships, as described in another section of the DEIS.

Page 7, 6th par. "It is widely recognized that benthic invertebrates are able to opportunistically invade unoccupied areas following disturbance (Hynes, 1970; Rosenberg

and Resh, 1993; Rhoads *et al.*, 1978; Howes *et al.*, 1997). Due to the limited width of direct impact anticipated during the Project's installation activities, mobile invertebrates (such as amphipods, polychaetes, oligochaetes, etc.) living in adjacent undisturbed areas will not have far to migrate to recolonize the disturbed area. These organisms are considered "pioneer" species, and are expected to be the earliest colonizers of the disturbed areas. In addition, many benthic invertebrates with relatively short life cycles disperse through reproduction; e.g., bivalves such as mussels and clams. These organisms will re-colonize during the first spawning season as their veligers float into the area from existing stocks. For these reasons, the limited area of direct disturbance is unlikely to result in anything more than a temporary impact to the benthic community. Equilibrium of benthic communities after similar disturbances is generally achieved within less than one year. Therefore, no specific mitigation actions are recommended."

The statement that "Recovery of benthos following disturbance is an ongoing process over much of the sea floor" is over-reaching. The disturbance regime for each of type of environment must be defined, and in the case of these deeper water habitats, certain prevailing conditions such as shifting sand waves may not necessarily be "disturbances" that set back communities to earlier successional stages.

The implication that all benthic invertebrates are able to respond opportunistically to disturbances is also not correct, as is clearly pointed out in the references used to support this statement.

Curiously, two of the references given are focused on freshwater riverine systems (Hynes, 1970; Rosenberg and Resh, 1993), and a third cited only an abstract of a non-peer reviewed presentation (Howes *et al.*, 1997). Although there can be some similarity in benthic responses to disturbance in river systems and deep water coastal systems, the lack of assessment relative to a well developed literature on this topic for soft-sediment sea floor communities calls into question the usefulness and applicability of this survey and its results in terms of assessing potential impacts to the site.

Not all polychaetes and oligochaetes are mobile, and even some amphipods are tubiculous and therefore may not migrate. Not all bivalves are short-lived (*Spisula solidissima*, for example can live up to 31 years per Cargnelli *et al.* (1999)), and to assume that a disturbed site can be recolonized by bivalves via larval settlement of veligers in the "first" spawning season following disturbance is a great oversimplification of recruitment and successional dynamics. Therefore, the conclusion that disturbances associated with WTG construction and maintenance are "unlikely to result in anything more than a temporary impact to the benthic community" is totally unsubstantiated.

The report does not even offer any assessment of just what "temporary" may mean in this specific case but does state that "Equilibrium of benthic communities after similar disturbances is generally achieved within less than one year." This statement is utterly false and unsubstantiated. There is no citation of recovery data for any type of bottom

disturbance that is even remotely similar to what will be done at the proposed Project site, nor is there any serious consideration of the applicable literature in this important aspect of the DEIS.

Tables 2 and 3. No measure of variability among samples is provided, which is necessary to determine the overall heterogeneity of the benthic communities across the site and how different or unique portions of the proposed site may be from one another.

Literature cited in the comments for this Appendix are as follows:

Avery, D.E., J. Green and E.G. Durbin. 1996. The distribution and abundance of pelagic Gammarid amphipods on Georges Bank and Nantucket Shoals. Deep Sea Research II 43(7-8): 1521-1532. [cited *after* the DEIS, Appendix 5.3-A]

Battelle. 1991. Environmental Studies in the Gulf of Thailand, Final Report prepared for Unocal Thailand, Ltd., August 16. 203 p + 6 appendices.

Brave New Biosphere. 2004. Between the grains. Internet URL: http://whyfiles.org/022critters/meiofauna.html.

Cape Wind Associates. 2001. Cape Wind Energy Project, benthic macroinvertebrate community assessment. ESS Report. Project No. E159-002.5. 13 p + app.

Cargnelli, L.M., S.J. Griesbach, D.B. Packer, and E. Weissberger. 1999. Essential fish habitat source document: Atlantic surfclam, *Spisula solidissima*, life history and habitat characterization. NOAA Tech. Memorandum NMFS-NE-142. 132p. Internet URL: http://www.nefsc.noaa.gov/nefsc/publications/tm/tm142/tm142.pdf

Coull, B.C. 2004. Meiobenthology. Internet URL: http://www.biol.sc.edu/~coull_lab/ and clicking on "Meiofauna" takes one to URL: http://www.biol.sc.edu/~coull_lab/phyla.html.

Culter, James. 2004. Personal Communication. Director, Benthic Studies Center, Mote Marine Laboratory, Sarasota, FL.

DeLeuw, Cather, & Company. 1991. Technical Memorandum #8, An inventory of selected aquatic and biological resources in the vicinity of the Quinnipiac River Bridge. Citation incomplete. [cited *after* the DEIS, Appendix 5.3-A]

EVS. 1993. Guidelines for monitoring benthos in freshwater environments. Prepared for Environment Canada. Internet URL: http://www.rem.sfu.ca/FRAP/gmbf.pdf.

Howes, B.L., D.R. Schlezinger, J.A. Blake, and D.C. Rhoads. 1997. Infaunal "recovery" as a control of sediment organic matter remineralization and the fate of regenerated nutrients in Boston Harbor: 14th Biennial Estuarine Research Fed. (ERF) Innatl. Conf. – The State of the Estuaries. Oct. 12-16, Providence, RI. Abstracts, p. 84. [cited *after* the DEIS, Appendix 5.3-A]

Hynes, H.B.N. 1970. The ecology of running waters. U Toronto Press. 555 p. [cited *after* the DEIS, Appendix 5.3-A]

McNulty, J.K., R.C. Work, and H.B. Moore. 1962. Some relationships between the infauna of the level bottom and the sediment in South Florida. Bull. Marine Sci. Gulf & Carib. 12(1): 322-332.

Meiofauna Marina. 2004. Organisms. Internet URL: http://www.meiofauna-marina.com/contents/html/frameset.html.

Morro Group. 2000. Final Environmental Impact Report, MFS Globenet Corp. / Worldcom Network Services Fiber Optic Cable Project, SCH 98091053. Submitted to County of San Luis Obispo, Dept. of Planning and Building.

Rhoads, D.C., P.L. McCall, and J.Y. Yingst. 1978. The ecology of seafloor disturbance. Amer. Sci. 66: 577-586. [cited *after* the DESI, Appendix 5.3-A]

Rosenberg, D.M. and V.H. Resh (eds). 1993. Freshwater biomonitoring and benthic macroinvertebrates. Chapman and Hall, New York, NY. 488 p. [cited *after* the DEIS, Appendix 5.3-A]

Sanders, H.L. 1956. Oceanography of Long Island Sound, 1952-1954. X. The biology of marine bottom communities. Bull. Bingham Oceanographic Collection, Peabody Museum of Natural History, Yale Univ. Vol. 15: 345-414.

Sanders, H.L. 1958. Benthic studies in Buzzards Bay. I. Animal-sediment relationships. Limnol. & Oceanogr. 3(3): 245-258.

Sanders, H.L. 1960. Benthic studies in Buzzards Bay III. The structure of the soft-bottom community. Limnol. & Oceanogr. 5(2): 138-153.

Swartz, R.C. 1978. Techniques for sampling and analyzing the marine macrobenthos. EPA-600/3-78-030. USEPA, Corvallis, OR. 27 p. [cited *after* USEPA, 1987]

USEPA. 1987. Recommended protocols for sampling and analyzing subtidal benthic Macroinvertebrate assemblages in Puget Sound. Prepared by Puget Sound Water Quality Authority. 34 p. Internet URL: http://www.psat.wa.gov/Publications/protocols/protocol_pdfs/benthos.pdf.

21. Appendix 5.3-B: Benthic Macroinvertebrate Community Assessment 2002

After review of Appendices 5.3-A & B, it is suggested that these benthos surveys are of little value for evaluating impacts on benthos of the proposed project development. While many general and specific comments are made throughout the comment submissions, the over-riding recommendation is that the benthos surveys be re-designed and repeated ad discussed in a supplemental EIS made available for public comment. The methods used in these 2001 and 2002 surveys are non-quantitative, yielding only qualitative results at best. Benthos surveys should be redesigned and redone so that decision- and policy-makers may deliberate over adequate and accurate information, as opposed to generalizations that are not effectively supported by the field surveys and analyses.

In addition to the general comments provided previously on benthic impacts and studies, the following specific comments are offered on this Appendix.

Page 1, 2nd par., lines 1-4. "Each of the three study areas was evaluated with consideration for specific habitat variables such as water depth, sand wave presence…and sediment

type...which are generally accepted as the primary factors influencing benthic community abundance and diversity in Nantucket Sound (Theroux and Wigley 1998, Zajac 1998)."

This use of the studies by Theroux and Wigley (1998) and Zajac (1998) to support the statement that water depth, sand wave presence and sediment types are "generally accepted as the primary factors influencing benthic community abundance and diversity in Nantucket Sound" is misleading and incorrect.

Theroux and Wigley (1998) studied a huge area extending from Nova Scotia to New Jersey, and only 7 of their 1,076 samples were actually taken in Nantucket Sound. Furthermore, they did not differentiate the samples from Nantucket Sound and compare them to the other sites directly. They were examining the area on a much different scale than the current work. As such, their conclusions apply to a much broader area and not directly to Nantucket Sound itself.

Zajac (1998) reviewed work on benthic communities in Long Island Sound, which is very different from Nantucket Sound. There are no direct references to Nantucket Sound at all in his review, and citing his work in this manner is over-reaching.

Page 1, 3rd par., lines 1-5. "Based on the 2001 field surveys, data indicated that Horseshoe Shoal is characterized by water depths of 8-60 feet, medium and fine sand, and sand wave coverage over approximately 50% of its area. The Monomoy/Handkerchief Shoal area...is characterized by depths of 19-43 feet, fine sand, and minimal sand waves. The Tuckernuck Shoal area, is characterized by depths of 4-66 feet, medium sand to fine sand and silt, and is expected to have sand waves over approximately 50% of its area."

To enable independent replication of statistical analyses, which in some cases are unclear, this report should include a table summarizing sampling locations with at least the following column headings: Sample Designation Code, Depth, Sediment Type, and Sand Wave Presence/Absence. The existing presentation is not clear.

The above quote states that the sediment descriptions were based on the 2001 survey and that Monomoy Shoal is characterized by fine sand. In fact, based on the 2001 survey, ESS originally predicted a predominance of medium sands on Monomoy Shoal, but found during the 2002 survey that "grain sizes were finer than predicted." (Page 4, 4th par., lines 1-2). They also found that some samples from Tuckernuck Shoal unexpectedly contained coarse sands.

In the statistical analyses summarized in Table 6 of Appendix 5.3-B and Table 6 of ESS (2002), the number of stations characterized as fine sands for statistical analysis is 25, but predictions as presented on Page 4 and in ESS (2002) were that only 11 stations were expected to consist of fine sands (5 at Horseshoe Shoal, 3 at Monomoy Shoal, and 3 at Tuckernuck Shoal). Conversely, it was predicted that 24 stations would consist of medium

sands, but the data used for statistical analysis indicates that only 8 actually consisted of medium sands.

A concise summary table would help remedy this confusion.

It is also interesting that, the above quoted passage (of page 1, 3rd par., lines 1-5) indicates that sediment types were "Based on the 2001 field surveys….," but page 4 (1st par., line 1) and ESS (2002) indicate that the predictions of sediment types were based on USGS maps rather than on the earlier survey. These predictions were apparently significantly inaccurate, based on the discrepancies between predictions and actual findings as indicated by bottom type data used for the statistical analyses, which calls into question the applicability of earlier bottom surveys for predicting Project impacts on benthos, and emphasizes the need for good surficial sediment data collected concurrently with benthos samples.

Page 1, 5th par., lines 2-3. "...the collection methods and data analysis employed have remained essentially unchanged from the 2001 study (ESS 2001)."

This is truly unfortunate, as these methods are atypical and inadequate for characterizing benthic communities in the Project area, and most importantly for predicting impacts and recovery potential. The methods are non-quantitative, yielding only qualitative results at best. Benthos surveys should be redesigned and redone so that decision- and policy-makers may deliberate over adequate and accurate information, as opposed to generalizations that are not effectively supported by the field surveys and analyses.

Page 1, 5th par., lines 3-7. "One significant change in methodology included an additional analysis of invertebrates from sediment depths > 5cm. This change was implemented…to ensure that all organisms present were accounted for, including large shellfish and polychaete worms that might be capable of surviving in sediment depths of more than 5 cm."

This statement implies a level of sampling precision that is false. Referring to sediment depths of 5 cm implies that someone or something accurately measured the 5 cm somewhere, which did not happen. The reality is portrayed in the methods description of Appendix 5.3-A (page 2, 2nd par., lines 1-2) which states "[i]n all instances when less than the full grab was placed into the sample jars, a gloved hand was used to remove <u>at least</u> the top 1.5-2 inches of sediment from the grab" (emphasis added).

One inch = 2.54 cm, so 5 cm = just less than 2 inches, which they imply composed the sample. However, they apparently were not consistent, sometimes collecting 1.5 inches, sometimes, 2 inches, and other times more, because the method description states "at least 1.5-2 inches."

This practice was apparently continued in the 2002 survey, because the previous sentence indicates that "...collection methods...remained essentially the same." Therefore, each sample appears to have been collected differently, which violates fundamental principles of statistically valid sampling.

It also appears that the entire upper level of the sample was not scrupulously collected, as later in this Appendix (page 6, 5th par., lines 3-4) reference is made to "residual sediment from the upper 5 cm of the dredge" remaining in the dredge after taking the sample. This indicates that not only was a rough estimate of the depth of sediment used to define the sample, but only part of that upper layer was taken, rather than all of it. These methods are careless and inappropriate for enabling reliable statistical analyses of benthos communities.

Page 1, 5th par., line 3 to 6th par., line 7. "One significant change in methodology included an additional analysis of invertebrates from sediment depth 5 cm. This change was implemented...to ensure that all organisms present were accounted for...[therefore] the portion of each retrieved sample representing sediment depths >5 cm were (*sic*) sieved through a coarse mesh (0.65 cm) box sieve in order to collect and record any large organisms...present deeper in the sediment."

The use of a 0.65 cm box sieve likely resulted in the loss of a significant number of organisms that may be living below 5 cm. This sieve size is equivalent to 6.5 mm, which is much larger than the 1 or 2 mm sieves generally used in surveys to collect the largest sized infauna.

The decision to use a 0.65 cm sieve is presumably based upon an assumption that only large organisms are capable of living more than 5 cm deep in the sediments. The basis for this assumption must be provided, because many small animals such as burrowing worms and crabs, tube worms, and other animals can and often do live deeper. If this assumption was tested before implementing the decision to use the large sieve, then methods and results of the test should be provided. Otherwise, one must assume that some components of the benthic community were probably un- or under-sampled.

Page 2, 5th par., lines 5-6. "The 2002 benthic sample locations were then selected to test the variability of the predicted geologic substrate conditions in the three alternative sites with respect to benthic organism diversity and/or abundance."

But the survey still did not include any replicate sampling within sampling locations in order to be able to determine variability among sampling locations on a firm statistical basis by gathering information on local, or within-location variation.

Page 3, 3rd par., lines 1-3. "...shallow sediment types in the Horseshoe Shoal area were mapped based upon visual descriptions of predominant grain size in shallow samples (uppermost sample or 0-2 feet) and gradation analysis, where available, in the 46

vibracores and borings collected during the 2001 CWA field program. The distribution of sediment types based upon these data…."

Please see extensive comments in the discussion titled "Sediment Grain-Size and Habitat Characterization" above. Note that these sediment samples were collected in 2001, not in 2002 when the benthos samples were collected. See also USEPA Tier 3 recommendations in the "Level of Effort" discussion, above.

Page 4, 2nd par., lines 1-3. "To test the hypotheses of whether benthic diversity or abundance depended or varied with respect to sediment type, the locations of benthic grab samples collected in 2002 were targeted for sampling, in order to reflect predicted sediment types...."

Although great effort was seemingly taken to determine the locations of different sediment types and presence/absence of sand wave fields, this information was not incorporated into the statistical analyses because the sites were lumped together in the analyses that considered these environmental differences. Nor were sediments collected at the time of sampling to confirm particle grain size expectations.

Page 4, 6th par., line 1. "One surface benthic grab sample was obtained from 33 of the 35 pre-determined locations…."

Again, no replicate samples were taken.

Page 4, 6th par., lines 1-3: "Samples were not obtained from two locations, A1-3 and A3-5, possibly due to the presence of hard bottom or larger sized substrates in these locations."

This is a significant statement. No replicates were used for any stations, so therefore reliance was placed on single samples to characterize significantly large areas of bottom. In these two cases, sampling was unsuccessful, potentially indicating a significantly different substrate, or benthic habitat type, yet no further effort apparently was made to characterize these areas. What was the bottom type? How many and what kinds of attempts were made to sample it? Over how extensive an area around the sampling point did this bottom type occur? Were other attempts to sample the nearby bottom made to work around the issue? How can these two areas be characterized? Are there potentially other areas where hard bottom prevails? What effect does this have on projections of impact?

Significant effort was made to sample predicted sediment types, but when anomalous bottom was found, it was ignored. How may this be reconciled?

Page 4, 6th par., lines 3-6. "Sample locations were selected to be representative of the range of depths, sediment types and sand wave conditions predicted within each of the three alternative sites being evaluated. The sampling program was designed to allow

statistical comparisons to be made among these parameters and benthic organism diversity."

1. Please see the immediately preceding comment. Why were potential hard bottom substrate areas ignored?

2. Benthic organism diversity cannot be validly evaluated using non-quantitative samples as were collected in this effort. The analyses conducted in this program are therefore flawed and undependable. They should not be used to evaluate the Project's potential impacts.

Page 4, 6th par., lines 6-8. "Based on communication with USEPA, it was agreed that a minimum of six samples would be required within each of the three alternate sites to effectively assess any potential differences in the benthic community among alternate sites. Additionally, it was also agreed that in order to assess the effects of key habitat variables (e.g. depth, substrate type and sand wave presence) on the benthic community, it would be necessary to evaluate a minimum of six samples from each key variable."

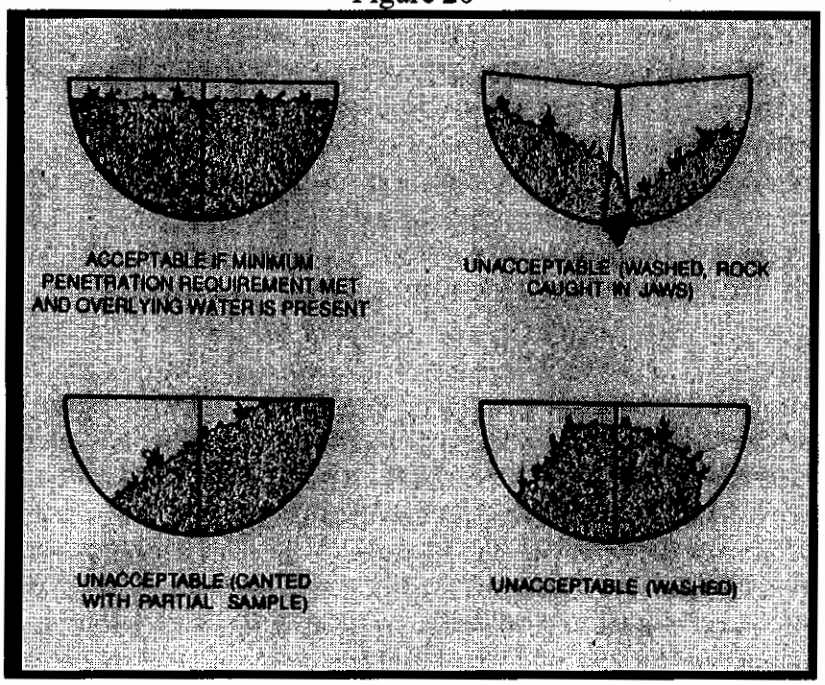
1. On what statistical basis or rationale was a sample size of aiz sediment grabs determined to be the minimum needed to effectively assess potential differences among sites and environmental conditions?

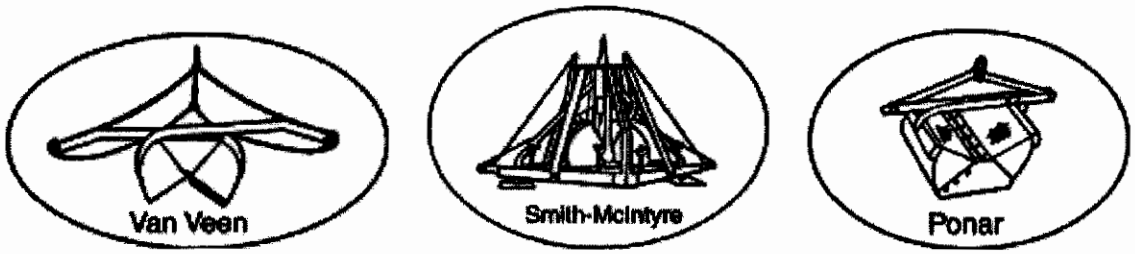
2. Based on communication with whom at USEPA? Was this an official negotiation or position taken by USEPA, or informal discussion with an EPA statistician or technician? Is this agreement documented?

Page 4, 7th par., lines 3-6. "The benthic samples were collected in a manner consistent with the collected made (*sic*) during the summer 2001 survey (ESS 2001). One minor difference was that a Ponar grab sampler was used throughout the 2002 study rather than the Van Veen grab sampler that was employed during 2001, however, all data are reported in numbers of organisms per square meter of bottom area sampled."

If the Ponar grab used here did not have a frame, then it may also have the same kinds of sampling issues that unframed Van Veen grabs are susceptible to, i.e. they sometimes have problems taking samples that are plane to the seafloor, and dig into the sediment at an angle. Sampling problems are sufficiently frequent that USEPA (1987) cautions against taking unacceptable samples, as depicted in their figure, below. An example of a framed benthic sampler is the Smith-McIntyre Grab (Smith & McIntyre, 1954), also illustrated below.

Figure 20





The fact that all numbers were extrapolated to numbers/m^2 does not makes a difference really, as any inconsistencies in sampling between the Ponar and Van Veen samplers would be propagated through any extrapolations made. For example, if one of the two tended to dig shallower than the other, any quantitative differences would not be cured by extrapolations to m^2 densities.

Page 5, 1st par., lines 1-2. "...area of bottom collected from each dredge was relatively similar (...81 in^2 for the Ponar sampler)."

This dimension requires a conversion factor of 19.1 to extrapolate specimen counts to densities/m^2, which is accurately reflected in density figures presented in Table 1. This emphasizes questions raised concerning the questionable conversion factors used for the 2001 survey (see comments on Appendix 5.3-A, page 1, 4th par., line 1).

Page 5, 2nd par., line 1. "Field personnel generated descriptions of each sample's sediment characteristics...."

Where are these descriptions? Why are they not presented? What kinds of characteristics?

Page 5, 2nd par., line 2. "...and made notes on the sediment volume removed from the dredge."

What kinds of notes, containing what kinds of information? Why is this information not presented?

Page 5, 2nd par., lines 2-4. "Subsequent to this, the benthic grab sample (the top 5 cm of material on the dredge) was processed and preserved as during the 2001 study (ESS 2001)."

Does this mean that the maximum volume of sample retained for laboratory analysis was again one quart, as in the 2001 survey, with the remainder being discarded after passing through the box sieve?

This statement implies a level of sampling precision that is false. Referring to sediment depths of 5 cm implies that someone or something accurately measured the 5 cm somewhere, which did not happen. The reality is portrayed in the methods description of Appendix 5.3-A (page 2, par. 2, lines 1-2) which states "In all instances when less than the full grab was placed into the sample jars, a gloved hand was used to remove <u>at least</u> the top 1.5-2 inches of sediment from the grab."(emphasis added)

One inch = 2.54 cm, so 5 cm = just less than 2 inches, which they imply composed the sample. However, they apparently were not consistent, sometimes collecting 1.5 inches, sometimes, 2 inches, and other times more, because the method description states "at lest 1.5-2 inches."

Use of a "gloved hand" conveys an image of blunt fingertips pushing their way through the sediment, moving them in all directions while forcing the "gloved hand" under a slab of sediment, then lifting the hand to extract the slab from the grab and convey it to a container of some sort. It is not possible to reconcile this image with the need for repeatable and consistent sampling protocols.

Use of this practice in the 2002 survey is problematic, because each sample consequently appears to have been collected differently, violating fundamental principles of statistically valid sampling.

It also appears that the entire upper level of the sample was not scrupulously collected, as later in this Appendix (page 6, par. 5, lines 3-4) reference is made to "residual sediment from the upper 5 cm of the dredge" remaining in the dredge after taking the sample. This

indicates that not only was a rough estimate of the depth of sediment used to define the sample, but only part of that upper layer was taken, rather than all of it. These methods lack the discipline for enabling reliable analyses of benthos communities.

Page 5, 3rd par., lines 1-8. "Following removal of the benthic grab sample (the top 5 cm of material) from the dredge, the remaining sediment was sieved through a coarse mesh box sieve with a mesh size of 0.65 cm. The debris and organisms retained on the box sieve represented the benthic community living in sediments at depths greater than 5 cm. Photographs were taken of the material retained on the sieve for each sample, although several samples did not have any debris or organisms retained.... A representative sample of each benthic organism retained on the box sieve was preserved in a 10% formalin solution and stored in a clearly labeled plastic bag."

1. The "debris and organisms retained on the box sieve most certainly did <u>not</u> represent "the benthic community living in sediments at depths greater than 5 cm." At best, they provide a non-quantitative subsample of large infauna captured by the grab. The box sieve mesh was very coarse, and the potential that smaller organisms passed through and were lost to the sample is great. Furthermore, these samples were apparently frequently contaminated, as described on Page 6 (5th par., lines 1-4): "The benthic organisms recorded from sediment depths greater than 5 cm are presented in Table 5. It is recognized that some of these organisms are not typical of deep sediments and are likely to have been incorporated with deep sediment organisms as a result of <u>residual sediment from the upper 5 cm</u> of the dredge being passed through the sieve" (emphasis added). As a result, these samples are hardly representative of anything other than a species checklist.

2. Using photographs for later identification and quantification can lead to errors unless their quality is high. Where are these photographs? Can they not be provided as an attachment to the DEIS? Can information concerning their resolution be provided?

3. What does it mean when it states "A representative sample of each benthic organism retained on the box sieve was preserved...?" Does it mean that one of each species encountered throughout the survey was kept? Does it mean that one of each species in <u>each</u> sieved sample was kept? The data in Table 5 indicate many single individuals of species collected in the box sieves. Are these the specimens collected as "representative" of each benthic organism retained on the box sieve?

Page 5, 4th par., lines 1-2. "The methods for sorting, identifying and preserving benthic samples were consistent with those performed and reported in the 2001 study (ESS 2001)."

The sorting method employed is likely to lead to errors and does not allow for accurate extrapolation to density per m^2 or for the statistical procedures that were employed. The data presented are in effect qualitative in nature and should be considered as such.

The sorting technique utilized to analyze benthos samples in the laboratory is not at all typical of standard accepted practice or appropriate for yielding dependably quantitative results. Even if the field samples had been collected properly, the laboratory methods would have created reservations about the quantitative validity of resulting data.

Per Appendix 5.3-A (page 2, 3rd par., lines 7-15), "The rinsed material retained in the sieve was then washed into a grid-lined tray and the sieve was checked carefully to ensure no organisms remained; any found were picked off carefully with tweezers and added to the tray. The sample material was then spread evenly throughout the tray and sorted through with fine tweezers.... Each section of the grid marked on the tray was sorted through until 100 organisms had been picked out, or until the entire sample had been sorted if less than 100 organisms were present. The organisms found were removed with the tweezers [and subsequently taxonomically identified]."

Although the sample material may have been spread evenly, the organisms in the sample may not have been. Typically, the whole sample would be counted. The reasons for using the method described in this Appendix are obscure, but in cases where this method is used, such as in some plankton studies, random number coordinates are usually used to generate the order of the specific grids from which organisms are picked. This is regarded as necessary to avoid non-randomness introduced by technician bias and habit, but no mention of random number generation is mentioned in this Appendix.

Another problem with identifying only the first 100 organisms in each sample is that the more rare species are liable to be missed entirely. Any claims that the samples were reexamined to identify the missed rare species to avoid this problem immediately negate claims of randomness in the counts. One cannot have it both ways. Either you count the first 100 organisms you encounter, thereby risking missing the less common (but not less important to the ecosystem) species, or you selectively search for species you have not encountered, thereby destroying randomness. This is one of the reasons why typically accepted practice requires analysis of the entire sample.

Page 5, 4th par., lines 5-6. "All quality assurance and quality control (QA/QC) for the sorting and identification phases of lab analysis were completed as reported in the 2001 study (ESS 2001)."

These QA/QC protocols are unclear and should be clarified. Appendix 5.3-A discusses the protocols states (page 2, 6th par., line 2 continuing onto page 3, 1st par., lines 1-3): "The quality check [on laboratory analyses] included both the sorting and identification phases of the analysis to ensure that no organisms or groups of organisms were being inadvertently excluded in the sorting process and to ensure that all organisms were being properly identified. It is not clear, however, how this was done exactly. Were all organisms from the entire sample sorted, identified and counted and then compared to the subsample to make sure the "no organisms or groups of organisms were...excluded?" Or

was only the subsample reanalyzed? This is unclear and the procedure therefore cannot be assessed.

Again in Appendix 5.3-A (page 3, par. 2, line 1)it is stated "In the sorting phase, the QA/QC reviewer checked the sample material for any remaining organisms." It is not clear which sample material was checked -- the entire sample or the subset of 100 organisms. On page 3, par. 2, lines 1-6 is stated "If the QA/QC reviewer found that more than 10% of the total number of organisms found by the sorter still remained, then four (4) additional samples were to undergo quality assurance checks. If the percent error in these additional samples was also found to be more than 10% then all samples sorted by the original processor were to be reprocessed."

This description is not clear. To what does the 10% refer? Does this statement mean that if more than ten organisms remained in the total sample after the sorter picked out 100, this defined a QC deficiency? Or does this mean that if the sorter missed more than ten of the 100 organisms he/she was to identify and count there was a deficiency? Or does it mean something else entirely?

Without clarification, these QA/QC protocols cannot be evaluated.

Page 5, 5th par., lines 1-4. "In addition to sorting and identifying organisms associated with each benthic sample, laboratory analysis also included the inspection of photographs of the debris retained on each sample's respective box sieve.... Organisms clearly visible on the sieve were identified to the lowest taxonomic level possible. Those organisms too small to identify were recorded as descriptively as possible."

Because no details are provided on the resolution of the box sieve photographs it is not possible to assess the potential accuracy of the identifications made, or of the actual data collected on abundances of fauna. This technique is not at all quantitative and should not be used to make any assessments of the benthic community components that reside deeper in the sediments at the alternative sites. For example, for many of the samples in Table 5 it is noted that sand tubes were found but in all cases they were believed to be empty. On what basis? They could have just as likely had worms in them. Another entry states "Not clear if all/any are occupied shells." These types of data have a significant potential for creating error which totally compromises their use in the DEIS.

Page 5, 5th par., line 4. "Those organisms too small to identify were recorded as descriptively as possible."

No such descriptions of unidentified organisms seem to be presented in Table 5, which provides data resulting from the box sieves. Were there many of these? Where were the observations recorded?

Page 5, 5th par., lines 5-6. "Where a large amount of debris covered the sieve, an estimate of the percentage of sieve covered was recorded."

The value of this observation for characterizing the benthic community is obscure, but it does clearly indicate another weakness of this method, in that samples occurred in which debris likely concealed animals from being discerned and identified in the photographs.

Pages 5-6, Section 3.0. This entire discussion of results is virtually without value, because of the unconventional and non-quantitative methods practiced in both the 2001 and 2002 benthos surveys. Please refer to the discussion of "Study Design Issues," above.

Page 5, 6th par., lines 4-7. "On average, Tuckernuck Shoal had the lowest macroinvertebrate abundance (organisms/m^2) and diversity (as measure [*sic*] by the number of taxa per sample). Monomoy Shoal had the highest average macroinvertebrate diversity but a lower abundance than Horseshoe Shoal."

These implications should not be made by comparing averages unless the differences are statistically significant. The statistical analyses presented in Table 6 – to the extent they are interpretable – suggest that there were no statistically detectable differences in abundance among the sites, and that richness was only statistically different between the Tuckernuck and Monomoy sites. It is therefore inappropriate to imply differences between the sites.

These conclusions and tests also assume that the underlying sample data are dependably quantitative, which they are not. These conclusions are equivocal because they are based on faulty sampling procedures that disqualify resulting data from valid statistical analysis.

Page 6, 1st and 3rd par. "Over the three alternative areas combined, 3 of the 71 total taxa found, accounted for 80% of the organisms collected and 30 taxa (or less than half) accounted for greater than 98% of the organisms collected (Table 3). Overall, the most dominant taxon was found to be Nematoda, followed by Ampeliscidae (four-eyed amphipod).... The six dominant taxa for Monomoy, Tuckernuck and Horseshoe Shoal in spring 2002 were very similar, with Nematoda being the most dominant taxon at each location (Table 4). However, nematodes formed a much greater percentage of the community in the Tuckernuck Shoal area with 80.9% compared to 50.1% and 45.3% at the other two. A high percent contribution by a single taxon generally indicates community imbalance and possible a stressed environment (Gibson et. al [*sic*] 2000)."

The three most common taxa include Nematoda which is skewing the data and trends analyses. Using the numerical dominance by nematodes in the samples as the basis for the statement that because a single taxon dominates the area it is a stressed environment is utter nonsense. Even Appendix 5.3-A recognized that "Nematoda are generally known to be the most numerous marine invertebrates and are adapted to live literally everywhere (Gosner, 1978)" (page 7, 3rd par., lines 3-4).

Please also see the discussion of "Nematodes in the Analyses" above.

Page 6, 5th par., lines 4-6. "...very few organisms were observed at any site in sediment depths greater than 5 cm. This validates the data collected during the 2001 study that analyzed only the top 5 cm of sediment...."

It most certainly does not validate the 2001 survey finding. This is absurd.

First, the measurement of "5 cm," as discussed elsewhere in these comments is grossly inaccurate because only a rough estimate was made using a "gloved hand." Only a portion of the top layer from about 1.5 – 2+ inches deep was collected. Also, some variable amount was left behind, as indicated by this Appendix itself in the sentence immediately preceding the above quote.

The quote notes that very few organisms were observed in depths greater than 5 cm, but one wonders how many of the organisms occurring in the top "5 cm" were actually observed in the field also. Most of these animals are very small, which is why analyses of such samples are conducted in a laboratory and not in the field.

The box sieve had a mesh size of 0.65 cm, which is huge for a benthic infaunal survey. This mesh size does not capture smaller organisms, such as amphipods, polychaetes, many mollusks, etc. A sample screened on such a mesh in no way represents the benthic infaunal community.

The methods used relied on analysis of field photographs taken of the box sieve and its contents, which is an inherently weak method. Polychaete and amphipod tubes in photographs were assumed to be empty, but the basis for such an assumption is not provided.

Based upon the methods followed, it is more appropriate to say that nothing was learned by this effort. The methods were inappropriate and apparently inconsistently applied. These data do not represent the community they purport to characterize.

Page 6, 7th par., lines 1-2. "The α value for this analysis was set at 0.10 for all calculations . . ."

Why was an alpha level of 0.10 selected instead of the more commonly used 0.05?

Page 6, 5th par., lines 7-9. "...the majority of benthic organisms living at Horseshoe, Monomoy and Tuckernuck shoals (*sic*), including the larger shellfish and polychaetes, live in the top 5 cm of sediment."

This may be true, or it may not be, but the question is not answered by samples taken with the methods described in the DEIS.

Page 7, 1st par., lines 1-2. "Analysis of Variance (ANOVA) results for each hypothesis tested are presented in Appendix 1."

There is no Appendix 1 included in the report. It is therefore not possible to fully assess the validity of statistical analyses that were performed.

Page 7, 2nd par. This paragraph provides a 5-point enumerated summary of significant differences found in the ANOVA analyses.

These statistical results are not clearly presented. Table 6 presents p-values of tests among specific sites and environmental conditions. Are these the results of *post hoc* tests? If so, then the original ANOVA results must be presented to confirm that the overall test was significant.

Table 6 notes that the data were transformed. Results cannot be verified without knowing what kind of transformation was used. What transformation was used?

No measurements of variation are given in any of the results. They must be provided to enable review of results.

Given that there were data for three sites and several environmental factors, two-way analysis of variance would have likely been a better and stronger testing approach.

Given that all these analyses include the nematodes, they likely do not give a fair representation of potential differences or similarities among the sites. Any assessments in the DEIS based on these analyses are equivocal.

There are also no analyses of "key" taxa differences. For example, were differences in patterns of polychaetes significant? Of mollusks? Of amphipods? Such analyses frequently clarify patterns by removing other species that may mask trends from the analysis. It appears, however, that nothing like this was attempted.

Of course, all of these comments assume that these analyses are based upon properly collected and valid samples, but they were not. The samples were non-quantitative to begin with, so quantitative analyses using data from these non-quantitative are inherently invalid and should not be used as a basis for evaluating impacts of the proposed Project.

Page 7, 3rd par., lines 1-5. "Overall species composition documented as part of this study and the 2001 study was consistent with data reported in earlier studies of Nantucket Sound, Georges Bank, and the Southern New England Shelf (Sanders 1956, Wigley 1968, Pratt 1973, Theroux and Wigley 1998). These previous studies found the benthic community of

Nantucket Sound to have a lower than average invertebrate diversity as compared to the rest of the Southern New England Shelf."

It is not stated here how data specifically for Nantucket sound were extracted from the references given, and one case (Sanders 1956) is particularly puzzling because Sanders did this work in Long Island Sound and does not even mention Nantucket Sound, Georges Bank or the Southern New England Shelf. It would seem that some uses of literature citations are a bit over-reaching. More care should be expended to provide sufficient detail to clearly convey how such evaluations of "consistency" among studies were made, and how significant the comparisons are.

The following statement that the studies found Nantucket sound to have lower than average invertebrate diversity is totally unsubstantiated because no information is provided as to how data specifically for Nantucket Sound was extracted from the studies that actually sampled broader areas but with only limited sampling in Nantucket Sound. In the Sanders (1956) case, it is utterly unjustified to used Sanders' credentials to substantiate claims concerning Nantucket Sound, because he mentioned nothing in this paper about Nantucket Sound, which differs from the statement quoted above that "These previous studies found the benthic community of Nantucket Sound to have a lower than average invertebrate diversity...." This is not a true statement.

Page 7, 4th and 5th par. This discussion of natural variability in benthic communities and the significance to the communities found in Nantucket Sound is not well-developed in terms of the significance to the proposed construction of WTGs in the site. The sampling conducted must be questioned on several levels as discussed elsewhere in these comments, and therefore relationships among sites and to the environmental factors that were studied are not at all clear. The benthic studies should be re-designed and repeated to provide dependable information upon which to make important public policy and development decisions.

Page 7, 4th par., lines 1-6. "In addition, there is a natural variability in most benthic communities since these communities are constantly subjected to a combination of physical and biological factors which results in a high degree of environmental variability (Sanders 1956, Zajac 1998). It also follows that a high sample-to-sample variability was found in total invertebrate abundance. This supports the conclusion of earlier research that also revealed the benthic community of Nantucket Sound to be highly variable from season to season and location to location (Wigley 1968)."

Because no replicate samples were collected in either of the 2001 or 2002 studies, no estimate of in-station variability is possible. Microhabitats and patchy distributions do exist, which is why replicate samples must be collected to characterize sampling locations. Rather than demonstrating that the benthic community of Nantucket Sound is highly variable, a study using adequate replicate samples might support the contrary view that benthic communities of Nantucket Sound are very consistently variable in distribution,

consistently supporting microhabitats and patchy distributions, and thereby supporting a consistently vigorous and diverse benthic community. We cannot know this for sure from these studies, however, because no replicate sampling was conducted.

Page 8, 2nd par. "With regard to the selection of a preferred site for the siting of the wind Farm, the Monomoy Shoal location appears to be less desirable, at least from a benthic community standpoint, since its benthic community was the most diverse of the three alternate site evaluated. Tuckernuck Shoal and Horseshoe Shoal were similar, statistically, with respect to both macroinvertebrate diversity and abundance. This may be a result of the similarity of habitat in each of thee areas. Given this similarity, either site would be equally suitable as a location for the Wind Farm."

Any conclusions with respect to which of the three sites is best suited for a wind farm are highly equivocal given the shortcomings of these 2001 and 2002 studies, both with respect to data collection and to statistical analysis.

Table 6. "Statistical correlations for macroinvertebrate data collected from Horseshoe Shoal, Monomoy Shoal and Tuckernuck Shoal, Spring 2002."

The ANOVA tests were run using transformed data. The authors should provide the type of transformation so that analyses may be verified.

Analyses were made using data from three sites and several environmental factors. Rather than one-way Analysis of Variance (ANOVA) tests, two-way ANOVA would have been more appropriate to decrease the confounding influence of variables not being tested in the one-way tests.

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23. Appendix 5.3-C: Lewis Bay Benthos & Shellfish Survey 2003

The data and analyses presented in Appendix 5.3-C provide a poor quantitative representation of the benthic communities in the area sampled, and provide a very poor basis for understanding underlying pre-project baseline issues. Specifically, very few stations were sampled there was no replication of samples at any station, no sediment data

were collected, no water quality data were collected, and poor laboratory procedures were apparently used. Each of these subjects is discussed individually below.

Only four stations were sampled. Two were sampled with three methods each; one was sampled with only two methods; and the fourth was sampled using only a single method, because it was considered an "extra" station. Statistical power increases with the number of locations sampled, and the converse is also true: statistical power decreases as the number of sampled locations decreases. In this survey, the number and locations of sampling locations were inadequate for characterizing the Lewis Bay communities, with only four points directly on the cable route being sampled, and these by variable suites of methods. No transects were employed to assess whether the benthic community was consistent with distance from the cable route.

Appendix 5.3-C is also deficient in that there was no replication of samples at any station. It is therefore not possible to sort out the degree of station location variation relative to the variation found among the several sampling stations or across the potentially impacted area as a whole. Numerous references may be cited. This Appendix is further flawed in that no sediment data were collected.

Sanders (1956), which is frequently cited in the DEIS, provides a rather extensive discussion of benthic infaunal feeding types and their relationships and community variations relative to amounts of silts and clays in sands occurring in Long Island Sound. Sharp changes in benthic community types based upon sediment characteristics are clearly reflected in his findings (Sanders Table IX; reproduced as Table 3 of this document). Such data are useful for forecasting the types of benthos that will become established in disturbed areas.

Similar sharp breaks are illustrated by McNulty *et al.* (1962), previously presented, again indicating the importance of the sediment-benthos relationship in defining benthic community types.

The survey described in Appendix 5.3-C, however, neither collected nor analyzed any sediment data relative to the benthic communities it purports to describe.

Appendix 5.3-C makes several inferences that the Lewis Bay environment is degraded, but provides no factual support. In the final text paragraph of the Appendix, the benthos data are related to "likely" nutrient inputs to Lewis Bay, but it is not possible to assess this without water quality data. Similarly, differences among stations may be attributable to water quality parameters such as turbidity, given the depth differences in this shallow survey area.

The survey described in Appendix 5.3-C neither collected nor analyzed any water quality data relative to the benthic communities it purports to describe.

Poor laboratory procedures were apparently used in the studies presented in this Appendix. On page 3, 1st par., lines 1-3, this Appendix states that the "methods used for sorting, identifying and preserving benthic samples collected with the Ekman dredge were consistent with those performed and reported for the 2001 and 2002 CWA benthic Macroinvertebrate community assessments...." These methods are described in Appendices 5.3-A and –B. Because these methods are non-standard and can lead to errors in quantification of the fauna, the resulting data are equivocal. Please see the comments on these Appendices.

Results of this survey are presented with comments having a tendency to depict Lewis Bay as degraded or disturbed in some fashion, but without much foundation. For example, it notes that *Streblospio benedicti* is…perfectly adapted for colonizing stressed or disturbed habitats and is typically associated with these environments" (page 4, 4th par., lines 5-6). This is somewhat too broad of a generalization, as *Streblospio* is often found in relatively high abundances in areas that are not disturbed, as they are common in shallow water environments. The same is true of the capitellid worms that were found, but were described in similar terms: "Capitellid thread worms were also present in large numbers…. They are known to eat their way through the substratum when they feed and are tolerant of poor conditions..." (page 4, 4th par., lines 11-14). The same comment applies to oligochaete worms, which are also described in similar terms: "Many of these worms are highly tolerant of degraded habitats including polluted areas..." (page 4, 6th par., line 4). These worms also occur widely in non-polluted environments.

Once again, on page 4, 7th par., lines 5-7, is stated: "Northern quahogs are often found in very polluted habitats; adults can tolerate wide ranges in water quality and can survive in changing concentrations of ammonia, nitrites, nitrates and phosphates."

Clearly, the authors are implying that the Lewis Bay environment is degraded, but they collected no data to support such a view. No water quality samples were collected.

On page 5, 3rd par., lines 4-7 Appendix 5.3-C states: "One reason for the absence of amphipods in Lewis Bay <u>could be</u> their sensitivity to environmental disturbance or stresses…many of the dominant taxa found in Lewis Bay during this study are either pollution tolerant, early colonizers following environmental disturbance, or opportunistic in nature" (emphasis added).

The absence of amphipods in the Lewis Bay survey could also be the result of when the sampling occurred, i.e., in mid-August, and not necessarily due to any kind of environmental disturbances or stresses. There is a significant portion of the fauna that is not characterized as potentially opportunistic. The statement that "The findings of the studies suggest that the waters of Lewis Bay are likely to be of poorer quality than the waters of Nantucket Sound" (page 5, 4th par., lines 1-2) is not substantiated by any of the data collected or analyses presented. They are different systems and this kind of comparison does not provide any substantive insight as to the potential impacts of the

proposed activities, or into the potential for recovery following those development activities.

The Appendix then follows (page 5, 4th par., lines 2-4) with: "A case study conducted in the Yarmouth area in 2000 noted that the apparent degradation of the Lewis Bay ecosystem was most likely attributable to effluent from septic systems affecting groundwater within the watershed, resulting in nutrient or nitrogen loading in the bay from the watershed (EFC, 2000)." This reference to EFC (2000) should, however, be interpreted cautiously. Although nutrient loading is known to have negative effects on small embayments on Cape Cod when it occurs, there are no data regarding conditions in Lewis Bay. Indeed the cited report states:

> No conclusive data has (*sic*) been adduced to support the assertions of the Conservation Consortium Foundation, the group that has spearheaded this campaign, about the extent and effects of the contamination of the watershed.... It was recommended that...more conclusive research and analysis be undertaken by the CCF, Cape Cod Commission, and/or the EPA. Only detailed verification of the problem, assessment of its impacts and importance, and analysis of its treatment options may move interested parties and decision makers to an effective solution.

A small number of water quality samples might have clarified these questions, but they were not collected, and these statements must therefore remain suppositions unsupported by a factual base.

Table 3 of this Appendix indicates that one of the more abundant organisms found in all Ekman grab samples was the Atlantic surf clam (*Spisula solidissima*) in numbers of 2,424–5,540/m^2, yet no mention of this species is made in the text. This is an oversight, given that *S. solidissima* is an important resource species. This is one of the species with Essential Fish Habitat (EFH) designation. It also apparently supports a significant fishery in Nantucket Sound.

According to Appendix 5.4-A (page 18, 1st par.), the "Fisheries Data Report," "Sea clams appear to be the most common species harvested over the ten-year period in Area 10, Nantucket Sound. Sea clam landings constitute 52% of the shellfish landings from 1990 through 2000." Table 8 of the same Appendix indicates that 13 million pounds of "sea clams" were landed in this ten-year period, which is reinforced by the pie diagram in Table 15 of that Appendix.

It is not clear why this important species, which was so common in the grab samples, was not discussed in this Appendix.

Indeed, there is a question as to whether these clams were correctly identified at all. Because surf clams grow rapidly, reaching a length of approximately 1.75 inches after about a year, the small size that would allow them to be found at such high concentrations

as reported by Appendix 5.3-C would require that these be young of the year juvenile clams. This is a possibility, because surf clams are reported to spawn in the summer and early fall (Cargnelli *et al.*, 1999), and these could therefore have been recently set juveniles. However, indications are that such concentrations of *S. solidissima* are probably unusual, because "High [surf] clam density may negatively affect growth rate and maximum size (Fogarty and Murawsky, 1986; Cerrato and Keith, 1992); density effects on growth have been detected at relatively low density (>50 clams per $352m^2$) Weinberg, 1998b)" (Cargnelli *et al.*, *op cit.*) While these statements refer to growing and adult clams, it is questionable that settling larvae would choose to settle in such hugely greater densities than would be preferred by adult clams. This is not a statement of certainty, but the literature suggests that small surf clams would tend to not occur at such densities as found in this survey. It is suggested that the clam found may actually be another species, perhaps the gem clam, *Gemma gemma*. A simple check of the voucher specimens for this survey by a qualified outside taxonomist would clarify this issue.

Nematodes should be deleted from this survey because they are considered meiofauna (Coull, 2004), which is smaller than the macrofauna that is the objective of the survey, as discussed.

In addition to these general comments, the following specific observations are made on this Appendix.

Page 1, 3rd par., line 1. "Three different sampling techniques were employed at the four sample sites in the nearshore area of Lewis Bay."

No replicate sampling was done at any of the sites. Therefore, local variability was not assessed as a framework for making assessments among sites. Except for very unusual conditions, natural and sampling variability render a single sample inadequate for adequately characterizing the benthic community at a given location.

The report does not provide any information as to what each sampling technique was supposed to achieve.

No sediment samples were collected for correlation with benthos occurrence. No such correlations were done, and it is therefore difficult to assign any cause and effect considerations to variations in benthos occurring in the survey area. Similarly, there seem to be no correlations with water quality parameters, such as nutrients, etc., because no mention is made of collecting or analyzing any water quality samples from the survey area.

It would also have been useful to collect samples along transects at right angles to the proposed cable route to provide some idea of the benthos communities occurring there that may be impacted from resettling of sediments dispersed by jet plowing or by the jet plow pontoons.

Page 1, 4th par., lines 1-3. "The 'clam rake technique' was the only method used to sample at site BGL1b2, as this was deemed an 'extra' site and only sampled in order to characterize the shellfish community at the edge of the shellfish bed seeded by the Town of Yarmouth."

It is difficult to conceive that a study designed to characterize the benthic community and consisting of so few samples could have an "extra" site. Indeed, by extension of the above logic, one could argue that site BGL1c should also have been deemed an "extra" site because it is so near the inner edge of the seeded shellfish bed.

Page 1, 5th par., lines 10-11. "Once back on shore the samples...were then placed directly into a pre-labeled one-quart sample jar (*sic*)."

Can it be assumed that no sample was larger than one quart? The offshore studies apparently had numerous samples larger than one quart, with the overage discarded.

Also, the wording of the above sentence should be changed to read "...were then placed directly into pre-labeled one-quart jars."

Page 2, 2nd par., lines 1-2. "The clam rake used during this study was a standard clam rake with an attached collection basket, much like the one depicted in Figure 3."

Why is Figure 3 "much like" the rake used? Why is there not a photograph of exactly what was used?

Page 2, 4th par., lines 1-2. "A five gallon scoop container was dragged by hand through the top 6 to 8 inches of sediment within the sample site area...."

For what distance was the scoop dragged? Was this distance the same every time? It would seem that if the top 6 inches were scooped the drag distance to fill the scoop would be longer than for an 8-inch depth, and the scoop would therefore sample different surface areas of bottom, rendering the samples quantitatively non-comparable.

What were the objectives of the scoop and box sieve samples? What were the investigators trying to achieve? These samples are not even mentioned in the "Results" or "Discussion" sections of this Appendix, and only presence-absence species data are provided in Table 3. The authors' objectives are obscure.

Page 2, 4th par., lines 2-4. "Once filled, the scoop container was emptied into a large box sieve with a ¼ inch mesh screen (Figure 3) and shaken gently to allow smaller material to pass through the screen while retaining larger material, including many benthic organisms."

The box sieve had a mesh size of ¼ inch = 6.35 mm, which is rather coarse. This certainly resulted in the loss of many infaunal specimens, so capture of the general infaunal community must clearly have not been the objective of this sampling method. What were the investigators' objectives?

"Figure 3" in this quote should read "Figure 4."

Page 3, 1st par., lines 1-3. "The methods used for sorting, identifying and preserving benthic samples collected with the Ekman dredge were consistent with those performed and reported for the 2001 and 2002 CWA benthic macroinvertebrate community assessments (ESS 2001, 2002)."

The methods used for laboratory analysis in this study were the same as the deepwater surveys. As such, because these methods are not standard and can lead to errors in the quantification of the fauna, the data presented in this Appendix are, at best, equivocal and non-quantitative. Please see the relevant comments on DEIS Sections 3.4.3.2.2 and 3.4.3.4.6, as well as on Appendices 5.3-A and -B.

Page 4, 2nd par., lines 1-2. "In general, the sample site located furthest from shore (BGL1A) had the highest overall macroinvertebrate abundance (organisms/m^2), as assessed using the dredge technique."

The station farthest from shore was also the only one outside the planted shellfish bed. Could the higher density at this station result from less anthropogenic disturbance than the stations located inside the planted shellfish bed?

Page 4, 2nd and 3rd par. "In general, the sample site located furthest from shore (BGL1A) had the highest overall macroinvertebrate abundance (organisms/m^2), as assessed using the dredge technique. However, the abundance of large shellfish, including the northern quahog, as assessed by the clam rake technique, was very similar at all four sites, though slightly higher at the site located near the center of the shellfish bed (BGL1b).

Continued quote: "The diversity of macroinvertebrates . . . was found to be the highest at BGL1b, as assessed using both the dredge and the clam rake. The site closest to shore (BGL1c) was found to have the lowest diversity, as assessed using the dredge and the second lowest using the clam rake. . ."

However, no correlations with sediment characteristics or water quality in the overlying water column are presented, because of failure to collect the data. It is therefore difficult to understand why these patterns exist – if they are indeed real based upon the limited sampling accomplished – and little useful information is provided by this discussion. Information produced by the analysis of data is only as good as the data upon which it is based. If the needed data are unavailable, resulting information is limited and frequently inadequate.

Page 4, 4th par. "Of all the macroinvertebrates found in Lewis Bay the Polychaeta were by far the most diversely represented Class . . . *Streblospio benedicti* . . . were the most abundant . . . [and] is known to be an early colonizing species, perfectly adapted for colonizing stressed or disturbed habitats and is typically associated with these environments . . . Capitellid thread worms were also present in large numbers in all dredge samples. In general, these worms live in the muddy sand of estuaries and the Intertidal zone to subtidal at shallow depths. They are known to eat their way through the substratum when they feed and are tolerant of poor conditions on bay mud flats and harbor bottoms . . ."

The results are presented here with comments as to the kinds of environments species that were found might inhabit. These comments are somewhat slanted to depict the Lewis Bay site as disturbed in some fashion. Specifically, it is noted that *S. benedicti* is "perfectly adapted for colonizing stressed or disturbed habitats and is typically associated with these environments." This is somewhat too broad of a generalization as *S. benedicti* is often found in relatively high abundances in areas that are not disturbed, as they are a common species in shallow water benthic environments. The same is true for the capitellid worms that were found.

In fact, the densities at which both of these taxa were found are actually quite low relative to the very high abundances they can attain during opportunistic recolonization following disturbances.

Page 4, 6th par. "Another abundant Class observed using the dredge technique was the Oligochaeta.... Many of these worms are highly tolerant of degraded habitats including polluted areas...."

Once again the authors seem to imply that Lewis Bay is degraded. Some oligochaete worms are indeed tolerant of some degraded habitats, but they also commonly occur in <u>un</u>degraded habitats. If the authors wanted to demonstrate degraded habitat in Lewis Bay, as they seem to, they might have collected sediment and water quality data to correlate with the benthos.

Page 4, 7th par., lines 5-7. "Northern quahogs are often found in very polluted habitats; adults can tolerate wide ranges in water quality and can survive in changing concentrations of ammonia, nitrites, nitrates and phosphates...."

And once again the implication is made that Lewis Bay is degraded without providing supporting data. Northern Quahogs can tolerate some polluted habitats, but they too are very common in <u>un</u>polluted waters. If this were not the case, very few Northern Quahogs would be used as human food, but they instead support important fisheries and restaurant trade.

Page 5, 1st par., lines 1-2. "A comparison of the data collected in this survey of Lewis Bay with previous benthic macroinvertebrate assessments conducted in Nantucket Sound for the Cape Wind Energy Project…."

Comparisons to the surveys conducted in the deeper water sections of Nantucket Sound are not really relevant to assessing what the potential impacts might be to the shallow water benthic communities in the Lewis Bay area. At any rate, it would not be surprising if Lewis Bay benthos differed significantly from the offshore sites visited in the 2001 and 2002 efforts. The significance of this paragraph and the comparisons it provides are therefore difficult to discern.

Page 5, 2nd par., lines 1-4. "Other recent studies conducted in bay and harbor areas of comparable habitat type, however, report abundances of a magnitude similar to the levels recorded in this study. For example, a study in New Haven Harbor, Connecticut found densities to range from 2,250 per m^2 to 60,675 per m^2 (ENSR, 2000) and a multi year study in the same area documented a mean density of 14,000 per m^2 (DeLeuw et al. [*sic*], 1991)."

Studies in New Haven Harbor, and particularly the area under the Quinnipiac River Bridge, are not particularly comparable sites to Lewis Bay. The question remains, therefore, of how the results presented in this survey compare to other inshore sites around southern Cape Cod. It is not answered by this discussion.

Page 5, 3rd par., lines 5-7. "As noted in the results section of this report, many of the dominant taxa found in Lewis Bay during this study are either pollution tolerant, early colonizer following environmental disturbance, or opportunistic in nature."

A significant portion of the fauna identified in this survey is not characterized as potentially opportunistic. Suggesting that the site may be disturbed or stressed because relatively moderate levels of certain taxa that are sometimes opportunistic were found is not justified by the data presented.

Page 5, 4th par., lines 1-2. "The findings of this study suggest that the waters of Lewis Bay are likely to be of poorer quality than the waters of Nantucket Sound."

This statement that is not substantiated by any of the data collected or analyses presented. They are different systems and this kind of comparison does not provide any substantive insight concerning potential impacts of the proposed activities, or the potential for recovery following those activities if they in fact occur.

Fundamental sampling of water quality and sediment structure and quality might have provided straightforward clarification of whether Lewis Bay is degraded, but these efforts were not made. Data presented in this Appendix do nothing to clarify this issue.

Page 5, 4th par., lines 2-4. "A case study conducted in the Yarmouth area in 2000 noted that the apparent degradation of the Lewis Bay ecosystem was most likely attributable to effluent from septic systems affecting groundwater within the watershed, resulting in nutrient or nitrogen loading into the bay from the watershed (EFC, 2000)."

Reference to EFC (2000) should be interpreted cautiously. Although nutrient loading is known to have negative effects on small embayments on Cape Cod (e.g. Waquoit Bay) there are no data regarding conditions in Lewis Bay itself. Indeed, the cited EFC (2000) report states:

> No conclusive data has been adduced to support the assertions of the Conservation Consortium Foundation, the group that has spearheaded this campaign, about the extent and effects of the contamination of the watershed.... It was recommended that...more conclusive research and analysis be undertaken by the CCF, Cape Cod Commission, and/or the EPA. Only detailed verification of the problem, assessment of its impacts and importance, and analysis of its treatment options may move interested parties and decision makers to an effective solution.

Page 5, 4th par., lines 5-7. "...the 'Cape Cod Coastal Embayment Project' identified the key contaminant causing the degradation of the water quality within Cap Cod's coastal embayments to be nitrogen from septic systems and treatment plants, stormwater runoff, and fertilizers...."

This is a general statement saying that when and if coastal embayments are degraded, <u>then</u> nitrogen is likely to be the primary culprit. Supporting data specific to Lewis Bay are not provided. Inexplicably, such data were not collected as a part of the survey described in Appendix 5.3-C.

Page 5, 5th par. states.

> It is possible that the high abundance and diversity of benthic macroinvertebrates found in Lewis Bay compared to the shoal areas of Nantucket Sound may simply be due to naturally greater food abundance. Food abundance for the benthos is known to be generally greater in shallow and coastal areas than in offshore and deeper areas (Rosenberg, 2001). In addition, the likely output of nutrients to Lewis Bay can also lead to increased primary production and therefore a greater accumulation of organic material on the bottom (Rosenberg, 2001) which is linked to greater food abundance for the benthos and would be likely to support a greater macroinvertebrate abundance.

Once again, these suppositions cannot be substantiated without appropriate supporting data collected, such as organic content of sediments and overlying water, particle size analysis of sediments including fines, and water quality analyses for nutrients with emphasis on nitrogen forms.

Rosenberg (2001) as cited here does not provide data specific to Lewis Bay. It provides general statements that may or may not apply to Lewis Bay.

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USEPA. 1987. Recommended protocols for sampling and analyzing subtidal benthic Macroinvertebrate assemblages in Puget Sound. Prepared by Puget Sound Water Quality Authority. 34 p. Internet URL: http://www.psat.wa.gov/Publications/protocols/protocol_pdfs/benthos.pdf.

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24. Appendix 5.4-C: Essential Fish Habitat Assessment

Comments provided in Appendix 5.4-C are skewed toward benthos issues rather than finfish-related issues.

It is disconcerting that much of the discussion of benthic communities and habitats in this Appendix, such as those occurring in paragraphs 3-4 of page 7, appear to be founded upon uncritical acceptance of faulty underlying data provided by the 2001 and 2002 benthos surveys. The methods used for these surveys are discussed in detail in comments above. These surveys provide, at best, only qualitative values that should preclude their use as a basis for quantitative assessments.

Characterization of habitat types by sediment grain size characteristics in this Appendix, as well as throughout the DEIS, is undependable. On page 5 of this Appendix, for example,

is stated, "Visual analysis of sediments within the 0- to 2-foot depth range beneath the seabed indicates the presence of fine- to coarse grained sands in areas of relatively shallow bathymetry, with fine to silty sands and silts predominating in deeper surrounding waters across the three sites."

First, the term "visual analysis" is rather grand, subtly implying a greater degree of precision than reality requires. "Visual estimation" would provide a more accurate impression.

Second, these estimates were of sediments occurring in the 0- to 2-foot depth range, and not of the sediment sizes present in the upper 15-20 cm (~6-8 inches) of sediments that influence sea floor benthic infaunal communities.

Third, the visual estimates are demonstrably unreliable. On page 5-11 of the DEIS (1st par.), seven core samples are identified, and it is noted that of the seven, three were "selected due to the visual observation of greater than 50% fine material at the time of sample collection." The seven samples mentioned are listed in Table 14, along with the amounts of materials in these samples passing through No. 4 and No. 200 sieves (data from DEIS Table 5.1-3).

It is clear from these analyses that none of the samples actually had >50% fines, as determined by visual observations, indicating that visual observation of sediment characteristics are unreliable for correlation of sediment type with benthic infaunal communities. Indeed, these analyses are clearly incapable of separating sample VC01-G1 from any of the samples said to have less than 50% fines from visual estimates, further illustrating why they are inadequate for discriminating benthic community analysis.

Samples that <u>were</u> analyzed for grain sizes were appropriate for engineering and construction needs, but were unfortunately inappropriate for benthic community evaluation. One important issue is that the core samples were composited prior to analysis of sediment characteristics. Vibracores take samples through several feet of sediment, and these long cores were sectioned for analysis. The top section of each core was apparently either 5 ft or 10 ft long when composited, i.e. the top 5-10 ft of the core was taken from the remaining length of core. This material was composited, and a subsample of the resulting mixture was submitted for analysis. Regardless of what analysis was conducted on these samples, the resulting data reflect the average occurring throughout the 5-10 ft length of core. Thus if sediment particle size characteristics were being measured, results would indicate the average sediment type mix over 5-10 ft of depth into the sediment. These results do not reflect the top few inches of sediment where benthic infauna live, and therefore are irrelevant to the analysis of the benthos community.

A second important issue is that these composited sediment samples were analyzed for only two size groups (DEIS Table 5.1-3), namely the % passing a No. 4 sieve and the % passing a No. 200 sieve. The mesh size of a No. 4 sieve is 4.750 mm (equals 0.475 cm,

which equals 0.19 inch, or 3/16 inch), which is a rather coarse sieve capable of separating rocks, pebbles, large pieces of shell and similar sized materials from the sample. A No. 4 sieve has a mesh size of 0.075 mm, which is very fine; silts and clays are frequently characterized as having particle sizes smaller than 0.063 mm, hence a No. 4 sieve is separating most silts and clays, or "fines," as they are collectively termed.

A typical benthos study uses many more particle size categories for correlation with benthos communities, because the species and resulting communities living in these sediments are very sensitive to small changes in the mixture of grain sizes and the resulting amounts of water contained in the sediments. Two typical examples from Buzzard's Bay are studies by Sanders (1958 and 1960), who used 13 and 14 categories, respectively. Sanders also used 12 categories in Long Island Sound studies (Sanders, 1956), and 9 size groups were used to analyze benthic communities for a jet plow installation of cable in California (Morro Group, 2000). Battelle Ocean Sciences used 8 size groups for particles greater than 62 μm in diameter, with further fractionation of silts and clays by pipette analysis (Battelle, 1991). Mote Marine Laboratory of Sarasota, Florida routinely uses 90 groups (measured electronically as opposed to sieve measurements) in their benthic surveys (Culter, *personal comm.*)

The DEIS persists in characterizing the benthic habitat in the potential project areas as uniform, such as on page 30 (par. 5) of Appendix5.4-C, which states ". . . because benthic habitat is similar throughout Nantucket Sound, [with] similar benthic communities . . ."

This is in spite of the discussion on page 5 (par. 2): "Medium-grained sands predominate atop the U-shaped Horseshoe Shoal, with fine-grained sands found in the east-opening embayment. Localized fractions of silt, gravel and/or cobbles, consistent with glacial drift may also be present in the area. Fine to silty sands were encountered in the deeper water portions surrounding the shoal area. Fine sands predominate in the western and central portions of Monomoy-Handkerchief shoal, with silty sands to the east in deeper waters. Across Tuckernuck Shoal, fine sands predominate, with an area of medium to coarse sands traversing the center of the shoal and oriented parallel to the tidal currents sweeping between Martha's Vinyard and Nantucket. Silty sands were encountered to the east of Tuckernuck Shoal, again in the deeper water areas surrounding the shoal."

This paragraph appears to describe substantial habitat variability, and does it without the benefit of any detailed analysis of the sediments. This discussion is apparently based entirely on visual characterization of sediments. More discriminating analysis of upper layer sediments would certainly have been instructive and useful in the proper analysis of benthic communities and impacts.

Sediment and bedload transport modeling conducted to date has been concerned with typical natural conditions. Note, for example, their mention on page 2 (par. 2) of Appendix 5.4-C: "the level of wave and current energy under typical conditions is not sufficient to lift and suspend large volumes of sediment within the water column." Modeling was apparently not conducted, however, to simulate transport of sediments already lifted by jet plowing, which is said to "fluidize" the sediments. It would seem that in such case, the jet plow may provide the lifting force not provided by the natural currents, thereby enabling transport that might not otherwise have occurred. Please see also comments on Appendix 5.2-A.

Appendix 5.4-C (page 28, 2nd par.) merely states that "sediment displaced by the jet-plow then begins to settle over the created path, thereby burying and protecting the cable." This seems very benign, but no information, observations, or monitoring data are provided to support this statement.

Sediments in the Project area have been characterized as primarily sands, with small fractions of fines and a low organic content that is likely to be associated with these fine sediments. Given that approximately 75 acres of the site will be disturbed by jet plowing, an evaluation of how much of this fine fraction will be winnowed away by currents flowing over the trenches would seem appropriate. Such losses would render the sediments somewhat coarser and would decrease their organic content. This sediment-associated organic content may be very important for deposit feeders and a decrease could cause shifts in community structure. The DEIS states that most of the sediments are expected to settle rather quickly, but no mention is made of the potential fate of the fine fractions, which may be critical to the benthic communities. [Comment from R. Zajac.]

As discussed previously, Appendix 5.4-C minimizes the importance of the Atlantic surf clam (*Spisula solidissima*), one of the species with Essential Fish Habitat (EFH) designation. Page 26 (par. 4) states: "<u>If</u> there are <u>small populations</u> of surf clams in the Project vicinity, there <u>may be</u> localized impacts to surf clam habitat during the construction or decommissioning phases of the Project" (emphasis added).

On page 26 (4th par.), this Appendix states, "Studies reviewed in Cargnelli *et al.* (1999c) have shown that the greatest concentration (*sic*) of surf clams are usually found in well-sorted, medium-grained sand, and are most common at depths of 8-66 m in the turbulent areas beyond the breaker zone. They are also found in a salinity range greater than 28 ppt and in areas where bottom temperature rarely exceeds 25 ° C."

Page 4 of this same Appendix states that "The highest bottom water temperature in Nantucket Sound during summer is in the range of 61 to 66°F (16-19°C)" This is certainly in the surf clams preferred range.

Page 4 also indicates that salinity in the Project areas is 30-32.5 ppt, also appropriate for surf clams. Page 3 indicates depths in the Project area of <10 to >50 ft, also coinciding

with the clam's preference. That the bottom consists of sand is repeatedly stated throughout the DEIS.

According to page 2, 1st par., of this Appendix 5.4-C, "The term 'adverse effect' means any impacts which reduces (*sic*) quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the substrate and loss of or injury to, benthic organisms...and their habitat...."

Surf clams are apparently very common in the area. Those living in spaces where monopiles and ESP piles will be driven will die, and these areas will not be recolonized because the monopiles will remain, eliminating EFH within their circumference. This is by definition an "adverse impact."

It is also not clear that jet-plowing will not alter the sediment regime in cable trenches by redistributing grain sizes. The possibility that heavier particles will settle more quickly than finer particles following sediment fluidization, resulting in poorly graded or otherwise altered sediment, has apparently not been analyzed for the DEIS, nor have any literature citations on this subject been provided. If these sediments will be appreciably altered, the Applicant should determine what the consequent impacts might be on benthos repopulation.

This Appendix refers to SAV in two places, pages 6 and 31. Both discussions consider only the nearshore SAV known to occur within State water, but on page 6 (5th par.) we are informed that "Field investigations have been conducted to determine the extent of mapped SAV beds in the vicinity of the proposed Project." No mention is made of SAV outside of state waters. Section 5.8.3.1.1 of the DEIS states, however, "Mapping indicates that two potential areas of submerged aquatic vegetation occur within the project area, beyond Massachusetts' 3-nautical mile limit."

Unfortunately, the DEIS does not divulge where these areas are, how large they are, what kind of SAV grows there, their importance or relevance to biological resources, or any other information about this resource. Considering the great importance of SAV to biological systems, much more information should be imparted about the offshore SAV. Section 6.1.3.1 of the DEIS indicates that maps are available, but it is unclear whether this is only for inshore SAV. These maps should be provided in the DEIS. It also states that a diver survey was conducted, but no resulting information or data are provided.

In addition to these general observations, the following specific comments are made on this Appendix:

Page 4, 2nd par., line 6. "Peak tidal currents often exceed two knots...."

In order to conform to following discussions, the conversion to feet per second should be provided. Two knots = 3.38 ft/s.

Page 4, 3rd par., lines 8-10. "Tidal current velocities were calculated to be approximately 2 feet/second at Horseshoe Shoal; less than 2 feet/second at Tuckernuck Shoal, and more than 2.5 feet/second at Monomoy-Handkerchief Shoal."

These tidal currents were presented in charts as ranges, as summarized here:

Table 16

Location	Current Range
Horseshoe Shoal	1.6 – 3.2 ft/s
Tuckernuck Shoal	1.6 – 2.6 ft/s
Handkerchief Shoal	1.4 – 3.5 ft/s

Page 4, 7th par., lines 1-2. "Nantucket Sound generally contains sand- and silt-sized surficial marine sediments, with localized patches of clay, gravel and/or cobbles."

Despite later generalizations of homogenous habitat, please note that this description provides for substantial habitat variability, which was undocumented by this DEIS.

It would also have been helpful to characterize variability of benthic habitats if more detailed grain size analysis had been done in closed coordination with benthic grab sampling.

Page 4, 7th par., line 2. "...with localized patches...."

What does "localized" mean? The term is used throughout the DEIS, but without definition it is an indefinite generalization. How large are these areas? Where are they? How common are they?

Page 5, 1st par., lines 1-2. "Visual analysis of sediments within the 0- to 2-foot depth range...."

This 0-2 ft interval was not specified in the 2001 and 2002 benthic survey reports (Appendices 5.3-A & B). Where did this information originate?

Also, the term "visual analysis" is a bit unclear. They looked, and did the analysis how? Perhaps "visual examination" or "visual estimation" would be more appropriate and unpretentious.

Page 5, 2nd par. These observations are all based on visual estimates. Please see comments in the discussion of Sediment Grain Size.

Page 5, 5th par., lines 1-2. "Along the submarine cable route, seabed sediments contain fine to coarse size sands, with patches of clay, silt, gravel and/or cobbles. Intermittent glacially transported boulders may also be present along the route."

Once again, benthic habitat variability is implied.

Page 6, par. 2, lines 1-4. "Bed load transport on Horseshoe Shoal is typically an order of magnitude greater than suspended load transport. . . since the level of wave and current energy under typical conditions is not sufficient to lift and suspend large volumes of sediment within the water column."

Would these conditions change if jet-plowing provided lifting force?

Page 6, par. 4, lines 2-3. "Information [for the report] was drawn from published literature and from studies conducted by the Applicant."

Apparently, the author(s) of this Appendix 5.4-C did not participate in the field studies conducted by the Applicant.

Page 6, par. 5, lines 9-10. "Field investigations have been conducted to determine the extent of mapped SAV beds in the vicinity of the proposed Project."

Where are the results of these surveys, not only of SAV maps within State waters, but also the offshore SAV noted in Section 5.8.3.1.1 of the DEIS?

Page 7, par. 2, lines 1-3. "Based on literature reviewed, the most abundant benthic fauna taxa in Nantucket Sound are crustaceans and mollusks, followed by polychaetes worms . . . (Theroux and Wigley, 1998)."

How were the data extracted from Theroux and Wigley (1998) to arrive at this conclusion? The cited document considers the macrofauna in the region based on several different groupings, but no groups were specific to Nantucket Sound.

Page 7, par. 2, lines 8-9. "Biomass is reported to be lower in shallow areas of Nantucket Sound, including the Proposed Alternative Site (Theroux and Wigley, 1998)."

It should be noted that much of the data being used to characterize the benthos of these alternative sites is over 20 years old. For example, the data presented in Theroux and Wigley (1998) was collected between 1956 and 1965. The sampling density in the areas of the alternative sites was also low in Theroux and Wigley's (1998) study; 7 samples in Nantucket Sound, 2 samples in the vicinity of the South of Tuckernuck Island site and 3 samples in Buzzards Bay. Although these older studies do provide valuable information on the potential general character of these benthic environments and communities, it should be kept in mind that benthic communities in coastal environments such as those in

the alternative sites can change over the long-term, and that little recent information is available to substantiate that the general nature of the communities is similar to that found in these older data collections in the alternative site, except as given for the Nantucket Sound site in Appendices 5.3-A to 5.3-C.

Page 7, par. 3, entire paragraph. These findings are based upon Appendices 5.3-A & B. Please see comments concerning these two Appendices.

Page 7, par. 4, lines 4-5. ". . . benthic diversity was . . . higher . . . in shallow waters characterized by fine-grained sediments . . ."

Based upon the lack of sediment analysis for grain size, the basis for this statement must be the visual observations of grain type, which are questionable, as discussed above in the discussion of "Sediment Grain Size."

Page 7, par. 4, lines 12-13. "Organisms living on or in these sandy sediments are expected to be adapted for movement or settlement in sand and recovery from burial."

No evidence is provided to support the statement that organisms living in these sediments are "adapted for...recovery from burial." Having good mobility in sandy sediments does not necessarily mean that organisms will be able to withstand what amounts to burial.

Page 10, par. 3, line 5. "Atlantic surf clam and winter flounder . . . appear to be decreasing [in the region]."

What is the evidence for this statement? How can it be justified? The Appendix states (same paragraph, lines 1-2) that trends were based on MDMF research trawl data over a 25-year period, and elsewhere (paragraph 1lines 6-7) specifies otter trawls, but otter trawls are categorically inappropriate sampling equipment for surf clams. It is not surprising – indeed , should be expected, that Atlantic surf clams appeared only rarely in these samples. Please see comments in the discussion on Surf Clam Importance and EFH.

Pages 10-11, Table 2. Same comment. How can otter trawl data be used to quantify Atlantic surf clams?

Page 26, par. 4, lines 10-11. "If there are small populations of surf clams in the Project vicinity, there may be localized impacts . . ."

It seems clear that substantial populations of Atlantic surf clams are supported by the proposed Project areas. Please see the discussion on Surf Clam Importance, above.

Page 27, par. 4, lines 11-12. "Initial installation of the scour control mats will directly impact approximately 110,160 square feet/2.53 acres of benthic habitat . . ."

What will happen to clams and other benthos covered by these mats?

The report does not clarify whether there is any information on whether benthic communities in scour control mats might differ from those in natural sediments. Information should be provided as to the kind of benthic organisms that typically colonize the scour mats. Is there any information as to the extent to which scour control mats act as a unique habitat? If the mats are not totally covered by sediment, perhaps by several inches, then their turf nature may in fact extend the hard substrate habitat of the monopiles to some extent and allow for the attachment of organisms that utilize hard substrate.

Page 27, par. 4, bottom line extending to page 28. "There could be additional temporary impacts to the seafloor in the vicinity of each proposed WTG associated with the anchors and/or jack-up barges involved in construction."

What would these be? What will be the depth to which the jacking legs extend into the sediment, and given this depth, what will be the length of time required for these holes to fill in? What would be the sizes of these holes? How many will there be? Will these holes have a negative or positive or no impact on benthos?

Page 28, par 1, lines 3-4. ". . . approximately 20,861,856 square feet/479 acres of temporary disturbance associated with vessel positioning, anchoring, and anchor line sweep could be anticipated . . ."

Given that the anchor scars will be approximately 4 feet deep, what is meant by "temporary" disturbance? No estimate of what "temporary" might be in actual time units is provided. How long will these scars take to heal? What will be their impact on benthos meanwhile?

Page 28, par. 2, lines 6-15. "In total, jet plow cable embedment of the inner-array cables within the Wind Park will <u>temporarily</u> directly impact up to 2,471,040 square feet/57 acres of benthic habitat or approximately 0.375% of the total Project Area. Jet plow cable embedment of the two submarine cable circuits connecting the Wind Park to the landfall location will <u>temporarily</u> directly impact up to 772,992 square feet/17.75 acres of benthic habitat or approximately 0.12% of the total Project area. Additionally, <u>temporary</u> impacts associated with cable installation barge positioning, anchoring, anchor line sweep, and the pontoons on the jet plow device are expected to occur along all cable installation paths. This results in a total anticipated <u>temporary</u> impact from anchoring and pontoons during the installation of the inner array cables and submarine cable system of approximately 35,920,896 square feet/825 acres of bottom area or approximately 5.4% of the total Project area..." (emphasis added).

The term "temporary" needs to be defined. The extent, duration, and degree of impact should be identified, not passed off as temporary, with its implied meaning of "insignificant."

How was the percentage of total Project area calculated? Is the Applicant trying to take credit for unused area within the array of WTGs? If so, why? If so, why not reduce the perceived impact by simply spreading the Project out over twice as much area, and saying that impacted area = about 2.7% of total Project area? The fact is that 825 acres of bottom area will be impacted. It does not matter how large an area this will be spread over.

Page 28, par. 5, entire paragraph. "Direct impacts may include localized habitat loss and creation, benthic organism mortality, burial and/or displacement, finfish mortality and/or displacement, temporary impacts due to elevated suspended sediment concentrations in the water, temporary impacts related to increased vessel traffic, and acoustical impacts from construction activities."

Page 28, par. 6, lines 1-2. "Installation of the monopile, inner-array cables, and two submarine cable circuits will physically <u>displace sediment</u> at specific locations" (emphasis added).

The term "physically displace" is something of an understatement. Driving the monopiles into the sediment will isolate all sediments lying within the circumference of each monopile, and everything living in these sediments will die. Nothing will live there until the monopiles are removed.

Page 29, par. 2, lines 1-6. "In general, the disturbance of the benthic environment will be short-term and localized because many benthic invertebrate species are capable of opportunistically recolonizing benthic sediments after disturbance . . . These opportunistic invertebrates are considered "pioneer" species and are expected to be the earliest colonizers of the disturbed areas. Opportunistic invertebrates such as amphipods, polychaetes, and oligochaetes living in adjacent, undisturbed areas are likely to rapidly colonize the disturbed area."

Section 3.4.3.4.6 of the DEIS, page 3-168, par. 6, words this a bit differently. It says, "<u>Most</u> benthic invertebrates are able to opportunistically recolonize." It mis-states the wording here, changing "many" to "most." The statement that "Most benthic invertebrates are able to opportunistically recolonize" is incorrect and misleading. As such, predictions in the DEIS as to the recovery periods of benthic communities and populations following construction activities are unsupported and incorrect to the extent to which they are based on this false assumption. This incorrect assumption is used throughout the DEIS, making any statements regarding recovery of benthic communities and populations equivocal. [Comment after R. Zajac]

It is also interesting that this Appendix 5.4-C inserts the word "opportunistic" in this statement as compared to Section 3.4.3.4.6 of the DEIS (page 3-167, par, 1), which states, "These invertebrates [mobile invertebrates such as amphipods, polychaetes, oligochaetes, etc.] are considered pioneer species, and are expected to be the earliest colonizers of the

disturbed areas." This statement is incorrect in the general way that it is applied, is misleading, and suggests a lack of understanding or knowledge of the literature on this topic. The benthic organisms at all of the proposed sites have a variety of life histories. Some of them may be able to respond opportunistically and have short (1 - 2 yr) recovery periods, but it is likely that the majority will not be able to because they do not have opportunistic life histories, and recovery of their populations will likely take considerably longer. It is apparent, therefore, that the DEIS wording is different than the wording in Appendix 5.4-C, whether intentional or not, and reviewers must be cognizant of the subtle shifts in meaning that such wording differences entail.

Page 29, par. 2, lines 8-9. "The scour control mats that are placed around each monopile to stabilize sediment will become colonized with benthic organisms, thus replacing some habitat that is lost."

The species that are likely to colonize this habitat should be identified. Will these areas become sedimentary or hard substrate habitats? Will the colonizing species be desirable or undesirable?

Page 29, par. 6, lines 1-2. "The construction technology that will be used for the Project was selected specifically for its ability to keep sediment suspension and other habitat disturbance to a minimum . . ."

This claim is made repeatedly throughout the DEIS, but no supporting evidence is provided anywhere. It must therefore be regarded as merely an opinion expressed by the Applicant without substance.

Page 30, par. 5, lines 1-3. "In general, the disturbance to the benthic environment from Project construction will be short-term and localized because many benthic invertebrates are capable of opportunistically recolonizing benthic sediments after disturbance."

See comments above, ref. Page 29, par. 2, lines 1-6.

Page 30, par. 5, line 4. ". . . because benthic habitat is similar throughout Nantucket Sound, similar benthic communities . . ."

Please see comments concerning sediment grain size, above.

Page 33, 2nd par., lines 3-4. "Both pelagic and more demersal finfish species may tend to congregate around the monopiles."

Page 33, 3rd par., lines 1-2. "The WTG monopile foundations and ESP piles may attract finfish and benthic organisms, thereby acting as fish aggregating devises (FADs)."

Is this the best analysis possible given the literature and earlier offshore wind-to-energy developments in other parts of the world? The piles may attract finfish, or will they attract finfish? Will this create a new recreational fishery? Will this increase susceptibility of some species to overfishing? Will there be safety or security issues associated with public use of space near the monopiles and WTGs? The DEIS should provide a better analysis of this important issue.

Page 35, 2nd par., lines 1-3. "Project decommissioning may directly impact the benthic habitat and benthic communities that became established over the 20 years lifespan of the Project as the scour control mats, inner-array cables, and submarine cable system are removed."

The conditional tense should not be used. These activities will directly impact these systems, not may impact them.

How will the cables be removed? Will the jet-plow be again employed, will they be simply pulled out through overlying sediment, or will another method be used?

Page 37, 1st par., lines 4-5. "The jet plow embedment process for laying the submarine cable system and inner-array cables produces no sound beyond typical vessel traffic."

It is difficult to accept that there will be "no sound" from the jetting. No underwater sound from dragging the jet plow and its pontoons along the bottom? Can this statement be substantiated? What is the basis of this statement?

Page 39, 4th par., lines 1-2. "The Project also minimizes impacts by using jet plow embedment methods for installing the inner-array and submarine cable systems."

Where is it actually documented that someone has tested or observed jet plows to see whether it truly minimizes impacts? This claim is made repeatedly, but without substantiation.

Literature cited in developing the comments on this Appendix are as follows:

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Battelle. 1991. Environmental Studies in the Gulf of Thailand, Final Report prepared for Unocal Thailand, Ltd., August 16. 203 p + 6 appendices.

Culter, James. 2004. Personal Communication. Director, Benthic Studies Center, Mote Marine Laboratory, Sarasota, FL.

Foodsubs. 2004. The Cook's Thesaurus: Shellfish. Internet URL: http://www.foodsubs.com/Shelfish.html.

MAFI. 2004. Everything you always wanted to know about clams! Mid-Atlantic foods Internet URL: http://www.mafi.com/mida_allaboutclams.html.

Morro Group. 2000. Final Environmental Impact Report, MFS Globenet Corp. / Worldcom Network Services Fiber Optic Cable Project, SCH 98091053. Submitted to County of San Luis Obispo, Dept. of Planning and Building.

Parker River. 2004. Sea Clam, *Spisula solidissima*. Internet URL: http://www.parker-river.org/KnowYourWatershed/Natural History/shellfish.sea_clam.htm.

Sanders, H.L. 1956. Oceanography of Long Island Sound, 1952-1954. X. The biology of marine bottom communities. Bull. Bingham Oceanographic Collection, Peabody Museum of Natural History, Yale Univ. Vol. 15: 345-414.

Sanders, H.L. 1958. Benthic studies in Buzzards Bay. I. Animal-sediment relationships. Limnol. & Oceanogr. 3(3): 245-258.

Sanders, H.L. 1960. Benthic studies in Buzzards Bay III. The structure of the soft-bottom community. Limnol. & Oceanogr. 5(2): 138-153.

Wellfleet. 2004. Sea Clams. Internet URL: http://www.wellfleetshellfishdepartment.org/Sea_Clams.htm.

25. Appendix 5.5-A: Marine Biological Assessment for the Cape Wind Project

a. Introduction

The first sentence in this section states that "[t]his Biological Assessment was prepared in accordance with section 7 of the ESA which requires that all Federal agencies ensure that any action they authorize, fund, or execute will not jeopardize the continued existence of any endangered or threatened species (i.e., listed species) or result in the destruction or adverse modification of any critical habitat of such species." Although it may not have been intended, the wording suggests that this document satisfies the requirements of section 7 of the ESA. It should be noted that section 7 of the ESA requires (1) that the Army Corps of Engineers, as the action agency, consult with the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) to assure that the proposed action will not jeopardize or adversely affect critical habitat of ESA-listed species under their respective jurisdictions, and (2) in cases such as this where listed species or their critical habitats could be affected, that the FWS and NMFS prepare and provide the Army Corps formal Biological Opinions assessing the possible impacts of the proposed action on the listed species under their jurisdictions and, if possible adverse impacts are identified, provide what they believe to be reasonable and prudent alternatives for avoiding the impacts. As noted above, the ESA procedures have not yet been initiated, and this purported biological assessment is grossly deficient for this purpose. A new BA is needed.

b. Section 1.2 Species Considered

For the reasons pointed out in our comments on Appendix 3-G, the green sea turtle should be included in this assessment.

c. Figure 1

The scale of this Figure 1 is so large that it is impossible to discern the bathymetric features referenced in the text. A figure should be provided showing the relevant features in appropriate detail.

d. Sections 3.2.2 and 3.2.4 Plankton Communities and Finfish

As pointed out below and in the comments on Appendix 3-G, the DEIS fails to provide meaningful information on the presence and abundance in the vicinity of the proposed Wind Farm of species of finfish and invertebrates that are the principal prey of marine mammals and sea turtles. This information should be included in the Biological Assessment and analyzed to determine its adequacy before the assessment is provided to the FWS and NMFS for formal section 7 consultations.

e. Section 4.1 The Humpback Whale (*Megaptera novaeangliae)*

Section 4.1 provides much more information on the demography and natural history of humpback whales than is provided in the species description in Appendix 3-G. However, like the species description in Appendix 3-G, it provides no information on the numbers, ages, sex, or activities of humpbacks that occur in areas where they could be affected by construction and operation of the proposed Wind Farm. Likewise, while it indicates that few humpback whales occur in Nantucket Sound because their principal prey are much less common there than in other areas, it provides no data or references to published data to support this contention. Without such information, there is insufficient basis for assessing the possible effects of the proposed action on this species, and no basis for designing a monitoring program to detect possible unforeseen impacts or to validate the assumptions upon which much of this draft impact assessment is based.

Page 10, par.1. The last sentence in this paragraph indicates that "[s]ince 1988 a dramatic decline in the use of Stellwagen Bank by adult humpback whales has occurred, apparently due to the decline in sand lance populations in the area, a primary food source (Weinrich et al. 1993)." As noted in our comments on Appendix 3-G, this implies, incorrectly, that the decline has continued for more than 15 years. More up-to-date information is available and should be used.

Page 10, par. 4: This paragraph states that:

> Although the primary feeding grounds for humpback whales are located further offshore from Nantucket Sound, very few whales are sighted within the Sound itself (Figure 2). Most whales are found in areas where their primary food can be easily located. The bathymetric and oceanographic features identified above that favor dense aggregations of humpback whale prey species are not developed in Nantucket Sound to the extent that they are farther north around Stellwagen Bank, Jeffreys Ledge, Browns and Bacaro Banks, and in the Great South Channel (Kenney and Winn 1986).

> Therefore, the preferred foods of humpback whales and the whales themselves occur in Nantucket Sound with far less abundance and frequency than in high-use areas farther north.

As pointed out in the comments on Appendix 3-G, it appears that this and other statements that very few whales are sighted within the sound are intentionally ambiguous. Likewise, the distribution of sightings shown in Figure 2 supports this contention only if the survey methodology and effort in Nantucket Sound was comparable to that in the areas where high densities were observed, a variable that should have been, but was not, considered anywhere in the DEIS. Also, while it is reasonable to assume that most whales are found during the summer feeding season in areas where their principal prey species are aggregated, we are uncertain as to how they locate appropriate aggregations of prey, but do know from radio tagging studies (e.g., Mate et al. 1997) that whales often move long distances for unknown reasons during the summer feeding season. Thus, the justification is questionable for the statement that "[m]ost whales are found in areas where their primary food can be easily located." Finally, while it no doubt is true that humpback and other whales occur far less frequently in Nantucket Sound than in high-use areas farther north, it does not follow as appears to be implied that insignificant numbers of whales occur in areas where they could be affected by construction and operation of the Wind Farm. As pointed out earlier, without more specific information on when, where, and how many whales occur in areas where they could by affected by the proposed action, there is an insufficient basis for doing a responsible impact assessment. Also, as pointed out earlier, there is no basis for designing a monitoring program to confirm the validity of the assumptions upon which the impact assessments are based, or to detect possible unforeseen adverse impacts. If the available data are insufficient for these purposes, appropriates studies, taking into account possible seasonal and annual variations in distribution, movement, and density patterns, should be carried out before finalizing the impact statement.

Page 10, last par.: Among other things this paragraph states that:

> Cumulative sightings from 1969 to 1992 did not record any humpback whales within Nantucket Sound.... The Center for Coastal Studies Humpback Whale Studies Program is currently reviewing humpback sightings data (Jooke Robbins 2002, personal communication). These data will be review for Nantucket Sound sightings when available and will be included in the Final EIR/EIS/DRI.

The source of the first statement is not, but should be, identified. Further, this statement appears inconsistent with the statement that the Center for Coastal Studies is reviewing sightings data -- i.e., if there are no records of sightings what is the Center reviewing? Finally, if the review was initiated in 2002 or earlier, why were the results not reported in the DEIS?

Page 13, par. 3. The first two sentences in this paragraph state:

> For the Gulf of Maine populations, the total mortality and serious injury **rate** attributable to human impacts for the period of 1996 to 2000 is estimated at 3.0 (Waring et al. 2002). Of this **rate** 2.8 are linked to incidental fishery interaction **records**, and 0.4 to vessel collisions **records** (emphasis added).

It seems that the references to rates and records in this paragraph may be misnomers -i.e., what presumably is meant is that the total mortality and injury and that attributable to fishery interactions averaged 3.0 and 2.8 annually during the referenced period. Also, the mortalities and injuries presumably were linked to fishery interactions and ship collisions, not records of these.

Page 13. The last sentence on this page indicates that parasites, ice entrapment, predation by killer whales, and fluctuating prey populations due to events such as El Nino are causes of natural mortality of humpback whales. Although this is true when worldwide populations are considered, ice entrapment, El Ninos, and even killer whale predation seldom if ever occur in the New England area. Clarification and more specific information on causes of natural mortality in the New England area would be helpful.

f. Section 4.2 The Fin Whale (*Balaenoptera physalus*)

Page 15, par.2. Among other things, this paragraph indicates that "[t]he average rate of increase in the size of the northwestern Atlantic fin whale population is approximately 8% per year (Agler et al. 1993)." There is no citation in the bibliography for Agler et al. 1993. Further, it is implausible that the average growth rate was or is 8% per year. According to the NMFS 2001 Stock Assessment Report for the Atlantic and Gulf of Mexico (Waring et al. 2001, p.27), Agler et al. (1993) estimated the ***gross annual reproduction rate*** for this population to be 8%. That is, the population could grow at this rate only if there were no mortality. This kind of misunderstanding or misinterpretation of publications leads one to question the accuracy and reliability of both the appendix and other related sections of the DEIS.

Page 16, 1st sentence. This sentence indicates that "[t]he estimated worldwide population of fin whales is 105,000 to 125,000 individuals (Wursig 1990)." The source of this estimate is a 1990 publication. If a more recent estimate is not available, the sentence should be changed to indicate that the estimated worldwide population was 105,000 to 125,000 in the late 1980s and that there is no information on current size or trends.

Page 17, par. 3. This paragraph is a near verbatim repeat of unsupported and ambiguous conclusions made in the large cetacean species descriptions in Appendix 3-G and in other sections of this Appendix. That is, it indicates that very few fin whales occur in Nantucket Sound, that most whales are found where there food sources can be easily located, and that the bathymetry and oceanographic features that favor dense aggregations of preferred prey

are not developed in Nantucket Sound to the extent that they are in the referenced areas farther north. Minimally, it should be explained what is meant by "very few whales", and the differences in bathymetric and oceanographic features that purportedly explain the differences in prey abundance in Stellwagen Bank, etc. versus Nantucket Sound should be described.

Page 19, par. 2. The fourth sentence in this paragraph indicates that, in recent years, fin whales have either ignored small vessels or actually approached them. The basis of this statement is a 1986 publication, which cannot be considered recent. If more recent data are not available, this sentence should be changed to read something like "However, Watkins (1986) reported that by the mid-1980s the whales often ignored small vessels or approached to investigate them." Also, it would be useful to note that Watkins thought that the avoidance behavior had been a response to approaches by whaling vessels and that this behavior apparently was extinguished over time after whaling ended.

Page 19, last par. Among other things, this paragraph indicates that there were 72 verified fin whale standings along the U.S. Atlantic coast during this century and that the highest numbers were in 1983 and 1986. The source of these data was Hain et al. (1992), suggesting that the reference to "this century" should have been "the 20th century." Also, there presumably are stranding data more recent than 1992.

g. Section 4.3 The North Atlantic Right Whale (*Eubalaena glacialis*)

Much of the information cited in the introduction to section 4.3 is almost exactly 10 years out-of-date. It could and should be updated by referencing the special 2001 IWC issue on right whales -- IWC. 2001. Report of the workshop on the comprehensive assessment of right whales: a worldwide comparison. *Journal of Cetacean Research and Management* (Special Issue) 2:1-60. For example, in that issue Kraus et al. estimate that the average age of first calving was 9.53 years and the mean calving interval was at least 4.4 years as of 1998 (the last year of data considered in the paper) vs. the earlier estimates of 7.57 years and 3.67 years cited in the introduction. Also, while the special IWC issue is cited elsewhere in the DEIS, it is cited incorrectly as a 1999 report.

As pointed out in our comments on Appendix 3-G, the distribution, movements, natural history, and status of this species are of particular importance regarding the proposed Wind Farm for three reasons: (1) right whales are by far the most endangered marine mammal that could be affected by construction and operation of the Wind Farm; (2) right whales are known to often enter shallow, nearshore waters; and (3) the PBR (potential biological removal level) for the western Atlantic population calculated by the NMFS is effectively zero (Waring et al. 2002), meaning the loss of a single individual, particularly a reproductive-age female, would further jeopardize the population. Although this species discussion provides much more information than is provided in the species description in Appendix 3-G, it does not provide sufficient information to conclude that the proposed action does not pose a risk to the continued existence of this species. For example, while it cites sighting records supporting the conclusion that very few right whales enter Nantucket

Sound, it also recognizes that right whales do occur at least occasionally in areas where they could be affected by construction and operation of the Wind Farm. However, there apparently are no data on how frequently, how many, or the sizes/ages and sex of right whales that enter those areas, or whether they feed and nurse young there, or simply pass through. Without such information, there is insufficient basis to be confident that the proposed action will not further jeopardize the species, and no basis for designing a monitoring program to verify the presumption that any effects will be biologically insignificant. To overcome this deficiency, seasonal surveys should be carried out for at least three years to document the seasonal and annual variation in the numbers, movements, behaviors, sizes and, where possible, the individual identity of right whales and other cetaceans that periodically inhabit areas where they could be affected by construction and operation of the proposed Wind Farm.

Page 22 (Seasonal Distribution). The first sentence in this section is not clear. That is, it is not clear whether the reference to "the last century" is to the 19th or 20th century. Further, right whales have been seen in all of the areas referenced in both the 19th and 20th centuries.

In the second paragraph of this section, the reference to Mate et al. 1992 presumably should be Mate et al. 1997. Also, there are more recent data concerning changes in habitat use - e.g., Weinrich et al. 2001; Brown et al. 2001, and Kenny et al. 2001.

Page 23, par. 3. This paragraph repeats nearly verbatim points noted earlier regarding the limited number of whale sightings in Nantucket Sound and attributes the paucity of sightings to bathymetric and oceanographic conditions dissimilar to those in areas farther north where dense aggregations of preferred prey species are presumed to occur. While the next paragraph provides supporting evidence that few right whales have ever been sighted in Nantucket Sound, no evidence is provided to support the contention that the paucity of sightings is due to the relative scarcity of preferred prey species.

Page 23, par. 4. The first sentence in this paragraph states that "[o]nly seven instances of right whales within Nantucket Sound have been documented." It then cites Allen (1974) as the source of these documented observations. The two references to Allen (1974) presumably should be to Allen (1916). Further, while it is true that only seven sightings are documented in Allen (1916), Reeves et al. (1999) have compiled numerous additional sighting records. For example, Table 3 in Reeves et al.(1999) lists 18th and 19th century observations of right whales in Buzzards Bay, Westport Point, Edgartown, and Yarmouth. Their Table 4 lists numerous additional historical sighting records from Nantucket and vicinity, at least some of which were in the Sound. Therefore, the claim that there have been only seven documented sightings of right whales in Nantucket Sound clearly is wrong.

This paragraph also indicates that an adult female right whale and her calf were monitored via satellite telemetry when they were present in Nantucket Sound. There is no indication

of the source of the observation, when it occurred, how long the animals remained in the Sound, and whether there were any dive records or other indications of the activities in which the animals were engaged. Since satellite tracking of whales is a relatively new technology, this presumably was a relatively recent occurrence and might provide valuable insight into the risk that the proposed action may pose to right whales. Thus, the source and details of the observation should be provided.

Pages 24 and 25. (Food and Feeding Behaviors): This section fails to acknowledge or describe the new information on right whale feeding in Kenny et al. (2001) or the observations of feeding behavior on Jeffreys Ledge by Weinrich et al. (2000).

Page 26, par. 3. The first sentence in this paragraph states that "[e]ntanglement in fishing gear is the second largest human-related threat to right whales." The statement is true regarding cases where the cause of death is known. However, it may well be that entanglement in fishing gear is a much greater cause of mortality than ship strikes. Thus, the accuracy of this sentence could be improved by inserting the word "documented" between the words "largest" and "human-related."

Page 27, par. 1. The next to the last sentence in this paragraph states that "[s]tudies off the California and Alaska coastlines have shown that most species of cetaceans adjust to the presence of drilling equipment (Geraci and St. Aubin 1987)." As indicated in the sections of the DEIS concerning the effects of noise, there is a growing body of evidence that different species respond differently to different sounds in different situations. Also, those species that have been studied tend to respond more to impulse sounds, such as those produced by ice breaking, seismic profiling and pile driving, than to non-impulse sounds such as produced by drilling. A more up-to-date synthesis of the available data on this subject should be provided.

h. Section 4.4 The Loggerhead Turtle (*Caretta caretta*)

Page 28 (4.4.2 Seasonal Distribution in North Atlantic Waters). The last sentence in the third paragraph of this section indicates that "[i]nformation from strandings, entanglements, mariner reports, and the U.S. Guard suggest that loggerheads can be expected to occur rarely in Nantucket Sound as well, in the summer and fall months, though no systematic surveys have been conducted in the Nantucket Sound area (Cheryl Ryder 2002, personal communication)." There is no indication whom Cheryl Ryder is or anything in the bibliography indicating the nature of the personal communication. In this regard, it is not clear whether Ms. Ryder is the source of the information from the Coast Guard, etc., the statement that there have been no systematic surveys in the Nantucket Sound area, or both. Since no systematic surveys have been conducted, there is no basis for determining the spatial distribution or abundance of loggerheads in areas where they could be affected by the proposed action, or for designing a monitoring program capable of verifying the presumption that few if any loggerheads will be affected.

Page 31, 1st sentence. Here and elsewhere the DEIS indicates that ingestion of and entanglement in plastic debris is a possibly significant source of sea turtle mortality. Nowhere is there any indication of steps that would be taken to insure that no plastic or other potentially harmful debris is discarded into the sea during construction and operation of the proposed Wind Farm.

i. Section 4.5 Kemp's Ridley Turtle (*Lepidochelys kempi*)

Page 34 (Table 2). This table shows the numbers of Kemp's ridley turtle strandings in Massachusetts and Rhode Island from 1990 through 2000. The actual locations of the strandings presumably are recorded in the referenced database. If so, the numbers of animals that stranded during this time period in areas around Nantucket Sound should be indicated.

j. Section 4.6 The Leatherback Turtle (*Dermochelys coriacea*)

Page 35 (Population Status and Trends). The third sentence in this section states that "[a]s many as 115,000 adult female leatherbacks remain worldwide (Pritchard 1982), though a more recent estimate places the adult female population at 34,500 (Spotila et al. 1996)." It is not evident why the larger 1982 estimate is referenced when the more recent estimate is much lower. This should be explained.

Page 36, par. 1. The first sentence in this paragraph states that "[b]etween ten and 188 leatherback nests are reported each year along the Atlantic coast of Florida …." This information is based on data reported through 1992. From 1997 through 2003, the number of leatherback nests along the east coast of Florida varied from 351 to 926 (FWC, unpublished data).

Pages 36 and 37 (Seasonal Distribution in North Atlantic Waters). Neither this nor the preceding section provide any information on the distribution or abundance of leatherback turtles in areas where they could be affected by the proposed action. If nothing is known about the species distribution or abundance in these areas, it should be so noted.

k. Section 5 Potential Impacts To Protected Species

Page 38 Project Construction. Here and elsewhere the language of the DEIS appears to assume that the various state and Federal agencies with related responsibilities either have determined or will determine that the proposed action will have negligible impacts on protected marine species, that the Army Corps will issue the requested permit, and that the Applicant has already decided to proceed with construction of the Wind Farm. For example, the first sentence in this section states that "[t]he construction of the Project **will involve** [not would involve] the installation of 130 wind turbine generators…" (emphasis added). Such use of declarative rather than conditional verbs raises questions concerning the integrity of the EIS process.

This section also indicates that sea grass-like polypropylene mats will be installed around all of the structures to control sediment scour. As pointed out elsewhere in this appendix and elsewhere in the DEIS, consumption of plastic debris by sea turtles and other marine vertebrates is a well-documented cause of mortality. However, nowhere in the DEIS is consideration given to the possibility that the polypropylene mats will attract and entangle or be eaten by turtles or other marine vertebrates. This is an oversight that should be corrected.

Page 39 (Project Decommissioning). This section indicates that the design life of the Wind Farm is approximately 20 years, after which the various structures would be removed. Further, it indicates that the monopiles would be cut off at and ultimately approximately 2 meters below the mud line. There is no indication of how the cutting would be done -- e.g., with explosives, acetylene torches, etc. Also, there is no indication of what would be done to assure that removal of the structures would not adversely affect populations of marine mammals, sea turtles, or other species that may have grown as a result of increases in shelter or food resources provided by the structures. If either construction or removal of the Wind Farm results in the "taking" of ESA-listed species or non-listed marine mammals, taking authorization would be required in accordance with the provisions of both the ESA and the MMPA. These possibilities and requirements are not, but should have been, acknowledged and addressed in the DEIS.

Page 42 (Vessel harassment). The first sentence in this section indicates that "Nantucket Sound has witnessed an increase in vessel traffic independent of the larger vessels (e.g., fishing boats…)" (emphasis added). From the context of the sentence, it seems that the word "larger" should be "smaller."

The last sentence in this paragraph states that "[s]ea turtles do not appear to be overly disturbed by the physical presence of and sounds produced by vessels and vessel traffic; they may simply dive when approached by a vessel and avoid areas of intensive human activity…" (emphasis added). The term "overly disturbed" is ambiguous, possibly intentionally so, in that it can be interpreted in multiple ways. Also, if animals "may simply dive" when they are approached by a vessel, it follows that they also may not dive and consequently would be vulnerable to being hit and killed or injured by approaching vessels. Further, if animals do dive when approached by vessels and/or avoid areas of intensive human activity, these actions would constitute evidence of disturbance. If it is uncertain how sea turtles or other marine species respond to vessel traffic or areas of intensive activity, the uncertainty should be acknowledged and studies undertaken to eliminate the uncertainty.

Page 42, par.2. The sixth sentence in this paragraph states that "… the central portion of Nantucket Sound and the vessel routes proposed to be used by Project vessels do not occur in areas where there have been high concentrations of whale or sea turtle sightings" (emphasis added). The statement implies that high concentrations of whales and sea turtles have been sighted in other parts of Nantucket Sound. Conversely, earlier sections of this

appendix and other parts of the DEIS indicate that sea turtles and whales occur in Nantucket Sound only occasionally and in small numbers—i.e., high concentrations of these species never occur in the Sound. More definitive data on both the abundance and the spatial distribution and movement patterns of these species, and the seasonal and annual variability in these parameters, clearly are needed to do a reliable impact assessment. Also, as pointed out earlier, without more definitive data there is no basis for designing monitoring programs capable of verifying that, if it is permitted, the proposed project will have negligible impacts on sea turtles and whales.

On a related matter, the last sentence in this paragraph states that "[c]lose encounters between project vessels and protected species is [sic] likely to be rare and result in **minimal disturbance** to the animals" (emphasis added). The term "minimal disturbance," like the previously noted term "overly disturbed," is subject to multiple interpretations. Use of such qualitative terminology should be avoided or, alternatively, unambiguous definitions of such qualitative terms should be provided in a glossary.

Pages 42 and 43 (Vessel strikes). This section, like the preceding one, contains a number of statements that are contradictory or are not supported by data or references to the publications cited in the DEIS. Like the previous section, for example, it indicates in the first paragraph that "the vessel routes proposed to be used by Project vessels do not occur in areas where there have been high concentration of whale or sea turtle sightings," suggesting, as noted earlier, that there apparently are areas in Nantucket Sound where high concentrations of whales and sea turtles have been sighted.

Further, while the first sentence in the second paragraph indicates that vessel strikes are a significant source of mortality for inshore species of baleen whales, the 8th sentence states that "… right, humpback and fin whales are likely to detect and respond to [avoid] the sounds of an approaching tug and barge." Then, the very next sentences states that "[w]hale responses, however, are unpredictable and may depend on the activity of the whale at the time, or its previous experience with other motor vessels."

Similarly, while the second sentence in the third paragraph states that "[s]hip strikes appear to be a significant source of mortality for sea turtles, and vessel-related injuries have increased in recent years," the next sentence states that "sea turtles should be able to easily avoid vessels moving at slower speeds, such as those associated with Project construction …."

Then the last paragraph in the section states that

> The listed whale and sea turtles considered in this BA will likely be able to avoid project related vessel traffic easily. In addition, because vessel traffic associated with the Project will not occur in areas where there have been high concentrations of marine mammal and sea turtle sightings, the

> probability of Project-related vessels colliding with marine mammals and sea turtles **is unlikely** (emphasis added).

These ambiguities should be removed, and the rationale or bases of the assertions should be identified.

I. Section 5.2.5 Acoustic harassment

Section 5.2.5, like many others in the DEIS, makes a number of conflicting assertions. Likewise, in many cases, the rationale or bases of the assertions are not identified. The following are illustrative examples. They as well as others should be clarified and supported with data, analyses, or references to appropriate data sources.

Among other things, the introduction to this section states that

> Based on modeling and results from other wind projects, it is concluded that the Project **will have no adverse impacts to wildlife**. A small amount of localized and temporary sound will be generated in the marine environment from construction of the Project. The operation and maintenance phases **will have low level acoustic effects**, and underwater sound will not be measurable above background levels beyond a short distance from each monopile (emphasis added).

Conversely, other parts of the DEIS, including later statements in this section, indicate that sounds associated with construction activities would be expected to have temporary and localized effects on a number of marine species, and that sounds associated with operation and maintenance would have no effects on these species (see, for example, the first sentence in the first complete paragraph on page 46 and the last two sentences in this section).

Page 45, par.1. The fourth sentence in this paragraph states that "... thresholds for behavioral responses to sounds in the natural environment depend on the level of ambient noise." As acknowledged elsewhere, behavioral responses in fact depend on a suit of variables, no simply background sound levels. The variables include, but are not limited to, the nature and duration of the sound, the location of the animal relative to the source, previous exposure to the sound, and the activity that the animal is engaged in at the time of exposure -- e.g., animals that are feeding or breeding generally are less likely than animals engaged in other activities to be aware of and to respond to sound, including that which might be harmful.

The last four sentences in this paragraph state that

> The sensitivity of sea turtles to acoustic disturbance has not been well studied. Sea turtles may use acoustic signals within their environment for orientation to natal beaches (Lenhardt et al. 1983). In addition, loggerhead

> turtles swam towards the surface when exposed to low frequency, high intensity sounds (20-80 Hz, 175-180 dB) while underwater (Lenhardt 1994). **However, typical vessel sounds, which can sometimes be in this range, do not seem to disturb sea turtles** (emphasis added).

No source reference is provided for the assertion that vessel sounds in the ranges indicated "do not seem to disturb sea turtles." Further, if as indicated, those sounds cause loggerheads and possibly other turtles to swim towards the surface, the response would make them more vulnerable to being hit and killed or injured by transiting vessels. Thus, it appears that the assertion is both misleading and unjustified.

Pages 45 and 46. The paragraph beginning at the bottom of page 45 and continuing on page 46 indicates that "[s]ound levels measured during impact pile driving operations at the Utgrunden Wind Park in Sweden were used to model underwater sound impacts ..." and that "[t]he Utgrunden data show a maximum (L_{max}) sound level of 178 dBL at 500m (1,640 feet). As pointed out elsewhere, nowhere in the DEIS is there a description and comparison of the environmental conditions - e.g., water depth, bottom contour and type, currents - at the two sites. Likewise, the model or models used to "model underwater sound impacts" are not described. Consequently, it is not possible to determine whether the conclusions regarding the sound levels expected to be generated by pile driving, and the impacts of those sounds on marine mammals and sea turtles, are valid. In addition, the conclusions appear to be based on an unstated determination or assumption that the environmental conditions around each of the 130 proposed WTGs are similar, so that there would be no substantive differences in the source levels or transmission characteristics of the sounds in different parts of the proposed Wind Farm. Both the data and models used to reach these conclusion need to be described in detail

This paragraph also states that

> NMFS suggests that 180 dBL represents **the threshold level for preventing injury or harassment** to marine mammals and sea turtles.[2] The sound levels anticipated to occur during Project construction at and beyond the 500 m Safety Radius[3] are below this level.... Therefore, construction of the Project **is not anticipated to cause physical harm** to marine mammals or sea turtle. Underwater sound monitoring **will be performed during initial monopile construction**.... This will include posting a NMFS- approved observer on site **during initial pile driving activities**.... If listed species are observed by the NMFS-approved observer within the 500 m Safety Zone, the observer will ensure that work will cease until the animal is clear of the work area and safety zone... (emphasis added).

Nowhere in the DEIS is there any indication of what is meant by the "initial" construction period, or why it apparently is anticipated that marine mammals and sea turtles would not

enter areas where they could be affected adversely by construction activities after this initial period. Similarly, there is no indication as to (1) how the observer would ensure that work stops if animals are observed within the proposed 500 m safety zone, (2) where the observer would be located and whether the entire 500 m safety zone could be observed from that position, (3) what if any provision would be made for multiple observers if the entire safety zone can not be observed by a single observer, or if periodic relief is needed to prevent observer fatigue; or (4) the likelihood that certain marine mammals and sea turtles will approach and enter the proposed 500 m safety zone while they are submerged and cannot be seen.

Also, nowhere in the DEIS is the rationale for the 180 dBL threshold level described. Instead, multiple references are made to a 27 June 2002 letter from the Regional Administrator of the NMFS to the Army Corps of Engineers, and a subsequent condition in a permit issued to CWA for construction and operation of the Scientific Measurement Devices Station (SMDS). Although not stated explicitly, it appears from these references that the Applicant and the Army Corps assume that the risks associated with installation of 130 monopiles are no different than the risks associated with installation of the SMDS and that there consequently is no need for further consultation with the NMFS. Further, while footnote number 3 references a "small-take" authorization issued by the NMFS for another pile-driving activity, nowhere in the DEIS is there any indication that a Marine Mammal Protection Act "incidental take" authorization would be required and sought.

Finally, while there is reasonable evidence that exposure to sound levels less than 180 dB are unlikely to cause permanent hearing damage or other physical injury to marine mammals, there is no evidence, as indicated in the paragraph referenced earlier, that sound levels less than 180 dB will not physically harm or adversely affect the behavior of sea turtles. Also, there is good evidence, as pointed out elsewhere in the DEIS, that sound levels far below 180 dB can harass or affect the behavior of marine mammals, sometimes with biologically significant outcomes -- e. g, startle or frighten animals and cause them to stop feeding, breeding or nursing, to become more vulnerable to predators, or even to beach themselves.

Page 46, first complete par. The first sentence in this paragraph states that "[i]f marine mammals or sea turtles are present in the Project area, they are likely to **temporarily avoid** the area during construction activities" (emphasis added). There is no indication of what is meant by "temporary" avoidance. As noted elsewhere, construction would take at least 13 months over two warm water seasons. Thus, while not stated explicitly, the implication is that avoidance of the proposed project area by migratory marine mammals and sea turtles over two consecutive spring-summer-fall "feeding" seasons is viewed as temporary avoidance. No data are provided or cited to support this assertion. Without supporting data, it would be equally reasonable to assert that neither marine mammals nor sea turtles would avoid the area, or that both would avoid or abandon the area permanently or throughout the construction period.

In this same context, the last sentence in this paragraph states that "[t]o date, there is no conclusive evidence that this short-term disturbance leads to long-term effects on individuals or populations…." Although it may have been unintended, the implication is that the absence of conclusive evidence of long-term effects is indicative that there are no long-term effects. In the absence of supporting data either way, it would be equally accurate to state that "[t]o date, there is no conclusive evidence that this short-term disturbance does not lead to long term effects on individuals or populations."

Page 46, par. 2. Among other things, this paragraph indicates that "[t]here is limited evidence that abrupt changes in vessel RPMs may disturb whales (Watkins 1986); however, it appears that they readily acclimate to the noise in their environment." No data or references are cited to support the assertion regarding acclimation, suggesting that it may be nothing more than optimistic speculation.

Page 46, last par. The first sentence in this paragraph states that "[o]nce installed, the operation of the WTGs is not expected to generate **substantial sound levels** above baseline sound in the area" (emphasis added). The last sentence in the paragraph states that "[submarine sound levels generated during Wind Park operation are unlikely to adversely affect the listed whale or sea turtle species **or their prey**" (emphasis added). There is no indication of what is considered to be sound levels "substantially" above the baseline levels. Also, the DEIS provides little information on marine mammal and sea turtle prey species, and no data or references to support the assertion that there are unlikely to be any sound-related effects on those prey species. In addition, the data and models used to estimate the frequencies and levels of sound likely to be generated in different modes during operation of the wind energy plant, like those used to estimate sounds likely to be generated by construction activities, are not describe in sufficient detail to judge their validity.

Page 47, par. 1. This, the last paragraph in the section titled "Acoustic harassment," states that

> In summary, sound levels produced during construction, operation, and decommissioning activities and by Project-related vessels are not expected to be of sufficient intensity to cause physical damage to listed whales or sea turtles that may be in the Project Area. Temporary avoidance behavior to Project related noise and to heavy vessel traffic is likely to occur. Sound levels expected from Project related activities are not expected to cause lasting behavioral alterations to the protected species (Richardson et al. 1991).

As pointed out earlier, it is not clear what is meant by "temporary avoidance behavior." It also is not clear what is meant by "lasting behavioral alterations." Contrary to what is indicated, the cited 1991 paper by Richardson et al. says nothing about the possible effects of the proposed Project on the behavior of endangered and threatened species of whales

and sea turtles. Both the conclusions and the rationale for the conclusions need to be articulated more clearly. Ambiguities and conflicting assertions should be eliminated.

m. Section 5.2.6 Electromagnetic / Thermal Emissions

The first sentence os section 5.2.6 states that "[p]otential direct impacts to listed whales or sea turtles **during the normal operation** of the inner-array cables and the two submarine cables are expected to be negligible" (emphasis added). The last two sentences in the section state that

> There will be no direct impacts to the listed whale or sea turtle species **during the normal operation** of the inner-array or submarine cable systems. There will also be no impacts to finfish, invertebrate, or plankton prey species of marine mammals or sea turtles (indirect impact) **during the normal operation** of the inner-array or submarine cable system (emphasis added).

The highlighted language appears to suggest that there could be both direct and indirect impacts on ESA-listed whales and sea turtles in some situations. Those situations and their potential impacts should be described.

Also, the last sentence in the first paragraph of this section indicates that Section 5.13 of the DEIS describes the basis for concluding that the magnetic fields associated with operation of the system are not anticipated to result in an adverse impact to marine mammals, sea turtles, or their prey. Neither here nor in section 5.13 is consideration given to the likelihood that sea turtles, marine mammals, and some of their prey species will be attracted to and remain in the vicinity of the monopoles and the ESP for extended periods of time and, if so, be exposed to EMF levels up to 473 mG (Tables 5.13-4 and 5.13-5) for extended periods of time. Further, neither here nor in section 5.13 are particular studies discussed that address the effects of power cable magnetic fields on marine mammals or sea turtles. If there is uncertainty as to whether electromagnetic fields associated with either normal or abnormal operation of the system could directly or indirectly impact sea turtles, marine mammals or other marine organisms, the uncertainty should be clearly acknowledged.

n. Section 5.2.7 WTGs as Fish Aggregating Devices

The last sentence of section 5.2.7 states that "[d]ue to [the] small amount of additional surface area in relation to the total Project Area and Nantucket Sound and the spacing between WTGs (0.34 to 0.54 nautical miles apart), the new additional structure is not expected to affect the overall environment, benthic community composition, finfish species composition, or populations of foraging marine mammals or sea turtles in the area." It appears that the assessment upon which this conclusion is based failed to consider the additional habitat, particularly for finfish, that would be created by the polypropylene fronds in the scour control mats. Also, it appears that it failed to consider the considerable evidence that sea turtles often feed and rest in association with man-made structures, and

repeatedly return to those structures, sometimes over several years. Those structures include reefs, offshore petroleum platforms, power plant cooling water intakes, and rock jetties (cf. Klima et al. 1988, Ernest et al. 1989, Wershoven and Wershoven 1992, Redfoot et al. 1996, Bresette et al. 1998, Redfoot and Ehrhart 2000). Further, as pointed out earlier, it appears that inadequate consideration was given to the possibility that removal of the structures after the approximately 20- year life expectancy of the project could lead to collapses of populations that might grow to new equilibrium levels in response to the addition of new and different habitats and food resources. Thus, the referenced conclusions must be reconsidered.

o. Section 5.2.8 Habitat Shift from Open Ocean Shoals to Structure-Oriented

Among other things, section 5.2.8 indicates that the "movements and populations of marine mammals and sea turtles that may occur in the vicinity of the WTG array are not predicted to substantially change from pre-Project conditions." Nowhere in the DEIS is any information provided on the movements of marine mammals or sea turtles in the vicinity of the proposed Wind Farm. Thus, there would be no basis for verifying whether the conclusion regarding movements is valid. Further, as pointed out in our comments on the preceding section, there is substantial evidence that sea turtles may well aggregate around the structures to feed and rest, suggesting that the conclusion is not valid, at least for sea turtles. Also, as pointed out earlier and in our later comments on Appendix 5.5-B, the structures will provide new or additional habitat for a number of marine mammal and sea turtle prey species, and increases in these prey species could be followed by increases in some of the predator population. Consequently, it is clear that the conclusion must be reconsidered.

p. Section 5.2.9 Cumulative Impacts

The first paragraph in this section states that

> No significant cumulative impacts to the listed whale or sea turtle species are expected from construction of the WTGs, the inner-array cables, or the two submarine cable circuits. Any impacts from construction activities are expected to be localized and temporary. In addition, the rarity with which the protected whale species and sea turtles occur within Nantucket Sound further reduces any of these temporary or localized impacts. Other projects that are proposed to occur in the vicinity of the Project could contribute additional impacts to protected marine species.

It appears from the wording of this paragraph that no consideration was given to the possible cumulative impact of operation, vs. construction, of the system. Also, as pointed out in our preceding comments on this Appendix and in our comments on other sections of the DEIS, these conclusions are not supported by data, analyses, or references to other data sources provided in the DEIS. As one example, the DEIS indicates that installation of the 130 monopiles will take approximately 13 months over two construction seasons.

Although not noted explicitly, it seems likely that construction would be done during the warm spring, summer, and fall months, the same time of year that sea turtles and marine mammals are most likely to be present in areas where they could be affected by noise and vessel traffic associated with the construction activities. Clearly, it is questionable at best whether any avoidance behavior, alteration in feeding habits, disturbance effects, etc. that might last over two annual residence periods can be considered temporary. Further, if as indicated the behavior of marine mammals and sea turtles can be affected at tens of kilometers by noise associated with construction activities, it also is questionable whether such changes can be considered localized. Of equal or even greater importance is the fact that the available data on the abundance, spatial distribution and movement patterns, and activities of marine mammals and sea turtles in Nantucket Sound and adjacent areas are insufficient to design monitoring programs capable of validating these predictions.

Also, this and other sections of the DEIS purporting to identify the possible cumulative impacts of the proposed action simply identify several other ongoing and possible future activities with environmental impacts that could add to or be exacerbated by those associated with construction and operation of the Wind Farm. The Council on Environmental Quality's guidelines for preparation of environmental impact statements require assessment of possible cumulative impacts. As noted elsewhere in the DEIS, those guidelines define cumulative impact as " the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non Federal) or persons undertakes such acts."

There are many past and ongoing actions with environmental impacts which were not, but should have been, considered in this and the other assessments of possible cumulative impacts. With regard to the ESA-listed species, past activities include commercial hunting which led to the near extinction of those species, and from which many of the species are in different stages of recovery. There is good evidence, for example, that the western North Atlantic humpback whale population is increasing, while the western North Atlantic right whale population has grown little since commercial hunting was prohibited more than 50 years ago. Ongoing activities with environmental impacts that could be exacerbated by the proposed action, and that are not considered in this or related sections of the DEIS, include recreational boating, commercial shipping, and commercial fishing.

This and the other sections of the DEIS dealing with possible cumulative impacts clearly fall short of compliance with the CEQ guidelines. They must be expanded to provide more thorough and substantive assessments of the impacts of past and ongoing activities, as well as those of possible future activities, that could add to or be exacerbated by the impacts of the proposed action.

q. Section 5.3 Summary / Conclusion of Impacts

For the reasons pointed out above and in our comments on other sections of the DEIS, few of the conclusions summarized in this section of this Appendix are justified by data, analyses, or other data sources cited in the DEIS

r. Section 5.4 Management Alternatives for the Potential Impacts of the Proposed Action

The title of this section is confusing. That is, it indicates that the measures listed are alternatives for managing the potential impacts of the proposed action, suggesting that not all of them necessarily would be implemented if the project proceeds. It also suggests that the goal is to manage, rather than avoid or minimize, potential impacts.

As pointed out in our comments on other sections of this DEIS, there is no evidence that these measures would assure that the proposed action would have negligible impacts on ESA-listed or other marine species. Also as pointed out earlier, the available data clearly provide an insufficient basis for designing monitoring programs to confirm that the proposed action has negligible impacts as the DEIS concludes.

s. Additional and More Recent Cetacean Literature

Set forth below is a list of the more recent and detailed literature that an adequate evaluation of these certain species, their habitats, and the impacts of the proposed wind energy plant should cause them.

Brown, M.W., S. Brault, P.K. Hamilton, R.D. Kenney, and 5 others. 2001. Sighting heterogeneity of right whales in the western North Atlantic: 1980-1992. . *Journal of Cetacean Research and Management* (Special Issue) 2:245-150.

Clapham, P.J. 1996. The social and reproductive biology of humpback whales: an ecological perspective. *Mammal Review* 26:27-49.

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Geraci, J.R., D.M. Anderson, R.J. Timperi, D.J. St. Aubin, and 3 others. 1989. Humpback whales (*Megaptera novaeangliae*) fatally poisoned by dinoflagellate toxin. *Canadian Journal of Fisheries and Aquatic Sciences* 46:1895-1898.

Geraci, J.R., J. Harwood, and V.J. Lounsbury. 1999. Marine mammal die-offs: causes, investigations, and issues. Pp. 367-395 in J.R. Twiss, Jr., and R.R. Reeves (eds.), *Conservation and Management of Marine Mammals*. Smithsonian Institution Press, Washington, D.C.

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Koschinski, S., B.M. Culik, O.D. Henriksen, N. Tregenza, G. Ellis, C. Jansen,a nd G. Kathe. 2003. Behavioural reactions of free-ranging porpoises and seals to the noise of a simulated 2 MW windpower generator. *Marine Ecology Progress Series* 265:263-273.
Kraus, S.D., P.K. Hamilton, R.D. Kenney, A.R. Knowlton, and C.K. Slay. 2001. Reproductive parameters of the North Atlantic right whale. whales. *Journal of Cetacean Research and Management* (Special Issue) 2:231-236.
Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2001. Collisions between ships and whales. *Marine Mammal Science* 17:35-75.
Mangel, M., L.M. Talbot, G.K. Meffe et al. 1996. Principles for the conservation of wild living resources. *Ecological Applications* 6(2):338-362.
Mitchell, E. 1974. Present status of northwest Atlantic fin whales and other whale stocks. Pp. 109-169 in W.E. Schevill (ed.), *The whale problem: a status report.* Harvard University Press, Cambridge, MA.
Nedwell, J., J. Langworthy, and D. Howell. 2003. Assessment of sub-sea acoustic noise and vibration from offshore wind turbines and its impact on marine wildlife; initial measurements of underwater noise during construction of offshore windfarms, and comparison with background noise. Report No. 544 R 0424, Subacoustech Ltd, Southampton, Hants, UK. Available: www.subacoustech.com
O'Shea, T.J. 1999. Environmental contaminants and marine mammals. Pp. 485-563 in J.E. Reynolds III and S.A. Rommel (eds.), *Biology of Marine Mammals*. Smithsonian Institution Press, Washington, D.C.
O'Shea, T.J., R.R. Reeves, and A.K. Long (eds.) 1999. *Marine mammals and persistent ocean contaminants: proceedings of the Marine Mammal Commission workshop, Keystone, Colorado, 12-15 October 1998.* Marine Mammal Commission, Bethesda, MD.
Palsbøll, P., P.J. Clapham, D.K. Mattila, F. Larsen, and 5 others. 1995. Distribution of mtDNA haplotypes in North Atlantic humpback whales: the influence of behaviour on population structure. *Marine Ecology Progress Series* 116:1-10.
Reeves, R.R., J.M. Breiwick, and E. Mitchell. 1999. History of whaling and estimated kill of right whales, *Balaena glacialis*, in the northeastern United States, 1620-1924. *Marine Fisheries Review* 61(3):1-36.
Reeves, R.R., R. Rolland, and P.J. Clapham (eds.) 2001. *Causes of reproductive failure in North Atlantic right whales: new avenues of research. Report of a workshop held 26-28*

April 2000, Falmouth, Massachusetts. Northeast Fisheries Science Center Reference Document 01-16. 46 pp.
Reeves, R.R., T.D. Smith, R.L. Webb, J. Robbins, and P.J. Clapham. 2002. Humpback and fin whaling in the Gulf of Maine from 1800 to 1918. *Marine Fisheries Review* 64(1):1-12.
Reijnders, P.J.H., A. Aguilar, and G.P. Donovan (eds.) 1999. Chemical pollutants and cetaceans. *Journal of Cetacean Research and Management* (Special Issue) 1, 273 pp.
Smith, T.D., J. Allen, P.J. Clapham, P.S. Hammond, and 8 others. 1999. An ocean-basin-wide mark-recapture study of the North Atlantic humpback whale (*Megaptera novaeangliae*). *Marine Mammal Science* 15:1-32.
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Weinrich, M.T., R.D. Kenney, and P.K. Hamilton. 2000. Right whales (*Eubalaena glacialis*) on Jeffreys Ledge: a habitat of unrecognized importance? *Marine Mammal Science* 16:326-327.
Weinrich, M., M. Martin, R. Griffiths, J. Bove, and M. Schilling. 1997. A shift in distribution of humpback whales, *Megaptera novaeangliae*, in response to prey in the southern Gulf of Maine. *Fishery Bulletin* 95:826-836.
Winn, H.E., C.A. Price, and P.W. Sorensen. 1986. The distributional biology of the right whale (*Eubalaena glacialis*) in the western North Atlantic. *Report of the International Whaling Commission* (Special Issue) 10:129-138.
Würsig, B., C.R. Greene, Jr., and T.A. Jefferson. 2000. Development of an air bubble curtain to reduce underwater noise of percussive piling. Marine Environmental Research 49:79-93.

t. Additional and More Recent Literature on Sea Turtles

Set forth below is a list of more recent and detailed literature that an adequate evaluation of these sea tutle species, thie habitats, and the impacts that the proposed wind energy plant should cause them.

Bartol, S. M. and J.A. Musick. 2003. Chapter 3. Sensory Biology of Sea Turtles. Pages 79-102 in Lutz, P.L., J.A. Musick, and J. Wyneken (editors). The Biology of Sea Turtles. Volume II. CRC Press.
Bresette, M., J. Gorham, and B. Peery. 1998. Site fidelity and size frequencies of juvenile green turtles (*Chelonia mydas*) utilizing near shore reefs in St. Lucie County, Florida. Marine Turtle Newsletter. 82:5-7.
Danton, C. and R. Prescott. 1988. Kemp's ridley in Cape Cod Bay, Massachusetts - 1987 field research. Pages 17-18 in Schroeder, B.A. (compiler). Proceedings of the eighth annual workshop on sea turtle conservation and biology. NOAA Technical Memorandum NMFS-SEFC-214.
Ernest, R.G., R.E. Martin, N. Williams-Walls, and J.R. Wilcox. 1989. Population dynamics of sea turtles utilzing shallow coastal waters off Hutchinson Island, Florida. Pages 57-59 in Eckert, S.A., K.J. Eckert, and T.J. Richardson (compilers). Proceedings of

the ninth annual workshop on sea turtle conservation and biology. NOAA Technical Memorandum NMFS-SEFC-232.
Guseman, J.L. and L.M. Ehrhart. 1990. Green turtles on sabellariid worm reefs: initial results from studies on the Florida Atlantic coast. Pages 125-127 in Richardson, T.H., J.I. Richardson, and M. Donnelly (compilers). Proceedings of the tenth annual workshop on sea turtle biology and conservation. NOAA Technical Memorandum NMFS-SEFC-278.
Klima, E.F., G.R. Gitschlag, and M.L. Renaud. 1988. Impacts of the explosive removal of offshore petroleum platforms on sea turtles and dolphins. Marine Fisheries Review, 50 (3): 33-42.
Lazell, Jr., J. D. 1980. New England waters: critical habitat for marine turtles. Copeia 2:290-295.
Lohmann, K.J. and C.M.F. Lohmann. 1993. A light-independent magnetic compass in the leatherback sea turtle. Biol. Bull. 185:149-151.
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Lohmann, K.J. and C.M.F. Lohmann. 1996b. Orientation and open-sea navigation in sea turtles. J. exp. Biol.199:73-81.
Lohmann, K.J., B.E. Witherington, C.M.F. Lohmann, and Michael Salmon. 1997. Chapter 5. Orientation, Navigation, and Natal Beach Homing in Sea Turtles. Pages 107-135 in Lutz, P.A. and J.A. Musick (editors). The Biology of Sea Turtles. CRC Press.
Lohmann, K.J., S.D. Cain, S.A. Dodge and C.M.F. Lohmann. 2001. Regional magnetic fields as navigational markers for sea turtles. Science, 294:364-366.
Morreale, S.J., A. B. Meylan, S.S. Sadove and E.A. Standora. 1992. Annual occurrence and winter mortality of marine turtles in New York waters. Journal of Herpetology, 26(3): 301-308.
Redfoot, W.E. and L.M. Ehrhart. 2000. The feeding ecology of juvenile green turtles utilizing the Trident Basin, Port Canaveral, Florida as developmental habitat. Page 33 in Abreu-Grobois, F.A., R. Briseno-Duenas, R. Marquez, and L. Sarti (compilers). Proceedings of the eighteenth international sea turtle symposium. NOAA Technical Memorandum NMFS-SEFSC-436.
Redfoot, W.E., L.M. Ehrhart, D.A. Nelson. 1996. A population of juvenile green turtles utilizing the Trident Submarine Basin, Port Canaveral, Florida. Pages 258-259 in Keinath, J.A., D.E. Barnard, J.A. Musick, and B.A. Bell (compilers). Proceedings of the fifteenth annual symposium on sea turtle biology and conservation. NOAA Technical Memorandum NMFS-SEFSC-387.
Still, B., K. Tuxbury, R. Prescott, C. Ryder, D. Murley, C. Merigo, C. Smith, and B. Turnbull. 2002. Pages 205-206 in Mosier, A., A. Foley, and B. Brost (compilers). Proceedings of the twentieth annual symposium on sea turtle biology and conservation. NOAA Technical Memorandum NMFS-SEFSC-477.
Wershoven, J.L. and R.W. Wershoven. 1992. Juvenile green turtles in their nearshore habitat of Broward County, Florida: a five year review. Pages 121-123 in Salmon, M. and

J. Wyneken (compilers). Proceedings of the eleventh annual workshop on sea turtle biology and conservation. NOAA Technical Memorandum NMFS-SEFC-302.
Wershoven, R. 1989. Assessment of Utilization of Sleeping Habitat by Juvenile Turtles off Broward County, Florida. Pages 347-348 in Ogren, L., F. Berry, K. Bjorndal, H. Kumpf. R. Mast, G. Medina, H. Reichart, and R. Witham (editors). Proceedings of the second Western Atlantic turtle symposium. NOAA Technical Memorandum NMFS-SEFC-226.
Wershoven, R.W. and J.L. Wershoven. 1989. Assessment of juvenile green turtles and their habitat in Broward County, Florida Waters. Pages 185-187 in Eckert, S.A., K.L. Eckert, and T.H. Richardson (compilers). Proceedings of the ninth annual workshop on sea turtle conservation and biology. NOAA Technical Memorandum NMFS-SEFC-232.

26. Appendix 5.5-B: Pinniped Assessment for the Cape Wind Project

This appendix considers only two of the four pinniped species known to occur in the vicinity of the proposed Wind Farm. The presence of harp and hooded seals are noted in DEIS section 5.5.5, but are not considered in this appendix. In winter, individual harp seals are found along the beaches of Cape Cod, Monomoy Island, and elsewhere in the area. Some are collected by the stranding networks. Although hooded seals are less likely to be found in the area, both species should be considered in the assessment.

Also, the literature reviewed in this appendix is cursory, often relying on secondary sources that in some cases are more than a decade old (e.g., Katona et al. 1993). Further, the website reference to the gray seal fact sheet (NHESP 2002) is no longer available on line. The attached bibliography provides additional and more up-to-date sources of information concerning these pinnipeds.

a. Section 2.1 Gray Seal (Halichoerus grypus)

The introduction to this appendix indicates that section 2 presents information on the life history, status, trends, distributions, preferred foods, and known disturbances and mortality factors for gray and harbor seals. The review of information concerning gray seals is incomplete and, in some cases, is not interpreted or portrayed correctly. For example, the second paragraph in this section indicates that

> Gray seals live on remote, exposed islands, shoals and unstable sandbars.... These seals are generally gregarious, but live in loose colonies when breeding.... Movement is largely a general dispersal in all directions after the breeding season (NHESP, 2002).

In fact, gray seals like all other pinnipeds spend most of their life in the water. Further, they are gregarious only when hauled-out for pupping and nursing young, and this is largely a function of the characteristics of the haul-out locations. There is no indication here or elsewhere in the DEIS of the characteristics of the pupping locations around Nantucket Sound. Likewise, there is no indication of the distinctness of the Nantucket

population from other populations in the Gulf of Maine. Further, there is no evidence that movement in Nantucket Sound or elsewhere "is largely a general dispersal in all directions after the breeding season."

Pages 1 and 2 (Population Status, Trends, and Seasonal Distribution). Contrary to what is stated in the first paragraph of this section, there are no year-round gray seal breeding colonies on Monomoy and Muskeget Islands. That is, pupping and breeding occur only from late December to early February. Also, there are more recent data on status and trends, including the NMFS' 2003 stock assessment report. More significantly, no data are presented on the in-water movements or seasonal distribution and activity patterns in Nantucket Sound. Also, there is no discussion of the count data in Table 1, which suggest that gray seal numbers at Muskeget and Monomoy have been declining.

Pages 2 & 3 (Food and Feeding Behavior). This section does not, but should, identify where and on what gray seals feed in Nantucket Sound. Further, while there have been a number of studies of gray seal food habits in other areas, the results of those studies were not but should have been cross referenced or assessed with respect to the distribution and abundance of finfish prey species present in Nantucket Sound. If the available data are insufficient for these purposes, the uncertainties should be noted and seasonal movement and food habit studies of adults, newly weaned pups, and juveniles should be conducted to resolve them before the impact assessment is finalized.

b. Section 2.2 Harbor Seal (Phoca vitulina concolor)

Phoca vitulina concolor is the scientific name of the western Atlantic subspecies of harbor seal, not the scientific name of the species.

Pages 3 & 4 (Population Status, Trends, and Seasonal Distribution). The point of these two sections should be that (1) the east coast harbor seal population is increasing, (2) the winter population in Nantucket Sound is increasing and is expected to continue to increase for the foreseeable future; and (3) the seasonal use and movements of harbor seals in the waters of Nantucket Sound are unknown and need to be documented.

Page 4 (Food and Feeding Behavior). The fact that neither this nor any other section of the DEIS provides information on the movements, feeding habits, feeding areas, or preferred prey of harbor seals in the vicinity of the proposed Wind Farm indicates that such information does not exists. Without such information, there clearly is no basis for assessing the possible impacts of the proposed action on this species. Further, there is no basis for designing a monitoring program capable of verifying the presumption that the proposed action would have only negligible effects on the distribution or abundance of this species.

Page 7 (Vessel Harassment). Much of the literature cited in this section has not been published in peer-reviewed journals. Further, the sources of several statements, such as "it is likely that seals react primarily to the sound generated by vessels, and not to their

physical presence," are not cited. Habituation to noise and presence of vessels should not be assumed, and what is observed in one situation -- e.g., by Vella et al. (2001) -- should not be presumed to be applicable in other situations. Important coastal habitats for gray and harbor seals do exist around Nantucket Sound as described. As pointed out earlier, however, there is no information on the seasonal movements and feeding locations of these seals in Nantucket Sound. Consequently, there is no basis for concluding that vessel traffic associated with the proposed action will not affect movements, feeding, etc. The background studies for this EIS should have included tagging, tracking, and assessment of the diets of representative groups of animals to document seasonal movement patterns, what different age classes eat, and where animals from the different pupping / breeding colonies feed. There then would have been a basis for follow-up monitoring to confirm the presumption that disturbance from vessel operations would have negligible effects.

Pages 7-11 (Acoustic Harassment). Much of this section is a verbatim repeat of the corresponding section in Appendix 5.5-A. As there, many of the conclusions in this section are little more than optimistic speculation not supported by data, analyses, or references to other data sources provided anywhere in the DEIS. Both the conclusions and the rationale for the conclusions should be articulated more clearly. Ambiguities and conflicting statements should be eliminated.

Page 11 (WTGs as Fish Aggregating Devices). Among other things, this section indicates that

> ...due to the small amount of additional surface area being introduced in relation to the total Project area in Nantucket Sound and the large spacing between WTGs (0.34 to 0.54 nautical miles apart), the new additional structure is not expected to affect the overall environment, finfish species composition, or populations of foraging marine mammals in the area.

It indicates further that

> Finfish aggregations will likely disperse following project decommissioning, requiring seals to forage elsewhere in the Sound. However, the production of finfish is not expected to greatly increase due to the presence of the WTGs, and thus marine mammal populations are not likely to increase solely due to the presence of the WTGs.

There is no indication whether the additional finfish habitat that would be provided by the scour control mats was considered in this or the other assessments of the WTGs as fish aggregating devices. Further, there is no indication of the current distributions or abundance of the referenced finfish species in the Sound, or the existing structures in the Sound that provide habitat for these or other potential finfish prey species. Thus, there is no basis for concluding, as is done, that establishment of the Wind Farm would not create significant additional habitat for, and lead to significant increases in the abundance of,

some of the seals' preferred finfish prey. Also, while at least the local harbor seal population is increasing, suggesting that local food supplies are not presently a limiting factor, there is no reason to believe that food will not be a limiting factor in 20 or so years when the Farm would be decommissioned and the structures removed. As pointed out earlier, if increases in food resources associated with construction of the Wind Farm allow the seal or other marine populations to equilibrate at higher levels than can be sustained by the current resources, a collapse in the populations could follow decommissioning of the Farm. Also as pointed out earlier, it is clear that the data described in the DEIS provide an insufficient basis for designing a monitoring program capable of validating the assumptions upon which this assessment is based.

c. Sections 3.2.9, 3.3, and 3.4

As pointed out elsewhere, none of the assessments in the DEIS of possible cumulative environmental impacts comply with the applicable parts of the CEQ guidelines for preparation of environmental impact statements. Also, as pointed out in our comments on the preceding sections of this appendix, few of the conclusions concerning possible impacts on pinniped populations are supported adequately by the data, analyses, or references to other data sources provided. Further, for the reasons noted, it is highly unlikely that the management or mitigation measures proposed would do much to assure negligible effects on the potentially affected pinniped populations.

d. Literature

Set forth below is the literature or pinnipeds that should be considered.

i. Literature on Seals in the Gulf of Maine and the Western Atlantic

Andrews, C., and P. R. Mott. 1967. Gray seals at Nantucket, Massachusetts. Journal of Mammalogy 48:657-658.

Baraff, L. S., and T. R. Loughlin. 2000. Trends and potential interactions between pinnipeds and fisheries of New England and the U.S. West Coast. Marine Fisheries Review 62 1-39 pp.

Barlas, M. E. 1999. The distribution and abundance of harbor seals (*Phoca vitulina concolor*) and gray seals (*Halichoerus grypus*) in southern New England, winter 1998 - spring 1999. MA Thesis, Boston University. 52 pp.

Bowen, W. D., J. McMillan and R. Mohn. 2003. Sustained exponential population growth of grey seals at Sable Island, Nova Scotia. I C E S Journal of Marine Science 60:1265-1274.

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Geraci, J. R., D. J. St. Aubin, I. K. Barker, R. G. Webster, V. S. Hinshaw, W. J. Bean, H. L. Ruhnke, J. H. Prescott, G. Early, A. S. Baker, S. Madoff and R. T. Schooley. 1982. Mass mortality of harbor seals: Pneumonia associated with influenza A virus. Science 215:1129-1131.

Gilbert, J. R., and N. Guldager. 1998. NMFS/NER Cooperative Agreement 14-16-009-1557 . Status of harbor and gray seal populations in Northern New England.

Gilbert, J.R., G.T. Waring, K.M. Wynne, and N. Guldager. 2005(*in press*). Changes in abundance of harbor seals in Maine, 1981-2001. Marine Mammal Science. 23(3).

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Harris, D. E., B. Lelli, G. Jakush and G. Early. 2001. Hooded seal (*Cystophora cristata*) records from the southern Gulf of Maine. Northeastern Naturalist 8:427-434.

Jacobs, S. R., and J. M. Terhune. 2000. Harbor seal (Phoca vitulina) numbers along the New Brunswick Coast of the Bay of Fundy in autumn in relation to aquaculture. Northeastern Naturalist 7 289-96 pp.

Lake, C. A., J. L. Lake, R. Haebler, R. Mckinney, W. S. Boothman and S. S. Sadove. 1995. Contaminant Levels in Harbor Seals from the Northeastern United-States. Archives of Environmental Contamination and Toxicology 29:128-134.

McAlpine, D. F., and R. J. Walker. 1999. Additional extralimital records of the harp seal, Phoca groenlandica, from the Bay of Fundy, New Brunswick. Canadian Field-Naturalist 113 290-2 pp.

Payne, M. P., and L. A. Selzer. 1984. Yearly changes in abundance of harbor seals, *Phoca vitulina*, at a winter haul-out site in Massachusetts. Fishery Bulletin 82:440-442.

Payne, M. P., and L. A. Selzer. 1989. The distribution, abundance and selected prey of the harbor seal, *Phoca vitulina concolor*, in southern New England. Marine Mammal Science 5:173-192.

Richardson, D. T. 1976. Assessment of harbor seal and gray seal populations in Maine 1974 - 1975. Report to U. S. Marine Mammal Commission Contract No. MM4AC009.

Rosenfeld, M., M. George and J. M. Terhune. 1988. Evidence of autumnal harbour seal, *Phoca vitulina,* movement from Canada to the United States. Canadian Field-Naturalist 102:527-529.

Rough V. 1995. Gray seals in Nantucket Sound, Massachusetts, winter and spring, 1994. Final report to Marine Mammal Commission. NTIS PB95-191391 ed.

Selzer, L. A., Greg Early, Patricia M. Fiorelli, P. Michael Payne and Robert Prescott. 1986. Stranded animals as indicators of prey utilization by harbor seals, Phoca vitulina concolor, in southern New England. Fishery Bulletin 84 217-20 pp.

Stevick, P. T., and T. W. Fernald. 1998. Increase in extralimital records of harp seals in Maine. Northeastern Naturalist 5 75-82 pp. 3

Zwanenburg, K. C. T., and W. D. Bowen. 1990. Population trends of the grey seal (Halichoerus grypus) in Eastern Canada. Pages 185-197 W. D. Bowen, editor. Population biology of sealworm (Pseudoterranova decipiens) in relation to its intermediate and seal hosts. Volume 222 4

ii. Food Habits of Harbor and Gray Seals

Bowen, W. D., and G. D. Harrison. 1994. Offshore Diet of Grey Seals Halichoerus-Grypus Near Sable Island, Canada. Marine Ecology-Progress Series 112:1-11.

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27. Appendix 5.6-A: Terrestrial Ecology Correspondence

Page 14. Only one endangered bat species, Myotis sodalis (Indiana bat), from Massachusetts, is Federally listed. Letters from various agencies are correct in asserting that this species has not been reported from southeastern Massachusetts.

29. Appendix 5.7-A: Preliminary Avian Risk Assessment (reported by Kerlinger and Hatch)

There was no reference to bats in this appendix. Citing a study by Erickson et al. (2001), estimates of 1-2 birds killed/turbine, included estimates of carcass removal by scavengers and those overlooked. From this study, the DEIS concluded that "*wind turbines do not impact any species because the number of fatalities are small—except for Golden Eagles.*" This study was conducted at the Altamont wind farm in northern California, and it is clear from more recent observations at this and other sites where similar assessments of fatalities have occurred, each site is unique with respect to habitat and species composition and one cannot extrapolate fatality rates from one site to another. A convincing example of this can be seen in fatality rates of bats observed at the Altamont site and other sites in Minnesota, Oregon, and Colorado (Johnson et al., 2003a, 2003,b, 2003c, 2004) that are significantly lower than what has been reported at on-shore sites in eastern North America (J. Kearns, pers. comm.). Moreover, for the CWA project, Kerlinger and Hatch admitted that "*the means of assessing risk is somewhat problematic*" because there is little information available about risks to birds offshore—at best only a 'rough estimate' can be made (p. 31). Kerlinger and Hatch concluded by stating that '*[r]isk assessment may be valid for many species, although for many others it is a rough approximation* and *information from new studies will be necessary.*" The fact that no empirical studies on risk assessment of wind turbines on bat populations have been conducted, suggests that such studies are needed before conclusions can be made about impact on migrants.

Kerlinger and Hatch further note (4.5.1, page 39) that: "*...turbines should not be situated in locations where there are high traffic rates of birds that are known to be susceptible to colliding with turbines or turbine like structures.*" This statement should be one of the principles that set policy standards for placements of wind turbines, either on land or at sea. Nantucket Sound should be ruled out on this basis.

In the Introduction to Chapter I, the authors (Kerlinger and Hatch) of this report note "rigorous and systematic studies done at sites throughout the United States, Canada and Europe . . . have not been suggested to impact bird populations." These authors note that "By rigorous and systematic we mean that the methods (duration of study, frequency of carcass searches, area of carcass searches, observer efficiency studies, and carcass scavenging studies) used at wind power sites have been accepted by various wildlife agencies and organizations as reliable means of determining numbers of fatalities." Until recently (summer 2004) at the Mountaineer site in West Virginia, these same standards

have not been applied in studies on bats. These authors further noted, that "Most fatality studies have been conducted in terrestrial situations and risk at offshore facilities has yet to be thoroughly investigated." Given the problems and challenges associated with assessing fatalities at onshore sites, and the nearly insurmountable problems of conducting similar assessments of fatalities at offshore sites, it may never be possible to know the fatalities at these sites if turbines are constructed.

These authors further note that "avian use of the proposed site" is "invariably required or requested by regulatory agencies" during the preconstruction period. They continue by stating that "Once the information about known or suspected risk factors and overall use by birds is gathered, it can be used to assess potential risks to birds at the site and to evaluate likely impacts on bird populations." These statements emphasize the critical need to collect appropriate empirical data on birds (and bats) for all sites being proposed for wind power development. Statistically rigorous data will require up to three years of empirical work both for bird and bat populations in Nantucket Sound. No further permit application review should occur until these studies are completed.

29. Appendix 5.7-E: Radar Studies of Birds

X-band and S-band radar studies were conducted at two sites within or near Nantucket Sound in the period from May 8 to June 7, 2002 (from a barge anchored at the southern edge of Horseshoe Shoal) and September 3 to 30, 2002 from land at the tip of Cape Page, Martha's Vineyard). Both X-band and S-band radar devices were deployed by GeoMarine of Plano, Texas. It was noted the S-band radar was capable of detecting "*birds*" above 36 feet above sea level up to 4 nautical miles from the installation, "*measuring bird size, flight speed and direction.*" The X-band radar reportedly "*measures altitude of targets passing within 3/4 miles of radar from top of radar to 9,000 ft above sea level.*" The report noted that a large percentage of the visually observed birds that flew below the range of turbine rotors were not detected by the radars.

The DEIS report erroneously referred to birds, yet it is well known that neither X-band or S-band radar, as deployed by GeoMarine, can distinguish birds from bats, or for that matter distinguish birds and bats at times from concentrations of insects. Thus, what is included in the report as "birds" may just as well be bats. This uncertainty raises serious questions regarding the efficacy of using X-band and S-band radar to assess either bird or bat traffic at proposed or installed wind farms. All of the data, summarized below, referred to birds within the radar range. It is important to emphasize that greater than 90% of the birds observed visually during the radar surveys were flying below 20 feet (and thus not detected by radar). The report also notes that the number of targets (birds and likely bats) varied seasonally (spring compared to fall dates). The number of targets was 2 x greater in the fall survey. Most targets were recorded above the rotor swept area (89% in the fall and 68% in the spring). <u>The radar study was not able to determine whether targets (erroneously reported only as birds in the report from GeoMarine) flew above or below fog or rain.</u> The report noted that "*the majority of 'birds' were small, attributed to songbirds*

or small shorebirds." It is informative that the report from GeoMarine failed to acknowledge the possibility that the small targets that they detected with X- and S-band radar could have been bats (which are the same approximate size as small song birds).

Appendix 5.7-E provides a peer review of the radar studies conducted in support of the document. Many of the key issues are well documented in this Appendix and further study is warranted based on this review.

30. Appendix 5.7-F: Spring/Summer 2002 Waterbirds Survey for the Cape Wind Energy Project

Appendix 5.7-F provides a review of methodologies used in visual counts of birds in the sound by aircraft and boat surveys. It outlines the difficulty in determining range and altitude estimates based on conditions and observer bias. Some of these biases may be addressed or "calibrated" in further studies if radar observations, or other methods, are used simultaneously to quantify errors. Other methods could include laser range finders, thermal infrared imagery, training observers on known targets such as suspended disks or radar directed targets, etc. Radar observations should also be "calibrated" by such supporting methods.

31. Appendix 5.11-A: Noise Report

Title Page. The author or authors of this section are not, but should be, identified.

Page 1, par. 1. Among other things, this paragraph states that "[t]he findings demonstrate there will be no adverse sound effect on humans or wildlife from the Project." This assertion is not supported by data, analyses, or references to other data sources or analyses provided in the Appendix or elsewhere in the DEIS. It also contradicts statements elsewhere that there would be unavoidable, temporary and localized impacts on both marine mammals and sea turtles.

Page 2, par. 4. The first sentence in this paragraph reads "[f]or underwater sound, the typical measurement range of interest is from 80 dBL (still water conditions) to upwards of 180 dBL, generally thought to be the threshold level for preventing injury or harassment to marine mammals and sea turtles." The corresponding footnote is a reference to a 27 June 2002 letter from Ms. Patricia Kurkal, Regional NMFS Administrator, to Ms. Christine Godfrey, U.S. Army Corps of Engineers. Here and elsewhere in the DEIS the letter from Ms. Kurkal is cited as the basis for the assertion that sound levels below 180 dB will neither cause injury nor harassment of marine mammals or sea turtles.

The letter from Ms. Kurkal is a response to a 16 May letter from Ms. Godfrey initiating informal section 7 ESA consultations with the NMFS concerning construction of a single data tower in Nantucket Sound. Ms. Kurkal's letter noted the NMFS' understanding that "the data tower will consist of three piling supports which will be driven into the ocean

bottom and a platform which will extend 197 feet above the mean lower low water elevation on Horseshoe Shoal in Nantucket Sound" and that the pile driving was expected to last 3 days and to produce anticipated sound levels of approximately 125 dBA [far below the sound levels actually measured]. Further, the letter indicated that:

- during prior consultations [not described in the letter or in the DEIS], NMFS had identified 180 dBA as the threshold level for preventing injury or harassment to marine mammals and sea turtles;
- NMFS concurred that the expected 125 dBA sound level would be below the 180 dBA threshold level for harassment or injury of ESA-listed species;
- in order to confirm the expected 125 dBA source level and ensure compliance with the 180 dBA threshold level, the NMFS recommends that the sound levels produced during the initial pile driving be monitored;
- listed species, particularly sea turtles, could be present in the area and at the time of year that the construction is planned and the NMFS therefore recommends that a Service-approved observer be present during the pile driving to document the presence of any listed species in the vicinity of the construction activities and that the activities be suspended until the animal is confirmed outside the estimated 180 dBA safety zone; and
- if a sea turtle or other listed species is injured, all construction activities must be stopped and further consultation initiated.

The letter also noted that "NMFS comments and section 7 determination on the proposed wind energy project will be forthcoming, once additional information is obtained and an Environmental Impact Statement (EIS) is submitted."

Although there is no indication in either the letter or the DEIS of the additional information that apparently was requested, it is clear that the letter addressed only the measures needed to avoid possible impacts on ESA-listed species from sounds expected to be generated by driving of three piles over three days. To assume, as has been done, that the same measures would avoid possible adverse impacts from the project as a whole on both ESA-listed marine mammals and sea turtles, and on non-listed marine mammals is not supported by information provided either in this Appendix or elsewhere in the DEIS.

Also, while Ms. Kurkal's letter notes that non-ESA listed species of seals, whales and dolphins have been documented transiting the Sound and to strand on adjacent beaches, and that all marine mammals receive special protection under the MMPA, it deals only with the requirements of the ESA. It makes no mention, for example, of the MMPA requirement to obtain a "taking" authorization if any marine mammal could be killed, injured or harassed incidental to the proposed project. Further, neither the letter nor the DEIS acknowledge that there are significant uncertainties and differing opinions concerning the validity of the cited 180 dBA threshold for preventing injury and

harassment of marine mammals and sea turtles. For example, while little is known about the effects of sound on sea turtles, it is well documented and acknowledged in the DEIS that a variety of marine mammal species are known to respond in detectable ways to received sound levels well below 180 dB. What is not known is the responses that have biological significance - e.g., that cause reductions in the life expectancy or reproductive potential of individuals and therefore could affect the size or productivity of the populations of which they are components.

The uncertainty concerning the biological significance of behavioral disturbances is widely recognized. It is pointed out in the following three National Research Council reports, none of which are referenced in the DEIS:

- National Research Council (NRC). 1994. Low-Frequency Sound and Marine Mammals: Current Knowledge and Research Needs. National Academy Press, Washington, DC. 75 pp.
- National Research Council (NRC). 2000. Marine Mammals and Low-Frequency Sound. National Academy Press, Washington, DC. 146 pp.
- National Research Council (NRC). 2003. Ocean Noise and Marine Mammals. National Academy Press. Washington DC. 192 pp.

Among other things, the issues and concerns raised in these reports led the NMFS, the Office of Naval Research, the National Science Foundation, and the Minerals Management Service to cooperatively provide support in 2003 to the National Research Council for an expert study of the subject. The study was initiated in October 2003 and the results were published early in 2005. A preliminary report, titled *Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects,* is available on the NRC's web site at www.nap.edu/catalog/11147.html.

Congress also has recognized the uncertainties concerning the effects of anthropogenic noise on marine mammals. In the Omnibus Appropriations Act of 2003 (Public Law 108-7), it directed the Marine Mammal Commission (MMC) to "fund an international conference or series of conferences to share findings, survey acoustic 'threats' to marine mammals, and develop means of reducing those threats while maintaining the oceans as a global highway of international commerce." This effort was initiated early in Fiscal Year 2004 and is expected to be completed in 2005. The nature of these ongoing consultations and much of the background information compiled to date are described in the MMC's web site at www.mmc.gov/sound/.

Both the uncertainties and the measures being taken to address them should have been addressed in the DEIS. Also, instead of depending on a reference in the letter from Ms. Kurkal, the Army Corps should have requested and, as appropriate, incorporated in the DEIS the NMFS' actual findings and policy regarding the effects of sound on marine mammals and sea turtles.

As pointed out in our comments on Appendices 5.5-A and 5.5-B, and related sections of the DEIS, additional baseline information would be required to do a realistic assessment of the possible direct and indirect impacts of the proposed project on marine mammals and sea turtles. Even then, significant uncertainties likely would remain and a monitoring program, much more comprehensive than that outlined in the DEIS, would be required to ensure that there are no unanticipated, unacceptable impacts.

Page 3, section 2.1 (Sound Measurements During the SMDS Pile Driving). The introduction to this section indicates that the Corps issued a permit (#199902477) authorizing the construction of a Scientific Measurement Devices Station (SMDS) in the Horseshoe Shoal area and that the Permit specified:

> Underwater sound pressure level measurements will be made at an Initial Safety Zone radius of 500 meters to determine compliance with the 180 dB NMFS threshold. Hydrophone Measurements will use the Lmax RMS 'fast' setting, and data will be analyzed on a real-time basis to ensure continuing compliance. If measured levels exceed the threshold, a site-specific Safety Zone radius corresponding to the 180 dB threshold will be established and the NMFS approved observer will be advised of the expanded action area for observation of marine mammals.

The permit condition appears to recognize that the activity could harm or adversely affect the behavior of marine mammals and sea turtles. Such "taking" can not be authorized by the Corps. As indicated earlier, the MMPA prohibits "taking" of marine mammals without prior authorization. Consequently, if a marine mammal was killed, injured or harassed during installation of the SMDS, the "take" would have constituted a violation of the MMPA. If, as seems likely, both construction and operation of the proposed Wind Farm could result in the taking of marine mammals and sea turtles, the taking would have to be authorized by the NMFS in accordance with the applicable provisions of the ESA and MMPA. Those provisions should have been, but were not, described in the DEIS.

Page 4, par. 1. The first three sentences in this paragraph state that:

> The underwater Lmax sound level ranged from 145 to 167 dBL at a distance of 500 m with the peak energy occurring in the 500 Hz 1/3 octave band. The ambient underwater Lmax was 123 dBL. The extensive sound monitoring effort demonstrated full compliance with the USACE sound level criterion.

The measured sound level was much higher than the anticipated 125 dBL referenced in the previously noted 27 June 2002 letter from the Regional Administrator of the NMFS. Also, while the measurements may have demonstrated compliance with the Corps sound level criterion during installation of the SMDS, they do not provide a sufficient basis for

concluding, as appears to have been done, that installation of nearly 50 times more, pilings, in locations with different water depths and substrates, and at different times of the year, would have the same or higher transmission loss rates. Further, there appears to have been no consideration given to possible sound transmissions through the differing bottom substrates in Horseshoe Shoals, or the possibility of higher received levels due to sound convergence beyond the 500m where the sound measurements were made. It is well known that transmission characteristics are likely to vary by season, and will vary with water depth, bottom substrate, bottom contour, and weather conditions. Thus, without better justification, there is no basis for assuming, as has been done, that the referenced sound measurements can be extrapolated and used as a reliable indicator of likely received sound levels at different distances from the sources throughout the construction and operation of the proposed Wind Farm. Also, it appears that no consideration was given to the distances from the pile driving that sound levels would be sufficient to kill, injure, stun, or affect the hearing and behavior of different sizes and species of finfish.

Minimally, additional sound measurements at variable water depths, etc., both inside and beyond the proposed 500 m "threshold" level, will be required to validate the estimates of likely exposure levels at different distances from representative monopole sites within the proposed Wind Farm. These should include (1) measurements at distances of 100 m or less to confirm estimates of source levels and to determine the distances from the sources that different species and sizes of finfish would be at risk; and (2) measurements to confirm estimates of the distances from the sources that sound levels will approach ambient levels at different times of the year and in different weather conditions.

Pages 4 and 5 (Sound Measurements During Monopile Driving). This section describes the results of underwater sound level measurements made on a single day during construction of the Utgruden Wind Park in the Baltic Sea. It then indicates that (1) the monopile foundations were similar in size to the monopiles planned for the Project, and (2) these data sets are the best available and, because of the similarities in environmental conditions in Nantucket Sound and the Baltic Sea, they were used to model the underwater sound impacts for the pile driving aspect of the Project. The actual dimensions of the monopiles are not identified. Likewise, the environmental conditions -- e.g., water depth, bottom type, bottom contour, etc. -- at the Utgruden site are not described. The reader is asked to simply accept that the structures, procedures, and environmental conditions in the two areas are comparable. Also, as noted earlier, it appears that no consideration was given to sound transmissions through the seabed or to possible sound convergence beyond the area where the measurements were made.

The DEIS failed to describe the structures and environmental conditions at the two sites in sufficient detail to show that they are, in fact, comparable.

Page 5 (Underwater Sound Measurements During Operation of a Monopile WTG). Among other things, this section indicates that

- As part of an environmental study, underwater sound level measurements were made on 26 January 2000 at a distance of 20m from an operating WTG near the Swedish Island of Gotland;
- The Gotland WTGs are 550 kW units and one was operated at its design speed during the study;
- Most of the sound energy was in the frequency range of 63 to 500 Hz and the peak 1/3 octave band was 95 dBL at 160 Hz;
- Preliminary measurements, made at 100 m, during an ongoing study of a 1.5 MW GE WTG at the Utgrunden Wind Park show a similar sound spectrum, with the peak energy at a lower frequency (63 Hz); and
- Underwater sound levels for the Project were calculated from these two sets of measurements with the spectrum peak at 31.5 Hz.

The design speed of the Gotland WTG is not identified. Likewise, the water depths, bottom types, and other environmental conditions at the two sites are not identified. Also, there is no explanation of why 31.5 Hz was used as the spectrum peak for the Project calculations. Further, there is no indication of the rationale for believing that the larger, 3.6 MW units proposed for use at Horseshoe Shoals site would generate similar underwater sounds.

Page 5 (Above Water and Underwater Sound at Two Off-Shore Sites). This section indicates that "[s]hort-term existing daytime sound level measurements were made above water and underwater at two locations in the areas where recreational boaters travel: at Buoy G5 in the North Shipping Channel about one mile north of the edge of the Proposed Alternative location of the Wind Park, and at Buoy R20 at the edge of the Main Channel about 1/3 mile south of the Proposed Alternative location." It notes that the data were collected on 22 October 2002, between 10 a.m. and 12 noon, and that the weather conditions were clear skies, light winds (4 mph average, and light seas (0.5-1.5 foot waves). The rationale for concluding that these locations and measurements made over two hours in a single day provide a reasonable approximation of the ambient sound conditions likely to occur at Horseshoe Shoals throughout the year is not explained. The rationale for this and other conclusions noted earlier are questionable and should be explained.

Page 7 (Analysis of Impacts). This section states that

> The Project has been planned, sited, and designed to avoid or minimize noise impacts. The findings of noise studies conducted for the Project indicate that no adverse impacts to humans or wildlife relative to noise are anticipated as a result of this Project. While temporary and limited impacts are anticipated during construction, measures will be implemented to prevent and minimize these impacts.

There is no indication in this Appendix or elsewhere in the DEIS of what is meant by a temporary and limited or localized impact. Although there was reasonable justification for concluding that possible impacts from the three-day installation of the pilings for the Scientific Monitoring Devices Station would be temporary and localized, it does not follow that impacts from construction of the Wind Farm, which would cover a much larger area and apparently would take 13 months or more (up to one month for the installation of each 10 strings of monopiles), would likewise be temporary and localized. As pointed out earlier and explained below in more detail, the measures proposed to prevent or minimize possible adverse impacts on marine mammals and sea turtles are insufficient to do so. Also, the available baseline data are insufficient to design monitoring programs capable of verifying the assertion that the Project would have no more than temporary and localized effects on marine mammals and sea turtles.

Pages 7 & 8 (Acoustic Modeling Methodology). The model or models used for the purposes indicated in this section are neither identified nor described anywhere in the DEIS. Consequently, it is not possible to make reasoned judgments as to whether the model(s) and modeling methods were appropriate, and whether the modeling results are likely to be an accurate reflection of the real world. This oversight should be corrected in the DEIS.

Among other things, this section concludes that "no noise impacts on recreational boaters are anticipated due to operation of the Project at either the cut-in or design wind speed conditions" and that "no noise impacts are anticipated at any onshore locations due to Project operation for either the cut-in or design wind speed conditions." These conclusions are based on two assumptions that are not valid.

Assumption # 1: *Attenuation effects due to air absorption, wind and temperature gradients, and atmospheric turbulence are assumed to be zero for all but the design wind speed conditions.*

Physical laws of refraction supported by a significant body of literature show this assumption not to be valid. Bending or refraction of sound waves in the atmosphere occurs because of large scale wind and thermal gradients, while absorption is related to motion at the molecular level. One has virtually nothing to do with the other and it is inappropriate to assume that they cancel each other out. One would expect refraction effects to be much larger than absorption effects, especially at the relatively low frequencies associated with WTGs. As pointed out by Beranek and Ver (1992),

> Downwind over water in the daytime, sound first refracts downward, then reflects without attenuation from the water's surface, and then continues on to refract/reflect many times again. As a result, sound is channeled into a moderately thick layer of air above the waster, and levels can be 10 - 20 dB higher downwind than would be expected.

Further, it appears that the DEIS actually *does* include atmospheric absorption effects without compensating refraction effects. Predictions in the DEIS are *identical* to those presented in a 2003 contract report to the Massachusetts Energy Facilities Siting Board. In the latter report, values of atmospheric absorption used in modeling sound propagation are given as a function of frequency. In the DEIS, these numbers are omitted from the tables, but the results are the same.

Assumption #2: *For high wind conditions (20 mph and above), a transition from hemispherical to cylindrical wave spreading occurs at a distance of 2km from the source only for sound at frequencies below 20 Hz. At higher frequencies, attenuation follows hemispherical spreading.*

This assumption is based on several studies of low frequency sound propagation from a downwind turbine. A downwind turbine is one that positions the rotor downwind of the supporting pylon. As the rotor turns, each blade sweeps through the aerodynamic wake behind the pylon and creates a very low frequency thumping noise, containing high levels of infrasound that are detectable by humans as long distances. Wilshire and Zorumski (1987) reported measurements of the propagation of these sounds. And Hawkins (1987) used ray theory to predict analytically the propagation of theses sounds.

Figure 1 in the Wilshire and Zorumski paper shows clearly that a cylindrical, rather than hemispherical, spreading law very nearly matches a "best fit" of low frequency data from about 300 m to 20 km. The notion that a transition from hemispherical to cylindrical spreading occurs at 2 km appears to be based on the theoretical predictions of Hawkins. His theory shows hemispherical propagation out to about 2 km and much more gradual attenuation beyond that. However, empirical data do not support the theory at distances close to the WTG. Figure 5.3-5.5 in the Wilshire and Zorumski paper indicate that experimental results are about 5 - 10 dB above the hemispherical curve in the 1 - 2 km range. When the theory and empirical results disagree, one normally assumes the empirical data to be correct. At greater distances, data and theory are more closely aligned and show a 15 to 20 dB reduction in attenuation as compared with a hemispherical model.

Applying the hemispherical/cylindrical transition to infrasound below 20 Hz is irrelevant to humans whose hearing does not extend to those frequencies. So, this correction is rather meaningless and indicates that Assumption 2 is inappropriate in that it applies to a frequency region of sound which humans cannot hear and ignores refraction effects that occur in the region where they can hear.

Given the preceding, it appears that in air noise levels could easily be 10 -20 dB higher than is predicted. In that case, Wind Park noise would be detectable and could exceed existing environmental levels at a number of locations.

On a related matter, it appears that no consideration was given to infrasonics and harmonics that could be produced by the rotation of the wind turbine blades. For example,

if the rotor turned at 60 rpm and had three blades, the blade rate would be 3 Hz and a 3 z tone could be expected in both the airborne and underwater sound. Higher frequency harmonics also might be present. Infrasonic sounds as low as 5 Hz have been detected with higher frequency bowhead whale calls, suggesting that bowheads and possibly other whales may be able to call at infrasonic frequencies. The hearing sensitivity of baleen whales has never been measured. It is generally assumed that they are likely able to detect all of the frequencies used in their calls. Fish sensitive to the low frequency oscillations or movements of other fish will be sensitive to infrasonic sounds. There is no information on the ability of sea turtles to detect infrasonic sounds.

These possibilities should be addressed in the DEIS. If the project proceeds, monitoring should be done early on to measure both airborne and underwater sounds at rotor blade frequencies, even if they are as low as 1 Hz. These infrasonic measurements should be made near the base of the monopiles and at increasing distances until the sounds are indistinguishable from background levels. The movements of representative species of marine mammals, sea turtles, and both bony and cartilaginous fishes should be monitored following start-up to detect and determine the biological significance of any apparent responses to these low frequency sounds.

Page 10 (Construction Effects). Among other things, this section states that

> The underwater sound effects of construction will be **temporary** and are associated with the installation of 130 16-foot diameter monopiles (one for each WTG), installation of six smaller 4-foot diameter piles for the ESP, and vessel traffic for transporting equipment, piles and workers to the site.... The driving rate will be in the range of 2 to 36 impacts per minute. It is anticipated that **the process of completing one string of WTGs (10 WTGs with associated inner-array cable and scour mats) will take up to approximately one month and installation of all 130 WTGs will occur over two construction seasons** (emphasis added).

A construction season presumably is the mid-year months when weather conditions generally are better than in the winter and when migratory sea turtles and whales, including the highly endangered right whale, are most likely to be present in and near the proposed Wind Farm site. As pointed out earlier, concluding that possible impacts from exposure of whales and other wildlife to sounds from construction and related activities for a year or more would be temporary is not supported by data or analyses provided in the DEIS and appears misleading at best.

This section also indicates that

> Sound data from installation of similar sized piles at the Utgrunden Wind Park were used in the acoustic modeling.... The levels [of predicted Lmax

> underwater sound from pile driving] range from 170 dBL at a distance of 1220 m to 145 dBL at a distance of 21 km.

As pointed out earlier, no rationale is provided for the conclusion that environmental conditions at the Utgrunden and Nantucket Sound sites are comparable so that data from the Untgrunden site can be used for acoustic modeling of the Sound. Similarly, there is no indication of what constitutes "similar sized piles" and, if the sizes are not identical, why the sounds produced during driving are considered comparable. Consequently, the basis for the acoustic modeling of the Nantucket Sound site is questionable.

Also, it is well documented that many cetacean species can detect and, in some situations, may respond to sounds in their hearing ranges less than the 145 dBL predicted to occur at a distance of 21 km from the Wind Park. This suggests that right whales, humpback whales, and other cetaceans moving into Nantucket Sound from the Great South Channel, a critical right whale habitat, may be exposed to detectable sound levels from pile driving. This possibility is not, but should have been, acknowledged and evaluated in the DEIS.

The last two sentences in this section state that

> The frequency spectrum of the underwater sound at a distance of 500 m from the piles is shown in Figure 40. The pile driving peak energy occurs in the 31.5 Hz 1/3 -octave band.

However, Figure 40 shows the beak to be in the 315 Hz band. One or the other presumably is wrong and must be corrected.

Page 10 (Operational Effects). This section notes that acoustic modeling using data from the Utgrunden and Gotland Wind Parks indicates that during operation of the proposed 130 WTGs "[t]he total level of baseline plus Project sound falls [would fall] from 109.1 dBL at 20 m to 107.5 dBL at 50 m to 107.2 dBL at 120 m. It then states "[t]hus, underwater levels fall to the baseline level within a relatively short distance (120 meters) of each monopile, which is far less than the spacing between monopiles."

Among other things, section 2.2.1 indicates that the underwater Leq levels measured at two sites in Nantucket Sound were 90 and 93 dBL respectively, suggesting that the ambient noise level in the Sound may be significantly less than in the areas from which the data were drawn for the acoustic modeling. This in turn suggests that operational sound levels may remain at detectable levels for distances greater than the 120 m indicated. Thus, if the monopiles are constructed approximately 629 meters apart as is indicated, sounds associated with operation of the WTGs could remain above detectable levels throughout and beyond the boundaries of the Wind Park. The consequences of this possibility were not, but should have been, considered in the DEIS. Among other things, the possibility that such relatively constant, low level sounds could attract marine mammals, turtles, and fish -- i.e. become an attractive nuisance -- should be considered.

Page 14, section 5.2.2 (Mitigation of Potential Impacts from Underwater Sound). This section indicates that

> Construction noise impacts will be **temporary**, unavoidable, and are primarily associated with pile driving the monopiles in the Wind Park. Predicted maximum underwater sound levels at a distance of 500 meters will be below the 180 dBL threshold set by the NMFS to prevent injury or harassment of marine mammals, sea turtles and **fish**. Noise mitigation will consist of having a NMFS approved observer present **during initial pile driving** to ensure no listed marine species are within the 500 meter Initial Safety Radius...**There will be no measurable underwater sound from Project operation beyond 120 meters from each monopile** and Project operations will not adversely affect marine mammals, sea turtles or fish (emphasis added).

As indicated earlier, the fact that pile driving apparently would take place for at least 13 months over two construction seasons makes it questionable, if not highly unlikely, that the possible impacts of construction noise would be temporary. Also, there is no indication in the frequently referenced 27 June 2002 letter from the Regional Administrator of the NMFS that the proposed 500 meter Safety Zone would prevent injury or harassment of fish. In this context, there is no indication as to how fish would be detected inside the proposed 500 meter Safety Zone. Also, as noted earlier, there is good reason to believe that sound levels below 180 dBL can have significant adverse effects on the behavior of some marine mammals so that the proposed 500 m Safety Zone may not avoid possible injurious harassment of marine mammals as defined in the Marine Mammal Protection Act, including injurious harassment of the highly endangered right whale. Further, even if application of the 500 m Safety Zone would prevent injurious harassment of right whales and other marine mammals, it is questionable whether it could be implemented effectively if approved NMFS observers would be present during the initial pile driving only. Also in this context, it appears that no consideration was given to possible higher sound levels beyond 500 meters due to converging sound paths or transmission of sounds through the bottom substrate. Finally, it seems likely that sounds from operation of the WTGs would be both measurable and detectable by at least some marine species beyond 120 meters from the monopiles.

32. Appendix 5.12-A: U.S. Coast Guard Correspondence

This section is incomplete whether it purports to reflect the public record of correspondence to the Coast Guard or correspondence to the Corps from the Coast Guard regarding the proposed project. It contains a single letter from the Coast Guard detailing the initial navigation safety requirements for the project in 2003. It is missing several e-mails and at least eight other pieces of correspondence including several letters expressing safety objections and concerns over the project from The Woods Hole,

Martha's Vineyard and Nantucket Steamship Authority and Hy-Line Cruises. It lacks letters from the Alliance to Protect Nantucket Sound submitting The McGowan Group report for review. Likewise, it lacks the Coast Guard letter (7/31/03) to the Corps (Adams) which, in addition to reporting the opinion "It appears to have sufficiently addressed the issues raised in MSO Providence's letter to you of February 10, 2003" on the 6/24/03 draft of Appendix 5.12-B, also requests clarification of two points on the Rules of the Road and on the safety of vessels with the WTG rotor blade clearance. It lacks any correspondence reporting the results of any Coast Guard review of Appendix 5.12-B.

The DEIS, in an incomplete and misleading manner, favorably comments in several areas (3.4.3.4.10, 5.12.2, and 5.12.4.1.1) on the results of a Coast Guard review of Appendix 5.12-B. It appears that the Coast Guard was never sent nor ever commented on the final navigational risk assessment that is included in the DEIS as Appendix 5.12-B. Finally, this section omits the letter sent from the Coast Guard (Landry) to the Corps (Adams) reporting receipt of The McGowan Group report and letter from the Steamship Authority. The Coast Guard suggested in this 7/12/04 letter that "Two documents in particular have raised issues that may need more examination and evaluation before a Draft Environmental Impact Statement is published." There is no indication that the Corps even considered this suggestion from the Coast Guard.

The purpose of this section in the DEIS needs first to be explained, then reviewed and made complete to fully serve its purpose. In addition, although issued after the release of the DEIS, the Coast Guard wrote to the Corps on February 14, 2005 with the important admission that considerable additional analysis is necessary on navigational impacts. The need for this work calls for a supplemental EIS.

33. Appendix 5.12-B: Navigation Risk Assessment

A new, complete and rigorous navigation risk assessment should be performed based on the elements of recognized international standards and industry best practices before an EIS is issued. Separate casualty and marine pollution analyses should be performed for each of the offshore alternatives since vessel traffic, routes and frequency of usage as well as vessel casualty and marine pollution history vary widely. The Coast Guard should perform a complete review of the new risk assessments and consider using the expertise of the Coast Guard Marine Safety Center. Please see detailed comments for Sections 1, 4 and 5 regarding the deficiencies of this appendix.

34. Appendix 5.12-C: FAA Determination

In the FAA NE Region letter found in Appendix 5.12-C, FAA Determinations, the FAA pledged to conduct an evaluation "regarding physical, electromagnetic, or line-of-sight interference on existing or proposed air navigation, communication, radar, and control

systems facilities." Evidence has been presented in the United Kingdom studies that points out the further research is needed before a supplemental EIS is released.

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