COMMONWEALTH OF MASSACHUSETTS

EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

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February 18, 2010

In the Matter of
Town of Plymouth

Docket No. WET-2009-016
File No. SE 57-2339
Plymouth

RECOMMENDED FINAL DECISON

I. INTRODUCTION

The petitioners in this matter appeal the Superseding Order of Conditions ("SOC") issued by the Department of Environmental Protection's Southeast Regional Office (the "Department") to the Town of Plymouth, ("Town"). The SOC conditionally approved the Town's request to allow the continued access by Off-Road Vehicles ("ORV") onto portions of Plymouth Long Beach ("Plymouth Beach")in accordance with a Beach Management Plan ("2008 Plan"). Plymouth Beach is a barrier beach that includes coastal beach and coastal dune resource areas subject to the Wetlands Protection Act, G.L. c. 131. § 40 (the "Act") and the Wetland Regulations, 310 CMR 10.00 (the "Regulations"). Plymouth Beach was also determined by the

Natural Heritage and Endangered Species Program ("NHESP") to be the habitat of five species of shorebirds protected pursuant to the Massachusetts Endangered Species Act, M.G.L. c. 131A, ("MESA") including piping plovers and four species of terns.

There are four petitioners. The first Petitioner is the Goldenrod Foundation Inc. ("GFI"). GFI is a non-profit Massachusetts corporation whose mission is to conserve and protect coastal habitat in Southeastern Massachusetts. It owns property on Plymouth Beach. The second Petitioner is the Defenders of Wildlife ("DW"). DW is a national, nonprofit membership organization with a mission to protect all native animals and plants in their natural communities. The third and forth Petitioners are two 10 citizens groups, one group are members of DW and the other are Town residents. The Petitioners contend that continuing to allow ORVs to use Plymouth Beach will result in adverse effects to the coastal wetland resources areas in contravention of the Act and the Regulation's performance standards governing coastal beaches (310 CMR 10.27), coastal dunes (310 CMR 10.28) and the estimated habitat of rare wildlife (310 CMR. 10.37).

After conducting a three day Adjudicatory Hearing ("Hearing"), I conclude that the SOC conforms to the Regulation's performance standards applicable to the resource areas on Plymouth Beach, including coastal dune, coastal beach and wildlife habitat. Based on the evidence presented at the Hearing, I recommend revisions to the SOC be incorporated into the Final Order of Conditions ("FOC") in order to clarify and strengthen certain of the special conditions of the SOC regarding protection to the state-listed species.

II. FACTUAL BACKGROUND

Plymouth Beach is a narrow 2.8 mile barrier beach, a peninsula of coastal beach and dunes whose boundary is the Ell River on its western side and Plymouth Bay on the eastern side out to its northern tip. It extends northwest from the mainland. Its southern end is characterized by a narrow to non-existent tidal flat and beach area with an exposed dike. The southernmost portion has a well established, vegetated dune field that generally runs along the center of its north-south axis with the large dune formations predominating from approximately its mid-point to the northern tip. The northern end has substantially wider tidal flats and beach areas. It is characterized as a low energy beach due its gently sloping profile from the dune field down to the Bay. Extensive tidal flats are exposed during low tides. Access to the northern end of the seashore and homes on river side is via an unpaved right of way maintained by the Town.

The Town has a long history of allowing its residents to drive and park ORVs on Plymouth Beach in order to facilitate public access to the more northern portion of the seashore. The Department began regulating ORV access in 1992. Gilmore Prefiled Direct Testimony ("PFD") ¶4. In 1998, the Town adopted a beach management plan that incorporated the recommendations of guidelines issued by the NHESP and the Department regarding recreational use of beaches that provide habitat for piping plovers and terns. The Plymouth Conservation Commission ("PCC") issued an Order of Conditions ("OOC") approving the Beach Management Plan. Id. The Massachusetts Audubon Society, ten residents, and two Plymouth Beach property owners requested a Superseding Order of Conditions from the Department. A SOC issued and was appealed by the Audubon Society and the property owners. After extended negotiations between the parties, a Settlement Agreement was reached along with an amended 1998 beach management plan (the "1998 Plan") that was incorporated into a Final Order of Conditions in

2003 (the "2003 FOC"). ORV access and operations on Plymouth Beach have continued to be regulated pursuant to the 1998 Plan and the 2003 FOC.[1]

Plymouth Beach is important habitat for piping plovers and terns.[2] Melvin Hearing Testimony ("HT"), pages 704-705. Piping plovers are listed as "threatened", the Least, Arctic and Common species of terns are listed as "special concern", and the Roseate Tern is listed as endangered under the MESA definitions and the implementing regulations at 321 CMR 10.00. In accordance with the provisions of 310 CMR 10.37, the Division of Fish and Wildlife ("DFW") issued a letter on March 20, 2008, that determined that Plymouth Beach was actual habitat for these species, and conditionally determined that the 2008 Plan would not result in an adverse effect to their habitat ("DFW Determination"). Through the spring and summer, plovers and the terns use the dune and beach habitat to breed and prepare for their annual fall migration.

The SOC adopts the 2008 Plan and prescribes additional Special Conditions ("S.C."). In summary, Plymouth Beach is divided into four zones which determine when and where ORV access is permitted. S.C. No. 21; Gould PFD ¶¶ 38-53, An ORV travel and parking corridor is laid out within Zone 2, an area of 5,500 feet long that runs north from approximately the mid-point of the beach on the Bay side. The seaward boundary of the corridor is set at the mean high tide ("MHT") line. The landward boundary is a maximum of 42 feet wide, but that limit is subject to being narrowed pursuant to several SOC special conditions intended to protect plover and tern habitat, coastal dunes and dune vegetation. S.C. No. 23. The SOC also prescribes that

[1] The 2003 FOC expired in September 2006, without a request for an extension. In the interim, the Town operated Plymouth Beach pursuant to an Administrative Consent Order with the Department that required the Town to comply with 2003 FOC and the Settlement Agreement.

[2] Plymouth Beach also provides habitat for other migratory shorebirds, but as those birds are not state listed endangered species and the habitat provided to them is not nesting habitat the SOC was not required to address the potential impact ORV operations would have to those species' habitat. See, 310 CMR 10.37 and 310 CMR 10.28(3), which precludes interference with mapped or otherwise indentified bird nesting habitat.

ORV travel and parking is prohibited or limited beginning at the commencement of plover and tern breeding periods and continuing until the chicks have fledged. S.C. Nos. 22, 28, & 29.

The Petitioners assert that the travel corridor is located within both coastal dune and coastal beach resource areas. They claim that the physical impacts caused by ORVs to these resources area contravene the applicable performance standards for coastal beach and coastal dune resulting in adverse effects that damage the resources and increase the potential for storm damage and flooding. The Petitioners further contend that the DFW Determination's conclusion of no adverse effect is invalid because it is based on factors that are inappropriate to consider in the application of the 310 CMR 10.37 and the definition of adverse effect at 310 CMR. 10.23. They also challenge the SOC on the grounds that its provisions are inadequate to protect the nesting, food and shelter functions the habitat provides to plovers and terns from the adverse effects of ORVs.

III. PRIOR PROCEEDINGS

In February 2008, the Town filed a new Notice of Intent ("NOI") with the PCC seeking continuation of the ORV access and operating rules established under the 1998 Plan, the Settlement Agreement and the 2003 FOC ("2008 Plan"). The PCC issued an Order of Conditions that approved the 2008 Plan, and in response to the Petitioners' request for Department review, the Department issued the SOC in March 2009. The SOC approved the 2008 Plan with additional Special Conditions.

At the outset of this appeal, I determined that it is a major and complex case as defined by 310 CMR 10.05(7). Nine witnesses testified at the Hearing.[3] The Petitioners' witnesses were:

(1) Scott Heckler, is the GFI's Executive Director since April 2008. Prior to his current position he was employed in the Massachusetts and National Audubon Societies as the Director of the Coastal Waterbird Program and the Coastal Bird Conservation Program. His responsibilities included the development of conservation and habitat protection programs for piping plovers and terns. He has a Master of Science ("MS") degree in Resource Management and Administration.

(2) C. Diane Boretos, is the principal wetlands biologist for Call of Wild Consulting and Environmental Services. She is certified as a Professional Wetland Scientist is certified in the Habitat Evaluation Procedure. She has worked in field of wetland's biology since 1981.

(3) Jonathan Cohen, PhD., is a research scientist in the Department of Fisheries and Wildlife Science at Virginia Polytechnic Institute where he manages and performs wildlife studies. He has conducted graduate research focusing on piping plovers ecology and authored the USGS Management and Protection Protocols for the Threatened Piping Plover on Cape Hatteras National Seashore, North Carolina.

(4) Scott Humphries, is a Senior Coastal Geologist with LEC Environmental Consultants. He has a graduate degree in Geology and his technical expertise is in the areas of coastal geomorphology and flood hazard mitigation. He has worked in this field since the 1978.

The Town's and Department's witnesses were:

[3] Catherine Muther is the president of Goldenrod Foundation. She submitted pre-filed direct as well as rebuttal testimony. She also attended the Hearing, but the respondents agreed to waive their right to cross examine her. The nine witnesses listed above also filed pre-filed testimony in the case.

(1) Scott Melvin, PhD., who has been the senior biologist with DFW since 2002. Prior to his current position, he was the Rare Species Biologist in DFW for most of the period since 1983. Dr. Melvin has spent the last 25 years developing and coordinating conservation efforts for piping plovers in Massachusetts. He was the principal author of DFW's Guidelines for Managing Recreational Uses of Beaches to Protect Piping Plovers, Terns, and Their Habitat in Massachusetts and has authored many studies on piping plovers.

(2) Daniel Gilmore, is an Environmental Analyst in the Department's wetlands program since 1989. He holds a graduate degree in Coastal Zone Management and Planning. He is a certified Wetland Scientist and Soil Evaluator.

(3) John Ramsey, is a Principal Coastal Engineer at Applied Coastal Research and Engineering. He has a Masters of Civil Engineering (Coastal) and is a Professional Engineer. He has worked in the field of coastal engineering since early 1990.

(4) Kerin McCall, is an Environmental Technician for the Town who is responsible for the implementation of the Town's Plymouth Beach Management Plan. She has been an Environmental Technician since 2005. Prior to that position, she was employed by the Town as a Natural Resource Officer for two years. She has worked in shorebird conservation positions since 1999. She has a Bachelor of Science degree in Marine Science.

(5) David Gould, is the Town's Environmental Manager and Acting DPW Director. He has been directly involved in the management of Plymouth Beach since 1991. He holds a Masters Degree in Environmental Planning.

On December 28, 2009, I issued a Tentative Decision and received comments from the Petitioners and the Town. I have considered their responses and recommendations in issuing this Recommended Final Decision.

IV. ISSUES FOR ADJUDICATION

1. Do the maintenance and use of a vehicle corridor and parking zones for ORVs on Plymouth Beach approved pursuant to the SOC cause adverse effects to the structures or functions of the beach in contravention of the standards at 310 CMR 10.27(3)?

2. Do the maintenance and use of a vehicle corridor and parking zones for ORVs on Plymouth Beach approved pursuant to the SOC cause adverse effects to the structures or functions of coastal dunes in contravention of the standards at 310 CMR 10.28(3)?

3. Do the maintenance and use of a vehicle corridor and parking zones for ORVs on Plymouth Beach approved pursuant to the SOC cause adverse effects to rare wildlife habitat in contravention of the standards at 310 CMR 10.29(4)?

V. REGULATORY FRAMEWORK

A. Coastal Beaches and Dunes

The regulations governing barrier beaches at 310 CMR 10.29, incorporate by reference the provisions regulating coastal beaches, 310 CMR 10.27, and coastal dunes, 310 CMR 10.28, as well as independently prohibiting permitting a project that will have any adverse effect on specified habitat sites of rare species identified pursuant to 310 CMR 10.37. The regulation at 310 CMR 10.23 defines adverse effect as " a greater than negligible change in the resource area or one of its characteristics or factors that diminishes the value of the resource area to one or more of the specific interests of M.G.L. c. 131, § 40, as determined by the issuing authority. 'Negligible' means small enough to be disregarded."

The coastal beach regulation at 310 CMR 10.27(1) establishes that all barrier beaches are significant to storm damage prevention, flood control and protection of wildlife habitat. The

regulation's performance standard requires that a project on a coastal beach not cause an adverse effect to the beach by increasing erosion, decreasing the volume or changing its form or an adjacent or downdrift coastal beach. See, 310CMR. 10.27(3).

The coastal dune regulation at 310 CMR 10.28(1), establishes that all coastal dunes on barrier beaches and the dune closest to the coastal beach are significant to storm damage prevention and flood control and provide protection of wildlife habitat. 310 CMR 10.28(2). A coastal dune is defined as "any natural hill, mound or ridge of sediment landward of a coastal beach deposited by wind action or storm wash." 310 CMR 10.28(3). The performance standard at 310 CMR 10.28(3) prohibits any alteration of a coastal dune or within 100 feet of a coastal dune that would cause an adverse effect to the dune by:

(a) affecting the ability of the waves to remove sand from the dune;
(b) disturbing the vegetative cover so as to destabilize the dune;
(c) causing any modification of the dune form that would increase the potential for storm or flood damage;
(d) interfering with the lateral movement of the dune;
(e) causing removal of sand from the dune artificially; or
(f) interfering with mapped or otherwise identified bird nesting habitat.

B. Wildlife Habitat Protection

The protection of wildlife habitat was made an interest of the Act pursuant to a 1986 amendment, St. 1986, c. 262, ("Amendment"). The Act defines wildlife habitat to include "those areas subject to [the Act] which, due to their plant community, composition and structure, hydrologic regime or other characteristics provide important food, shelter, migratory or overwintering, or breeding areas for wildlife." Act, ¶19. Pursuant to the Amendment, the Department adopted implementing regulations in 1987. In the 1987 Preface to Wetland Regulations Relative to Protection of Wildlife Habitat ("the 1987 Preface"), the Department articulated the principles it applied in implementing the Amendment through the regulations.

The Preface enunciated that it is the presence of the habitat values enunciated in the Amendment, and not simply the presence of wildlife, that are the interests subject to protection. 1987 Preface III. A site must provide "important" wildlife functions which are related to the specific physical characteristics of the habitat. Id. Wildlife habitat of rare species as listed by the NHESP is always important and the regulations preclude adverse effects to this habitat. Id.

The performance standard at 310 CMR 10.37 for the protection of state listed rare wildlife habitat provides that a project that would alter a resource area shall not be permitted to have "any short or long term adverse effects on the habitat of the local population of that species." The determination of whether a project would contravene the standard is the responsibility of the issuing authority. Id. Where the NHESP issues a written opinion on whether the project will have an adverse effect, the issuing authority shall presume that opinion is correct. Id. The presumption is rebuttable, but only upon a "clear showing" that it is incorrect. Id.

Subsequent to the adoption of the regulations, the NHESP issued a document to provide guidance on how it intended to implement its authority under 310 CMR 10.37 regarding the operation of vehicles on beaches that were habitat for piping plovers and terns. Guidelines for Managing Recreational Uses of Beaches to Protect Piping Plovers, Terns, and Their Habitat in Massachusetts (April 21, 1993)("NHESP Guidelines").[4] The objective of the NHESP Guideline was "to provide the necessary protection to piping plovers and terns without unnecessarily restricting appropriate access along all of the state's beaches" Id. at pp. 1-2. The NHESP Guidelines require that "suitable piping plover nesting habitat" be delineated and demarcated

[4] The U.S. Fish and Wildlife Service issued Guideline for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take under Section 9 of the Endangered Species Act (April 15, 1994) ("USFW Guidelines") with recommendations that mirror the management practices in the NHESP Guidelines.

with warning signs or symbolic fencing,[5] prohibitions on vehicle traffic through delineated nesting areas, the creation of buffer zones outside of the delineated nesting areas where vehicle travel should be restricted or prohibited based upon the stage of breeding, and the accumulation of sufficient sources to forage for food. Id. at pp. 7-10. The Department issued a guidance document that paralleled the NHESP Guidelines in order to provide recommendations to applicants and Conservation Commissions on the standards the Department intended to be incorporated into orders of conditions in order to comply with 310 CMR 10.37. See Recommended Conditions for Activities on Barrier Beaches (June 1993) ("DEP Guidance"). The Department's Commissioner at the time issued a cover letter to the DEP Guidance that acknowledged the intent of the Guidance to appropriately balance the use of ORVs with the protection of wildlife and their habitat. See Cover Letter to DEP Guidance at page 3. The objective to allow public access to barrier beaches consistent with avoiding adverse impacts to listed species is also reflected in the Guidelines of Barrier Beach Management in Massachusetts (February 1994) ("Barrier Beach Guidelines") issued by the Massachusetts Barrier Beach Task Force. The NHESP's and the Department's guidance documents were incorporated into the Barrier Beach Guidelines. Barrier Beach Guidelines at pages 2-3; Appendices H-I.

VI. DISCUSSION

A. Coastal Dunes

The ORV corridor within Zone 2 commences 200 feet north of the Crossover, the beach access point for ORVs and is the area within which ORVs are permitted to operate. Gould PFD ¶ 44, pages 18-19; S. C. No 21. The setting of the corridor a maximum of 42 feet in width from the mean high tide ("MHT") results in it being subject to the tidal cycle which inundates the

[5] Symbolic fencing consists of posts or poles with rope strung between them.

corridor to a greater or lesser extent depending on the height of the tide and the effect of the wind's speed and direction pushing lower tides landward. Within this intertidal zone, clumps of wrack or other flotsam are deposited on the beach. Wrack consists of seaweed, vegetation, shells and other organic material deposited on the beach by tides and storms. See NHESP Guidelines at p. 3. Wind blown sand can accumulate on the wrack creating wrack-sand piles creating what the Petitioners characterize as "embryo dunes." Boretos PFD ¶ 27. Ms. Boretos testified that these structures can form within 24 hours and be as small as 3 inches in height. Boretos HT, pp. 19-20 and 30.

A coastal dune is defined to be "any natural hill, mound, or ridge of sediment landward of a coastal beach deposited by wind action or storm overwash." See 310 CMR 10.28(2). The Petitioners argue that embryo dunes in the intertidal zone are mounds of sand[6] and qualify as regulated coastal dunes subject to the performance standards at 310 CMR 10.28(3). The Town and Department point out that the regulations do not include the term embryo dune. They contend that these piles of wrack and sand are part of the coastal beach because they are regularly subject to wave and tidal action, which is the definition of a coastal beach.

Including embryo dunes located in the intertidal zone within the Regulation's coastal dune definition is inconsistent with the definition of coastal beach: unconsolidated sediment subject to waves and tides that extends from the mean low water line to the dune line. See 310

[6] The term "mound" of sediment in the definition of coastal dune appears to apply to larger features than a 3-6 inch accumulation of sand on wrack or a piece of flotsam. In Matter of Stephen D. Peabody, 13 DEPR 37 Final Decision (January 25, 2006), cited by the Petitioners in their Post Hearing Memorandum, it was determined that the Department's definition of a coastal dune appeared to allow both "ridge" and "mound" type dunes as illustrated in the Federal Emergency Management Agency's guidance document, the Coastal Construction Manual, as depicted at Figure 7-62. Matter of Peabody, supra at 41 n.16. That figure distinguishes between mound and ridge type dunes based on differences in their topographic features located along the top of dunes with a substantially larger height and mass than the Petitioners' claims address.

CMR 10.27(2). Coastal dunes commence landward of the beach. See 310 CMR 10.28(2). Mr. Humphries agreed that there is no overlap between beach and dune. Humphries HT, p. 136. Consequently, he concluded that due to the diurnal high tides, the boundary line demarcating the beach from an embryo dune field on Plymouth Beach can move tens of feet twice a day. Humphries PFD ¶ 40. Under this formulation, the boundary delineation of these resource areas and the application of the appropriate performance standard are continually in flux, an outcome that is unsupported by the resources' definitions or the Preambles to the coastal dune and beach provisions. It would also likely lead to inconsistent implementation of the Regulations. This is particularly the case with the application of the performance standards for coastal dunes which regulates alterations within 100 feet of the dune (310 CMR 10.28(3)), a rapidly moving target under the Petitioners' interpretation.

Mr. Humphries' rationale for a fluctuating boundary line is his claim that Plymouth Beach is unique because it is one of few Cape Cod Bay beaches that is accreting sand, so that the wrack line becomes the boundary line. See Humphries PFD ¶¶ 21, 46 and 52. Mr. Humphries' evidence for Plymouth Beach's uniqueness is far from convincing being limited to three eroding beaches on which ORVs operate. Moreover, there is no basis in the regulations to ignore or waive the resource area definitions on the basis of the beach's shoreline profile, which at different locations on Plymouth Beach has a history of erosion and accretion. See Singer Friedlander Corp. v. State Lottery Comm'n, 423 Mass. 562, 565, 670 N.E.2d 144, 146 (1996) (regulation should be read as a whole to produce internal consistency); Matter of Town of Rockport Public Works, Docket No.2003-018, Recommended Final Decision (September 24, 2008). Adopting the approach suggested by Mr. Humphries' testimony could lead to inconsistent application of regulations and claims of arbitrary and capricious decisions. Matter

of Zeraschi 15 DEPR 184,189 Recommend Decision (June 12, 2008)(citing Novak v. Department of Environmental Protection, 1995 WL 1146156, *7 (Mass. Super. 1995).

Moreover, I conclude that the weight of credible evidence supports a finding that vegetation must be present for an accumulation of wrack and sand to be characterized an embryo dune. There are several instances in which Mr. Humphries expresses the opinion that the presence of vegetation is a necessary component. He states that "incipient vegetated dunes have been used to described embryo dune" Humphries PFD ¶ 42. In response to questions on differentiating the beach from embryo dunes he also includes the presence of vegetation. Humphries HT at pp.158 and 183. This opinion is consistent with the description of an embryo dune formation in a seminal report on the impact of ORVs on coastal resources, "[O]nce the plants are established, embryonic dunes can develop." Hearing Exhibit No. 2. Stephen P. Leatherman and Paul Godfrey, The Impact of Off-Road Vehicles on Coastal Ecosystems in Cape Cod National Seashore: An Overview, The Environmental Institute (1979), page 4 ("Leatherman Report"); see also, Barrier Beach Guidelines, supra, at page 117. Ms. Boretos did not consider vegetation to be a necessary component of an embryo dune and stated that there is literature subsequent to the Leatherman Report that confirms her opinion. Boretos HT at p. 16. However, an attachment to her testimony regarding the growth of incipient dunes states, "[T]he dunes begin around small isolated hummocks of dune vegetation." Boretos PFD Exhibit 5, Schwartz, Maurice, The Encyclopedia of Beaches and Coastal Environments, (1981) at page 237. Vegetation is also referenced in the Preamble to the coastal dune as a contributing condition favorable to sand deposition. 310 CMR 10.28(1).

In the multiple photographs submitted by the Petitioners of wrack in the ORV corridor, none showed beach vegetation although ORV access does not commence until Memorial Day

and vehicles are excluded from substantial areas of Zone 2 through June in order to protect breeding plovers and terns. The Petitioners also submitted no evidence that ORVs drive over dune vegetation. The photographs of foredunes show them located behind the symbolic fence. See, Gilmore Rebuttal Exhibits 1-4. That is likely the result of Special Condition No. 22 which provides that symbolic fencing be placed at least 10 feet seaward of the toe of the primary dune and be expanded to include any dune vegetation community that develops throughout the year. Dune community vegetation is defined as any three individual plants of the same species within 10 feet of each other. Id.

Based on the foregoing, I find that the wrack stand structures in the intertidal zone do not constitute coastal dunes are defined in 310 CMR 10.28, and are therefore, not directly protected by the performance standards relating to alteration of a coastal dune at 310 CMR 10.28(c).

The performance standards protecting coastal dunes also do not allow any alteration within 100 feet of a coastal dune. See 310 CMR 10.28(3). There is inconsistency in the evidence whether the ORV corridor is within 100 feet of the regulated dune area. Mr. Humphries developed a table that delineated the width of components of the beach and dune system resource areas based on aerial photographs. Humphries PFD ¶ 29. He concludes that the "interior dune system" that includes the backdunes and the foredunes is an average of 60 meters wide, almost 200 feet. Id. He estimates the seaward embryo dune field to be an additional 70 feet wide. Id The ORV corridor is a maximum of 42 feet wide from MHT, which for the purpose of the table appears to be the landward edge of the tidal flats. Id. Applying the estimated distances provided by Mr. Humphries, it appears unlikely that the ORV corridor would be within the 100 foot zone and be subject to the coastal dune performance standards. Conversely, the respondents' coastal geologist, John Ramsey, measures the width between the seaward edge of the coastal dune and

the landward edge of the corridor at under 100 feet. Ramsey PFD¶ 45 and Exhibit 19. In the interest of ensuring all the performances standards are met, I assumed that the ORV corridor was subject to the performance standards for coastal dune protection.

The allegations of adverse effects from ORVs are associated with the effect of traffic on degrading or destroying the wrack and compacting and rutting the sand within the corridor. 310 CMR 10.28(3) establishes six criteria. No evidence was introduced that ORV operation affects the ability of the waves to remove sand from the beach 310 CMR 10.28(3)(a). There was no evidence that ORV operation disturbs the vegetative cover of the dune. The Petitioners argue that ORVs crush seeds that may be located in wrack that could mature into vegetation if left undisturbed. The regulation speaks to disturbing vegetation, not seeds. I conclude the potential of ORVs to impact seeds that may be contained in wrack deposited in the intertidal area is outside the ambit definition of vegetative cover. In addition, all the evidence shows that vegetated dunes were protected behind symbolic fencing pursuant to S.C. No. 22. Based on my finding that the area the Petitioners' characterize as embryo dune does not constitute a coastal dune, and that the regulated coastal dunes are not within the ORV corridor, I further conclude that the SOC does not allow any modification of the dune form that would increase the potential for storm damage or cause removal of sand from the dune artificially. See 310 CMR 10.28(3)(c) and (e).

310 CMR 10.28(3)(d) precludes interference with the landward or lateral movement of the dune. The parties concur that Plymouth Beach has been accreting sand in the period between 2000 and 2007 in the dune areas adjacent to the coastal beach within Zone 2, reducing the slope of the beach and increasing its energy absorbing ability, although their respective experts disagree on the cause of the accretion. See Ramsey PFD ¶¶ 47-48; Humphries PFD ¶¶ 32 and 41.

The fact that the Petitioners' expert concludes that over the past several years the foredune on Plymouth Beach has increased is inconsistent with a finding that the operation of ORVs has not adversely affected the coastal dune. Gilmore, PFD ¶10. Mr. Humphries concurred with a study's conclusion that coastal dunes on accreting coasts are initiated above the spring high tide. Humphries PFD ¶ 42. He described the succession through which the vegetated incipient dunes develop allowing the foredunes to grow seaward. Humphries PFD ¶ 45. Mr. Humphries' description of the foredune development process does not support a finding that the SOC interferes with landward or lateral movement of the dune system. Testimony and photographs from all the parties establish that the ORV corridor is set below the spring high tide. Therefore, operation of the ORV cannot interfere with the initiation of foredune development taking place above that tideline. While there is substantial evidence that foredunes have grown seaward, the coastal dune performance standard looks to prevent interference with the landward or lateral movement of the dune. The Petitioners' do not supply evidence on the landward or lateral movement of the dunes or the ORVs role in that process. See Matter of Deborah M Stanley and Donald Stanley, 8 DEPR 72, 77, Final Decision (March 27, 2001)(costal dune regulation does include protecting vertical movement of a dune). The seaward growth of the foredune will provide additional protection against storm damage, but there is no evidence that the SOC allows operation of ORVs in the foredune. To the contrary, the SOC protects and promotes the seaward growth of the dune by requiring small pockets of vegetation that may sprout on the upper beach to be protected behind symbolic fences. S.C. No. 22.

Mr. Humphries expresses the conclusion that vehicular travel violates the performance standards by lowering the elevation of the dunes and exposing more area to tides, waves and storms, but states that because ORV have been present on all parts of Plymouth Beach for an

extended period of time, direct examples of impacts are not available. Humphries PFD ¶ 55. That statement is factually incorrect because at least since the 2003 FOC, ORVs have been prohibited from operating on dunes, where a dune vegetation community exists, salt marsh, or tidal flats as well as in Zones 3 and 4. That restriction is continued in the SOC. S.C. No. 32. Mr. Humphries opinion is also counter intuitive. If the ORVs had been lowering the beach elevation within the corridor to greater than a negligible extent for ten years under the 1998 Plan, I would expect the beach profile should have shown some effect. The coastal geologist for the Town and Department provided an evaluation based on Geographic Positioning System ("GPS") and Light Detection and Radar ("LIDAR") measurement of topographic and bathymetric changes at Plymouth Beach occurring from 2007-2009. Mr. Ramsey's analysis of elevation changes in the beach and dune system profile during this period indicates the area within the ORV corridor was stable or slightly accreting. Ramsey PFD ¶ 45.

Mr. Humphries' opinion is also contradicted by photographic evidence, confirming the witnesses' own statements, that the foredunes have been expanding seaward and the beach accreting sand. Humphries PFD ¶¶ 32-33; McCall PFD, Exhibits I-L. The evidence of the alleged effects of ORV operation on another beach is not persuasive in relation to the impact to Plymouth Beach under the SOC because Mr. Humphries had no knowledge of whether the other beach was subject to any of the restrictions prescribed in the SOC. Humphries HT at p. 166. The areas marked on the photograph as ORV use are areas in which ORVs would not be permitted to operate under the SOC, and there was insufficient credible evidence to demonstrate the extent to which the features observed in the aerial photograph could be attributed to ORV use.

The provision at 310 CMR 10.28(3)(f) prohibits interfering with mapped or otherwise identified bird nesting habitat. While the Petitioners' raise concerns about the impacts to a range of shorebirds, the mapped nesting habitat at Plymouth Beach is for piping plovers and terns. As discussed in detail in the section of this decision that addresses adverse effects to rare species habitat, I find that the SOC will not interfere with mapped nesting habitat.

The Petitioners cite the case of Matter of Stephen D. Peabody, 13 DEPR 37, Final Decision (January 25, 2006), in regard to the degree of protection afforded to coastal dunes on barrier beaches. That case involved the construction of a house and septic system on top of a primary dune. In applying the performance standards, the decision made particular note that siting new residential developments on primary dunes was inconsistent with the policy determination to prevent the cumulative effect from many other similar projects if a regulatory precedent was set that allowed for unsound coastal development. Id. at 42, 45. The decision made a point of distinguishing its holding from cases where existing structures in dunes were allowed to be replaced, citing Matter of Stanley, supra. Matter of Stephen Peabody, supra at 45. The SOC in this appeal is even less intrusive on public policy than the Stanley line of cases in only allowing seasonal, public recreational use to continue under the most stringent conditions regulating ORV access beach in the state. Melvin PFD ¶18. That use can also be modified and potentially discontinued in response to a change in conditions as it is not a permanent structural alteration.

The Petitioners requested that in the event the SOC is sustained, the Final Order of Conditions revise the SOC to reduce the travel corridor from two lanes, which allow vehicles to travel in opposite directions, to one lane in order to increase the extent of undisturbed habitat. To accomplish that reduction, the FOC would also need to be revised to reduce the number of

vehicles allowed on the beach and necessitate pull out areas be created within the parking corridor to allow for vehicles to pass each other. I do not conclude that the evidence mandates the revisions necessary to accomplish the potential benefits suggested by the Petitioners. The testimony shows that vehicles tend to arrive and depart as a group resulting in a single lane of travel. Muther PFD ¶38. I am concerned, moreover, that the proposal raises a substantial safety risk to beachgoers, particularly children, if cars travelling in the opposite direction met head on compelling one to back up to find a pull out area. Avoiding that risk would require the Town to provide a level of traffic management over an undetermined length of the corridor, an unreasonable implementation burden to impose in the context of this proceeding.

B. Coastal Beach

The performance standards for coastal beach at 310 CMR 10.27(3) proscribe that a project "shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent downdrift coastal beach." The regulation's Preamble indentifies the critical characteristics to the prevention of storm damage and flood control: (a) volume (quantity of sediments) and form, and (b) the ability to respond to wave action. 310 CMR 10.27(1). The testimonial and photographic evidence from the Town's and the Department's witnesses credit the removal of ORVs from the area above the monthly high tide line to the expansion of the foredunes. Gilmore, PFD ¶10; McCall PFD ¶61. The Petitioners do not dispute the fact that area has experienced the seaward advance of the foredune. The crux of the dispute in regard to the travel corridor's location is whether excluding ORVs from the intertidal zone between the monthly high tide and the MHT is necessary to comply with the coastal beach performance standards.

Both the Town and the Department take the position that there is negligible, if any, impact from ORVs to the beach is based on several lines of evidence. To the extent that ORVs create tire ruts affecting the surface profile of the beach, that impact is virtually wiped out by periods during the month when the tide rises above the MHT at the seaward edge of the corridor and through to the monthly high tide at or beyond its landward edge. McCall, PFD ¶ 43 and Exhibits D, F, & Q. Photographs show that the difference between areas of the beach with and without ORV access is indistinguishable after being swept by the monthly hide tide. McCall PFD Exhibits Q-S. The Town provided data that showed that during the period of time the Crossover gate was open in the three years from 2006-2008, a period of 110 days, vehicles could on average access the full length of the travel corridor only 18 days (16% of the open period); three quarters of the corridor length for 28 days (25%); and less than one-half the corridor length for 49 days (45%). McCall PFD ¶ 94; Gould PFD ¶ 110. Only 7% of the length of the vehicle corridor was open over the entire summer season. McCall PFD ¶ 95. Thus, the implementation of the SOC's provisions has resulted in limited opportunities for ORVs to impact the beach. Mr. Ramsey's evaluation of the GIS and LADR measurements of the large scale fluctuations in beach and dune system elevation, accretion and erosion led him to conclude that ORV operations had less than negligible effect on the large scale coastal processes that influenced the form of the beach over the last several decades including the period when the 2003 FOC was in effect. In particular, he found that the area within the ORV corridor had not experienced a significant change in elevation between 2002 and 2007. Ramsey PFD ¶ 45. The Petitioners sought to dismiss the testimony on the grounds that Mr. Ramsey had not recently been on Plymouth Beach. I conclude that his analysis of long term trends did not require him to recently walk the

beach and is credible regarding the historical, larger scale alterations to the beach's and dunes' profile.

The Petitioners' evidence on ORV impacts to the beach's form discounts long term trends and focuses instead on tire ruts and degraded wrack. In response to Petitioners' counsel's question on whether ORVs lower the vertical elevation of the beach, Mr. Humphries testified that it had been lowered in the central portion of the tire track and raised on outside. Humphries HT at p. 198. In reference to a photograph of a portion of the corridor with tire tracks he opined that the form of the corridor would provide less storm damage protection then that shown in other photographs. Id. I do not accord significant weight to that opinion because there was no factual basis to explain the basis for his conclusion. See Matter of Jon L. Bryan, Docket No. 04-767, Recommended Final Decision (July 25, 2005); Matter of Cheney, Docket No. 98-096, Final Decision (October 26, 1999). With the expected storm wave height of 16.4 feet from the northeast and 9.8 feet from the southeast, and breaking waves greater than 3 feet along the beach and dunes, see Humphries PFD ¶¶ 26 and 35, sufficient credible evidence was lacking that the tire track alone, which both raises and lowers the elevation would have greater than a negligible effect on beach or diminish its ability to limit storm or flood damage. Moreover, his opinion was proffered in reference to other photographs which were never identified or compared, and therefore it was not possible to understand the factual basis for the comparison.

Even if that condition was present for the length of corridor, and constituted more than a negligible change, it does not constitute an adverse effect unless the change diminishes the value of the resource area. In Matter of Stanley, supra, at 76 the issue presented was whether a project on a coastal dune would result in adverse effect. The petitioner argued that project was closer to

ocean and expanded impacts into an undeveloped portion of the dune. In finding that the petitioner had misconstrued the definition of adverse effect, the initial decision was upheld:

> First, a project is evaluated for "adverse effect" based on its impact on a resource area's ability to function for the specified purpose, not in comparison to the structures on site. Second, even if the [P]roject will have more than a negligible effect on the dune's ability to provide storm damage prevention and flood control, the Regulations required that any change not be an adverse one. The "change" must "diminish the value of the resource area in performing those functions. Id.

Mr. Humphries also acknowledges that there is no cumulative effect to the compression that results from ORV traffic because the tides resort the sediment. Humphries HT, p. 202. That conclusion is consistent with Mr. Ramsey's assessment of the stable elevation of the beach within the corridor. Ramsey PFD, Exhibit Nos. 6-7 document that over a recent seven year period the area within the corridor experienced less than one foot of change. In comparison, other sections of the dune system and areas of the beach, particularly Zone 3 from which vehicles are excluded, experienced far more substantial erosion or accretion associated with natural events. Mr. Ramsey's conclusion is that over the longer term the shoreline and dune system is highly dynamic in which storm related events are the significant force in altering Plymouth Beach and the impact of ORVs in negligible. Ramsey PFD ¶¶ 62-64.

The credibility of the Petitioners' position on the significance of the environmental impact of tire tracks on Plymouth Beach is also called into question by photographs relied on by Mr. Humphries in his rebuttal testimony. Humphries Prefiled Rebuttal ("PFR") Exhibit H. One photograph depicts an ORV corridor on Race Point Beach with tire tracks of a depth and width equivalent, if not greater than, the tracks depicted in photographs of Plymouth Beach. The photograph's caption states that the corridor is "environmentally acceptable." A second photograph with deep tire tracks on Nauset Beach was also introduced. Humphries PFR Exhibit

K. Mr. Humphries contends that the Race Point and Nauset ORV corridors are further distant from the wrack line than the corridor on Plymouth Beach. Humphries PFR ¶10. But, it is not apparent why the Petitioners' assertions that the profile of Plymouth Beach is lowered and the potential for storm damage increased to the level of an adverse effect would not apply to the tire rutting on these higher energy beaches characterized as environmentally acceptable.

Based on the above evidence, the impact of the ORV traffic is limited to compaction of sand within the width of the tire treads that is present until the tide redistributes the sand. That narrow period of time, combined with the limited periods of ORV access that results from the SOC's conditions leads me to conclude that this aspect of the ORV traffic does not decrease the volume or change the form of the beach to a degree that diminishes its value in storm prevention or flood control.

The more complex aspect of the Petitioners' argument relates to the ORVs impact on wrack within the intertidal zone and the expansion of the foredune. The SOC excludes ORVs from within 10 feet of an established dune or three plants of the same species constituting dune vegetation. S.C. No. 22. With ORVs excluded from the tidal flats on the seaward side, and the foredunes on the landward side, there only remains a relatively narrow portion of the intertidal area on the upper beach in which to locate the travel corridor. Wrack is deposited in the intertidal zone that is likely to be destroyed or degraded if the corridor is open to traffic. The Petitioners' position is that the SOC allows wrack to be adversely impacted during some periods of the tidal cycle, which reduces the potential for additional accretion of sand associated with the development of embryo dunes. Left undisturbed, the Petitioners' assert that these embryo dunes may develop into foredunes. Humphries, PFD ¶ 39; Boretos, PFD ¶ 42. Consequently, the Petitioners argue that the beach is too narrow to maintain an ORV corridor. Humphries, PFR

¶ 11. In order to prove that premise, a demonstration project was conducted by the Petitioners' on private property in 2008 and 2009 that narrowed the ORV corridor to 12 feet.

The Petitioners contend that the no adverse effect standard of 310 CMR 10.27(3) requires the beach to be closed to ORVs in order to preserve wrack deposited in the intertidal zone. I conclude it does not. There is no reference in the Preamble of the regulations to wrack accumulation as a protected interest. To the extent that vegetation is mentioned, it is in reference to it being a food source for invertebrates that feed on vegetative debris. 310 CMR 10.27(1). This is in contrast to the coastal dune performance standard which precludes disturbance of vegetation that destabilizes the resource area. See 310 CMR 10.28(3)(b). The coastal beach performance standard precludes changing the form of the beach 310 CMR 10.27(3). Driving over wrack, other forms of seaweed or flotsam may change their form, but it does not change the form of the beach, defined as "unconsolidated sediment." 310 CMR 10.27(2).

Degrading the wrack may at certain times and under certain conditions reduce the potential for wind blown sand to accumulate on the beach. But that conditional, potential succession of events does not constitute changing the form of the beach. I do not read the performance standards for protecting beaches to bar activities that might have the effect of moving the foredunes in the proximity of the beach seaward, which appears to be the outcome desired by the Petitioners. As noted earlier, the performance standard for coastal dunes precludes interference with the landward movement of the dune. See 310 CMR 10.28(3)(d). Matter of Stanley, supra at 77. The beach performance standard also speaks to interfering with the movement of sediment, but only with regard to the impacts to downdrift beaches, an impact not alleged by the Petitioners.

The Petitioners allege that the conditions at Plymouth Beach make it impossible for the ORV corridor to be laid out in a manner that does not result in the vehicles travelling in the tidal flats in violation of S.C. 32. Humphries, PFR ¶ 11. There was testimony that during 2009, the corridor was incorrectly laid out that ended up with corridor being placed too seaward. McCall HT pages 457-460. However, the testimony did not convince me that compliance with the SOC could not be achieved. The definition of tidal flat means: "any nearly level part of a coastal beach which usually extends from the mean low water line landward to the more steeply sloping face of the coastal beach or which may be separated from the beach by land under the ocean." See 310 CMR 10.27(2). There was no testimony that delineated the mean low water line or the boundary of the more steeply sloping face of the beach. On cross-examination, Mr. Gilmore testified that he had not observed the corridor in the tidal flat and disagreed with boundary suggested by counsel as the landward boundary of the tidal flat. Gilmore HT, pages 611 and 616. I give considerable weight to Mr. Gilmore's expertise and experience in applying the regulatory definitions to field conditions. If there is a violation of the SOC, it may be addressed through an enforcement action. Matter of Luongo, Docket No. 98-053 Final Decision (March 4, 2009). Mr. Gilmore testified that he participates in the annual process of laying out the corridor, which provided him with the opportunity to confirm compliance.

C. State Listed Habitat

1. Piping Plovers and Terns on Plymouth Long Beach

Piping plovers are the rarest of North Atlantic shorebirds, and Plymouth Beach is important to the species survival. Melvin HT at p. 5. The statewide population rose from 126 pairs in 1987, to 566 pairs in 1998. Hecker PFD ¶ 45. Although the statewide population has risen over 322% over the last 20 years due to protections against human and predator impacts,

the piping plover population is among the lowest of shorebirds that breed only in North America. The population of plovers at Plymouth Beach was as low at 1 pair in the 1991, but has since risen to 17 pairs in 2002, 16 pairs in 2008, and an estimated 20 pairs in 2009. Id. It has been estimated that it requires 1.245 fledglings per pair to sustain the Massachusetts population. Hecker PFD ¶ 16. Dr. Melvin estimated that the productivity for piping plovers on Plymouth Beach is 1.67 per pair, which exceeds the key population recovery criterion established for Massachusetts and nationally as estimated by the U.S. Fish and Wildlife. Melvin PFD ¶ 17. Between 1998 and 2008, the number of tern pairs increased from 213 to 512 pairs. Melvin PFD ¶15.

The piping plovers' and terns' life cycles have a significant relationship to the management conditions established in the SOC. Piping plovers arrive at Plymouth Beach around March 15th, and commence territorial protection, courtship dances, and nest establishment. Melvin HT, page 686. Nests are scrapes in the sand or sand mixed with shells and gravel. First nests are established approximately April 18th and the last until around July 1st. Id at 687. There are usually four eggs in the nest clutch which are incubated for a period of approximately 27 days. The first hatching is around Memorial Day. Id. Plover chicks are precocial, which means they are mobile within hours of birth and, and their survival depends on their ability to find their own nourishment. Melvin HT, page 795. Until the chicks are able to fly or "fledge", between 25-35 days from hatching, they forage for food by walking the beach and dunes. Except in unusual cases, the chicks have fledged by August 1st and have migrated out by early September. Melvin HT, page 688.

Least terns arrive in early to mid-May, conduct courtship and establish nesting areas between the last week in May through mid-July. Melvin HT, page 689. Tern chicks are also mobile shortly after being hatched, but are fed fish by their parents so they do not forage until

they fledge. Tern chicks are present from late June to the first week in September and the flock migrates out at the end of September. Id.

2. Overview of Management of ORVs on Plymouth Beach.

(a) Zones and Maximum Vehicle Limits

A central component of ORV access management is the division of Plymouth Beach into four zones. Zone 1 commences at the southerly end of the Town's property and extends northward to a point 200 feet south of the Crossover. The Crossover is the transition area through which ORVs can leave the unpaved road, Ryder's Way, and turn east to drive onto the bayside beach or west to continue up the harbor side. McCall PFD ¶ 26. The Town maintains a guard shack and lockable gate at the Crossover to control access to the beach. McCall PFD¶26. Zone I also extends up the harbor side to the limit of the Town's property ownership. Access to the Crossover is gained by travelling a distance of approximately 1.3 miles from a parking lot at southern extremity of the beach along an unpaved path known as Ryder's Way. Zone 2 begins 200 feet south of the Crossover and extends north along the bayside approximately 5,500 feet to a location known as the 790 line.[7] The Town owns approximately 4,500 feet within Zone 2 and the remainder is privately owned. Zone 3 extends from the 790 line to northern tip of beach out to mean low water. Zone 4 extends approximately 3,300 feet from the limit of Zone 3 along the harbor side until it reaches the harbor side boundary of Zone 1.

Zone 1 is accessible to ORVs for travel and parking only between Memorial Day and Labor Day under the 2008 Plan. Zone 2 does not have a seasonal access restriction, but because ORV access is conditioned on the installation of the symbolic fencing and the Town's beach management staff being present on site, the Town has chosen to open Zone 2 on Memorial Day

[7] The 790 lines are approximately 790 feet south of and parallel to an existing coastal beach stone groin.

and close it to ORVs after Labor Day.[8] S.C. No. 21. Zone 3 is closed to vehicle traffic from April 1st through September 30th. ORVs are not permitted in Zone 4. A maximum of 225 vehicles daily are permitted on the beach up to the 790' line, the northern limit of Zone 2, subject to limitations arising from beach configuration, tidal conditions, and shorebird nesting and roosting activities. See S.C. No. 35.

(b) Demarcating Protected Habitat and OVR Corridors

A second central element of the management controls is the initial demarcation of the areas protected as nesting habitat and the area designated for ORV travel and parking corridors. Two annual initiating events occur no later than April 1st. The NHESP must indentify and delineate "suitable piper plover nesting habitat"by warning signs or symbolic fencing. S.C. No. 22. Subsequent to approximately March 15th, piping plovers will have arrived and be conducting courtship, but nests will not have been established. In 2008, Dr. Melvin advised the Town that suitable plover nesting habitat was above the monthly high tide line. McCall PFD ¶ 79. The symbolic fencing is the landward limit of ORV operations, subject to being moved seaward based on factors including actual bird nesting actions, development of vegetation and the exercise of private property owners' rights. Symbolic fencing demarcating the nesting habitat is required to be maintained or expanded through July 31st or to the end of the period of nesting activity provided nesting activity began on or before July 31st. S.C. No. 22. Nesting activity includes plover and tern courtship, scrapes on the ground above the high tide line, the presence of active (with footprints) nests, eggs, or unfledged chicks. Id.

[8] I have recommended that any proposed change in the opening and closing dates for ORV access to the beach be approved by the Department. See Appendix, Recommended Revisions to FOC.

Also, prior to April 1st, the Town, with appropriate notice, must demarcate with poles the MHT line based on either tide tables or the wrack line deposited by the tide. S.C. No. 31. A second MHT determination must be conducted no later than July 15th. Id. If the beach is closed for more than two continuous weeks to vehicle traffic, the seaward edge of the vehicle corridor must be reestablished before the beach is reopened. S.C. No. 30. The MHT poles are the seaward limit of ORV operation, and the SOC prohibits operating ORVs on the tidal flats.[9] S.C. No. 32.

(c) Layout of ORV Corridors

The boundary of the ORV corridor is a maximum distance of 42 feet landward from the MHT line of 42 feet or to the symbolic fence line, whichever is less. S.C. No. 27. The basic single travel corridor is a maximum of 12 feet wide. S.C. No. 23. The single corridor can be expanded to 24 feet, where there is sufficient beach width seaward of the symbolic fencing, to allow for vehicles to travel simultaneously in the opposite direction. S.C. No. 26. A parking corridor of a maximum of 18 feet may be established seaward of the travel corridor where sufficient beach width exists. S.C. No. 24. In addition to the limitations prescribed by the SOC, several private property owners have required the Town to place the locate the symbolic fencing to allow a maximum 12 foot wide travel corridor.

(d) Restrictions on ORV Operations

The basic parameters for ORV access and operation within the travel and parking corridors are subject to 2008 Plan and SOC restrictions that are primarily designed to protect the propagation of dune vegetation and plover and tern breeding periods. The SOC requires that the

[9] The regulation at 310 CMR 10.27 defines tidal flat as "any nearly level part of a coastal beach which unusually extends from the mean low water line to the more steeply sloping face of the coastal beach…."

symbolic fencing be placed at least 10 feet seaward of the toe of the primary dune and any "dune vegetation community." S.C. No. 22. Dune vegetation community is defined in the SOC any "as three individual plants of the same species within 10 feet of each other." Id.

There are several layers of ORV restrictions intended to protect the habitat's providing breeding and foraging functions. The SOC requires a 50 yard radius "refuge area" around plover and tern active nesting areas in which ORV parking is prohibited and travel is permitted within a 12 foot wide corridor, provided the vehicle activity does not disturb the nesting birds. See S.C. No. 24. In order to allow wrack to accumulate to provide a food source for plover chicks, the travel corridor must be closed starting 5 days prior to the anticipated hatch date and remain closed until the last chick associated with that nest has fledged. See S.C. No. 28. Prior to hatching, the vehicle closure boundary is 100 yards north and south of the nest. See S.C. No. 29. In accordance with the 2008 Plan, for the first week following hatching, the closure area is extended to 200 yards north and south of the nest. See 2008 Plan at p. 14. The closure area extends to all habitat potentially accessible to chicks. See S.C. No. 29. If the chicks move outside of the closed area, its boundaries must be expanded to retain a 100 yard buffer between chicks and vehicles. Id. Because tern chicks are fed by their parents and therefore do not search out food, the vehicle travel closure for terns commences on their hatch date. See S.C. No. 29. The effect of the corridor closure rules is that the most southern nest with unfledged chicks effectively precludes ORVs from traveling north beyond the exclusion boundary of that nest.

(e) NHESP Application of No Adverse Effect Standard

In accordance with the provisions of 310 CMR 10.37, on March 20, 2008, Thomas French, DFW's Assistant Director,[10] issued the DFW Determination to the Town stating that the project proposed by the 2008 Plan, allowing the operation of ORVs on Plymouth Beach, will occur within the actual of piping plovers and four species of terns. It imposed two conditions in order for the project to avoid any short or long term adverse effect on the species' habit: (a) All the provisions in the 2008 Beach Management Plan must be implemented; and (b) "Symbolic fencing must be erected or expanded to protect any areas of beach where territorial or courting Piping Plovers are "scraping" i.e., using their bodies to scrap shall depressions in the sand that are precursors to nests."

The Petitioners challenge the underlying validity of the DFW Determination based on Dr. Melvin's Hearing testimony. Dr. Melvin stated on cross examination that he had drafted the DFW Determination for Mr. French, and in doing so had applied the provisions of NHESP Guidelines. Melvin HT at p. 744-45. Dr. Melvin acknowledged that the NHESP Guidelines were drafted to strike a balance between protecting rare species habitat and recreational access so that the public would not consider the restrictions on beach access to be unreasonable and press to reduce the level of habitat protection. Id. at 741. On the basis of that admission, the Petitioners contend that the DFW Determination is fatally flawed because it was premised on an impermissible balancing of the Act's and the regulation's requirement to avoid adverse habitat effects with the public's interest in recreational access to the beach. The Petitioners assert that there is no basis in the Act, the 1987 Preface or the language of 310 CMR 10.37 to import recreational interests into a determination of whether activities on a barrier beach adversely effect the habitat of rare species. In the Petitioners' view, balancing habitat values with

[10] The Natural Heritage Endangered Species Program is a unit within the DFW.

recreational access also led Dr. Melvin to introduce the concept of "suitable" habitat, which has no legitimate foundation in the Act or Regulations, and is improperly relied on as a justification to allow adverse impacts to occur in the actual habitat of piping plovers and terns on Plymouth Beach.

The Petitioners are correct in concluding that the regulatory requirement of no adverse effect to state listed species habitat cannot be contravened in order to insulate the agencies from adverse public opinion. But Dr. Melvin's personal expression of concern over the public turning against ORV access restrictions designed to protect wildlife habitat, does not *per force* lead to an invalidation of the NHESP Guidelines or the conclusions of the DFW Determination. The NHESP Guidelines acknowledge the agency's interest in promoting recreational access to beaches, but explicitly affirm that restrictions on access will be imposed when it is " . . . necessary to protect the habitat, nests and unfledged chicks of plovers and terns." NHESP Guidelines at p. 2. The Department's Guidance on the application of 310 CMR 10.37 adopts an identical perspective in ORV management recommendations for conservation commissions. Instead of a total ban on public access, the NHESP Guidelines and the Department's Recommendations allow the agencies to impose site specific restrictions on ORV travel that are intended comport with the no adverse effect standard. The fact that the public's interest in recreational access to beaches was a consideration in the development of the NHESP Guidelines does not invalidate their application to the adverse effect determination at Plymouth Beach. As made clear by the DEP Guidance**,** consideration of recreational access to coastal beaches is recognized as legitimate interest to consider in the application of the regulations.

The determination of whether the SOC complies with regulation at 310 CMR 10.37 does not require a determination of the validity of the NHESP Guideline. 310 CMR 10.37 establishes

that a presumption that the conclusions of the DFW Determination are correct. The presumption can only be rebutted by a clear showing to the contrary. The issue for adjudication is whether the Petitioners have clearly shown that the conditions established in the DFW Determination and the SOC approve activities that result in an adverse effects to the plover or tern habitat.

Moreover, I conclude that Dr. Melvin's affirmation of the 1998 Plan and the SOC was based on his conclusion that the restrictions imposed on ORVs was sufficient to prevent an adverse effect to the habitat. The framework he used in reaching that conclusion was to evaluate the magnitude of the potential adverse impact ORV access could cause to a habitat function in relation to the magnitude of the biological impact it might cause the birds taking into account the extent of overall habitat protection the SOC provided. He testified that:

> " . . . the biggest determination again is, are we adequately protecting habitat in a meaningful enough way to provide restoration and conservation to the populations of species we are focusing on. And that's the key part, the reasonable component of this. Not whether or not we are allowing enough recreational activity, [it is] are the restrictions we are imposing on recreation, could they be construed as reasonable, to achieve some meaningful biological effects." Melvin, HT at p. 851.
>
> I believe that the current management practices dictated in the [2008] Management Plan and the SOC provide a level of protection that should be able to preserve an adequate habitat base and drive further increases in the population of piping plovers and least terns. Melvin HT at p. 834.

There were instances under cross examination that Dr. Melvin stated that an ORV's impact to a habitat feature or function would result in an adverse effect in a "strict" or "general biological sense" Melvin HT at p. 749 and 854. I conclude that in using the term "adverse effect" in that context he was not applying the performance standard at 310 CMR 10.37. Instead, he acknowledged that any degree of physical interaction between humans and birds could produce a potentially negative impact. In response to a question on whether he believed that the SOC permitted "relatively small" adverse effects he stated: "Not based on an application of the

Division's 1993 Guidelines, but strictly biologically. A single jogger, a walkway from a cottage, one ORV can have a biological adverse effect. If you walk down a beach and flush a flock of terns you have an adverse effect." Melvin HT at p. 854.

I find that Dr. Melvin did not endorse the 2008 Plan and the SOC because they allowed recreational access, even though he held the opinion that ORV access as conditioned by these approvals would not result in an adverse effect to the habitat. I conclude that Dr. Melvin's determination of no adverse effect is based on his opinion that restrictions to ORV access beyond those imposed through the SOC would not yield biological results that would benefit the listed species' population growth or breeding productivity. While the outcome of the Plan and the SOC might not yield the ideal habit for the species, one devoid of any human interference, I conclude that Dr. Melvin considered the ORV impacts as governed by the SOC to meet the 310 CMR 10.23 definition of adverse effect because they did not diminish the value of the resource area to a degree that was shown to negatively effect the species population growth or productivity.

The Petitioners' position is that the Act and 310 CMR 10.37 do not sanction the application of the Guidelines or Dr. Melvin's adverse effect assessment methodology, and, therefore, the 2009 SOC is invalid. The Petitioners point to statements in the 1987 Preface that all state listed habitat is "important" and permits must not allow "any adverse impacts whatsoever." See 1987 Preface at IIIB. They contend that Dr. Melvin's evaluation of SOC is inconsistent with those principles.

There is no dispute that the habitat on Plymouth Beach is important. Where a permitted activity is occurring in a state listed habit area, its impacts cannot be ignored on the applicant's

contention that the area affected is not important habitat. See Matter of Pacheco, 6 DEPR 84, Ruling on Applicant's Motion for Summary Decision (April 14, 2009); Matter of Dukes County Commissioners, 3 DEPR 106, 109, Final Decision (June 4, 1996); Matter of Capolupo, 10 DEPR, 52, 56-57, Partial Decision and Stay (March 5, 2003). However, the statement in the 1987 Preface regarding no adverse effect whatsoever to rare species habitat was made to distinguish that type of habitat from water dependent projects in coastal wildlife habitat where it is sufficient to minimize impacts. 1987 Preface, supra. The Preface's guidance was not intended to preclude the application of the adverse effect definition at 310 CMR 10.23 to rare species habitat. It is remains the Petitioners' burden to rebut the presumption of DFW and clearly show that the activities permitted under the 2009 SOC resulted in a greater than negligible change in a resource area that diminished its value.

The Petitioners posit that in applying the no adverse effect standard in 310 CMR 10.37, the only relevant issue is the potential impact to the habitat, and there is no precedent that allows for consideration of a project's effect on the species in applying the regulation's performance standard. That proposition is contradicted by the DEP Guidance promulgated for Conservation Commissions to apply in developing Orders of Conditions allowing for vehicles operations on barrier beaches. The Guidance is oriented almost entirely to restrictions on vehicles designed to avoid potential impacts to the nesting and foraging cycles of piping plovers and terns. The Supreme Judicial Court has ruled that an agency is bound by the guidelines it promulgates to inform communities and residents of the agency's view of compliance with its statutes and regulations. Macioci v. Commissioner of Revenue, 386 Mass. 752, 763 (1982); Matter of Luongo, supra.

The Petitioners' argument that an assessment of the magnitude of the harm to the species is not relevant to an adverse effect determination is also inconsistent with the decision in Matter of James Love, 3 DEPR 101, Tentative Final Decision (April 3, 1998). In that case, the applicant proposed to construct a stairway over a coastal bank and on a coastal beach and a footpath leading to the stairway. It was determined that the project site was actual habitat for a rare species, the Northern Harrier Hawk, because the area provided foraging habitat for food. In ruling that the stairway would not have an adverse effect on the habitat, the Magistrate concluded:

> "While there was evidence that, as a general matter, the hawks would be disturbed by a particular level of human activity in the area, the evidence was insufficient to establish that the stairs and their use will generate such a disturbance. I base this conclusion on [the expert's] lack of specific testimony about precisely what level of use of the stairs would disturb the hawk."

Id. at 105.

The decision also made a finding that the site did not provide nesting habitat, but held that even if the site was actual nesting habitat, the petitioner's evidence was insufficient to establish that project would result in an adverse effect on it. "They have not shown, for example, that the birds require a certain amount of territory for breeding or nesting that would be severed by this project, or that existing food sources would be affected by it." James Love, supra at 104 n.6.

In support of their proposition, the Petitioners cite two cases, Matter of Capolupo, supra and Matter of the Jan Companies, Inc. 6 DEPR, 72, 78, Final Decision (April 14, 1999). The Capolupo decision did not involve an interpretation or application of the no adverse effect criterion. In determining whether a wetland crossing was subject to 310 CMR 10.59, a factual issue arose on whether an area of bordering vegetated wetland constituted feeding habitat for a

state listed eagle. The finding required a determination not only that the eagle fed in the location, but that it did so because the location was a wetland. "Because the ultimate focus is on the wildlife characteristics of the wetland, I look at whether the wetland is part of the eagles' food habitat, I look at whether the eagle would choose the wetland in particular as a place to eat." Capolupo supra at 57. It was in the context of narrowing the factual issue to whether the wetland served a habitat function deemed important under the Act that the ruling stated: "[T]he [Wetlands]Act and its implementing regulations do not protect rare species *per se,* but rather rare species habitat in wetlands." Id.; see also 1987 Preface at Section III. (clarifying that it is not the presence of wildlife alone that qualifies an area to be considered wildlife habitat, but instead "…the presence of plant community, hydrologic, or other characteristics that is determinative.") Contrary to the Petitioners' reading, the decision did not hold that in determining whether an activity would constitute a short or long adverse effect to the habitat's functions that the consequences to the species could not be considered.

In Jan Companies, supra, the applicant proposed to clear trees and construct a bridge over a stream within 100 feet of a vernal pool.[11] A state-listed amphipod, a small, shrimp like invertebrate that lives in and feeds on leaf litter, was collected within the crossing area. The Magistrate concluded that the permanent 50% reduction in the amount and type of vegetation resulting from the construction and shading impact of the bridge would reduce the quantity of leaf litter at the crossing to the extent that it constituted an adverse effect to the habitat.

[11] The state listed habitat was located in an inland not a coastal resource area, and was subject to regulation pursuant to 310 CMR 10.59. Since that provision lacked a specific definition of adverse effect, the definition of adverse effect in 310 CMR 10.23 was looked to for guidance. Jan Companies, supra at 78.

While the Jan Companies ruling did not address the extent to which the project would adversely affect the species, as distinct from the habitat, I do not conclude that the absence of such an assessment precludes its consideration in any evaluations of a project's compliance with 310 CMR 10.37, or of the SOC for Plymouth Beach in particular. In the first instance, there was no indication that any evidence was introduced relative to the project's potential impact to the species, so the Magistrate was not obliged to address it in reaching her decision. In contrast, just a year prior to the Jan Companies ruling, the same Magistrate in the Matter of James Love, supra, explicitly evaluated the project's impact to the species' foraging patterns and disturbance tolerance and declined to find an adverse effect due to the lack of sufficient evidence that the local population of harrier hawks would be disturbed by the opening of state-listed coastal habitat to beachgoers. Thus, the Jan Companies decision rested on the evidence presented, and not for the principle advanced by the Petitioners that a project's potential impact on the protected population is immaterial to a determination of adverse effect.

The marked differences in the nature of the projects, the habitats and the species present in Matter of Jan Companies, supra and Plymouth Beach also provide a rational basis to distinguish between the scope of the impact assessments appropriate to determine whether the proposed activity constitutes an adverse effect. The project in the Jan Companies' would have resulted in the permanent loss of 50% of the habitat's shelter and foraging components as a result of a structure built within the spatially limited confines of the area in which an invertebrate species with very limited mobility lived. In contrast to structures causing permanent impacts in a confined, predominantly static environment, there are no permanent impacts to the dynamic habitat of Plymouth Beach from the time and area limited operation of ORVs as conditioned by the SOC. The values of the habitat for nesting, foraging, shelter and roosting are temporally and

qualitatively affected by the tidal cycles, which naturally alter the habitat's availability to provide these functions causing the birds to access different areas of the beach over the course of a single day and from day to day within the 4.3 miles of habitat. The spatial and temporal limitations on ORV access to the entire habitat and within the OVR corridor also differentiate these impacts from those evaluated in Jan Companies. Finally, the structure in Jan Companies was permanent, while the activity approved under the SOC is subject to modification in the event of changed conditions.

In both in pre-filed direct and Hearing testimony Dr. Melvin affirmed the conclusion in DFW Determination that the 1998 Plan and the SOC would not result in an adverse effect on the grounds of: (a) the documents' consistency with and expansion of the habitat protection provisions of the NHESP Guidelines; and (b) the positive status of the nesting population of plovers and least terns and breeding productivity of plovers at Plymouth Beach.[12] As a general proposition, the Petitioners' experts did not contest the relevance of population data. Mr. Hecker, gave his opinion that " . . . one may use the accuracy of date collected in Massachusetts to demonstrate the relationship between improved productivity and specific changes in management actions that reduce the impacts to Piping Plovers and the damage to their habitat." Hecker, PFD ¶ 16. He acknowledged that the imposition of vehicle buffers had a very significant positive impact in the increase of piping plovers, their fledglings and annual nesting numbers. Hecker, PFD ¶ 38. He disputed, however, Dr. Melvin's interpretation of the Plymouth Beach population and productivity statistics as a basis for concluding that the SOC would not

[12] Between 1993 and 2008, the number of breeding piping plover pairs at Plymouth Beach rose from 4 to 16. Melvin PFD ¶ 15. The preliminary data for 2009 showed a substantial increase to 24 pairs. McCall PFD ¶ 131. Least terns increased from 223 to 512 pairs. Melvin PFD ¶ 15. The 2005-2008, average breeding productivity of chicks fledged per pair exceeds the estimated level to maintain stationary populations in New England and allow for recovery on the Atlantic Coast. Melvin PFD ¶ 17.

result in an adverse effect on the habitat. In Mr. Hecker's view, the health of the plover population is due in large measure to the institution of predator controls and the protection offered to some breeding pairs on certain portions of the beach. Hecker, PFR ¶ 6. He concluded that the population and productivity statistics "are equally consistent, if not more so" with the conclusion that ORVs act as a limiting factor on populations and productivity of the species." Id. To the extent that population and productivity statistics may be relevant to the determination of adverse effect, I conclude that Mr. Hecker's equivocal opinion on the interpretation of the statistics and his supporting evidence did not yield a clear showing that the NHESP's conclusions on the positive relationship between the SOC and the status of the plover population were incorrect.

Dr. Cohen also rejects Dr. Melvin's reliance on the population and productivity rates to support the DFW Determination's conclusion. But rather than taking the position that this type of data is inappropriate to consider, he contends that measure of adverse effect should be whether the ORV access allowed under the SOC constrains the future population growth and full carrying capacity of the habitat. Cohen PFR ¶ 3(a) and (d). Even if a determination of the maximum potential of Plymouth Beach to support plovers and tern colonies was a key factor in determining compliance with the no adverse effect criterion, I do not concur that it was erroneous for the NHESP to consider the current status and recent trends in growth and productivity of the local population of listed species in evaluating the SOC. Dr. Melvin considered that data relevant in assessing the SOC because its provisions were consistent with the restrictions being implemented through the 2003 FOC and Agreement during the previous five years. Dr. Cohen also concludes that species population growth would be faster and carrying capacity greater if all ORVs were removed because of the damage they cause to the habitat's features. Id. He does not, however,

offer any opinion or evidence on what the population growth trend or maximum carrying capacity would be in the absence of ORVs or, public access in general.

While there may be particular circumstances under which species' population and productivity trends are appropriate and relevant to consider in evaluating a project's compliance with 310 CMR 10.37, I did not consider the Plymouth Beach population and productivity data determinative of whether the SOC would result in an adverse effect to Plymouth Beach's habitat. In the first instance, as the evidence makes apparent, factors such as predation, unseasonable weather during breeding periods, and storms can have population level effects that override or at least substantially mask the consequences of a permitted activity. In addition, Plymouth Beach provides different, overlapping habitat functions throughout the seasonal life cycle of plovers and terns each of which vehicles have been shown to have the potential to disrupt and degrade. The SOC addresses these impacts through a series of adaptive management measures intended to prevent that potential from being realized. The evidence in support of both the Petitioners' claims and the Respondents' opposition require that a determination of adverse effect be made as to ORVs' impact on each these habitat functions. Mr. Gilmore relied on the increasing number of nesting terns and plovers to support his conclusion that the 2003 FOC was not interfering with indentified bird nesting habitat and argues the SOC provides at least the same level of protection. Gilmore PFD ¶ 15. Even accepting that premise, a similar population impact link was not explicitly made to impacts to other habitat values such as foraging and roosting. It was not practicable on the evidence proffered to make findings on whether or the degree to which any particular aspect of the vehicles' impact or the SOC's conditions has a causal effect on the species' population or productivity trends. In reaching that conclusion, I do not find that the NHESP was precluded from considering population and productivity trends in making in

exercising its regulatory responsibilities pursuant to its regulations and the provisions of 310 CMR 10.37.

In applying the adverse effect standard and determining whether the presumption arising from the DFW Determination was rebutted, I considered the following factors: (a) the magnitude of the impact on the habitat associated with the ORV access and operation in relation to the food, shelter, migratory or overwintering, or breeding functions the available habitat provides to the populations of plovers and terns, (b) the timing and duration of the ORVs' impact; and (c) the extent to which the ORV activities permitted under the SOC will diminish the habitat values to the species. In evaluating those criteria, I considered evidence on the extent to which ORV activity within the habitat would affect the state-listed species.

(f) Habitat Functions and ORV Impacts

(1) Nesting Habitat

(a) Disruption

The DFW Determination denotes that piping plovers build their nests "in the narrow area of land between the high tide line and the foot of the coastal dunes." DFW Determination at p. 1. Piping plovers begin arriving at Plymouth Beach around March 18th and conduct courtship and territorial selection until July 1st, with the first nest established around April 18th. Terns don't arrive until mid-May and continue nesting through mid-July. The nesting habitat for both species is largely the same, so while the discussion below refers to piping plovers it applies to both species.

The NHESP Guidelines and the USFW Guidelines locate one area of piping plover nesting habitat as above the high tide line on sandy beaches. NHESP Guideline at p. 2; USFW

Guideline at p.3. SOC Condition No. 22 requires the NHESP to delineate "suitable piping plover nesting habitat" by April 1st, and defines "nesting activity" as occurring above the "high tide line." Neither of the Guidelines or the SOC specifies whether the high tide line refers to the mean or monthly high tide.[13] During some periods of the month, the areas landward of the MHT up to the monthly high tide line are subject to tidal inundation. The combined laying of a clutch of eggs and incubation period for piping plovers is 35 days. NHESP Guidelines at p. 3; Melvin HT at p. 735. Consequently, nests and eggs located in this intertidal portion of the habitat, the area between the MHT and the monthly high tide, could be subject to being regularly washed out, depending on the location of the nest between the tidal boundaries and the tidal cycle.[14] Plovers fledge a single brood per season, but may renest several times. USFWS Guideline, supra.

Dr. Melvin acknowledged that from a strict biological viewpoint the intertidal area could be considered nesting habitat, but stated that he made a regulatory decision on the boundary of the nesting habitat based on application of the NHESP Guidelines criteria. Melvin HT at p. 733-740. He testified that in applying the NHESP Guidelines, he considered this intertidal area not to be actual or suitable nesting habitat for piping plovers because of the substantial increased risk of nest inundation and loss of the eggs. Id. Consequently, when the symbolic fencing is set out in April in accordance with the SOC, it would not be set below the monthly high tide line unless other conditions in the SOC, e.g. protection of emerging vegetation, required it to be moved further seaward.

[13] In the context of Plymouth Beach, mean high tide is the mid-point at which half the tides are above that height and half are below. In statistics, that midpoint is called the median.

[14] Piping plovers may re-nest several times if a nest is lost. NHESP Guidelines at p. 3.

Dr. Melvin's conclusion that the intertidal area on Plymouth Beach should not be regulated as plover nesting habitat is sharply challenged by the Petitioners. The Petitioners' contend that if a bird chooses to nest at a location that choice is a biological delineation that the area is actual nesting habitat, even if the location chosen is vulnerable to tidal inundation and lower survivability. In particular, the Petitioners contend that all the area landward of the MHT should be considered piping plover nesting habitat. While the Petitioners' logic has the benefit of simplicity, the distinction between characterizing nesting habit on the basis of the populations' general pattern of conduct rather than the individual bird's aberrant choice is also reflected in the Petitioners' expert's testimony. In describing all the areas on the beach or in the dunes that are piping plover nesting habitat, Dr. Cohen fails to identify the intertidal area as one where plovers nest. Cohen PFD ¶ 9. To the contrary, Dr. Cohen cites a study that concluded that where beaches are wide enough, plovers nest far from the tide line to avoid the risk of nest overwash. Id This generalized delineation is the approach that Dr. Melvin appears to applying in establishing the starting point for the delineation of Plymouth Beach nesting habitat.

Mr. Hecker and Mr. Cohen also testified, that there are instances where plovers nest in an area subject to tidal or storm flow and will successfully reconstitute an inundated nest in the same location, gather up the eggs and yield a successful hatch, or nest on an embryo dune sufficiently high enough to avoid being washed out. Hecker HT at p. 302; Cohen, HT at p. 254-56. Neither witness testified, however, that he had seen a nest in the intertidal area above the MHT at Plymouth Beach where ORVs may conditionally operate. Ms. McCall testified that on more than one occasion, piping plover nests at Plymouth Beach have been inundated and the eggs have hatched. McCall HT at p. 497. She further testified, however, that while she had observed nests below the monthly high tide line, they were never in the ORV corridor. McCall

PFD ¶ 124. Thus, the Petitioners' argument that using the suitable habitat principle will result in the ORVs corridor occupying actual nesting habitat at Plymouth Beach is abstract, and not based on the evidence of breeding practices at Plymouth Beach.

It is not necessary to determine whether Dr. Melvin's description of suitable or actual nesting habitat under cross-examination is sufficiently inclusive to avoid adverse effects. The DFW Determination, which establishes the presumption of no adverse effect, protects a wider portion of the beach habitat than indicated in Dr. Melvin's testimony. The DFW Determination requires, in part, that in order to avoid an adverse effect to the habitat symbolic fencing must be erected and expanded to protect "any area of beach where territorial Piping Plovers are scraping . . ." (emphasis added). Although the DFW Determination describes that plovers often build nests "between the high tide line and the foot of the coastal dune," the condition that must be adhered to in order to avoid an adverse effect to the habitat does not use a tide line boundary to determine whether any area of beach showing scrapes should be protected from ORV operations. In his pre-filed direct testimony, Dr. Melvin adopts the DFW's Letter's conditions on the protection required for nesting habitat in addition to that provided by the 2008 Beach Management Plan. Melvin PFD ¶¶ 13-14. Therefore, based on the "any area of the beach" condition prescribed in the DFW Determination, I do not concur with the opinion expressed by Dr. Melvin's on cross examination regarding the actual or suitable habitat nesting habitat necessary to the extent that it is inconsistent with the condition set out in the DFW Determination. Neither party's evidence clearly showed that the determination in the DFW Determination to protect any areas of the beach were scraping is occurring is incorrect. The potential for the intertidal habitat to serve a

nesting related function is protected from ORVs driving through or parking on a pre-nest scrape.[15]

Dan Gilmore, testified that he had adopted the conditions in the DFW Opinion Letter. Gilmore ¶ 16. The definition of nesting activity in S.C. No. 22 includes the presence of plovers or terns conducting courtship including any scrapes on the ground above the high tide line. To the extent the reference to the high tide line may be interpreted to mean the monthly or spring high tide line,[16] that interpretation would be inconsistent with the DFW Determination's protection boundary. At a minimum that phrase should be limited to the MHT line, and the SOC must be revised to clarify that distinction.[17] The Special Condition requires the fencing be expanded as necessary to protect nesting activity through at least July 31st, well beyond the nest selection period for both species.

The SOC requires that symbolic fencing for plovers be determined by the NHESP on April 1st. Plovers are anticipated to arrive on or about March 18th. There is substantial evidence that plovers' preferential nesting habitat is the area above the monthly or spring high tide. Therefore, I conclude that it would not result in a adverse effect if the initial fencing was set at an the monthly high tide line, except where areas seaward of that line show scrapes from territorial or courting plovers in which case the fence must be extended seaward to protect the active

[15] The testimony indicates that a courting pair may create multiple scrapes before selecting one to become the nest. Cohen PFD ¶ 18. Once a nest had been established, the protection afforded to the pairs' other scrapes does not appear to serve a valid function and could be lifted. Other exclusion barriers designed to protect the nest may then be in effect depending on the distance between the nest and the scrape.

[16] In Special Condition No. 27, the SOC makes specific reference to the monthly extreme spring high tide suggesting that the reference to high tide in Special Condition 22 was intended to mean the MHT.

[17] See Appendix, Recommend Revisions to the FOC.

scraped areas up to the MHT line.[18] Prior to the opening of beach to ORV access at the end of May on Memorial Day, the fence must be adjusted to account for actual nests and active scrapes through July 1st for plovers and mid-July for terns as part of the 2008 Plan's daily procedures to inspect the ORV corridor prior to opening of the beach to ORVs.[19] McCall PFD ¶110. Upon finding a scrape, the symbolic fence would be expanded to protect it if ORVs were not already excluded from that area due to restrictions imposed to protect nests and unfledged chicks located south of newly discovered scrape. This is consistent with current practice to fence off both nests and scrapes below the monthly high tide line. As previously noted, Ms. McCall testified that she had never observed a scrape or nest within an ORV corridor properly set within 42 feet of MHT. McCall PFD ¶124; McCall HT at p. 507.

The Petitioners point to an occurrence in May, 2009, in the vicinity of the Crossover that they argue demonstrates the adverse impact of ORVs to nesting. In his pre filed testimony, Mr. Hecker reports observing scrapes, one of which might have become a nest, within 100 yards of the Crossover in the first three weeks in May, and on the 22nd of May observed courtship tracks in a location within what shortly thereafter fell within the ORV corridor. Hecker PFD ¶85. The corridor was opened on May 25th. The Petitioners' allege that the opening of the ORV corridor resulted in the courting pair to nest south of the Crossover. It is not clear whether Mr. Hecker is claiming that it was the ORVs passing within 100 yards of the scrapes or over the courtship tracks that led to the pair's abandonment of the area. As discussed in further detail below, there is testimony from Dr. Cohen that ORVs can disturb plovers' nests, but at much closer distance

[18] Since the seaward boundary of the ORV corridor is the MHT line, no further seaward protection is required to ensure the intent of the DFW Determination to protect nesting areas from ORV activity is achieved. Mr. Hecker also testified that nesting habitat was limited to the area above MHT. Hecker PFD ¶ 73.

[19] A second factor affecting the location of the symbolic fence is the requirement hat it placed at least 10 feet seaward of the toe of the primary dune and any vegetation community. See SEE, S.C. No. 22. A weekly landward adjustment of the fence is also required between April 1st to May 31st to protect sprouting vegetation.

than 100 yards. In the absence of credible scientific evidence on the distance that would likely a nesting pair to the point of abandoning territory they had scraped, I cannot conclude that the vehicles' passage a football field's distance from the scrapes would be sufficient cause for abandonment. Moreover, had the DFW Determination been in effect, any scrapes Mr. Hecker observed in the ORV corridor would be protected behind fencing.[20]

It is more likely that the Petitioners' argument is that the ORVs' passage near the courtship tracks was the disturbance that triggered the pair to nest elsewhere. There are several evidentiary gaps that weaken the causal connection between opening the corridor and the alleged disturbance. There is no evidence that travelling over courtship tracks leads to abandonment of territory. There was no evidence that the pair were at or near the Crossing on Memorial Day. If it was the Petitioners' intent to show that the location of the courtship tracks would have become a scrape or a nest, the evidence provided did not establish the proximity link that courtship dances only occur on or in the immediate vicinity of scrapes or even only in nesting areas. I am unable to conclude from the testimony that courtship dances take place only in proximity to nesting habitat or that vehicle passage in the vicinity to a set of courtship tracks alone as compared to nests or even pre-nest scrapes would likely lead to territorial abandonment. It is also relevant to note, that in the five years since the 2003 SOC and Management Plan has been in effect, the only evidence submitted by the Petitioners attempting to connect ORV traffic to nesting habitat abandonment is the May 2009 circumstances. I conclude that the evidence did not clearly show that allowing ORVs beach access in conformance with the conditions set out in

[20] ORV access in May 2009 was still regulated by the 2003 FOC, not the DFW Determination.

the DFW Determination and the SOC would have an adverse effect on the habitat's potential to provide productive nesting areas to piping plovers and terns.[21]

The assessment of the nature and magnitude of the impact to the habitat and its diminishment of in value to the species associated with ORVs raises the issue of the consequences of ORV activities vehicles' in comparison to the impact of beachgoers in assessing whether it is the vehicles or the people that are the predominant source of potential adverse effect to the habitat. The Leatherman Report at page 6, concludes that vehicles were far less disturbing to nesting habitat than people.

> Controlled impacting experiments were also directed toward nesting birds. For each test, a vehicle was driven closer to sitting birds to determine the flushing disturbance and the amount of time the birds spent in the air before returning to the nest. The results showed that birds can acclimate to vehicles passing very close to their nests, but would flush when persons or dogs approach. Vehicles could come twice as close to sitting birds before they would fly than could people on foot.

Dr. Cohen, also reported a finding that although chicks and adults were more likely to respond to ORVs and joggers than to walkers, the response to ORVs tended to be limited to adopting an alert posture rather being leaving the area. Cohen PFD ¶17. Dr. Cohen's statement that Mr. Hecker's observations of the Crossover pair were "consistent with the disturbance of piping plover nesting habitat" see Cohen, PFD ¶¶18 and 29, is contradicted by the study's conclusions and is equally consistent with the pedestrians being the cause of the disturbance.

While the Crossover was not open to ORVs before Memorial Day, it was open earlier to those who chose to access the beach by other means. Plovers courting in the general area of the Crossover could have been exposed to disturbances from beachgoers before or on Memorial Day

[21] A Petitioner's subsequent observation of what was believed to be same pair of plovers return to the Crossover area was not convincing proof that the pair had been displaced in the absence of some evidence that it was an established pattern of plovers to return to areas they had initially territorialized for nesting, but were forced to abandon.

even if they parked their cars in the parking lot or along Ryder's Way came onto the beach through the Crossover, which is the natural entry point. Mr. Hecker testified that prior to the opening of the beach to ORV access in 2008: "Many people park at the crossover at that time of year [early April], and walk out with their dogs, and the dogs go inside the symbolic fencing . . . So they [the birds] are being disturbed enough not to nest in the area between the demonstration project[22] and the crossover." Hecker , HT at p. 332. ORVs will indisputably have some greater physical impacts to the habitat than the beach than people recreating, such as tire ruts or the crushing of wrack. But as the Petitioners introduced no evidence to show that the ORVs' travel or presence is distinguishable in effect from people walking or recreating near the Crossover[23] or further along the beach outside of the symbolic fencing, I conclude that Petitioners did not make a clear showing that the DFW Determination or the 2008 SOC would permit an adverse impact in allowing ORVs to travel in proximity to courtship marks.

(2) Beach/Dune Surface Features

The Petitioners' further claim that evidence documents that ORVs alter the beach's surface and appearance such that the area inside the travel and parking corridors are more compacted, flattened and homogenous in appearance than the nesting habitat outside the corridors. Based on that conclusion, they contend that these beach alterations within the corridors cause the area to become less attractive to courting birds and, therefore, degrade or reduce the courting and nesting habitat available to the birds. There was little evidence

[22] The demonstration project was an area where there ORV corridor was reduced to 18' wide.

[23] Opening day for ORVs at the beach is an intense use event to which the birds had not been exposed to earlier in the season. Of course, the same came be said in regard to the number of beachgoers the vehicles carry. It is, at best, unclear that it was Memorial Day ORV traffic that caused the pair to relocate from the Crossover. But even if it was a contributing factor, I do not find sufficient evidence to conclude that shifting one pairs' nesting location to another suitable area of the beach where they successfully nested equates to an adverse impact to habitat foreclosing all ORV access.

specifically related to the effect of ORV traffic on the beach's features from a nest site selection perspective. Dr. Cohen testified that ORVs leave ruts that disrupt the nesting substrate, and frequent ORV passage may obliterate courting scrapes. Cohen ¶15. Mr. Hecker testified that the ORVs "destroy the crust of the beach" which is created through the effect of the stones and the shells that are present on the surface in areas from which vehicles are excluded. Hecker HT at p. 330-31. It is Mr. Hecker's opinion that birds are attracted to the untraveled upon areas for nesting. Id**.** The USFW Guideline states that nesting substrate ranges from fine grained sand to mixtures of sand and pebbles, shells or cobble. USFW Guidelines at p. 3. Nests are also usually located in areas with little or no vegetation. Id. Fine grained sand and absence of vegetation is not inconsistent with the surface condition of the active ORV corridor. There was no testimony that sand substrate disruption affects courtship behavior.

Based on the photographic evidence of the beach and foredune areas and my two site visits, I conclude that there is qualitative range of difference between areas inside and outside of the ORV corridor depending on the intensity of use and restorative effects of the tide. For example, areas closer to the MHT, which include the parking areas, will be subject to tide and wave effects more frequently that the landward boundary of the corridor at close to the monthly high tide line. In some instances the photos show markedly different surface features in and outside of the corridor in the manner described by the Petitioners, but in other photos there is little to no differences observable. These relative qualitative differences make it difficult to conclude whether or to what extent an alteration of the beach's surface alone actually diminishes its nesting habitat function. There were no studies from other beaches or evidence from Plymouth Beach submitted on which to conclude that the surface alternation alone would cause plovers or terns not to court or nest in an area showing the effects of tire tracks. Evidence was

tendered that plovers will scrape within the corridor and, as discussed above, once scraped that area would be fenced off pending the establishment of the nest.

There is a period of approximately one month where courting and nest selection is still taking place for plovers[24] after Memorial Day, the traditional opening day for ORV access. Special Condition No. 24 result in portions of the ORV corridor being reduced to a maximum of 12 feet within a 50-yard radius of active nesting areas and S.C. Nos. 28 and 29 close portions of the corridor until chicks from nests established earlier in May and onward hatch and fledge, a period of 62 days. In 2008, nearly 50% of the piping plover nests were located in the northerly portion of Zone 2, the Zone that is conditionally open to ORVs during the breeding season. Hecker PFD ¶89. Assuming the population remains stable or continues to expand as the recent trend indicates, the result would be that substantial areas of the corridor would be limited or closed to ORV access during the breeding season. The ORV corridor is also subject to tidal flows during one-half of the month when the tide travels up the beach above the MHT line, with the monthly high tide affecting the full width of the corridor. These higher tides will eradicate part or all of the surface alterations in the corridor. This is evident in several photographic exhibits that show the corridor with extensive wrack deposit left by the tide. See, e.g., Hecker, PFD Exhibits 43, 51, and 53.

While the surface characteristics of the sand within an active ORV corridor may be impacted in ways that differentiate it from areas landward of the corridor where plovers appear to preferentially nest, I conclude that the Petitioners did not meet their burden to clearly show that the difference in surface features would result in an adverse impact to the habitat's function in providing potential courting and nesting habitat. In reaching this conclusion, I considered the:

[24] There was no evidence submitted by the Petitioners that surface feature alterations affect tern nest selection.

(a) lack of substantial evidence that the distinction in sand features alone deter plovers from scraping or nesting in areas subjected to ORV use;

(b) requirement that scrapes in areas landward of the MHT will be placed behind fencing preventing further disturbance of the area;

(c) exclusion of ORVs until Memorial Day combined with the restriction on ORVs travel and parking through the SOC have had the effect of making the corridor unavailable for significant portions of the courting period; and

(d) effect of the tide in eliminating or minimizing the effect of ORV operations on sand features.

(3) Nests and Incubation

Once a nest is established, the SOC requires it be protected from intrusion behind symbolic fencing. See S.C. No. 24. That Special Condition also requires that a 50-yard buffer radius be maintained within which vehicles cannot park ("parking refuge"). A maximum 12 foot wide corridor is allowed for travel through the parking refuge, provided vehicle activity does not disturb the birds. Town staff actively monitors the nests to determine if travel within the corridor will result in disturbing the incubation and close the corridor if flushing from the nest occurs. McCall PFD ¶33.

Dr. Cohen incorrectly asserts that allowing vehicles to pass within 50 yard buffer is inconsistent with the USFW Guidelines. Cohen PFD ¶ 30. The reference to a 50 meter exclusion radius around incubating plover nests applies to pedestrian disturbances. See USFW Guidelines, Appendix G at p. 5. In regard to motor vehicle management the Guidelines state that " . . . vehicles may pass by such areas [posted nesting habitat] along designated vehicle corridors established along the outside edge of plover nesting habitat." Id at 6; see also USFW Piping Plover Atlantic Coast Population Recovery Plan: Life History and Ecology at p. 5, Table 3 citing a Massachusetts study's finding that 24 meters was the mean flushing distance for incubating

plovers. Dr. Cohen reports that in New York he observed that frequent disturbances to birds that have begun to lay or incubate eggs can negatively impact the laying schedule, the clutch size, loss of eggs from heat exposure, or result in nest abandonment Cohen PFD, ¶19. There is, however, no evidence that these outcomes are not being avoided on Plymouth Beach through the parking refuge and the travel corridor width and travel restrictions. See James Love, supra. The Leatherman Report, supra at p. 6, also indicates that nesting birds become acclimated to ORVs and their response is often limited to alert posture.

Based on the evidence on the lack of disturbance of nesting birds, I conclude that the SOC, as revised herein, provides adequate protection to active nests and does not result in an adverse effect to the habitat's function to provide nesting habitat that is not disturbed by ORV use.

(4) Pre-Fledged Chicks

There is a period of approximately 35 days between the time that chicks hatch and before they are fledged. During this period they can walk outside the symbolic fencing into the ORV corridor where they are at risk of being crushed. The SOC and the 2008 Management Plan establish vehicle free buffer zones to address that risk. Special Condition 28 requires that ORV travel corridor be closed to ORVs for a 100 yards ORV north and 100 yards south of a plover nest starting not less than 5 days prior to the "anticipated hatch date" and continuing until all the chicks associated with that nest have fledged. The SOC requires the boundaries of the 200 yard buffer zone be "adjusted periodically" to maintain a 100 yard exclusion between the chicks and vehicles unless site conditions allow for a reduction in the distance. Id. It does not describe what circumstances would trigger an adjustment of the buffer. Since vehicles enter the Crossover and

can only travel north, the most southern nest establishes the effective boundary of ORV travel. McCall PFD ¶ 35. The plover pre-hatch commencement date for the corridor closure is designed to allow sufficient wrack to accumulate in the vicinity of the nest to provide a nearby food source for the chick. S.C No. 28. In the event the hatching is not directly observed, the anticipated hatch date is determined by the procedures prescribed in the Guidelines. Id.

The vehicle exclusion zone provided for in the 2008 Management Plan for plover chicks commences when the chicks are present, not in relation to the hatch date. 2008 Plan, page 26. It also describes the exclusion zone differently, but presumably with the same effect as S.C. No. 28 in relation to closing the vehicle corridor. The 2008 Plan provides that the exclusion zone encompasses all dune, beach and intertidal areas within 100 yards of either side of a line drawn through the nest and perpendicular to the long axis of the beach. Id. The Plan further provides that for the first week following hatching, the exclusion area is extended to 200 yards on either side of the nest. Id. See also, Gould PFD ¶65. The 2008 Plan provides the exclusion zone be moved if the unfledged chicks move outside the original 200 yard protection. 2008 Plan, page 25.

Special Condition 29 adopts the format used in the 2008 Management Plan to describe the vehicle closure boundaries for unfledged tern chicks. The boundary commences from the outermost nest and encompasses all dune, beach and intertidal areas within the 100 yards of lines drawn through the nests and perpendicular to the long axis of the beach. This Condition is also more explicit than S.C. No. 28 in stating that the exclusion zone must be adjusted if unfledged chicks move outside the original protected area.

No explanation was provided on why S.C. Nos. 28 and 29 set out the exclusion boundary in different geographic formats. Nor was there an explanation why S.C. No. 28 does not expressly adopt the 200 yard corridor closure during the first post-hatch week, although that additional protection is consistent with the limits prescribed in the Guideline and the S.C. No. 1 explicitly approves the 2008 Management Plan. The Petitioners raised no objection to this inconsistency between the descriptions of the vehicle closure zones in the two special conditions, but in the interest of clarity and consistency, I recommend S.C. No. 28 be revised to add the additional 100 yards of protection.[25] The additional 100 yard protection is not afforded to the terns, but I assume that is because the NHESP Guideline states that tern chicks travel shorter distances than plovers from their nest and at older ages than plover chicks. See NHESP Guidelines, p. 8. In addition, the common, Arctic and roseate terns nest in the established higher dunes substantially further away from the vehicle corridor. Again, the Petitioners did not object to this disparity of protection between the plovers and terns.

The Petitioners do not, however, concede that the protection afforded by the vehicle exclusion buffers is adequate. Mr. Hecker's opinion was that while the establishment of the vehicle exclusion buffers had the most significant role in increasing piping plover population numbers by reducing chick mortality and the overall level of damage caused by vehicles, it was insufficient because it is limited in distance, 100 yards, and time, 35 days. Hecker PFD ¶¶ 38-39. Hr. Hecker has observed chicks staying within 100 yards of the nest during the first week post hatch, but moving further thereafter, including one occasion on another beach where the plover family had moved one-half mile Hecker PFD ¶19. Dr. Cohen's opinion, based on his experience that movements of kilometer or more overnight can occur without warning, is that

[25] See Attachment Recommended SOC Revisions.

1,000 meters is a minimum safe distance. Cohen PFD ¶31. Ms. Muther testified and submitted a photograph that showed an unfledged chick foraging on tidal flats more than 300 yards from its nest during a period when ORVs were not present on the beach. Muther PFR ¶10. ORVs are not permitted in the tidal flats, but it was not stated in her testimony that she either observed, or that it would have been necessary for the chick to have crossed through the ORV corridor to reach that portion of the flats.

The vehicle exclusion zone distance adopted by the SOC is generally consistent with both the NHESP Guidelines and the USFW Guidelines. There is a provision in the USFW Guideline for a 1,000 meter exclusion area, but that is applicable to situations where there is no monitoring of the broods during the chick-raising phase of the breeding season. See USFW Guidelines at p. 7. Plymouth Beach is subject to daily monitoring, and the SOC provides for expansion of the exclusion area in response to the chicks' movement. McCall, PFD ¶¶ 25, 110; S.C. Nos. 21 and 28-29. Each morning before the Crossover is opened to ORV access, the most southern piping plover nest is located, and plover and least tern nests are checked to see if any eggs are hatched. McCall PDF ¶¶ 24 and 110. A member of the Town's staff is located at the starting point of the most southern nest to enforce the restriction. McCall PDF ¶29. There is no evidence that any chick has been harmed since 1996. Ms. Muther testified that there is a period of collective ORV arrivals in the morning and departures in the afternoon and not a lot of travel in between. Muther PFD ¶ 38. This would appear to allow continued monitoring of the chicks and reduce the potential for a vehicle to chick contact.

Whether to exclude ORVs from the beach until all the chicks have fledged or instead to establish a vehicle exclusion buffer of a certain distance is a determination that something less

than no risk of harm is acceptable. The no adverse effect standard allows for a negligible risk in this context. In the absence of evidence of harm to a plover since the Town's management plans have gone into effect or that the conditions at Plymouth Beach present a greater risk than was considered in establishing the recommendations in the NHESP, USFW and DEP Guidelines, the vehicle exclusion boundaries provided for in the SOC and the 2008 Plan, as well as the other risk management measures documented in the 2008 Plan and prefiled testimony, I conclude that allowing ORVs on the beach during the pre-fledge period in accordance with the SOC does not result in an adverse effect that diminishes the breeding habitat function of the beach. I reach the same conclusion in regard to the length of time the exclusion is in effect. For plover chicks, the protection commences prior to their hatch date and remains in place for both plover and tern chicks, not for 35 days, but until all chicks that may reasonably cross into the ORV corridor are fledged. Given the protected status of these species, I recommend that in the event harm comes to an unfledged chick through contact with an ORV, that all ORV access be suspended until an assessment is conducted and revised restrictions are put in place.[26]

(5) Foraging For Food

Beaches and dunes afford a variety of areas in which piping plovers forage for nourishment, including intertidal areas, washover areas, sand flats and wrack lines. Melvin HT at p. 714-15; USFW Guideline at p. 3. One of the most important foraging locations is wrack. Id; see also NHESP Guidelines at p. 3. Wrack consists of seaweed, vegetation, shells and other organic material deposited on the beach by tides and storms. Id. Plovers feed on invertebrates

[26] See Appendix, Recommend FOC Revisions.

carried within the wrack such as marine worms, fly larvae, beetles, crustaceans or mollusks. See USFW Guidelines, supra ; Boretos PFD ¶ 17 (c)-(d), and Exhibit C. Plover chicks can live off their yolk reserves for only 2-3 days. Cohen PFD ¶36. Plover chicks forage the wrack for food within hours after hatching and to continue to move and feed themselves to survive. Melvin HT at p. 706, 719. A 1977 study found that chicks that were unable to achieve a 60% weight gain within the first 12 days were unlikely to survive. See USFW Guidelines supra. Feeding of adults and chicks occurs during all hours of the day and night and at all stages of the tidal cycle. Id.

The SOC acknowledges that wrack performs a wildlife habitat function and in order to allow sufficient wrack to accumulate for plover chicks requires that not less than 5 days before the anticipated hatch date of a plover nest, the 100 yard north to south vehicle closure boundaries be put into effect. See S.C. Nos. 27-28. Special Condition No. 28 references the NHESP Guidelines in determining the anticipated hatch date, which assumes the nest is observed before the last egg has been laid. If a nest is first observed with a full clutch, the anticipated hatch date cannot be determined. In that event, the NHESP Guidelines require that vehicle restrictions must commence immediately. See NHESP Guidelines at p. 9.

The Petitioners introduced testimony of observing wrack being ground up and buried by vehicles operating in the ORV corridor. Hecker PFD ¶102. Petitioners also introduced photographs that showed portions of the beach where the wrack line was present outside the ORV corridor, but absent inside the corridor as a result of ORV traffic impacts. See Exhibit Nos. 64 and 77. The Petitioners contend that this destructive impact to an important food source is an adverse effect to the habitat. The Petitioners also contest that the 5 day pre hatch rule is inadequate for several reasons. First, Mr. Hecker asserts that in 2008 more than 4/5ths of the

hatch dates were unknown, so it was not possible to comply with the NHESP Guidelines. Hecker PFD ¶102. Mr. Hecker also noted that the SOC's pre-hatch restriction does not address impacts to adult plovers and other shorebirds that also forage in the wrack. Dr. Cohen stated that he knew of no data that supports five days being sufficient time to allow adequate wrack to accumulate, see Cohen PFD ¶34, although that time period is prescribed in both the NHESP Guideline and the USFWS Guidelines. Ms. McCall's testimony presents a different picture of the extent of protection provided in the context of the implementation of the current restrictions. She testified that in 2009 the average pre-hatch closure was 17 days, and 11, 9, and 23 days in 2006, 2007, and 2008, respectively. McCall PFD ¶ 34.

Dr. Melvin acknowledged that wrack destruction is adverse to the habitat in what he characterizes as a strict biological sense, but he did not believe the foraging habit was fragmented by the ORV corridor, pointing pointed out that fledged birds could fly to foraging areas all over the beach. Melvin HT at p. 751 and 754. In light of his general knowledge of the relatively high volume of wrack on Massachusetts beaches and from what he has observed from the Petitioners' recent photographs of Plymouth Beach, the ORV access restrictions imposed under the 2009 SOC, and the population and productivity levels of plovers on Plymouth Beach, Dr. Melvin concludes there is adequate wrack to sustain the population. Melvin HT at p. 835-840. He testified that one of the reasons the Massachusetts has large percentages of the Atlantic Coast and global plover populations is that "we have a lot of wrack on our beaches." Melvin HT at p. 835. This abundance yields higher productivity so that will it is critical to protect the wrack foraging habitat, protecting every square yard may not be essential. Id.

The Petitioners' contend that the criterion of "adequacy" that Dr. Melvin and, consequently, the Department are applying to determine whether the ORV impact to the habitat

constitutes an adverse effect is irrelevant and incorrect. The Petitioners' contention is that since all rare species habitat is considered important and impacts to a significant swath of the habitat will be permitted under the SOC, then a *per se* adverse effect to the habitat has been clearly shown.

I find Dr. Melvin's opinion in conjunction with the DFW Determination to conclude that the impact from ORVs did not result in an adverse effect to the foraging function of the habit because even if the impact was more than negligible, there was no evidence that it diminished the value of the resource area in light of the overall availability of wrack at Plymouth Beach and the conditions established in the SOC that led to accumulation of wrack during the breeding period in particular. In situations were it is not possible to determine the hatch date, the vehicle exclusion takes effect immediately. 2008 Plan, p. 27. Those conditions are consistent with the NHESP Guidelines, the USFW Guidelines and the Department's Guidance. The basis in evidence for his opinion rests on the availability of sufficient wrack to sustain the productivity of the listed species at a level that will continue to expand the local population. As discussed above, I disagree with the Petitioners' argument that evidence of whether or the extent to which the project will have a site specific effect on the listed species is wholly irrelevant to compliance with the no adverse effect standard. See Matter of James Love, supra.

Whether or not a species productivity measures should be a determinative factor in deciding if the foraging habitat will suffer an adverse effect from the activities permitted under the SOC, the burden rests on the Petitioners to clearly show that the DFW Determination's opinion is incorrect, implicitly concluding that impact from ORVs on the foraging characteristics of the habitat can be ignored without diminishing its value. As discussed earlier, in determining if that burden was met I considered (a) the magnitude of the impact on the habitat associated

with the ORV access (b) the timing and duration of the ORVs' impact; and (c) the extent to which the ORV activities permitted under the SOC will diminish the habitat values to the species. Applying those criteria to the evidence, I find that the petitioner's evidence did not clearly show that NHESP's conclusion that the 2008 Plan did not result in an adverse effect was incorrect.

The Petitioners' focus on impacts to wrack during the period when it is present within the corridor does not address the availability of wrack and other food sources outside the corridor that may be considered in determining whether the ORV's impact are less than a negligible change to the resource area, which at a minimum encompasses the entire beach. The Petitioners' experts both testified that plover chicks will travel significant distances to forage, and once fledged can access sources anywhere within the habitat along with the adults.

There are substantial areas of the beach and dune in which wrack and other food sources can accumulate without any potential ORV impact, including in Zone 2 below the MHT line, at or above the monthly high tide line or the symbolic fence line which is likely to be seaward of the monthly high tide and in Zones 1, 3 and 4 which exclude ORVs during the relevant periods. Melvin, HT, page. 855. The corridor is also open during daylight hours, allowing foraging for much of the day. There are also substantial periods of time in which the ORV corridor is closed to traffic during the period from before hatching until fledging. The Town provided data that showed that during the period of time the Crossover gate was open in the three years from 2006-2008, a period of 110 days, vehicles could on average access the full length of the travel corridor only 18 days (16% of the open period); three quarters of the corridor length for 28 days (25%); and less than one-half the corridor length for 49 days (45%). McCall PFD ¶ 94; Gould PFD

¶ 110. Only 7% of the length of the vehicle corridor was open over the entire summer season. McCall PFD ¶ 95. The percentages of corridor closure are consistent with the distribution of piping plover nests in 2007 and 2008, which show that approximately 50% and 43 % of the nests, respectively, were located in an area that was open only 28 days to ORV transit. Hecker PFD, Exhibits 23 and 24. One half of the remaining plover nests during each of those years were in Zone 3, an area off limits to vehicles. Id. As noted earlier, the average pre-hatch corridor closures for the past three years substantially exceeded the period recommended in the NHESP and USFW Guidelines. While this may be a collateral benefit of a vehicle exclusion overlapping nesting territories, it still yields extended periods when wrack can accumulate without vehicle disturbance.

The Department has issued a guidance document on the protection of inland wetland wildlife habitat that prescribes the circumstances under which it may be demonstrated that alterations that exceed the impairment threshold[27] on important wildlife habitat functions will be considered to have only a negligible effect. Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands, Department of Environmental Protection (March 2006) at p. 3.

> Applicants may show that alternations will have a negligible effect on important wildlife functions in some circumstances. This may occur only when an above-threshold activity will alter an important habitat feature that is very common on the site, so that the amount of habitat feature lost on the site is insignificant compared with the amount that remains. Id.

The guidance was written to address issues arising under the provisions of 310 CMR 10.60 regulating wildlife habitat not determined to be habitat of state listed species. While the Petitioners are correct that the wildlife habitat regulated in accordance with 310 CMR 10.60 is

[27] See Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands, Department of Environmental Protection (March 2006), pp. 2-3 for a listing of the thresholds below which impairment of the habitat will not be deemed have occurred.

subject to a less stringent alteration standard than the no adverse effect criterion for state-listed habitat in both inland and coastal wetlands, there is nothing in the regulations that precludes consideration of the above principle provided that the standard of no adverse effect as defined at 310 CMR 10.23 and applied through 310 CMR 10.37 is met. In addition, the Department is solely responsible for implementation of the wildlife habitat provisions in the regulations as interpreted by the guidance, whereas protection of rare species habitat is implemented by the NHESP and the Department properly relies on its opinion as to adverse effect.

There is no evidence that the volume of wrack on Plymouth Beach is a limiting factor in sustaining or expanding the local species population and that ORVs' operation exacerbate that condition. The Petitioners did not provide sufficient evidence to demonstrate a clear showing that the effect of ORV traffic is greater than negligible and results in a diminishment in the resource areas value in relation to the relative magnitude of the wrack impacted, the percentage of the beach or the duration in time that ORVs degrade wrack or otherwise deprive the habitat of potential food sources.

The Petitioners' raise a concern about the energy budget necessary for the plovers to survive and successfully migrate as a consequence of having to forage beyond the corridor, but do not attempt to estimate the energy demands of the current population or the maximum population the beach could support in relation to the food supply lost to ORV traffic. Dr. Cohen opines that there is no evidence that documents that a five day accumulation of wrack would support the same foraging rates for chicks as less disturbed clumps. Cohen PFD ¶ 34. But, neither does he offer any evidence to the contrary. Mr. Hecker references a study that concludes that human disturbance, including that associated with ORVs inhibits migratory shorebirds ability to gain enough fat to migrate. Hecker PFD ¶ 49. I did not give significant weight to this

evidence because I was not able to distinguish between human and ORV impacts or its effect on the state-listed species regulated pursuant to 310 CMR 10.37. In addition, the dates of the studies indicate they were done prior to the adoption of the ORV restrictions now in effect, so their specific conclusions are likely not to be relevant to the conditions that will pertain under the SOC.

In sum, both Mr. Hecker and Dr. Cohen state their opinions that ORV traffic will have an adverse effect on the habitat due to impacts to wrack, but the lack of evidence in support of that opinion as it relates to the conditions at Plymouth Beach under the SOC provides an insufficient factual basis or function-based metric to support a clear showing that the extent of the impact from ORVs on Plymouth Beach's habitat as a food source is greater than negligible. Expert opinion presented without supporting facts does not sustain the Petitioners' burden to clearly show that reliance on the DFW Determination is incorrect. See Matter of Jon L. Bryan, Docket No. 04-767, Recommended Final Decision (July 25, 2005); Matter of Cheney, Docket No. 98-096, Final Decision (October 26, 1999).

The length of pre-hatch corridor closure presented in Ms. McCall's testimony clearly exceeds the 5 day limit prescribed in the SOC and recommended in the NHESP Guidelines. It is not apparent from the testimony whether that is result of corridor closures to avoid disturbance of nests, in compliance with SOC Condition No. 24, or for other reasons. Reliance on those statistics to ensure no adverse affect has limitations. The reported pre-hatch closure dates represent the average corridor closure period, so one or more nests may have been protected for much shorter periods if the nest wasn't observed before the last egg was laid. The extent of the pre hatch closure periods are also likely a function of the benefit that some unhatched nests, but perhaps not all now or in the future, receive from the corridor closure to protect neighboring

unfledged chicks. If Mr. Hecker's assertion that it was not possible to determine the anticipated hatching date for 80% of the nests, then under certain situations a five day amount of wrack may not accumulate before the chicks hatch, but it appears that the average pre-hatch closure periods far exceed the five-day objective. The 2008 Plan incorporates the NHESP Guideline's recommendation to implement the closure immediately if the pre-hatch date of nest cannot be determined. 2008 Plan, pages 26-27; NHESP Guideline, page 9. The SOC approves the 2008 Plan. S.C. No. 20.

Special Condition No. 28 does not explicitly address what the Town's response should be regarding closing the corridor if the anticipated hatch date cannot be determined. As noted above, the 2008 Plan requires the exclusion zone for a nest be established immediately if the hatch date is unknown. That outcome, however, appears to be inconsistent with S.C. No 24 that allows for 12 foot wide corridor next to a nesting area provided vehicle transit does not disturb plover nests. If wrack was present in the corridor during this period, S.C. No. 24 would allow vehicles to drive over the wrack if the nesting pair had acclimated to the ORV transit. In order to clarify the SOC and increase the accumulation of wrack, recommend that Special Condition No. 24 be revised to exclude travel for the period of time where wrack is being deposited within the travel corridor in an area where there are nesting plovers and the provisions of Condition 28 have not already come into effect.[28]

(6) Roosting and Shelter

[28] See Attachment, Recommend FOC Revisions.

The Petitioners assert that by mid-August or earlier, depending on when the last chicks have fledged, Zone 2 is largely open over its entire 5500 foot length for the full 42 foot width interfering with the birds use for roosting or resting, in addition to feeding. Hecker PFD ¶ 104. The extent of ORV access represented by Mr. Hecker is contradicted by Ms. McCall's testimony that documents that in August 2006, 2007, and 2008, vehicle access to the 790 line was 11, 7, and 11 days respectively in August, and 4, 3, and 1 day respectively in September. McCall PFD ¶ 117. I have no doubt that there is displacement of areas that plovers and terns might occupy for some period if ORVs were not present. But, I also consider the limited hours of the day the beach is open, the large areas outside the corridor available including the Zone 4 harbor side as well as the area below MHT and landward of the symbolic fencing. Ms. Muther also testified that there was little travel within the corridor except for the arrival stream of traffic and the departure stream. I conclude that would mean that while the 18 foot wide parking corridor may be occupied, the 24 foot travel corridor is largely unused for most of the period and would provide habitat for roosting, resting and feeding. It should also be noted, that excluding ORVs from driving on the beach does not preclude people from walking or boating to the beach, and conducting all the activities on or proximate to the vehicle corridor that substantially reduce the likelihood of birds using that area for extended roosting. In light of the evidence that indicates substantial habitat in time and space for resting and roosting and the Petitioners' failure to clearly show the impact from ORV on this habitat function was greater than negligible, I find the SOC did not result in an adverse effect.

VI. CONCLUSION

Based on the foregoing evidence, I conclude that the conditions set out in the DFW Determination, the SOC and the 2008 Plan sufficiently prevent the potential impacts from ORVs

to the extent that no adverse effect is caused to the coastal beach, coastal dune, or state-listed rare species habitat on Plymouth Beach. I have proposed recommend revisions to the SOC in the interest of reconciling inadvertent discrepancies between the DFW Determination, the 2008 Plan and the SOC. I have also proposed additional recommendations that I believe will further advance the interest of the regulations in regard to the protection of habitat functionis. Accordingly, I recommend that the Department's Commissioner issue a Final Decision affirming the SOC with the attached proposed revisions.

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Philip Weinberg
Presiding Officer

NOTICE- RECOMMENDED FINAL DECISION

This decision is a Recommended Final Decision of the Presiding Officer. It has been transmitted to the Commissioner for her Final Decision in this matter. This decision is therefore not a Final Decision subject to reconsideration under 310 CMR 1.01(14)(e), and may not be appealed to Superior Court pursuant to M.G.L. c. 30A. The Commissioner's Final Decision is subject to rights of reconsideration and court appeal and will contain a notice to that effect.

Because this matter has now been transmitted to the Commissioner, no party shall file a motion to renew or reargue this Recommended Final Decision or any part of it, and no party shall communicate with the Commissioner's office regarding this decision unless the Commissioner, in her sole discretion, directs otherwise.

APPENDIX

RECOMMEND REVISION TO THE PLYMOUTH BEACH

FINAL ORDER OF CONDITIONS

1. The Town of Plymouth shall comply with the provisions of the Plymouth Long Beach Management Plan except to the extent that it is inconsistent with this Superseding or Final Order of Conditions.
2. Special Condition 21 shall be revised as follows: Zone 2 shall be open to vehicle traffic only when the Applicant's staff is present and all symbolic fencing and posts are installed and in place in accordance with Special Conditions No. 23 to 26 of this Order; provided that the Applicant shall not open Zone 2 to vehicles prior to Memorial Day without prior written approval from the Department, except for essential Town vehicles in accordance with the provisions of Section 7.4 of the Plymouth Long Beach Management Plan. If prior to the annual opening of Zone 2 to vehicles, the distribution of active nests is such that the area from the Crossover to the adjustable groin has significantly less active plover nests than the prior year, the Applicant shall consult with the Department and the NHESP to determine if any modifications should be made to the layout of the corridor or conditions under vehicles may travel or park to ensure that potential nesting areas are not disturbed.
3. Special Condition 22 is to be revised as follows: The fencing delineating where nesting activity is occurring shall be maintained and expanded as necessary through July 31 or through the end of any period of nesting activity, whichever is later, provided that any such nesting activity began on or before July 31. Nesting activity is defined as the presence of plovers or terns conducting courtship including scrapes on the ground anywhere above the

mean high tide line as established herein, and or the presence of their active(with footprints) nests, eggs, or unfledged young.

4. Special Condition 24 is revised as follows: The 12-foot wide travel corridor may pass through the 50 yard refuge area provided: (a) that the vehicle activity does not result in disturbance to the nesting plovers; and (b) the provision of paragraph 28 regarding closure of the travel corridor are not in effect. In the event any harm comes to a chick through contact with a vehicle, all non-essential vehicle access shall be suspended until an assessment of the cause is conducted and the Department, in consultation with the NHESP, determines if and under what conditions vehicle access may be resumed.
5. Special Condition 28 is revised as follows: . . . *Guidelines for Managing Recreational Uses of Beaches to Protect Piping Plovers, Terns, and Their Habitat in Massachusetts (April 21, 1993).* If a plover nest is found with a complete clutch, precluding estimation of the hatching date, and the availability of wrack has been substantially reduced within the vehicle corridor, or ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles shall be begin immediately. The section of beach shall remain closed until all remaining plover chicks associated with the nest have fledged. The 100 yard boundary to the south shall be expanded to 200 yards on or before the anticipated hatch date, if known, or upon observation that hatching has commenced. The 200 yard southern boundary may be reduced to 100 yards after the first week. If unfledged plover chicks move outside of the original protected area, then the boundaries of the protected areas shall be adjusted to provide at least a 100 yard buffer between the unfledged chicks and vehicles unless site specific conditions allow for a reduction in this distance.

6. Special Condition 29 is revised as follow: If unfledged tern chicks move outside the original protected area, then the boundaries of the protected area shall be adjusted to provide at least a 100 yard buffer between unfledged chicks and vehicles.