AMERICAN BIRD CONSERVANCY

Bringing back the birds

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RE: Comment on Initiation of 5-Year Review of Roseate Tern, Northeastern North American population

Dear Ms. von Oettingen:

Thank you for the opportunity to provide new information and comment publicly on the initiation of the 5-Year Review of the Northeastern North American population of the Roseate Tern.

American Bird Conservancy is a 501(c)(3), non-profit membership organization whose mission is to conserve native birds and their habitats, working throughout the Americas to safeguard the rarest bird species, restore habitats, and reduce threats. We are writing to provide new information on the Roseate Tern's species biology and habitat conditions.

Based on recent and future developments that we outline below, we recommend that the U.S. Fish and Wildlife Service maintain the species' current classification as Endangered under the Endangered Species Act (ESA). We propose updates to both sections of part 2.3: Updated Information and Current Status, as presented in the previous (2010) version of the 5-year Review[1]: Biology and habitat (Section 2.3.1) and Five-factor analysis (2.3.2).

[1] Amaral, M., Saliva, J.E., 2010. Caribbean Roseate Tern and North Atlantic Roseate Tern (*Sterna dougallii dougallii*): 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Concord, NH, USA. https://ecos.fws.gov/docs/five_year_review/doc3588.pdf

2.3.1 Biology and habitat

2.3.1.2 Abundance, population trends, demographic features, and/or demographic trends:

2.3.1.2.9 Population modeling

Several new quantitative techniques have been developed to implement robust population viability analyses (PVA). These models estimate carrying capacity and represent the best available science; such models have been used for other ESA listing reviews of seabird and upland game species, using annual rates of change within an information-theoretic modeling framework[2, 3, 4]. These metrics have the benefit of incorporating density dependence into estimates of population size, accounting for fluctuations around a changing carrying capacity. Because colony-breeding seabirds are known to undergo negative density dependence, these techniques serve as a robust tool to "maintain the population above thresholds necessary to conserve declining populations"[4], and would be extremely useful in estimating and predicting population trends of the Roseate Tern.

2.3.1.5 Spatial distribution, trends in spatial distribution, or historic range:

We suggest adding information to this section (2.3.1.5) on the nearshore and offshore distribution of Roseate Terns during the pre-breeding, breeding, and post-breeding seasons.

Nearshore distribution

Recent ship-based and tracking studies have found that Roseate Terns forage at distances from the colony much farther than previously thought (e.g., 30km; see 2.3.1.6[5]). These new studies have shown that tracked Roseate Terns (i.e., fitted with nanotags) travel up to 50km away from the colony during the breeding season (Jun-Aug)[6], likely in pursuit of high quality, persistent prey: Northern Sandlance (*Ammodytes dubius*; Fig. 1) and Atlantic Herring (*Clupea harengus*)[7]. Furthermore, at-sea studies have reported Roseate Terns in

[2] Garton, E.O., Connelly, J.W., Horne, J.S., Hagen, C.A., Moser, A., Schroeder, M., 2011. Greater sage-grouse population dynamics and probability of persistence, In Ecology and conservation of Greater Sage-Grouse: a landscape species and its habitats. Studies in Avian Biology (vol. 38). eds S.T. Knick, J.W. Connelly, pp. 293-381. University of California Press, Berkeley, CA.

[3] Garton, E.O., Hagen, C.A., Beauprez, G.M., Kyle, S.C., Pitman, J.C., Schoeling, D., Van Pelt, W.E., 2016. Population dynamics of the lesser prairie-chicken, In Ecology and conservation of Lesser Prairie-Chicken. Studies in Avian Biology (vol. 48). eds D.A. Haukos, C.W. Boal, pp. 49-76. CRC Press, Boca Raton, FL.

[4] Goyert, H.F., Garton, E.O., Drummond, B.A., Renner, H.M., 2017. Density dependence and changes in the carrying capacity of Alaskan seabird populations. Biological Conservation 209, 178-187.

[5] Heinemann, D., 1992. Foraging ecology of Roseate Terns breeding on Bird Island, Buzzards Bay, Massachusetts. USFWS, Manomet, MA.

[6] Loring P., Goyert H.F., Griffin C., Sievert P., and Paton P. Tracking Movements of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers in the Northwest Atlantic. Annual Report to Bureau of Ocean Energy Management under Interagency Agreement No. M13PG00012 to USFWS

[7] Goyert, H.F., 2015. Foraging specificity and prey utilization: evaluating social and memory-based strategies in seabirds. Behaviour 152, 861-895.

high densities up to approximately 80km from shore during spring (May) [8] and summer (Jun to mid-Aug) [9, 10]. This range places them at high risk of vulnerability to the development of wind energy facilities currently leased or proposed within 80 km of shore (see Fig. 2 and sections 2.3.2.1, Factor A, and 2.3.2.5, Factor E, below).

Offshore distribution

During the fall post-breeding season (mid-Aug to Oct), Roseate Terns have been documented far offshore, up to approximately 250 km[10, 11], often in association with tunas or marine mammals. This range places them at risk of vulnerability to the development of wind energy facilities on the Atlantic Outer Continental Shelf (see Fig. 2 and sections 2.3.2.1, Factor A, and 2.3.2.5, Factor E, below).

2.3.1.6 Habitat or ecosystem conditions:

Foraging Habitat

Many of the aforementioned studies have characterized the foraging habitat of the Northeastern population of Roseate Terns. In nearshore waters during the spring pre-breeding season (May), Roseate Terns tend to associate with Common Terns (*Sterna hirundo*) in relatively shallow water with high primary productivity, intermediate sea surface temperatures, and abundant herring and sandlance [8]. In offshore waters during the pre- and fall post-breeding season (Aug-Oct), foraging Roseate Terns associate with Common Terns, tunas (e.g., Atlantic bluefin tuna, *Thunnus thynnus*), and dolphins (e.g., Common Dolphin, *Delphinus* spp.), in relatively close proximity to shore, over shallow water with high sea surface temperatures[11]. Roseate Terns specialize on sandlance [7, 12], particularly foraging habitat with high quality and persistent sandlance[8], such as outer Cape Cod, Massachusetts, which is an important staging ground[6] that contains critical foraging habitat[13] (Fig. 1).

[8] Goyert, H.F., 2014. Relationship among prey availability, habitat, and the foraging behavior, distribution, and abundance of common terns Sterna hirundo and Roseate Terns S. dougallii. Marine Ecology Progress Series 506, 291-302.

[9] Fig. 17b in Veit, R.R., White, T.P., Perkins, S.A., Curley, S., 2016. Abundance and Distribution of Seabirds off Southeastern Massachusetts, 2011-2015. U.S. Department of the Interior, Bureau of Ocean Energy Management, Sterling, Virginia. OCS Study BOEM 2016-067. 82 p.

[10] Figs A-238-240 in O'Connell, A.F., Gardner, B., Gilbert, A.T., Laurent, K., 2009. Compendium of Avian Occurrence Information for the Continental Shelf Waters along the Atlantic Coast of the United States, Final Report (Database Section - Seabirds). USGS Patuxent Wildlife Research Center, Beltsville, MD. U.S. Department of the Interior, Geological Survey, and Bureau of Ocean Energy Management Headquarters, OCS Study BOEM 2012-076.

[11] Goyert, H.F., Manne, L.L., Veit, R.R., 2014. Facilitative interactions among the pelagic community of temperate migratory terns, tunas and dolphins. Oikos 123, 1400-1408.

[12] Nisbet, I.C.T., Gochfeld, M., Burger, J., 2014. Roseate Tern (Sterna dougallii), version 2.0, In The Birds of North America. ed. A.F. Poole. Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.370.

[13] http://climateactiontool.org/species/forage-fish. Select layer to show Spring and Fall (MA DMF) – Sandlance

2.3.1.7 Other:

2.3.1.7.3 Winter quarters, migration and staging

Roseate Terns engage in social facilitation, often feeding in the presence of Common Tern feeding flocks or predatory fish and marine mammals, to increase the detectability and accessibility to forage fish[11, 12, 14] (see suggested updates to Section 2.3.1.5-2.3.1.6). This is important because it means that the conservation and management of the Roseate Tern depends not only on habitat suitability and the availability of prey, but also on the conservation and management of other mesopredators (e.g., Common Terns, tunas, dolphins).

2.3.1.7.4 Food and foraging

As stated in the suggested updates to 2.3.1.6, Roseate Terns specialize on sandlance during the breeding season, and herring is another important food source [7, 12].

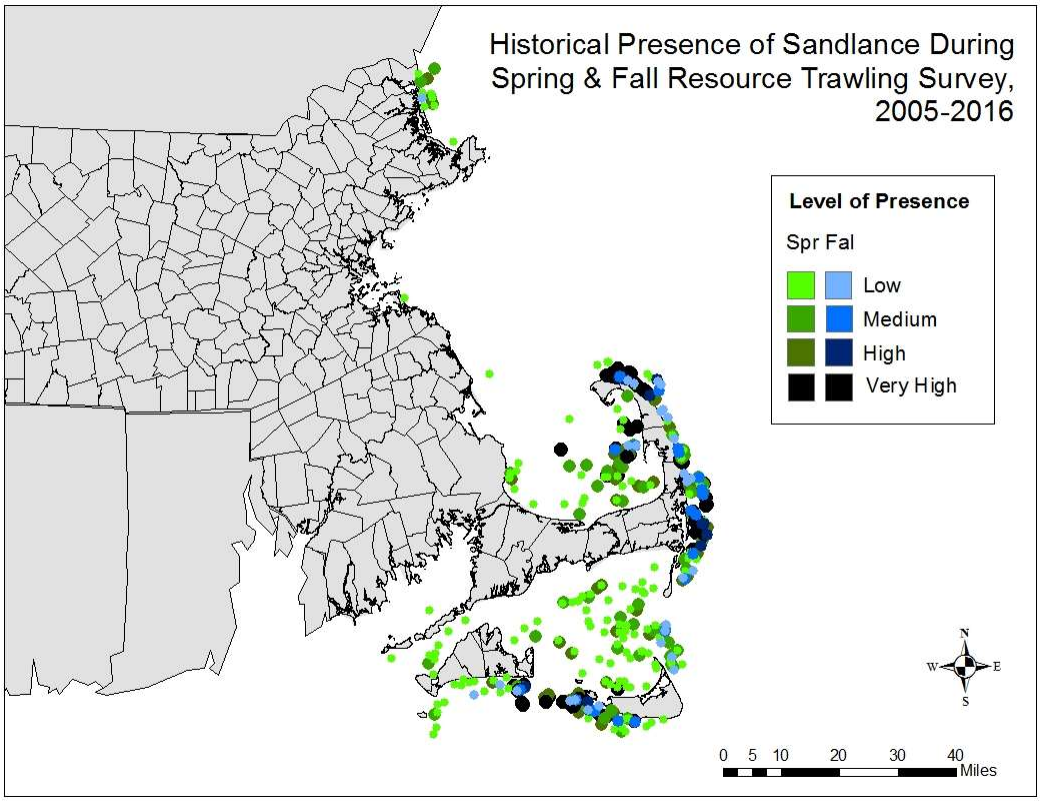

Figure 1. Critical habitat for Roseate Terns in southeastern Massachusetts. The outer Cape Cod and the islands of Martha's Vineyard and Nantucket act as staging grounds where adults feed themselves and their fledglings sandlance prior to migrating to South America. From: http://climateactiontool.org/species/forage-fish, courtesy of M. Staudinger and A. Davis.

[14] Goyert, H.F., Gardner, B., Veit, R.R., Gilbert, A.T., Connelly, E., Duron, M., Johnson, S., Williams, K., 2018. Evaluating habitat, prey, and mesopredator associations in a community of marine birds. ICES Journal of Marine Science, 1-11.

2.3.2 Five-factor analysis:

2.3.2.1 Factor A. Present or threatened destruction, modification or curtailment of its habitat or range:

Two developing environmental threats are likely to impact the habitat and range of Roseate Terns in the present and near future: climate change and wind turbines.

Climate change

Increasing sea surface temperatures and deteriorating secondary productivity (i.e., krill abundance) have negatively affected the population dynamics and carrying capacity of other larid species (e.g., Red- and Black-legged Kittiwakes, *Rissa* spp.[15]), and are likely to impact Roseate Terns through similar mechanisms (i.e., their forage base). As specialists, Roseate Terns show foraging fidelity to feeding grounds where sandlance is abundant and persistent, consistent with mechanisms involving the use of spatial memory to find food[7]. Breeders demonstrate low reproductive success (i.e., productivity, which is the number of chicks fledged per pair) in years of low sandlance availability, as determined by fisheries surveys[7]. Roseate Terns are not likely to adapt quickly enough to unpredictable (i.e., rapid or extreme) changes in the distribution of forage fish, such as sandlance, that is occurring as a result of climate change[16].

The 2010 version of the Roseate Tern 5-year Review[1] described the potential effects of sea level rise on breeding and roosting sites. In 2015-2017, MassWildlife restored Bird Island (Marion, MA in Buzzards Bay, one of the three predominant breeding colonies of Roseate Terns) with higher revetment to increase its resilience to the threat of overwash from storms, tides, and sea level rise[17]. This set an important precedent for management agencies to initiate comprehensive mitigation efforts that will be needed to minimize impacts to Roseate Terns from climate change.

Wind turbines

The development of offshore wind energy is mentioned in Factor E (2.3.2.5), but should additionally be discussed here, under Factor A, given the potential for habitat displacement and/or loss, as has occurred with Northern Gannets (*Morus bassanus*). These seabird species are piscivorous. plunge-diving foragers, similarly to Roseate Terns, and when tracked using GPS tags were found to avoid wind energy facilities in the North Sea[18]. While the Block Island Wind Farm currently is the only offshore facility operating in the USA, several other projects have already been leased in southern New England (i.e., in federal waters off the coasts of Massachusetts and Rhode Island; Fig. 2). The majority

[15] Goyert, H.F., Garton, E.O., Poe, A.J., 2018. Effects of climate change and environmental variability on the carrying capacity of Alaskan seabird populations. The Auk, 975-991.

[16] Lucey, S., Nye, J., 2010. Shifting species assemblages in the Northeast US Continental Shelf Large Marine Ecosystem. Marine Ecology Progress Series 415, 23-33.

[17] https://www.mass.gov/service-details/masswildlife-monthly-july-2017 "Terning around Bird Island"

[18] Garthe, S., Markones, N., Corman, A.-M., 2017. Possible impacts of offshore wind farms on seabirds: a pilot study in Northern Gannets in the southern North Sea. Journal of Ornithology 158, 345-349.

of these wind energy areas fall within the foraging range of terns during the spring pre-breeding and summer breeding season (up to 80km from shore)[8, 9, 10], and they fall well within the post-breeding range of terns[10, 11] (up to 250 km from shore; see suggested updates to 2.3.1.5). New tracking studies have documented Roseate Terns crossing the proposed/leased wind energy areas, particularly between Long Island, NY, Block Island, RI, Martha's Vineyard, MA, and Cape Cod, MA[6]. These crossing events occurred most often during the post-breeding season, when Roseate Terns travel from their colonies on Great Gull Island, NY, and islands in Buzzards Bay, MA, to Cape Cod, MA, which contains critical habitat used as a staging ground due to the highly persistent and abundant availability of sandlance[13].

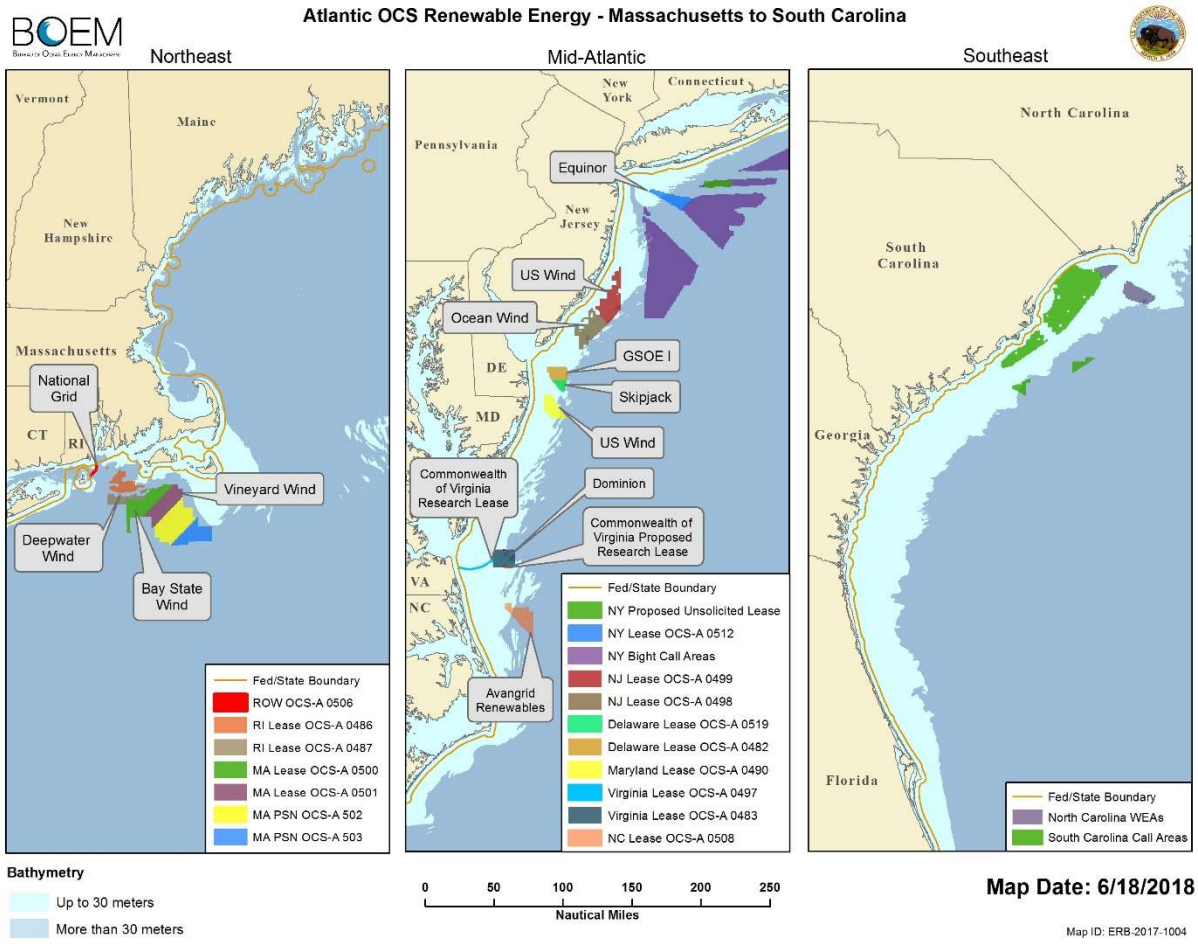

Figure 2. Proposed and leased wind energy areas in federal waters (i.e., > 3nm from shore) along the Eastern seaboard of the USA, on the Northwest Atlantic Outer Continental Shelf. From https://www.boem.gov/Renewable-Energy-GIS-Data/.

2.3.2.5 Factor E. Other natural or manmade factors affecting its continued existence:

Contaminants

Since the 2010 version of the Roseate Tern 5-year Review was published[1], the Gulf of Mexico Oil Spill occurred. The USFWS listed the Roseate Tern as threatened by the spill[19], and new studies are needed to determine its potential effects, particularly given the detrimental impacts of the 2003 Bouchard oil spill in Massachusetts[20].

Wind turbines

In addition to the impacts of wind turbines on habitat (see suggestions to 2.3.2.1, Factor A), wind energy developments pose imminent threats to the Roseate Tern with respect to collision risk, as well as cumulative impacts. The American Bird Conservancy has developed a "Bird-Smart Wind Energy Policy" that can be used as guidelines to reduce and redress any unavoidable bird mortality and habitat loss from wind energy development [21]. Our policy states that wind power should employ careful siting of infrastructure, operation and construction mitigation, monitoring, and compensation. Proper siting offers the most effective strategy to prevent take, but several wind energy areas have already been leased in southern New England (Fig. 2). Given that these turbines fall in the flight paths of foraging Roseate Terns, particularly during the post-breeding season, there is much uncertainty as to how take will be minimized, either from collisions, habitat displacement/loss, or cumulative impacts. Multiple years of scientifically rigorous study (e.g., before-after-control-impact) are critically needed to assess impacts on the Northeastern Roseate Tern population. Such studies should be independent from the leasing industries and be systematically designed to accurately and precisely quantify the exposure and vulnerability of Roseate Terns to offshore wind energy development[14, 22]. Mitigation should be planned to appropriately address and compensate any permitted take. Effective mitigation actions should be considered for breeding, winter and non-breeding roost sites, for example habitat restoration, predator control, and establishment of protected areas (as has occurred at Bird Island in Marion, MA, Buzzards Bay).

[19] https://www.fws.gov/home/dhoilspill/pdfs/FedListedBirdsGulf.pdf

[20] Tseng, F.S., Apanius, V., Nisbet, I.C., 2007. Integrating Physiological and Demographic Parameters into NRDA. A Final Report Submitted to The NOAA/UNH Coastal Response Research Center, West Grafton, MA.

[21] https://abcbirds.org/program/wind-energy-and-birds/learn-more/

[22] Goyert, H.F., Gardner, B., Sollmann, R., Veit, R.R., Gilbert, A.T., Connelly, E.E., Williams, K.A., 2016. Predicting the offshore distribution and abundance of marine birds with a hierarchical community distance sampling model. Ecological Applications 26, 1797–1815.

Population trend uncertainties

Given imminent threats to Roseate Terns from contaminants, climate change and wind turbines, and the need for further study of these impacts, there remains much uncertainty in the projected future of the Northeastern Roseate Tern population. Further scientific study is critically needed to reduce such uncertainty. For example, research is needed to quantify the vulnerability of Roseate Terns to contaminants, climate change and wind turbines, and such environmental variables can be included in PVAs to help reduce projected uncertainty[4, 15]. Until such studies are implemented and evaluated, it is imperative that the Northeastern population of the Roseate Tern remains listed as Endangered, to maximize its protection and avoid population collapse.

Given the impacts of climate change, changes in the distribution of forage fish and critical foraging habitat, contaminants, and the development of offshore wind energy, American Bird Conservancy recommends to maintain the current classification of the Northeastern North American population of the Roseate Tern as Endangered under the Endangered Species Act. Please do not hesitate to contact us with any questions on information pertaining to Roseate Terns at any point during or after the 5-year Review process.

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