

**UNITED STATES OF AMERICA**  
**NUCLEAR REGULATORY COMMISSION**  
**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

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In the Matter of )  
Entergy Nuclear Generation Company )  
Entergy Nuclear Operations Inc. )  
Pilgrim Nuclear Power Station )  
License Renewal Application )

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Docket # 50-293 LR

**AFFIDAVIT OF IAN CHRISTOPHER THOMAS NISBET, Ph.D.**

1. My name is Ian Christopher Thomas Nisbet. I reside at 150 Alder Lane, North Falmouth, Massachusetts 02556.

2. I hold a Ph.D degree from the University of Cambridge and I am a professional environmental scientist. I recently retired from my position as President of I. C. T. Nisbet & Company, an environmental consulting firm, but I continue to do part-time consulting under the same name.

3. I have studied roseate terns in Massachusetts, including the vicinity of Pilgrim Nuclear Power Station (PNPS) and other parts of Plymouth, Massachusetts, since 1970. I have published 28 papers on roseate terns in peer-reviewed scientific journals and I have two others awaiting publication. I was a co-author of the two most recent monographs on roseate terns, published in the series *Birds of North America* (Gochfeld, M., J. Burger, and I. C. T. Nisbet, Roseate Tern *Sterna dougallii*, No. 370 in *The Birds of North America* [eds., A. Poole and F. Gill], The Birds

of North America, Inc., Philadelphia, PA, 1998) and *BWP Update* (Ratcliffe, N., I. C. T. Nisbet and S. Newton, Roseate Tern *Sterna dougallii*, *BWP Update*, vol. 6, pp. 77–90, 2004). I am recognized as one of the leading experts on roseate terns, both in the USA and worldwide.

4. I have worked closely with the U.S. Fish and Wildlife Service (USFWS), the Massachusetts Division of Fisheries and Wildlife (MDFW) and the Massachusetts Natural Heritage and Endangered Species Program (NHESP) towards conservation of the roseate tern since the 1970s. I have been a member of the Recovery Team for the Northeast population of the roseate tern (RTRT) since 1989 and I have attended all of its annual meetings. (However, this affidavit is written in my capacity as an independent expert on roseate terns and not on behalf of or as representative of RTRT, USFWS, MDFW or NHESP.)

5. In 1980-1981, under contract to USFWS, I wrote two lengthy reports reviewing scientific literature on roseate terns. These reports formed the basis for the listing of the Northeast population of the roseate tern as federally endangered in 1987 (*Endangered and threatened wildlife and plants: determination of endangered and threatened status for two populations of the roseate tern*, USFWS, *Federal Register* 52: 42064-42071). In 1989, under contract to USFWS, I wrote another report summarizing information on the Northeast population of the roseate tern that had become available since 1981. This formed part of the basis for the Recovery Plan for the Northeast population of the roseate tern, issued in 1989 (*Roseate Tern Recovery Plan, northeastern population*, USFWS, Newton Corner, MA, 1989). In 2010, again under contract to USFWS, I reviewed all scientific literature on the Northeast and Caribbean populations of the roseate tern, and I drafted extensive sections of USFWS's Five-year Review of the roseate tern (*Caribbean Roseate Tern and North Atlantic Roseate Tern [Sterna dougallii dougallii]. 5-Year Review: Summary and Evaluation*, USFWS, Boqueron, Puerto Rico, and

Concord, New Hampshire, September 2010.

[http://ecos.fws.gov/docs/five\\_year\\_review/doc3588.pdf](http://ecos.fws.gov/docs/five_year_review/doc3588.pdf)).

6. I studied roseate terns nesting on Long Beach, Plymouth (LBP), in 1970-1971 and I continued monitoring them, including counting and marking nests and banding chicks, there until 1994. I was Director of Science for the Massachusetts Audubon Society in 1974-1980. I have been associated with Manomet Center for Conservation Sciences (MCCS: formerly Manomet Bird Observatory) since 1970 and I served as adviser to their scientific program in the 1990s and 2000s. Since 2011, I have served on the Scientific Advisory Committee of the Goldenrod Foundation, based at LBP, and I have visited LBP several times and observed roseate terns there.

7. In 1998, I coordinated a study of roseate terns staging (gathering, resting and roosting) at many locations around Cape Cod, including LBP. I summarized information from previous studies and was the principal author of a paper on this topic (Trull, P., S. Hecker, M. A. Watson and I. C. T. Nisbet, *Staging of Roseate Terns in the post-breeding period around Cape Cod, Massachusetts, USA, Atlantic Seabirds*, vol. 1, pp. 145-158, 1999). Between 2007 and 2009, personnel of the Massachusetts Audubon Society (MAS) conducted intensive studies of roseate terns staging around Cape Cod, including 76 visits to LBP; three annual reports were issued by MAS's Coastal Waterbird Program. I participated in the MAS studies, although I did not visit LBP in 2007-2009. I visited LBP several times in 2010 and 2011 and observed staging roseate terns there.

8. Roseate terns have nested at LBP since at least the early 1950s. Oliver Austin's banding records indicate that he banded thousands of roseate tern chicks there in the early 1950s and there were apparently several hundred pairs nesting at that time. I recorded 40 pairs nesting in 1970 and 50 pairs in 1975. However, terns at LBP have been periodically subjected to heavy

predation by rats, foxes and other predators, and both roseate and common terns shifted to other sites several times. Twelve pairs of roseate terns nested in 1998, and they were then absent until 2007, a period during which predators were not controlled. Since 2007, intensified efforts by the Town of Plymouth to control predators have encouraged large numbers of common terns to return to the site and to breed successfully. One pair of roseate terns probably nested in 2008, increasing to three pairs in 2011.

9. Roseate terns at LBP form part of a “cold water” segment of the population that breeds in varying numbers at about 20 sites in the Gulf of Maine, Cape Cod Bay and outer Cape Cod. Banding and resighting records show considerable movement of individual birds from site to site within this region, influenced mainly by predation. LBP has been an important site in the past and it is reasonable to expect that it will become important again in the future as other sites become less suitable. The presence of larger numbers of roseate terns nesting at LBP in the past (paragraph 8) indicates a potential for further considerable increases in numbers in succeeding years if predator control efforts are continued.

10. Most roseate terns from the population breeding in the northeastern USA and southeastern Canada stage (gather, rest and roost) in the area around Cape Cod from late July to mid-September, following the breeding period (see paragraph 7). Total numbers are on the order of 10,000 birds (3,000 breeding pairs plus young of the year and some nonbreeding adults). This is an important period in the life cycle of the species because the young are then learning to feed independently and the birds molt their feathers and lay down energy reserves for southward migration in September.

11. Prior to 1999 LBP was known to be used by staging roseate terns but was thought to be a relatively minor site, with a maximum of 240 birds in August 1988 (Trull *et al.*, *ibid.*).

However, the MAS studies in 2007-2009 found that it had become a major staging site, with a high count of 4,776 birds (about half the North American population) on September 6, 2007. Numbers fluctuated markedly from day to day and from hour to hour within days, indicating that the birds were moving to and from other staging sites in the Cape Cod region. On some days large numbers of roseate terns arrived at LBP in the evening and apparently spent the night there; on other days large numbers left LBP in the evening and flew towards other roosting sites on Cape Cod. Depending on the level of disturbance at LBP, terns often rested and roosted on offshore sand banks, including Browns Bank.

12. Roseate terns feed on small marine fish. They usually forage within 10-20 miles of their nesting sites during the breeding season, but range more widely in the post-breeding period. They usually forage over waters less than 15 feet deep and within 1-2 miles of the coast (Rock, J. C., M. L. Leonard and A. W. Boyne, *Foraging habitat and chick diets of Roseate Tern, Sterna dougallii, breeding on Country Island, Nova Scotia, Avian Conservation and Ecology*, vol. 2, pp. 29-38, 2007. <http://www.ace-eco.org/vol2/iss1/art4/>; see also Gochfeld *et al.*, *ibid.*, and Ratcliffe *et al.*, *ibid.*). They often concentrate over shallow sand bars, in tide rips where tidal currents flow through narrow channels or around headlands, or other locations where turbulent currents bring small fish towards the surface.

13. PNPS is located about four miles from the location on LBP where roseate terns breed in May-July, and about four miles from the locations on LBP and Brown's Bank where roseate terns stage and roost in large numbers in July-September. It is well within the foraging range of roseate terns from both areas, and also has to be passed by roseate terns from those areas on their way to and from feeding areas down the coast to the southeast. The turbulent water around the two jetties that form the intake and discharge channels at PNPS, turbulence created by regular

and periodic cooling water discharges, and the tide rips off Rocky Point (about one quarter mile from PNPS) and Manomet Point (about two miles to the southeast) are expected to be prime locations for foraging roseate terns.

14. From time to time since 1970, I have observed roseate terns feeding along the length of LBP (two to four miles from PNPS), at Manomet Point (two miles from PNPS) and MCCA (less than three miles from PNPS). However, I have not made systematic observations and did not keep detailed notes. Since 2008 Ian Davies, a biologist at MCCA, has observed birds regularly in the area and has kept detailed notes. Besides recording large numbers of roseate terns at LBP, he has records of 51 individual roseate terns on 18 occasions at White Horse Beach, Manomet Point or MCCA, with a maximum of 10 birds at MCCA on August 28, 2011. I have conferred with Mr. Davies about his observations and have obtained his findings. These findings indicate that, he can expect to see roseate terns on any day in May-June or August if he looks offshore while conducting observations at one of these sites. His findings also indicate that he has also regularly observed large numbers of roseate terns staging at LBP in August-September, in numbers similar to those reported by MAS.

15. I have been asked to comment on whether the relicensing of PNPS for an additional 20-year period would be likely to have an adverse effect on the roseate tern, a federally endangered species. I have specifically been asked to comment on an assertion made by Entergy that license renewal would have “no effect” on the roseate tern, and on the concurrence with this assertion by USFWS. I have reviewed relevant documentation relating to this issue.

16. A letter dated February 3, 2005 from Entergy to USFWS stated, in part,

...the roseate tern nests in colonies along the Massachusetts coast in summer. The roseate tern nests in dune areas with thick vegetative cover, always in association with the common tern.

Although suitable nesting habitat has not been identified at PNPS, migrating terns may move through the site in late spring (en route to nesting areas in Maine and Nova Scotia) and late summer (en route to wintering areas in the West Indies and Latin America).

....

We therefore request your concurrence with our determination that license renewal would have no effect on threatened or endangered species (including candidate species and species proposed for listing) and that formal consultation is not necessary.

In 2005, when the USFWS reviewed this request for concurrence from Entergy, USFWS knew or should have known that the statement “migrating terns may move through the site in late spring...and summer...” was incorrect. It was known within the scientific community in 2005 that roseate terns occurred in significant numbers at times at LBP in the staging period in August and September (including late summer, but **not** exclusively on migration en route to wintering areas). As to nesting, it was also known within the scientific community in 2005 that although roseate terns had not nested at LBP for several years prior to 2005, they had nested there in the recent past and hence were likely to do so again in the future, including during the period proposed for relicensing (2012 to 2032). If Entergy had been uncertain about the factual basis for their statement, they could and should have sought advice from experts, including the biologists at MCCS on their doorsteps. Moreover, USFWS should have directed them to do so.

17. A reply letter dated March 6, 2005 from USFWS to Entergy stated, in part,

“..... roseate terns are known to occur on Plymouth beach just north of PNPS but ... [a]ccording to our records, none of the above-listed species [including the roseate tern and bald eagle] are known to frequent the immediate vicinity of PNPS and, therefore, the presence of these species near the power station is probably transient in nature...Since no expansion of existing facilities is planned and no additional land disturbance is anticipated, we concur with your determination that license renewal for PNPS is not likely to adversely affect federally-listed species....”

USFWS confirmed this determination in a letter to the NRC dated May 23, 2006. Although it may have been correct that USFWS had no “records” in its own files of roseate terns in the immediate vicinity of PNPS, they should have known that their records were incomplete.

USFWS was aware of the history of roseate terns nesting at LBP. As the agency responsible for

the recovery of the roseate tern population, USFWS should have known that the roseate tern was likely to nest again at LBP during the period of relicensing, and indeed that restoration of this colony fell within its own goals for recovery of the species.

18. At the time its letter was written in March, 2005, USFWS was aware of the Trull *et al.* (1999) paper which recorded staging of roseate terns at LBP and should have reviewed that paper in this context. USFWS was aware that MCCA biologists and I had information about roseate terns in the area and should have consulted us. So far as I can determine, USFWS did not raise this issue in meetings of the Recovery Team even as an information item: if they had done so, I and others could have informed them about the occurrence and likely recurrence of roseate terns in the area.

19. The assessments by Entergy and USFWS of potential effects of relicensing on roseate terns were narrowly focused on the movements of terns “through the site”, in “the immediate vicinity of PNPS” and “near the power station.” Neither Entergy nor USFWS appears to have considered the potential for adverse effects mediated through effects on the food supply of roseate terns over a larger area, in spite of the known fact that the facility continually kills large numbers of fish of the species relied on by roseate terns. Neither Entergy nor USFWS appears to have considered the potential for adverse effects on roseate terns or their fish prey by the pollutants discharged from the facility (see letter dated April 12, 2012, from Ecolaw to Daniel S. Morris, Acting Regional Administrator, National Oceanic and Atmospheric Administration, National Marine Fisheries Service).

20. Although Entergy and USFWS should have been aware that their statements in 2005-2006 were incorrect, and should have consulted experts if they had been uncertain about the facts, much more information has become available since 2006 and this new information demonstrates a much larger potential for adverse effects than could have been inferred in 2006. Predator control efforts have been stepped up at LBP, resulting in its colonization and successful breeding by large numbers of common terns; roseate terns have started to nest there again and it is now clear that this site could support important numbers of breeding roseate terns. The studies by MAS have shown that LBP is now a major site for staging roseate terns (supporting at times up to half the entire regional population). Recent field work by Ian Davies has confirmed the previously unquantified information on the presence and feeding of roseate terns in the immediate vicinity of PNPS. The first two of these developments were fully reported at meetings of the Roseate Tern Recovery Team and USFWS was undoubtedly aware of them. USFWS should have revisited its 2005-2006 conclusion of “no adverse effect” and should have conducted a Biological Assessment. At the least, USFWS should have instituted new field studies to address this issue, or should have required Entergy to do so.

21. If PNPS is relicensed and continues to operate for twenty more years, there is significant potential for adverse effects on roseate terns throughout that period (see paragraph 19). These adverse effects will increase if the number of roseate terns nesting at LBP increases during that period, as is likely (see paragraph 9). These effects could and should have been considered by USFWS during its ESA Section 7 Consultation with the Nuclear Regulatory Commission. In my professional opinion, this is a significant environmental issue and a materially different result would have been likely if the evidence proffered in this affidavit had been considered in a timely fashion.

Executed in accord with 10 C.F.R. 2.304(d) on April 30, 2012.

*Ian C. T. Nisbet*

Ian Christopher Thomas Nisbet, Ph.D.  
April 30, 2012