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Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Rufa Red Knot; Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2013–0097; 4500030113]

RIN 1018–AY17

Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Rufa Red Knot

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine threatened species status under the Endangered Species Act of 1973 (Act), as amended, for the rufa red knot (*Calidris canutus rufa*). The rufa red knot is a migratory shorebird that breeds in the Canadian Arctic, winters in parts of the United States, the Caribbean, and South America, and primarily uses well-known spring and fall stopover areas on the Atlantic coast of the United States, although some follow a midcontinental migratory route. The effect of this regulation will be to add this species to the list of Endangered and Threatened Wildlife.

DATES: This rule becomes effective January 12, 2015.

ADDRESSES: This final rule is available on the internet at *http://www.regulations.gov* at Docket Number FWS–R5–ES–2013–0097 and at *http://www.fws.gov/northeast/redknot/.* Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at *http://www.regulations.gov.* All of the comments, materials, and documentation that we considered in this rulemaking are available by appointment, during normal business hours at: U.S. Fish and Wildlife Service, New Jersey Field Office (see **FOR FURTHER INFORMATION CONTACT**).

FOR FURTHER INFORMATION CONTACT: Eric Schrading, Field Supervisor, U.S. Fish and Wildlife Service, New Jersey Field Office, 927 North Main Street, Building D, Pleasantville, New Jersey 08232, by telephone 609–383–3938 or by facsimile 609–646–0352. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Endangered Species Act, a species may warrant protection through listing if it is endangered or threatened throughout all or a significant portion of its range. Listing a species as an endangered or threatened species can only be completed by issuing a rule.

This rule will finalize the listing of the rufa red knot (*Calidris canutus rufa*) as a threatened species.

The basis for our action. Under the Endangered Species Act, we may determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. We have determined that the rufa red knot is a threatened species due to loss of both breeding and nonbreeding habitat; likely effects related to disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (mismatches) in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions.

Peer review and public comment. We sought comments from three independent specialists with expertise on red knot biology and sea level rise to ensure that our designation is based on scientifically sound data, assumptions, and analyses. We invited these peer reviewers to comment on our listing proposal. Only one of the three peer reviewers provided comments on the proposal. This peer reviewer was generally supportive of the proposal, and provided substantive comments and documentation regarding biological differences between red knots in northern versus southern wintering areas. Many of these differences were already in the proposal but in separate locations; we consolidated and emphasized these differences, updating as appropriate with new information.

Previous Federal Action

Please refer to the proposed listing rule for the rufa red knot (78 FR 60024; September 30, 2013) and its Previous Actions supplement available online at *www.regulations.gov* under Docket Number FWS–R5–ES–2013–0097 for a detailed description of previous Federal actions concerning this species.

Background

Species Information

The rufa red knot (*Calidris canutus rufa*) is a medium-sized shorebird about 9 to 11 inches (in) (23 to 28 centimeters (cm)) in length. (Throughout this document, ''rufa red knot,'' ''red knot,'' and ''knot'' are used interchangeably to refer to the *rufa* subspecies. ''*Calidris canutus''* and ''*C. canutus''* are used to refer to the species as a whole or to birds of unknown subspecies. References to other particular subspecies are so indicated.) The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed.

The November 2014 Rufa Red Knot Background Information and Threats Assessment (Supplemental Document; Service 2014, entire), available online at *www.regulations.gov* under Docket Number FWS–R5–ES–2013–0097, provides a thorough assessment of the rufa red knot biology and ecology, historical distribution and abundance, population surveys and estimates, and threats to its survival. The Supplemental Document has been updated since the September 30, 2013 publication of the proposed rule with data received during the peer review and public comment processes and relevant scientific data that have become available. In the Supplemental Document, we compile biological data and a description of past, present, and likely future threats facing the red knot. Because data in these areas of science can be limited, some uncertainties are associated with the data and conclusions drawn from the data. We have attempted to clearly identify these uncertainties and assumptions, which are based on the best available scientific and commercial data, explicit in the Supplemental Document. The Supplemental Document provides the scientific basis for our decision (see Summary of Biological Status and Threats in this final rule), the legal basis for which is the Act and its regulations and policies (see Determination in this final rule).

Summary of Biological Status and Threats

In this section, we summarize the population and threats information previously provided in the proposed rule (78 FR 60024; September 30, 2013) and updated as appropriate from new information received since the proposed rule's publication. See the Summary of Changes from the Proposed Rule section below for what has been updated.

We note that the proposed rule referenced four separate documents of supporting material—Previous Federal Actions, Rufa Red Knot Ecology and Abundance, Climate Change Background, and Factor D: The Inadequacy of Existing Regulatory Mechanisms. For this final rule, we have combined those documents into one Supplemental Document. From here forward, when we are referencing information in the proposed rule, we will use the proposed rule's **Federal Register** citation and page number (*e.g.,* 78 FR 60024, p. 60032); when we are referencing information in one of the proposed rule's supporting documents, we will use the document's name and page number (*e.g.,* Rufa Red Knot Ecology and Abundance, p. 5); and when we are referencing information now contained in the final rule's Supplemental Document, we will use the Supplemental Document's title and section (*e.g.,* Supplemental Document, Factor E—Reduced Food Availability—Horseshoe Crab Harvest).

Population Information: After a thorough review of the best available population data, we conclude that we do not have sufficient reliable data on which to derive a precise rangewide population estimate for the rufa red knot. For example, there are no rangewide population estimates for fall migration or breeding areas because birds are too dispersed. We have limited confidence in any population trends inferred from wintering areas in Brazil's north coast, the northern Gulf coast, and the Southeast United States because available data from these areas vary in geographic coverage, methods, and level of effort. However, there are several areas where surveys have been conducted using more consistent observers, methods, and geographic coverage: Tierra del Fuego and the Argentine coast (winter), Delaware Bay (spring), the east coast of South America (spring), and Virginia (spring).

For Tierra del Fuego, baseline population data are available from the 1980s, and annual counts are available from 2000 to 2013, all collected with the same methodology and surveyors. The most recent counts (2011 to 2013) are about 75 percent lower than the 1980s baseline. The annual counts (2000 to 2013) show that the decline began after 2000, but the population has apparently stabilized at a low level since 2011.

For Delaware Bay, baseline data are available from the early 1980s, and annual peak counts are available for 1986 to 2014. The core years of 1986 to 2008 were collected with consistent methodology and surveyors. Based on these data, there may have been declines in the Delaware Bay stopover population in the 1990s, but variability in the data makes it difficult to detect trends. In contrast, the decline in Delaware Bay red knot counts in the 2000s was sufficiently pronounced and sustained that we have confidence in the downward trend over this time period despite the variability in the data. The average of peak counts in Delaware Bay over the past decade (2005 to 2014) was about 70 percent lower than the 1980s baseline. However, Delaware Bay numbers appear to have stabilized or increased slightly from 2009 to 2014, despite our lower confidence in the data over this later period due to shifts in methodology and surveyors.

Data sets from three South American Atlantic coast spring stopovers also suggest declines roughly over this same timeframe (early 2000s relative to 1990s). We previously concluded that the Virginia spring stopover had been stable since the mid-1990s, but new information now indicates a decline in Virginia relative to the 1990s.

In summary, our analysis of the best available data concludes that an overall, sustained decline of red knot numbers occurred at Tierra del Fuego and Delaware Bay in the 2000s, and that these red knot populations may have stabilized at a relatively low level in the last few years. Although we lack sufficiently robust data to conclude if other wintering and stopover areas also declined, we conclude it is likely that declines at Tierra del Fuego and Delaware Bay drove an overall population decline (*i.e.,* lower total numbers), because these two sites supported a large majority of rangewide knots during the baseline 1980s period. This conclusion is consistent with efforts (by others) to evaluate long-term population trends using national or regional data from volunteer shorebird surveys and other sources, which have also generally concluded that red knot numbers have declined. Please refer to this final rule's Supplemental Document—Population Surveys and Estimates for a more detailed discussion of the population information available for the rufa red knot throughout its range, available online at *www.regulations.gov* under Docket FWS–R5–ES–2013–0097.

Threats: Substantial threats exist throughout the red knot's breeding, migration, and wintering range and these threats are likely to continue or intensify into the future. For a full discussion of the five factors (*i.e.,* Factors A, B, C, D, and E) assessed as a basis for making the listing determination, please see the Supplemental Document—Summary of Factors Affecting the Species available online at *www.regulations.gov* under Docket Number FWS–R5–ES–2013–0097. A summary is provided below:

(1) Past habitat losses in wintering and migration areas have reduced the resilience of the red knot (Factor A). Ongoing losses in these areas from sea level rise, shoreline hardening, and development are expected to continue into the coming decades (Factor A). Beach nourishment can be beneficial or detrimental to red knot habitat, though any negative effects are mostly considered to be short-term. More recently, vegetation and ecosystem changes resulting from climate change, and potentially from development, have begun to threaten habitat loss on the breeding grounds as well (Factor A).

(2) Threats to the current and future quality and quantity of prey resources occur throughout the red knot's range from climate change and other causes (*e.g.,* ocean acidification; warming coastal waters; marine diseases, parasites, and invasive species; sediment placement; recreation; and fisheries) (Factor E). Reduced food availability in Delaware Bay due to commercial harvest of the horseshoe crab (*Limulus polyphemus*) (HSC) is considered a primary causal factor in red knot population declines in the 2000s. (Red knots rely on horseshoe crab eggs as food during their spring stopover in Delaware Bay.) We do not consider the HSC harvest a threat under the science-based management framework that has been developed and adopted to explicitly link harvest quotas to red knot population growth (Factor D). However, HSC monitoring necessary for the implementation of the management framework was not conducted in 2013 or 2014 due to lack of funding; thus, the framework is not currently being implemented as it was intended to function. There is uncertainty regarding implementation of the framework in the future (Factor D). While we anticipate a fully functioning management framework would continue to adequately abate the threat to red knots from the HSC harvest, there are other biological factors independent of harvest that may limit the availability of HSC eggs into the future. For example, HSC population growth may be limited by a biological lag time because HSCs take up to 10-years to become sexually

mature and therefore it may take at least that long for harvest restrictions (which have been phased in since 2000) to produce a corresponding increase in HSC populations. Other factors (*e.g.,* early life stage mortality, undocumented or underreported mortality) may also be slowing HSC population growth (Factor E). Most data suggest that the volume of horseshoe crab eggs is currently sufficient to support the Delaware Bay's stopover population of red knots at its present size. However, because of the uncertain trajectory of horseshoe crab population growth, it is not yet known if the HSC egg resource will continue to adequately support red knot population growth over the next decade.

(3) The red knot faces ongoing and future increases in asynchronies (timing mismatches) throughout its migration and breeding range as a result of climate change and unknown causes (Factor E). Successful annual migration and breeding of red knots is highly dependent on the timing of departures and arrivals to coincide with favorable food and weather conditions in the spring and fall migratory stopover areas and on the Arctic breeding grounds (Factor E).

(4) On the arctic breeding grounds, normal 3- to 4-year cycles of high predation, mediated by rodent (*e.g.,* lemming) cycles, result in years with low reproductive output of red knots (in some years it is zero), but do not threaten the survival of the red knot at the subspecies level (Factor C). That is, when lemmings are abundant, predators (*e.g.,* arctic fox) concentrate on the lemmings, and shorebirds breed successfully, but when lemmings are in short supply, predators switch to shorebird eggs and chicks (Niles *et al.* 2008, p. 101; COSEWIC 2007, p. 19; Meltofte *et al.* 2007, p. 21; USFWS 2003, p. 23; Blomqvist *et al.* 2002, p. 152; Summers and Underhill 1987, p. 169). It is believed shorebirds, such as red knots, have adapted to these cycles, therefore these natural cycles are not considered a threat to the red knot. What is a threat, however, is that these natural rodent/predator cycles are being disrupted by climate change, which may increase predation rates on shorebirds over the long term and have subspecies-level effects (Factor C and Factor E) (Chapter 28 *in* IPCC 2014, p. 14; Fraser *et al.* 2013, pp. 13, 16; Brommer *et al.* 2010, p. 577; Ims *et al.* 2008, p. 79; Kausrud *et al.* 2008, p. 98). The documented collapse or dampening of rodent (*e.g.,* lemmings) population cycles of over the last 20 to 30 years in parts of the Arctic can be attributed to climate change with ''high confidence'' (Chapter 28 *in* IPCC 2014, p. 14). We conclude that disruptions in the rodent/predator cycle pose a substantial threat to the red knot, as they may result in prolonged periods of low reproductive output of red knots due to increased predation (Factor C). The substantial impacts of elevated egg and chick predation on shorebird reproduction are well known. Disruptions in the rodent/predator cycle may have already affected red knot populations and are likely to increase due to climate change (Factor C).

Other factors may cause additive red knot mortality. Individually these factors are not expected to have subspecies level effects; however, cumulatively, these factors could exacerbate the effects of the primary threats if they further reduce the species' resiliency. These secondary factors include hunting (Factor B); predation in nonbreeding areas (Factor C); and human disturbance, oil spills, and wind energy development especially near the coasts (Factor E).

In summary, the rufa red knot faces numerous threats across its range on multiple geographic and temporal scales. These threats are affecting the subspecies now and will continue to have subspecies-level effects into the future.

Summary of Changes From the Proposed Rule

The following minor but substantive changes have been made to the listing rule and the Supplemental Document (available online at *www.regulations.gov* under Docket FWS–R5–ES–2013–0097) based on new information that has become available since the publication of the proposed rule, including information received through peer review and public comments. These changes did not alter our previous assessment of the rufa red knot from the proposed rule to the final rule.

(1) We present new data and insights regarding the nonbreeding distributions of rufa red knots versus *Calidris canutus roselaari.*

(2) We have emphasized and consolidated information about the differences between rufa red knots from northern versus southern wintering areas.

(3) We have added new geolocator data and new analyses of available resightings data showing (a) movement of rufa red knots between the North American Central and Atlantic Flyways; (b) clusters of sightings along the Great Lakes, the Mississippi River and its tributaries, and other major water bodies away from the coasts; (c) apparent use of saline (or alkaline) lakes in the Northern Plains by northbound red knots using the Central Flyway; and (d) use of U.S. Atlantic coast habitats used by juveniles in summer and winter.

(4) We updated population information with winter counts in South America and the southeast United States. The 2013 red knot winter counts in Tierra del Fuego were down to the second lowest level on record, while the counts in northern Brazil were nearly double the previous high count recorded in 1986. The large number of knots found in Brazil in 2013 was likely the result of the survey team experiencing favorable tidal conditions throughout the survey period, and this is probably the team's best aerial survey estimate to date. In addition, a new report from the Georgia Department of Natural Resources (GDNR) based on mark-recapture mathematical models estimated that the northern wintering population may be around 20,000 birds; this number is consistent with some previous estimates but notably higher than the best available field survey from the Southeast of about 4,000 to 5,000 birds. However, we do not yet have information to determine whether the geographic extent of the ''northern'' population in the GDNR study includes areas outside the Southeast.

(5) We updated our analysis of climate change information based on new reports from the International Panel on Climate Change (IPCC) and National Climate Assessment. Updates include:

(a) The IPCC's increased certainty in the overall trajectory of global and regional climate changes over the next few decades.

(b) Recent assessments of the red knot's vulnerability to climate change indicating a large increase in extinction risk due to the likely loss of breeding (from arctic warming) and nonbreeding habitat (from sea level rise), as well as the red knot's high degree of habitat specialization and dependence on ecological synchronicities, and long migration distance.

(c) New reports finding, with high certainty, that arctic ecosystem changes are already under way and will continue, in some cases faster than previously anticipated. (The IPCC notes early warning signs that arctic ecosystems are already experiencing irreversible regime shifts.)

(d) A new conclusion by the IPCC that the documented collapse or dampening of rodent population cycles in some parts of the Arctic over the last 20 to 30 years can be attributed to climate change with ''high confidence.''

(e) An updated analysis of threats to red knot prey species from ocean acidification, temperature changes, and other aspects of climate change. (A new report highlights the vulnerability of mollusks (which include the red knot's primary prey species in most of its range) to acidification (''high confidence'').)

(6) We updated the best available data regarding current and likely future rates of sea level rise. We also noted a new study showing that expected effects to migratory shorebird populations from sea level rise are disproportionally larger than the extent of projected habitat loss, especially for species (such as red knots) whose migration routes contain ''bottlenecks'' through which a large fraction of the population passes.

(7) We discussed new voluntary, regulatory, or proposed restrictions on red knot hunting (*e.g.,* in Barbados, Guadeloupe, Martinique, and French Guiana), but acknowledged that best available data are insufficient to determine if hunting is or was at levels in South America that may have a population-level effect.

(8) We updated Federal and State authorities to regulate the importation of Asian HSC species, which may pose a threat to native HSC populations.

(9) We noted the results of the Atlantic States Marine Fisheries Commission's (ASMFC) 2013 HSC stock assessment update showing that, in the Delaware Bay Region, there is evidence of increases in certain age or sex classes, but overall population trends have been largely stable (neither increasing nor decreasing) since the previous stock assessment in 2009.

(10) We updated our analysis of possible undocumented or underestimated HSC mortality with new information on poaching, bycatch, and sublethal effects of biomedical bleeding.

(11) We updated the discussion as follows about the Adaptive Resource Management (ARM) monitoring efforts to reflect uncertainty (due to lack of funding) in ongoing implementation:

(a) We continue to conclude that, as long as the ARM is in place and functioning as intended, ongoing HSC bait harvests should not be a threat to the red knot.

(b) Data necessary to support the ARM previously came from an annual HSC trawl survey conducted by the Virginia Polytechnic Institute (Virginia Tech) that was ended after 2012 due to lack of funding. The ARM modelers are working on the best way to switch to another, newer survey, the North East Area Monitoring and Assessment Program (NEAMAP), and we support those efforts.

(c) As of fall 2014, however, these efforts have not identified a method by which NEAMAP or other alternate data sets can be appropriately used to allow the functioning of the ARM models (ASMFC 2014b). Stable funding sources for other baywide monitoring programs necessary to support the ARM are also a concern.

(d) If the ARM cannot be implemented in any given year, ASMFC would choose between two options based on which it determines to be more appropriate—either use the previous year's harvest levels (as previously set by the ARM), or revert to an earlier management regime. Although the HSC fishery would continue to be managed under either of these options, the explicit link to red knot populations would be lost.

(e) Insufficient monitoring has already impacted the ability of the ASMFC to implement the ARM as intended (ASMFC 2014b; ASMFC 2012c, p. 13). Absent the necessary HSC monitoring data to use the ARM models for the 2015 season, ASMFC (2014b) has opted to use the 2014 harvest levels which we considered at the time to adequately ensure the red knot's food supply.

(12) We updated our analysis of disturbance with new findings from two sites on the Atlantic coast of New Jersey, showing that disturbance affected red knots' spatial uses of these sites and displaced knots from otherwise suitable habitats.

(13) We reorganized the wind energy development discussion by moving general information on avian collision and displacement hazards to a background section, not specific to either offshore or terrestrial development. We updated this section with new information including a new report on avian vulnerability to offshore wind development. We updated our conclusions that collision and displacement risks per turbine (notwithstanding differences in specific factors such as turbine size, design, operation, and siting) are likely higher along the coasts than far inland or far offshore.

(14) We updated the 50 CFR 17.11 table to add Martinique and the District of Columbia. We received new information that red knots occur on Martinique. The District of Columbia was already included in the known range of the red knot, but was inadvertently left off the table in the proposed rule.

Summary of Comments and Recommendations

In the proposed rule published on September 30, 2013 (78 FR 60024), we requested that all interested parties submit written comments on the proposal by November 29, 2013. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. A newspaper notice inviting general public comment was published in the USA Today on October 3, 2013. We received four requests for a public hearing. On April 4, 2014 (79 FR 18869), we reopened the comment period on the proposed rule until May 19, 2014, and announced that two public hearings would take place on May 6, 2014, in Corpus Christi, Texas, and Morehead City, North Carolina. On May 14, 2014 (79 FR 27548), we extended the public comment period until June 15, 2014, and announced that another public hearing would take place in Manteo, North Carolina on June 5, 2014. All substantive information provided during the comment periods is summarized above in the Summary of Changes from the Proposed Rule and has either been incorporated directly into this final determination or addressed in the more specific response to comments below.

A number of commenters, including a peer reviewer, Federal agencies, and States, provided new information or clarifications on information presented in the red knot proposed listing rule (78 FR 60024) and its supporting documents. Categories of new or clarified information include additional years of population estimates or sighting information throughout the rufa red knot's range, status of the rufa red knot and ecology in Argentina and French Guiana, beach cleaning, sea level rise and its projected effects on migratory shorebirds, disturbance, the Deepwater Horizon and Galveston oil spills, status of offshore wind energy development leases along the Atlantic coast, historical and current food resources and foraging habitat, migration and staging areas, updated stopover population size estimates in Delaware Bay, State restrictions on importing Asian HSC, ongoing management of HSC, habitat protection in Maine, and geolocator scope of inference. This new or clarified information has been incorporated, as appropriate, into this final rule or its Supplemental Document.

General Issues

(1) Comment: Several public, State, and Federal commenters submitted comments on topics related to other issues not specific to the red knot listing proposal. These issues include (a) general criticism of the Act (funding species' conservation and Service employees being a target of litigation, imposing fines that are too punitive, having negative effects on local

communities, producing decisions on which species survive and where public hearings are held, and using science that would not withstand National Academy of Science Review); (b) the information and analysis required to designate critical habitat; and (c) red knot or HSC population targets, other species, research, actions, or resources that should be considered, as well as where funding should be directed and whom the Service should work with as part of ongoing or future conservation activities and recovery planning for the rufa red knot.

Our Response: All of these comments are outside the scope of this final listing rule and will not be addressed here. Substantive comments related to critical habitat issues will be addressed during development of a proposed critical habitat rule for the red knot. Substantive comments related to future conservation of the red knot will be addressed during the development of a recovery outline and draft recovery plan.

(2) Comment: Several commenters, including one State, expressed concerns that the rufa red knot's listing could (a) result in restrictions on pedestrian and vehicular beach recreation, additional regulatory hurdles, decreased property values, and increased costs to otherwise lawful activities, all of which could cause negative effects to local communities, economies, and quality of life, and could erode the current goodwill of partners to work on red knot conservation; (b) result in reduced HSC harvest levels, causing economic impacts to fishermen reliant on the HSC bait fishery, potentially shifting harvest pressure to areas outside of Delaware Bay, and potentially creating incentives to import Asian HSC species for bait; (c) reduce availability of HSCs for biomedical uses; and (d) restrict beach access for HSC conservation programs (*e.g.,* rescue programs for volunteers to flip stranded crabs). Additionally, some commenters expressed frustration over existing beach access and management on National Park Service (NPS) lands because of other listed species and asked for expanded management options beyond beach closures. Conversely, other commenters asked for additional restrictions in places like Delaware Bay.

Our Response: While we appreciate the concern about potential management actions that may result from listing the rufa red knot or any species, the Act does not allow us to factor those concerns into our listing decision. Section 4(a)(1) of the Act specifies that we shall determine whether any species is threatened or endangered because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Section 4(b)(1)(A) further specifies that we shall make such determinations based solely on the best scientific and commercial data available. See *Our Response 60* regarding other implications of listing that we may not consider in evaluating whether a species meets the definition of threatened or endangered under the Act.

The Service does not make management decisions about any lands other than National Wildlife Refuges and National Hatcheries, but we remain committed to working with coastal communities to evaluate any effects of coastal management on the rufa red knot, and to implement actions in a manner consistent with the species' conservation using many of the Act's available tools. We will strive to build on existing management practices in local areas to limit disturbance to red knots and other shorebirds through coordination and partnership with the States, other Federal agencies, conservation groups, and local communities.

The Service does not have authority to directly regulate the HSC fishery, but we intend to continue our active role in the ASMFC's management of the HSC fishery, and will provide recommendations and technical assistance to ensure that future harvests of HSCs do not result in take of red knots under section 9 of the Act. See *Our Responses 45, 46, 48 through 50, 52, 111, 117, 120, and 121* below and the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest) for detailed answers related to other aspects of HSC management, including biomedical use and implications of importation of Asian HSC species.

(3) Comment: Several commenters asked how listing will benefit the red knot when its range spans several countries, yet the Act's jurisdiction is limited to the United States. Many of the threats discussed in the proposed rule either occur only in areas outside of the United States (*e.g.,* hunting) or are issues (*e.g.,* climate change) that cannot be affected by management under the Act. The Service cannot expect to achieve a fraction of the conservation success that has been achieved in Delaware Bay, given that the Act's prohibitions do not apply outside of the United States.

Our Response: The Act requires listing of a species that meets the definition of threatened or endangered even if we currently lack the means to fully abate the threats that cause it to be threatened or endangered. Notwithstanding, we disagree that listing will have no effect on threats such as adequacy of food supplies and hunting, and we expect these threats to be addressed during recovery planning. The development of a recovery plan will guide efforts intended to ensure the long-term survival and eventual recovery of the rufa red knot, as discussed in the proposed rule (78 FR 60024, p. 60097). While we acknowledge that listing will not have a direct impact on those aspects of climate change impacting the rufa red knot (*e.g.,* sea level rise, arctic and ocean warming, ocean acidification, timing changes in the annual cycles of natural systems, possible changes in storm patterns or predation pressures), we expect that listing will enhance national and international cooperation and coordination of conservation efforts, enhance research programs, and encourage the development of mitigation measures that could help slow habitat loss and population declines.

Benefits to the species outside the United States from listing include a prohibition on import. By regulating this activity, the Act ensures that people under the jurisdiction of the United States do not contribute to the further decline of listed species. Although the Act's prohibitions regarding listed species apply only to people subject to the jurisdiction of the United States, the Act can generate additional conservation benefits such as increase awareness of listed species, encourage research efforts to address conservation needs, or prioritize funding for *in-situ* conservation of the species in its range countries. The Act also provides for limited financial assistance to develop and manage programs to conserve listed species in foreign countries, encourages conservation programs for such species, and allows for assistance for programs, such as personnel and training.

While we agree that limiting HSC harvests and other actions in Delaware Bay have been instrumental in halting (though not yet reversing) the decline of the red knot, we do not agree that conservation of this species is impossible in other geographic areas. For example, the rufa red knot is listed as endangered in Canada and Argentina, was recently protected from hunting in the Caribbean, has been listed as a protected species in French Guiana, and is a focus of active conservation programs in several countries including Canada, Argentina, and Chile. In the United States, there are ongoing conservation and research efforts in many areas outside Delaware Bay including Massachusetts, Virginia, North Carolina, South Carolina, Georgia, Florida, and Texas. Many important red knot areas within and outside the United States have been recognized as Western Hemisphere Shorebird Reserve Network sites.

(4) Comment: One commenter stated that the Act is currently under revision and it is advisable to postpone further listings until the changes are finalized.

Our Response: While we are aware of several proposed legislative changes to the Act, those changes may not come to fruition and we may not delay implementing the current Act while those proposed changes are being debated. In addition to the proposed legislative changes, we are actively working on a series of regulatory changes to improve the implementation of the Act (see our ''Improving ESA Implementation'' Web site for more information: *http://www.fws.gov/endangered/improving_ESA/index.html*).

Peer Reviewer Comments

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinion from three knowledgeable individuals with scientific expertise that included familiarity with the rufa red knot and its habitat, biological needs, and threats. We received responses from one of the peer reviewers.

We reviewed all comments received from the peer reviewer for substantive issues and new information regarding the listing of the rufa red knot. This peer reviewer was generally supportive of the overall proposal and, in addition to providing further site-specific information, generally confirmed our use of the best available scientific information. Peer reviewer comments are addressed in the following summary and incorporated into the final rule as appropriate.

(5) Comment: The peer reviewer stated there is nonscientifically reported evidence (newspaper articles, animal care center reports) that red tide poisoning has caused extensive death of knots on Florida's west coast.

Our Response: We appreciate the peer reviewer bringing this information to our attention. Unfortunately, we were unable to locate the sources of the suggested information and, therefore, cannot verify the content. However, we have obtained a report of one nonfatal case of red tide poisoning of a red knot in Florida (H. Barron pers. comm. April 29, 2014); the bird's blood was tested and confirmed to have a brevetoxin level of 2.64 nanograms/milliliter (ng/ml). Brevetoxin is a highly potent neurotoxin produced by red tide events. We have added this information to the Supplemental Document (Factor E—Harmful Algal Blooms—Gulf of Mexico). Though not documenting widespread effects or mortality from red tide, this report does confirm that red tide poisoning of red knots has occurred in Florida, which is otherwise unreported in the scientific literature.

(6) Comment: The peer reviewer noted that the proposed rule (78 FR 60024, p. 60045) states that uncontrolled invasive vegetation can cause a habitat shift from open or sparsely vegetated sand to dense vegetation, resulting in the loss or degradation of red knot roosting habitat. The link between dense invasive vegetation and red knot habitat degradation is conjecture and should be strengthened with reference to a scientific study.

Our Response: We agree. We have revised this paragraph in the Supplemental Document (Factor A—Invasive Vegetation) to add citations to support the statement that uncontrolled invasive vegetation can cause a habitat shift from open or sparsely vegetated sand to dense vegetation. We have removed the wording ''resulting in the loss or degradation of red knot roosting habitat,'' because we are not aware of any scientific studies or other data documenting that such degradation has occurred. We have instead added the statement that, in nonbreeding habitats, *Calidris canutus* require sparse vegetation to avoid predation (Niles *et al.* 2008, p. 44; Piersma *et al.* 1993, pp. 338–339, 349).

(7) Comment: The peer reviewer stated that the Southeast coast of the United States is important during northward migration. Many red knots marked in Argentina and Chile are seen on the Atlantic coasts of Florida, Georgia, South Carolina, and North Carolina during, but not before, May. In addition, several other commenters stated the proposed rule did not identify North Carolina as having major or important spring or fall stopover areas.

Our Response: The Southeast, including North Carolina, was identified in the proposed rule as providing spring and fall stopover sites (Rufa Red Knot Ecology and Abundance, pp. 18, 50–51). Data characterizing the stopover usage of the Southeast, including North Carolina, are presented unchanged in the Supplemental Document (*e.g.,* figure 4; Population Surveys and Estimates—Spring Stopover Areas—Southeast United States). However, we have revised the text of the Supplemental Document (Population Surveys and Estimates—Spring Migration) to clarify that our review focused on geographically large spring stopovers with multiple years of survey data, but that other important spring stopover areas are known (*e.g.,* from International Shorebird Survey data, eBird, localized surveys). We have also revised the wording of the Supplemental Document (Migration—Atlantic Coast) to refer to ''well-known'' instead of ''major'' or ''important'' spring and fall stopover areas, since many potentially significant stopover areas have been surveyed only sporadically or are yet undiscovered. Finally, we have added the information provided by the peer reviewer regarding passage of southern-wintering birds along the Southeast coast during May (Migration—Atlantic Coast—Spring Timing and Distribution).

(8) Comment: The peer reviewer stated the proposed rule presented comprehensive evidence about threats to red knots during winter and northbound migration seasons, mostly focused on the longest-distance migrating knots that winter in Argentina and Chile. However, the proposed rule presented less information regarding northbound or southbound passage of the knots that spend winter seasons in regions north of the Equator. One issue that needs elaboration is the relative numbers of knots that winter in each of these two large regions and the differences of habitat use and migration strategies that exist between them.

Our Response: The proposed rule presented available data regarding numbers of red knots in each wintering area (Rufa Red Knot Ecology and Abundance pp. 38–45), summarized by Atkinson *et al.* (in Wader Study Group 2005) and Harrington *et al.* (2010b) regarding differences in migration strategy by wintering area (Rufa Red Knot Ecology and Abundance pp. 22, 32), and presented information regarding possibly greater reliance on HSC eggs by migrants from Argentina and Chile relative to birds from more northern wintering areas (Rufa Red Knot Ecology and Abundance pp. 31–33). In the Supplemental Document, we have added a section (Wintering—Northern Versus Southern) to summarize the differences between red knots from northern versus southern wintering areas that are discussed elsewhere in the document, moved and supplemented information to a new section (Migration—Differences in Migration

Strategy by Wintering Region) on differences in migration strategies, and clarified information regarding differential reliance on HSC eggs (Wintering and Migration Food).

(9) Comment: The peer reviewer noted the proposed rule stated that red knots require stopovers rich in easily digested food to achieve adequate weight gain due to changes in the digestive system that birds undergo before long flights. This may be less true for the knots from northern wintering grounds.

Our Response: In the proposed rule, we noted this possible physiological difference between southern- and northern-wintering rufa red knots (Rufa Red Knot Ecology and Abundance, pp. 30–31), but we did not mention this possible difference in the section cited by this commenter (Rufa Red Knot Ecology and Abundance, p. 17). In the Supplemental Document (Species Information—Migration—Migration Biology), we have added a sentence to this paragraph to clarify that some researchers have suggested that digestive system changes are more pronounced, or have a more pronounced effect on energy budgets at the stopover areas, in southern-wintering (Argentina and Chile) than in northern-wintering (Southeast United States) rufa red knots (Niles *et al.* 2008, p. 36; Atkinson *et al.* 2006b, p. 41). We have also added a cross reference in this paragraph to refer readers to a more detailed discussion of this issue that is presented under Migration and Wintering Food—Horseshoe Crab Eggs—Possible Differential Reliance on Horseshoe Crab Eggs.

(10) Comment: The peer reviewer suggested the term ''full segregation'' is unclear with regard to migration strategies, routes, or stopover areas among red knots from different wintering areas. There is a good deal of segregation in stopover regimens and in molt regimens between southbound knots with destinations in Argentina and Chile versus northern-hemisphere wintering birds. There also appears to be some degree of difference in stopover habitat use between these two groups in northbound migration.

Our Response: We have clarified the lack of full segregation by providing examples in the Supplemental Document (Migration—Differences in Migration Strategy by Wintering Area). Also see *Our Responses 8* and *9* above.

(11) Comment: The peer reviewer stated northern- versus southern-wintering knots have different strategies in southward migration. The southern group has essentially passed through Atlantic regions of North America before September, and strongly depends upon being able to accumulate fat and protein prior to launching on over-ocean flights between North and South America. Northern-wintering birds, however, linger on the North American coast (*e.g.,* Massachusetts, Georgia coasts), are using ''stopover'' locations as molting areas, and are using different food and habitat resources as compared to the southern-wintering knots. The resource requirements by birds of these two groups during southward migration are quite different.

Our Response: We have added this information with supporting citations to the new section of the Supplemental Document (Migration—Differences in Migration Strategy by Wintering Region).

(12) Comment: The peer reviewer noted that, historically, oiling was perhaps an important problem to knots in Patagonia, and suggested limited information was available in the reference Harrington and Morrison 1980.

Our Response: Some of the data from Harrington and Morrison (1980) were presented in the proposed rule (78 FR 60024, p. 60086) from a secondary source (Niles *et al.* 2008, p. 98). We have added the rest of these data and this reference to the Supplemental Document (Factor E—Oil Spills and Leaks—South America).

(13) Comment: The peer reviewer stated that, although the Costa del Este area of Panama City, Panama (referenced in the proposed rule, 78 FR 60024, p. 60043), is a very important location for many kinds of shorebirds, few knots have been reported from here.

Our Response: We agree that only moderate numbers of *Calidris canutus* have been reported in most seasons from Panama's Pacific coast (which includes habitats near Panama City as well as other sites). However, larger numbers have been reported from Pacific Panama during fall migration. In the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 41–42, 52), we presented available data regarding numbers of *C. canutus* in Panama. We have consolidated and updated these data with new information in the Supplemental Document (see Population Surveys and Estimates—Central America and Pacific South America).

(14) Comment: The peer reviewer stated that recently published data show dramatic declines and shifting of stopover locations during south migration in Massachusetts.

Our Response: This information (Harrington *et al.* 2010a; Harrington *et al.* 2010b) was presented in the proposed rule (Rufa Red Knot Ecology and Abundance, p. 51). We have expanded the discussion of these results in the Supplemental Document (Migration—Atlantic Coast—Fall Timing and Distribution; Population Surveys and Estimates—Fall Stopover Areas).

(15) Comment: The peer reviewer stated that the proposed rule was incorrect in describing only small numbers of red knots on mid-Atlantic and northern Atlantic beaches between Memorial Day and Labor Day. Currently about 1,000 to 2,000 knots occur on the Massachusetts coast during the fall migration period, and numbers were previously much higher. Peak dates for these southbound migrants are in July and August.

Our Response: This statement appeared in the section of the proposed rule addressing beach cleaning (78 FR 60045). We have revised the Supplemental Document (Population Surveys and Estimates—Fall Stopover Areas; Factor A—Beach Cleaning) to correct this information.

(16) Comment: The peer reviewer stated that there has been a major shift of key stopover areas of knots in south migration in Massachusetts since the 1980s when up to 10,000 southern-wintering knots were heavily concentrated on the western shore of Cape Cod Bay (Harrington *et al.* 2010a).

Our Response: We discussed the findings of Harrington *et al.* (2010a) in the proposed rule (Rufa Red Knot Ecology and Abundance, p. 51). We have revised several sections of the Supplemental Document to provide more specific results from this study (Migration—Differences in Migration Strategy by Wintering Region; Historical Distribution and Abundance; Population Surveys and Estimates—Fall Stopover Areas).

(17) Comment: The peer reviewer stated that the proposed rule (78 FR 60024, p. 60046) notes that more red knots were documented in northeast Brazil in the 2000s than during the early 1980s. The wording of this paragraph could be misconstrued to suggest that habitats were improved by the development from shrimp farm ponds.

Our Response: We agree and have clarified this point in the Supplemental Document (Factor A—Agriculture and Aquaculture).

(18) Comment: The peer reviewer commented that the proposed rule (78 FR 60024, p. 60045) stated that beach-cleaning machines are likely to cause disturbance to roosting and foraging red knots. This is more of an issue with respect to roosting than to foraging. In almost all cases, raked areas would be

beaches that knots might use during high tides for roosting (if not for high levels of human disturbance), but not as sites for foraging. Beach cleaning generally happens on beaches intensively used for human recreation. Because of heavy human use, knots that might otherwise roost in these areas would generally avoid such locations. Thus, the issue would be disturbance versus beach cleaning.

Our Response: The proposed rule (78 FR 60024, p. 60077) noted that roosting red knots are particularly vulnerable to disturbance. We have revised the Supplemental Document to cross-reference this information under Factor A—Beach Cleaning, and to note in this same section that beach-cleaning typically occurs along or landward of the high tide line where red knots may roost but are unlikely to forage. The proposed rule (78 FR 60024, p. 60044) states that mechanical beach cleaning is most commonly conducted on beaches that are heavily used for tourism. We agree that disturbance to red knots from recreational activities may, on many beaches, be greater than the disturbance from the beach cleaning machines. However, beach cleaning may occur at times of day (*e.g.,* early morning, evening) when few recreational activities are taking place, thus increasing the total daily duration that knots are disturbed by human activities. Conversely, many raked beaches may have such high levels of human recreational use that red knots are precluded from using them entirely; in such cases there would be no incremental additional disturbance from the raking activities. We have added these conclusions to the Supplemental Document (Factor A—Beach Cleaning). In addition, the proposed rule already described (78 FR 60024, p. 60044) physical impacts to beach habitats from mechanical beach cleaning.

Federal Agency Comments

(19) Comment: One Federal agency provided data regarding the seasonality and abundance of red knots in or near units managed by the NPS in the Central and Eastern United States. To assess gross trends in occurrence of red knots across NPS units, this commenter considered vetted eBird data points where birding effort was reported, and found that, in the NPS units where most red knot occurrences were reported (Assateague Island, Cape Lookout, Cape Hatteras, Cape Cod, Gateway National Recreation Area, and Timucuan Ecological and Historic Preserve), a clear declining trend in red knot observations was detected since 1980.

Our Response: We thank the commenter and have added this trend information to the Supplemental Document (Population Surveys and Estimates). The information regarding the seasonality and abundance of red knots at individual NPS units will be valuable for purposes of recovery planning, management under section 7(a)(1) of the Act, and consultation under section 7(a)(2) of the Act.

(20) Comment: One Federal agency noted that several Navy installations within the range of the red knot have Integrated Natural Resources Management Plans in place that benefit the red knot, including provisions for shoreline protection.

Our Response: We appreciate this information and anticipate working closely with these installations as we develop a critical habitat designation, and develop and implement a recovery plan for the red knot.

(21) Comment: One Federal agency commented that the proposed rule and supporting document overemphasized the risks to the red knot, and birds in general, associated with offshore wind energy development. In addition, several States and other commenters stated that wind energy development outside of coastal areas is unlikely to be a significant threat to red knots.

Our Response: In both the proposed rule (78 FR 60024, pp. 60089–60093) and the Supplemental Document (Factor E—Wind Energy Development), we have summarized and characterized the best available data regarding risks to the red knot from both offshore and terrestrial wind energy development. We have made considerable revisions to this section of the Supplemental Document to reflect substantive public comments and new information (see also *Our Responses 62, 134* to *137*). We conclude that wind energy development, especially near the coasts, may cause some unquantifiable amount of red knot mortality into the foreseeable future, and that one model indicated this species is vulnerable to population-level effects from even low levels of anthropogenic mortality (Watts 2010, pp. 1, 39). Unless facilities are constructed at key stopover or wintering habitats, we do not expect wind energy development, especially offshore or inland, to cause significant direct habitat loss or degradation, or displacement of red knots from otherwise suitable habitats.

(22) Comment: One Federal agency stated that, in addition to the total number and height of offshore turbines, exposure is a factor contributing to avian collision risks. For red knots, exposure to offshore wind facilities is reduced because (1) they can fly nonstop for 1,500 miles (mi) (2,414 kilometers (km)), which limits their time over the open ocean, and (2) birds on long-distance flights, such as red knots crossing the offshore environment, fly at higher altitudes than short-distant migrants.

Our Response: We agree that exposure to wind turbines is a contributing factor to avian collision risk. The proposed rule (78 FR 60024, pp. 60090–60091) presented the findings of Burger *et al.* (2011, entire), who used a weight-of-evidence approach to examine the risks and hazards to red knots from offshore wind energy development on the OCS at three spatial levels of exposure. We concur that the red knot can fly nonstop for 1,500 mi (2,414 km) and that some knots have limited temporal exposure to the offshore environment (Normandeau Associates, Inc. 2011, p. 202). Geolocator data show certain knots crossing the OCS as many as six times per year, and because these numbers reflect only long flights, more crossings of the OCS may occur as birds make shorter flights between States (Burger *et al.* 2012c, p. 374).

It is estimated that the normal cruising altitude of red knots during migration is between 3,281 to 9,843 feet (ft) (1,000 to 3,000 meters (m)) (Burger *et al.* 2011, p. 346), well above the estimated height of even a 10-megawatt (MW) offshore turbine (681 ft; 207.5 m). However, lower flight altitudes may be expected when red knots encounter bad weather or high winds, and these lower flight altitudes are known to occur on ascent or descent from long-distance flights, during short-distance flights if they are blown off course, during short coastal migration flights, or during daily commuting flights (*e.g.,* between foraging and roosting habitats) (Burger *et al.* 2012c, pp. 375–376; Burger *et al.* 2011, p. 346), as discussed in the proposed rule (78 FR 60024, p. 60090).

(23) Comment: One Federal agency stated that some studies and analyses used in the proposed rule (78 FR 60024) fail to distinguish between onshore/nearshore and offshore wind energy development. This distinction is important because the species at risk and the magnitude of the risk can be considerably different. The agency further stated that coastal environments generally have higher concentrations of birds than offshore areas and that birds taking off from land may fly through the rotor zone before reaching cruising elevation. In addition, this commenter questioned our conclusions about the risk of bird collisions with offshore wind facilities, which were based on a

scientific paper (Kuvlesky *et al.* 2007) summarizing research from Europe.

Our Response: In the proposed rule (78 FR 60024, p. 60089–60092), we addressed separately land-based wind energy development (including along the coasts) versus in the offshore environment. Based on the high frequency and lower altitudes of red knot flights along the coast (*e.g.,* ascent or descent from long-distance flights, during short coastal migration flights, or during daily commuting flights between foraging and roosting habitats) (D. Newstead pers. comm. March 5, 2013; Burger *et al.* 2012c, pp. 375–376; Burger *et al.* 2011, p. 346; Stewart *et al.* 2007, p. 1; Alerstam *et al.* 1990, p. 201), we agree with the commenter that collision risk per turbine (notwithstanding differences such as size, design, operation, local habitats) along the coasts (both on land and nearshore) is likely higher than in areas either far offshore or far inland. We have revised the Supplemental Document (Factor E—Wind Energy Development—Terrestrial) to reflect this conclusion. We have also revised the Supplemental Document (Factor E—Wind Energy Development) to move the discussion of avian collision risk factors (*e.g.,* weather, light levels, lighting, turbine characteristics, habitats) and displacement effects to be generalized across both terrestrial and offshore wind energy facilities, as the citations supporting this discussion pertain to both.

In the proposed rule (78 FR 60024, pp. 60089–60091), we did not attempt to differentiate between nearshore (*e.g.,* State waters) and the OCS. Although we still have little information on avian impacts from turbines far offshore, we have updated our conclusions in the Supplemental Document (Factor E—Wind Energy Development—Offshore) to reflect geolocator results by Burger *et al.* (2012c, p. 373) and analysis by Burger *et al.* (2011, p. 346) suggesting red knot collision risk may decrease far offshore. Finally, we have removed the following statement from the Supplemental Document (Factor E—Wind Energy Development—Offshore): ''Research from Europe, where several offshore wind facilities are in operation, suggests that bird collision rates with offshore turbines may be higher than for turbines on land.'' Upon further review of the source cited for this statement (Kuvlesky *et al.* 2007, p. 2489), we found that these authors presented results from both coastal and nearshore wind facilities. Further, these authors went on to present countervailing findings from other studies, and did not cite any studies from wind turbines located far offshore. Therefore, we reasoned that this statement from the Kuvlesky *et al.* 2007 paper was not appropriate to include in this final rule.

(24) Comment: One Federal agency commented that the Bureau of Ocean Energy Management (BOEM) has worked with State Task Forces to determine the best locations for wind energy development to help avoid impacts. For example, areas being considered are greater than 9 mi (14 km) offshore; the Virginia lease area is 23.5 nautical miles (nm) (43.5 km) from Virginia Beach.

Our Response: We concur that siting far offshore may succeed in reducing overall avian collision hazards, including for red knots, although species that rely on the offshore environment for breeding, feeding, or sheltering (*e.g.,* certain seabirds and waterfowl) may have increased exposure risk to turbines farther offshore. We appreciate the work of BOEM to evaluate and minimize avian collision risks in siting decisions, and this information has been added to the Supplement Document (Factor E—Wind Energy Development—Offshore). However, we also updated this section of the Supplemental Document to compare these distances offshore with red knot use areas delineated by Burger *et al.* (2012c, p. 373) based on geolocator results, which do appear to have some overlap with both the offshore commercial wind energy development leases executed to date and the Wind Energy Areas (WEA) where BOEM will focus for future leases, including areas off the mouth of Delaware Bay (BOEM undated, p. 1).

(25) Comment: One Federal agency stated that BOEM recently published a study on the relative vulnerability of migratory bird species to offshore wind energy projects on the Atlantic OCS; the study ranked the relative vulnerability of 177 migratory bird species to collision and displacement by offshore wind turbines. The relative collision vulnerability of red knot was ''medium'' and the relative vulnerability to displacement ''low.''

Our Response: We have reviewed this report and incorporated the findings into the Supplemental Document (Factor E—Wind Energy Development—Offshore). We note that some of the factors considered in this report are not specific to the *rufa* subspecies of *Calidris canutus,* and thus the numerical vulnerability scores are not applicable to *rufa.*

Comments From States

(26) Comment: One State expressed disappointment in the Service's communication regarding the proposed rule. Because of the wide geographic scope of this listing proposal, the Service should have engaged all of the State wildlife agencies for their input prior to publication and should have briefed the State agency directors about the proposed expansion of the rufa red knot's listed range. In addition, several States and other commenters stated that the proposed rule contained inadequate justification for a sweeping change in the red knot's range from previous Service documents (*e.g.,* 2006 to 2011 Candidate Notices of Review (CNORs)).

Our Response: We regret that this State is disappointed in our communication efforts on the rufa red knot proposed listing. We acknowledge the proposed range was greatly expanded from what was described in the last CNOR update, but the proposed rule (78 FR 60024) and this final rule contain our analysis of, and conclusions drawn from, the best scientific and commercial data available. Substantial new data have become available since 2011, the last year we were required to update the knot's CNOR form. We also acknowledge that the 2011 CNOR form indicates the rufa red knot's range is limited to coastal areas and did not include interior portions of the coastal States or any inland States. The 2011 CNOR was based on the best data available at the time. Our understanding of the species' biology and occurrence records evolved rapidly based on results from geolocator research followed by enhanced analysis of national and regional databases. The proposed rule (Rufa Red Knot Ecology and Abundance, pp. 21, 23) explained the best available data and supported the expanded geographic scope of analysis under the Act. The discussion of these data has been updated and expanded in the Supplemental Document (Species Nonbreeding Distributions; Migration—Midcontinent; Migration and Wintering Habitat—Inland; Population Surveys and Estimates—Inland Areas Spring and Fall). We will strive to improve our communication with the States as we greatly value our conservation partnerships.

(27) Comment: Several States and other commenters stated that the proposed rule is generally lacking in scientific evidence and is based on speculative information. For example, (1) in the proposed rule, the Service repeatedly made undocumented claims and speculated that a variety of items ''may'' be a factor that could cause the demise of the species; (2) in describing threats and risks to the red knot, the proposed rule used terms such as high uncertainty, expected, likely, may, could, possibly, and unknown but

possible; (3) although the best available science has been used to generate predictions about some possible future impacts, best available science has not been used to examine and explain the relevance of potential threats (*e.g.,* sea level rise, climate change) to recent red knot population trends; (4) because of the potentially serious ramifications of a Federal listing on Federal programs and permitting processes, it is neither sufficient nor professional to base listing decisions so heavily upon speculation; and (5) the principle of best available science must be used to demonstrate causal relationships between threats and population change. In a related comment, one commenter stated that it is well-established that the Act does not provide for the listing of species on the basis of speculative, uncertain, or inconclusive information. A number of courts (*i.e., Conner* v. *Burford, Trout Unlimited* v. *Lohn, Ctr. for Biological Diversity* v. *Lubchenco, Bennett* v. *Spear,* and *Nat'l Res. Council* v. *Daley*) have determined that the threshold decision to list a species as threatened or endangered is not to be based on speculation or a misplaced intent to err on the side of species conservation. The default position for all species is that they are not protected under the Act.

Our Response: We disagree that our analysis is ''speculative.'' The Service is required to make listing determinations based on the best scientific and commercial data available. Sources of data include peer-reviewed journal articles; field notes and other unpublished data; and personal communications with species, habitat, and policy experts. We analyze these sources of data and use our best professional judgment to determine their credibility, in accordance with applicable data standards (Interagency Policy on Information Standards Under the Endangered Species Act (59 FR 34271); Information Quality Act (P.L. 106–554, section 515); Information Quality Guidelines and Peer Review (USFWS 2012f, entire). All data have some level of uncertainty, but the proposed rule properly identified, through citations, the data sources and was transparent in qualifying areas and levels of uncertainty.

In making a listing determination, we evaluate the threats affecting a species in the past, currently, and into the foreseeable future. What constitutes the foreseeable future may be different for each threat, given our confidence in the sources of the data and their level of certainty regarding future conditions. The proposed rule and Supplemental Document discuss what information we can reliably use to reasonably foresee into the future. As discussed below, the Act and our policies do not require a definitive knowledge of what will happen in the future, only what we may reasonably predict is likely to occur. Although there is some inherent uncertainty surrounding the threats we evaluated for the red knot, this does not prevent us from making a credible assessment of the likely direction and magnitude of those impacts, even though it may not be possible to make such predictions with precision. In addition, the proposed rule and its underlying data were available for peer review and extensive public review and comment, but the commenters did not provide additional substantive information to refute our analysis or assumptions.

Under section 4 of the Act, a species shall be listed if it meets the definition of threatened or endangered because of any (one or more) of the five factors that are a basis for making a listing determination, considering solely best available scientific and commercial data. Although many species proposed for listing have undergone, or are undergoing, a population decline, declining numbers (rangewide or in portions of the range) are not necessary for listing if a species is facing sufficient threats, now or in the foreseeable future, to meet the definition of threatened or endangered. Accordingly, not all threats contributing to a species' threatened or endangered status must be tied to past or ongoing population declines; threats for which the species is listed may not be affecting the species at the time it is being evaluated for listing, but are likely to do so in the future.

The commenter is incorrect in asserting that ''the default position for all species is that they are not protected under the Act,'' or that listings must be based on conclusive evidence. As stated above, the Act and our policies do not require a definitive knowledge of what will happen in the future, only what we may reasonably predict is likely to occur when making a listing determination.

Further, our decisions are not based on speculation or misplaced intentions. The Act requires the Service to base its listing determination on the ''best scientific and commercial data available'' (16 U.S.C. 1533(b)(1)(A)). The ''best available science'' requirement does not equate to the best possible science. Instead, this information standard simply prohibits the Service from disregarding available scientific evidence that is better than the evidence it initially relied upon. The Service is required to rely upon the best available science, even if that science is uncertain or even ''quite inconclusive'' (*i.e., Trout Unlimited* v. *Lohn,* 645 F. Supp. 2d 929, 947 (D. Or. 2007) (''*Trout Unlimited''*); *Southwest Center for Biological Diversity* v. *Babbitt,* 215 F.3d 58, 60, 342 U.S. App. D.C. 58 (D.C. Cir. 2000)). The case law cited by the commenters supports this position.

In distinguishing endangered from threatened, Congress defined ''threatened'' species as a species that is ''*likely* to become an endangered species within the foreseeable future throughout all or a significant portion of its range'' (16 U.S.C. 1532(20)) (emphasis added). Courts have acknowledged the word ''likely'' clearly means something less than 100 percent certain (*Trout Unlimited* at 947). Moreover, courts have found that an agency is entitled to particular deference where it has drawn conclusions from scientific data (*i.e., Marsh* v. *Or. Natural Res. Council,* 490 U.S. 360, 375–77 (1989); *Ethyl Corp.* v. *EPA,* 541 F.2d 1, 36 (D.C. Cir. 1976); *Oceana* v. *Evans,* 384 F. Supp. 2d 203, 219 (D.D.C. 2005) (citing cases)).

(28) Comment: Several States and other commenters stated that the rufa red knot geographic range should include only areas where the species occurs regularly (annually or near annually), and should avoid identifying jurisdictions (*e.g.,* States) merely because they represent continuous geographies between discrete regularly used stopover sites. As presented in the proposed rule, the red knot range is inconsistent with how the Service has defined the range of other listed migratory birds. These commenters also noted that although eBird is a useful resource, the Service should not have used it as the sole source for determining the species' range in a listing process, and suggested a more thorough and comprehensive review of occurrence records should be conducted.

Our Response: In both the proposed and final rules, we have defined the rufa red knot's range based on the best available data; however, we recognize that scientific understanding of this species' range will likely continue to improve over time. The Service may define a species' range using State boundaries or other geographically appropriate scale. How range is defined depends on characteristics of the species' biology and how it is listed (*i.e.,* as species/subspecies or a distinct population segment (DPS)). A species' or subspecies' range is typically described at the state or country scale. While the range of a DPS listing can include entire States, it is more typically defined at a more refined geographic scale because we must define where the discrete entity occurs.

We defined the rufa red knot's range based on the data from reliable published scientific literature, submitted manuscripts, and species' experts; occurrence data; and analysis (*e.g.,* estimated flight paths based on known wintering and breeding grounds combined with siting records). The regulations at 50 CFR 17.11(e) state, the ''historic range'' indicates the known general distribution of the species or subspecies as reported in the scientific literature. The present distribution may be greatly reduced from this historic range. This column [in the table at 50 CFR 17.11(h)] does not imply any limitations on the application of the prohibitions in the Act or implementing rules. Such prohibitions apply to all individuals of the species, *wherever found* [emphasis added]. Therefore, whether a specific State or geographic area is included or excluded from the textual description of the rufa red knot's range, the subspecies would be protected under the Act wherever it may be found, for as long as it remains federally listed. (See also *Our Response 33* below.) Although a species is listed wherever found, we strive to accurately describe the range in the 50 CFR 17.11 table based on the best available data at the time of listing. For earlier listed species such as the piping plover and Kirtland's warbler, certain tools to help us understand the migration routes of birds (*e.g.,* satellite transmitters, geolocators, eBird) were not available at the time.

See *Our Response 82* for explanation of how we have interpreted and utilized eBird data. We did not solely rely on eBird data to determine the rufa red knot's range. In addition to eBird, we also relied heavily on Newstead *et al.* 2013 (draft manuscript we had at the time) and Morrison and Harrington 1992, and to a lesser degree on Skagen *et al.* 1999. These four sources constituted the best available data at the time. For this final rule, we have also considered an analysis for the Mississippi Flyway done by our Midwest Region Migratory Bird Program (Russell 2014), the State reports provided by the Central Flyway Council and other commenters, updated versions of Newstead *et al.* (2013) and Carmona *et al.* (2013), and all other relevant new information we have received since March 2013 when we completed drafting of the proposed rule. These new sources further validate our assumptions and conclusions outlined in the proposed rule. See *Our Response 35,* below, and the Supplemental Document (Subspecies Nonbreeding Distribution) regarding how we have delineated the nonbreeding ranges of *C.c. rufa* versus *C.c. roselaari* based on the best available data.

(29) Comment: Several commenters, including States, stated that they were unaware of any reliably used stopover sites for the red knot in the interior portion of the United States. These commenters contended that bird occurrence data do not support the existence of stopover sites (defined as habitats or locations that consistently provide migrants with the opportunity to refuel and rest) within the Central Flyway States, and that observed behavior and diet reinforce the concept that red knots do not regularly use and do not require any inland wetland locations as stopover sites within the interior of the Central Flyway. Further, most interior records are for vagrant, single birds, and interior sightings are so sparse that they are ecologically insignificant. These State commenters specifically requested removal of their particular States from the range, and requested that listing of the rufa red knot not confer any requirements for any Federal or State agency or private landowner. Conversely, one commenter rebutted that, as is frequently the case for ''jump'' migrants, periodic weather events or other circumstances occasionally result in birds being grounded in locations or habitats that are only infrequently used along the flyway. This commenter also stated that while this may be the case for some of the interior areas, recent communications with biologists working in North Dakota indicate that habitats in this region (*e.g.,* Missouri River sandbars) are far more regularly used than eBird records or other databases would indicate. Further, additional unpublished geolocator tracks also show use of sites throughout the Missouri Coteau, on both U.S. and Canadian sides of the border, as spring migration stopovers. This commenter stated that the Service should make a more complete assessment of the occurrence of the species in North Dakota, and possibly other States, by contacting other biologists that may have additional information that is not captured in electronic databases.

Our Response: We also are unaware of any consistently used rufa red knot stopover sites in the U.S. portion of the Central Flyway. However, all three of our primary sources (Newstead *et al.* 2013, Skagen *et al.* 1999, and eBird.org 2014) suggest that habitats in the plains of southern Canada (Alberta, Saskatchewan, Manitoba) are routinely relied upon by migrating knots at least under certain conditions (*e.g.,* favorable water levels). In addition, from the relatively small sample size in Newstead *et al.* (2013, p. 56), one of six birds used North Dakota for 14 days in spring. We do not yet know how aberrant or representative this bird was, but these results indicate the possibility that the documented Northern Plains stopover region may be found to extend into the United States, as research on midcontinental migrants continues. This possibility is supported by the new geolocator information regarding additional knots on the U.S. side of the Missouri Coteau (D. Newstead pers. comm. May 8, 2014), including three in northern North Dakota, two in northern Montana, and one possibly further south (*e.g.,* Nebraska) (D. Newstead pers. comm. May 16, 2014). Newstead *et al.* (2013, p. 56) found that the Northern Plains were used as a northbound stopover by five of six birds in 2010 (including the one in North Dakota), with the sixth bird using Hudson Bay. Hudson Bay was used by three of three birds in 2011. Although the sample size (*e.g.,* recovered geolocators) is small, a large proportion of the recovered geolocators show red knots using a midcontinental flyway. Therefore, these results suggest that, in years when conditions favor it, a large proportion of midcontinental migrants may use Northern Plains stopovers in spring. In addition, birds using the Northern Plains as a spring stopover stayed an average of 16.2 days (Newstead *et al.* 2013, Table 3); this was not a short stop but actually similar to the stopover duration in Delaware Bay.

In the proposed rule, we did not define ''stopover site.'' In the Supplemental Document (Migration—Stopover Areas), we have added clarification that places where migrant birds stop to rest, drink, and eat are often described as either stopover or staging sites, with the two terms frequently used interchangeably (Warnock 2010, p. 621). We have adopted the definitions of Warnock (2010, p. 621) that all sites where migrants rest and feed are stopover sites, while staging sites are a subset of stopovers that provide abundant and predictable food resources without which birds would incur significant fitness costs.

We agree that many of the inland red knot sightings to date represent single birds. However, we understand the term ''vagrant'' to mean a bird that has strayed or been blown far from its usual range or migratory route; synonymous with ''accidental.'' According to Russell (2014, p. 1), ''accidental'' implies an extraordinary record, out of the normal pattern, and unlikely to occur again. Based on this understanding of the term, we disagree with characterizing rufa red knots in the Central Flyway as vagrant, based on geolocator results showing that the midcontinent does constitute the most prevalent migratory route for at least some birds that winter in Texas (D. Newstead pers. comm. May 8, 2014; Newstead *et al.* 2013, entire). Based on these geolocator data, we conclude that a substantial proportion of Texas-wintering knots pass over the Central Flyway twice annually during migration. Other than the Northern Plains of southern Saskatchewan (and potentially extending into the northern U.S. plains), we are not currently aware of any other stopover sites in the Central Flyway that are routinely or intermittently relied upon by a substantial number of birds.

Further, there are clusters of sightings records in both the midcontinent and further east through the Mississippi Valley and along the Great Lakes. These cluster areas warrant further study to more fully evaluate their usage as red knot stopovers. (See Supplemental Document section Migration—Midcontinent—Stopovers.) As recommended by one commenter, we anticipate a more complete assessment of unpublished or anecdotal sightings data in the course of recovery planning. The existence of such additional sightings data, and the geographic clustering of the eBird data along water bodies, suggest that some inland areas may, upon further study, be found to routinely or intermittently support roosting and feeding red knots during migration.

(30) Comment: Several States and other commenters noted Newstead *et al.'s* (2013) findings that more than 10,000 red knots from the Atlantic coast have been uniquely marked. These commenters highlighted the authors' conclusion that ''The paucity of resightings in Texas suggests that most of these knots probably do not share the same wintering or stopover sites as those associated with the West Atlantic flyway.''

Our Response: We agree that available data do not show any use of a midcontinental (inland Texas through North Dakota) flyway by knots known to winter or stopover along the U.S. Atlantic coast. However, Newstead *et al.* 2013 go on to say, ''The paucity of resightings in Texas suggests that most of these knots probably do not share the same wintering or stopover sites as those associated with the West Atlantic flyway, *though the paucity may be the result of limited effort and/or reporting*'' [emphasis added]. Indeed, we have updated the Supplemental Document with new geolocator data confirming earlier indications (from resightings) that at least some Texas-wintering knots do mix with Atlantic coast birds during migration, both in Canada (Migration—Midcontinent—Spring) and the United States (Migration—Midcontinent—Flyway Fidelity).

(31) Comment: Several States and other commenters stated that records of this species' occurrence in the midcontinent suggest red knots use a ''jump'' migration strategy, whereby birds fly over the Southern and Central Great Plains and stopover at sites in the Northern Great Plains, principally in Southern Canada. Further, both spring and fall migrations involve a single 2- or 3-day flight between the Gulf coast and Canada.

Our Response: We agree that this picture of midcontinent migration (long ''jumps'' mainly to Southern Canada) is consistent with best available data. However, that body of available data (mainly Newstead *et al.* 2013, Skagen *et al.* 1999, and eBird.org 2014) is not extensive. Newstead *et al.* (2013) did find 2- or 3-day migration flights between Texas and the northern stopovers, based on a sample size of eight geolocators, some of which had been carried by the same birds for 2 full years. In addition to Newstead's research, our review of reliable national and regional occurrence data (Central Flyway Council 2013; eBird 2012; A. Simnor pers. comm. October 15, 2012) found multiple rufa red knot sighting records in every interior State. See *Our Response 29* for discussion of potential stopover areas in the interior United States.

(32) Comment: Several States and other commenters stated that a separate population of rufa red knots exists in the midcontinent of the United States and this population may constitute a DPS; therefore, a DPS analysis should be conducted. Further, these commenters stated that there is no compelling evidence that the midcontinental population meets the definition of threatened and none of the threats affecting the Atlantic coast population are applicable to the midcontinental population.

Our Response: Under the Act, we may list a species, subspecies, or a DPS of a vertebrate species. The Act's definition of ''species'' includes ''any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreed when mature.'' We have no evidence that the rufa red knot is composed of separate populations that may warrant protection of the Act at less than the subspecies level. Based on the best scientific and commercial data available, we determined the *rufa* subspecies of the red knot to warrant listing as threatened throughout its entire range.

(33) Comment: Several States and other commenters stated that giving infrequently or unused areas the same standing as regularly used and critically important sites ultimately hinders conservation efforts and is counterproductive. Listing in the Central Flyway States will result in expenditure of resources and create unnecessary bureaucracy (*e.g.,* to conduct consultations) in areas with little to no occupancy, potentially diverting resources away from coastal habitats where they would have substantially greater conservation benefit. Further, listing in the Central Flyway States has no conceivable conservation benefit to red knots or to noncoastal wetland habitats, which already derive protection from other listed species like the piping plover, whooping crane, and interior least tern.

Our Response: We disagree. The Service must make its determination on whether a species, subspecies, or DPS meets the definition of threatened or endangered based solely on the best available scientific and commercial data. This determination is based only on an analysis of the population and threats affecting the species as set forth under sections 4(a) and 4(b) of the Act. The extent to which a potential listing will or will not advance the conservation of any particular ecosystem (*e.g.,* noncoastal wetlands) is not a factor we may consider when determining whether a species meets the definition of threatened or endangered, nor may we consider economic information, including workload implications. As discussed above in *Our Response 28,* the provisions of the Act apply to all individuals of a listed species *wherever found* (emphasis added). Upon listing, therefore, the rufa red knot is protected by the Act wherever it occurs, even as scientific understanding of its range will likely continue to improve over time. That said, the Service has the appropriate tools under sections 7 and 10 of the Act to work with our State, Federal, and private partners to appropriately evaluate the likelihood of effects to red knots stemming from proposed activities. Such evaluations will be based on the species' level of exposure to the proposed activity, including the frequency and consistency of the species' occurrence in the affected area, and the type of activity, including its timing and duration. These evaluations may be done at different geographic scales.

During the recovery planning process we will focus on those stopover sites, both coastal and inland, that support the largest concentrations of birds, based on best available data. Inland habitats could be an important feature for certain flyways at certain times (*e.g.,* during particular weather conditions). Based on best available information, the Texas-wintering birds using the Central Flyway are important to the red knot's overall conservation because these birds contribute to the subspecies' resiliency and geographic representation. Protecting these birds and their habitats under the Act does have conservation benefit to the rufa red knot.

(34) Comment: One State commented that, given the longitudinal relationship between the Atlantic coast of the United States and the Pacific coast of South America, as well as the documented occurrence of marked *Calidris canutus rufa* in Panama and the central coast of Chile (González *et al.* 2006), it is conceivable that some *C.c. rufa* winter in sympatry (*e.g.,* occur in the same area) with *C.c. roselaari* along the Pacific coasts of Peru and Chile. Further, the subspecific affiliation of the knots that winter along the Pacific coast from southern Mexico through Chile is currently uncertain (78 FR 60024, p. 60026).

Our Response: We agree. We have updated the Supplemental Document (Subspecies Nonbreeding Distributions) with considerable new information and new conclusions regarding the nonbreeding distributions of the *rufa* and *roselaari* subspecies, including areas of likely or potential overlap.

(35) Comment: Several States and other commenters noted that the proposed rule includes inland States with low *Calidris canutus* occurrence (*e.g.,* Nebraska) while excluding other inland States with more numerous *C. canutus* occurrence records (*e.g.,* Utah). Despite past uncertainty, *C.c. roselaari* is now believed to be restricted to the Pacific coast based on current information.

Our Response: Numerical prevalence of *Calidris canutus* does not shed light on which subspecies (*C.c. roselarri* or *C.c. rufa*) predominate in any particular area. There is considerable uncertainty regarding the subspecific identity of *C. canutus* in the western interior United States, and it is possible that the two subspecies both occur in this area during migration. This uncertainty was reflected in questions 5 and 10 under ''Information Requested'' in the proposed rule (78 FR 60025). Despite a number of population-wide morphological differences (USFWS 2011a, p. 305), the *rufa* and *roselaari* subspecies cannot be distinguished in the field because physical variability among individuals results in overlaps in many physical parameters (*e.g.,* wing and bill length) between the two subspecies (USFWS 2011a, p. 205; Harrington 2001, pp. 4–5; Harrington *et al.* 1988, p. 441). Because these two subspecies cannot be distinguished in the field, other methods (*e.g.,* mark-resighting efforts, stable isotope analysis, genetics) are needed to delineate their distributions (D. Newstead pers. comm. September 14, 2012).

As discussed under *Our Response 28* and detailed in the Supplemental Document (Subspecies Nonbreeding Distributions—Western Interior United States), we defined the rufa red knot's Western U.S. range based on best available data from reliable published scientific literature, submitted manuscripts, and species' experts; occurrence data; and analysis (*e.g.,* estimated flight paths based on known wintering and breeding grounds combined with siting records). While it is possible that rufa red knots range nearly all the way to the Pacific coast during migration, we do not have any evidence to date (*e.g.,* genetics, mark-resightings, geolocator data, or stable isotope data) of *rufa* west of the Great Plains. We acknowledge considerable uncertainty around the subspecies composition in the Western States but conclude, based on best available data, that the *rufa* range likely extends to the western limit of the Great Plains (as mapped by the Level I ecoregions (U.S. Environmental Protection Agency (USEPA) 2013a)). See also *Our Response* 82 below.

(36) Comment: One State and several other commenters stated that, prior to a listing determination, more information is needed regarding the status and characteristics of red knot populations (*e.g.,* population status in Texas, connectivity of migratory flyways). In addition, gathering more scientific research on the red knot population in Texas will improve viability assessments of the entire subspecies throughout its range.

Our Response: The proposed rule presented best available data regarding red knot population size, diet, habitat use, and threats in Texas, as well as the prevalence and migration patterns of *Calidris canutus rufa* versus *C.c. roselaari* in Texas (Rufa Red Knot Ecology and Abundance pp. 5–7, 9, 14–16, 21–24, 27, 34–35, 42; Factor D pp. 10–11; 78 FR 60024, pp. 60030, 60033, 60035, 60039–60042, 60044–60045, 60052, 60056, 60059, 60063, 60078, 60081, 60085–60086, 60089, 60092). Section 4 of the Act directs that listing determinations be made on the basis of the best scientific and commercial data available. We evaluated approximately 1,400 references during the preparation of the proposed rule, and communicated with numerous species and threats experts, to comply with this data standard required by the Act. We solicited peer review on the proposed rule. Peer review comments are reflected in the Supplemental Document, which has also been updated with new data regarding Texas, the nonbreeding distribution of rufa red knots, and connectivity of the flyways (Subspecies Nonbreeding Distributions; Migration; Migration and Wintering Habitat) that has subsequently become available through the public comment period and clarification from experts. Although a more complete picture of red knot ecology in Texas will be helpful for recovery planning, research to generate these new data is not yet available. As discussed in *Our Response 27* above, the ''best available science'' requirement does not equate to the best possible science. We acknowledge certain data gaps (78 FR 60024, pp. 60024–60025) and uncertainties, some of which are inherent in all natural systems and all evaluations of future conditions; however, we conclude that the best available data are sufficient to document several population-level threats to the red knot, as well as its reduced population size relative to the early 1980s, and thus conclude that the red knot meets the definition of a threatened species.

(37) Comment: One State commented that the proposed rule did not provide comprehensive population numbers for either the historical or current population size for this subspecies or estimates that encompass the entire wintering range, the entire nesting range, or all of the potential migration stopover habitats along the U.S. Atlantic coast. This commenter believes the proposal gave undue importance to population trends at only two locations, Delaware Bay and Tierra del Fuego, and that maximum percent declines at these two sites are not sufficient for an evaluation of the severity of the apparent [rangewide] population decline. Further, because the red knot is highly mobile and individual birds and flocks appear to be capable of using different locations as stopover points from year to year, a more rigorous approach than subsampling should be used to assess population changes. Another commenter believes 40 years of data are not enough to show a trend in red knot populations and the Service

should look at hundreds of years of data.

Our Response: As discussed in the Supplemental Document (Population Surveys and Estimates), we conclude that we do not have sufficient reliable data on which to base a precise rangewide population estimate. Thus, we have instead considered the best available data, which consists of survey data for specific regions. In the proposed rule, we limited our conclusions to trends within each regional data set (Rufa Red Knot Ecology and Abundance, pp. 53–54), though we did note a temporal correlation between declines at Tierra del Fuego and Delaware Bay (Rufa Red Knot Ecology and Abundance, p. 48). Although we lack sufficiently robust data to conclude if other wintering and stopover areas also declined, we conclude it is likely that declines at Tierra del Fuego and Delaware Bay drove an overall population decline (*i.e.,* lower total numbers), because these two sites are believed to have supported a large majority of rangewide knots (see *Our Response 38*). We note that our calculation of those regional declines (75 percent at Tierra del Fuego and 70 percent at Delaware Bay) are based on averages of early and late time periods, calculated to smooth out inherent variability in the data. In contrast, the maximum declines (*i.e.,* comparing only the single lowest count with the single highest count) were both recorded in 2011 and show an 81 percent decline at Tierra del Fuego and an 87 percent decline at Delaware Bay. Despite the above-mentioned limitations in producing a rangewide population estimate, we do note that several analyses conducted by others all concluded red knot numbers declined, probably sharply, in recent decades. While we did not rely on these other analyses, we do note that they are independently consistent with the conclusions we draw from the available (regional) data sets.

A more rigorous survey regime to estimate rangewide population changes over time may become available in the future. For example, mathematical population size estimates based on marked birds were begun in 2011 in Delaware Bay (J. Lyons pers. comm. September 3, 2013) and Georgia (GDNR 2013). This new method does not yet allow for trend analysis because only a few data points are available, and does not yet have the geographic coverage to permit a rangewide population estimate. However, the Act requires that we make listing determinations based on the best available data. The proposed rule identifies and evaluates the best available population information, which is associated with high confidence in those regions with long time series and consistent survey methods (*e.g.,* Delaware Bay, Virginia, Tierra del Fuego).

We disagree that these best available data cover an insufficient time period for trend analysis. Even with inherent annual variability, we conclude the available data are sufficient to document a sharp and prolonged period of decline in red knot counts in Delaware Bay and Tierra del Fuego in the 2000s. Further, we have gathered best available historical data dating back to the mid-1800s, as presented in the proposed rule (Rufa Red Knot Ecology and Abundance) and the Supplemental Document (Historical Distribution and Abundance, pp. 33–36). Although these historical data do not permit a quantitative analysis, they do convey a consistent qualitative account of historical declines and followed by, at least, a partial recovery.

(38) Comment: One State questioned the validity of applying the observed decline in Delaware Bay to the entire population since, despite its apparent importance, the bay represents only a small portion of the Atlantic coast and the potential stopover habitat available to migrating red knots.

Our Response: While, geographically, Delaware Bay represents only a small proportion of the total U.S. Atlantic coast, we conclude the bay supports a significant proportion of the total rufa red knot population during spring migration (Brown *et al.* 2001, p. 10), as discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, p. 29). Although no current, reliable, rangewide population estimate is available, reliable regional population data are available (see *Our Response 77;* Rufa Red Knot Ecology and Abundance, pp. 38–52; and Population Surveys and Estimates in the Supplemental Document). We have analyzed the most recent estimates of red knot numbers from each wintering region, Delaware Bay peak counts from the past 10 years, and Delaware Bay total passage population estimates from the past 3 years. Based on this analysis, we conclude that Delaware Bay continues to support the majority of red knots during spring.

That said, we agree that extrapolation of population declines in Delaware Bay to the rest of the red knot population should be conservative and undertaken only when supported by corroborating data. In the proposed rule, we presented data for specific regions (Rufa Red Knot Ecology and Abundance, pp. 38–52) and limited our conclusions to trends within each regional data set (Rufa Red Knot Ecology and Abundance, pp. 53–54). However, we also stated, ''the pattern and timing of these declines in Delaware Bay relative to Tierra del Fuego and other stopovers is suggestive of a decrease in the overall population'' (Rufa Red Knot Ecology and Abundance, p. 48). We agree that this statement was imprecise and have revised the Supplemental Document (Population Surveys and Estimates—Spring Stopover Areas—Delaware Bay) to clarify our conclusions drawn from best available data. We have also revised the Supplemental Document (Summary—Population Surveys and Estimates) to clarify, ''Although we lack sufficiently robust data to conclude if other wintering and stopover areas also declined, we conclude it is likely that declines at Tierra del Fuego and Delaware Bay drove an overall population decline (*i.e.,* lower total numbers), because these two sites supported a large majority of rangewide knots during the baseline 1980s period.''

(39) Comment: One State commented that the annual variation in the Delaware Bay peak counts suggests that knots are capable of altering their stopover behavior between years. It is unlikely that the actual population fluctuates at the high magnitude reflected in the Delaware Bay peak counts; therefore, year-to-year changes are probably related to variations in passage rates for birds moving through the region and variations in the use of multiple stopover sites.

Our Response: We agree that the Delaware Bay peak counts are highly variable, but conclude that much of the short-term (year-to-year) variation can be attributed to the fact that peak counts are only a proxy measure for the total passage population. Year-to-year differences in the month-long patterns of arrival and departure would affect the percentage of total passage population that is captured by each year's peak count (*e.g.,* some years more birds may depart early and be missed by the late-May peak count). It is also possible that the survey date has missed the true peak number of birds in some years, particularly after 2008 when weekly, season-long survey efforts were scaled back to focus only on the end of May. That said, we also agree that red knots may switch between mid-Atlantic stopovers between, and even within, years, and that this flexibility may explain part of the variability in the data from both Delaware Bay and Virginia (Supplemental Document tables 8 and 11). We noted this flexibility in spring stopovers in the proposed rule (Rufa Red Knot Ecology and Abundance, p.

20). Despite the high variability, we attach high confidence to the long-term trend evident in the Delaware Bay peak count data, based on the consistent methods and observers, particularly during the core years of 1986 to 2008.

(40) Comment: One State and several other commenters stated that recent population estimates calculated from resightings of banded knots using capture-recapture statistical methods should not be conflated with long-term data sets of maximum 1-day (peak) counts.

Our Response: The proposed rule (Rufa Red Knot Ecology and Abundance, pp. 47–51) did not conflate population estimates derived from these two different methods. As we explain in the Supplemental Document (Population Surveys and Estimates—Spring Stopover Areas), because birds pass in and out of a stopover area, the peak count (the highest number of birds seen on a single day) for a particular year is lower than the total passage population (*i.e.,* the total number of birds that stopped at that site over the course of that migration season). For this reason, we have not compared data sets estimating total passage population (from capture-recapture statistical methods) with those of peak counts (maximum 1-day counts). We present these data sets separately in tables 9 to 13 of the Supplemental Document, with data updates where available.

(41) Comment: One State concluded that peak red knot numbers in Delaware Bay have been stable to increasing since 2002, while another commenter concluded that red knot numbers in Delaware Bay continue to decline.

Our Response: We disagree with both of these conclusions. We find that peak counts from 2002 through 2008 continued to show a slight downward trend. Peak counts from 2009 through 2014 appear to have been stable to slightly increasing, despite lower confidence in these recent counts due to multiple shifts in methodology and surveyors. Average peak counts for the last decade (2005 to 2014) remain about 70 percent lower than during the baseline period of 1981 to 1983. See Supplemental Document, Population Surveys and Estimates—Spring Stopover Areas—Delaware Bay.

(42) Comment: One State and several other commenters noted that the ARM model established a threshold of red knot abundance (45,000 or half of the historical peak counts) which, when reached, will trigger female crab harvest. As this threshold was derived from peak counts, it must be adjusted upward to account for differences in methods before it can be judged against new estimates of total stopover population derived from mark-resighting data. One State also commented that the mark-resighting method is of limited value in trend assessment because population estimates cannot be made retrospectively, but did acknowledge that it is probably the most robust method of estimating actual stopover population numbers and, therefore, will be useful in developing future trend information.

Our Response: We agree that the threshold must be revised and note that this adjustment has already been made. This threshold, used in the ASMFC's management of the HSC fishery under the ARM, has now been adjusted upward to account for differences in methodology. In September 2013, the ASMFC's Delaware Bay Ecosystem Technical Committee adopted a ratio of 1.82, and adjusted the threshold from 45,000 to 81,900 red knots. This ratio may be refined when the ARM model is re-evaluated in the future (ASMFC 2013e, p. 1). We agree that this is a robust method of estimating stopover populations, but also agree that the mark-resighting method cannot yet be used for trend analysis because too few data points are available to date. No accurate estimates of the total stopover population using the methods of J. Lyons (pers. comm. September 3, 2013) can be calculated prior to 2011, when the required data began to be collected. However, estimates prior to 2011 are not needed to implement the ARM model as decisions on HSC harvest are based upon the current populations of HSCs and red knots. For red knot population trend analysis in Delaware Bay, we have relied on the peak counts (see *Our Responses 37* and *39*.)

(43) Comment: One State said that it had difficulty evaluating the geographic adequacy of the winter surveys in Tierra del Fuego and the southern coastline of Argentina, because these surveys may or may not cover a sufficiently large portion of the wintering range to develop a comprehensive population estimate. This State questioned if it is possible that red knots winter outside of the surveyed area further north along the coast lines of Argentina and Chile, or on the Falkland Islands.

Our Response: Much of what we know about the distribution of wintering red knots along the coasts of South America comes from Morrison and Ross (1989), who reported the results of aerial surveys conducted from 1982 to 1986. This survey effort covered nearly the entire Atlantic, Pacific, and northern coasts of South America (Morrison and Ross 1989, Vol. 1, p. 22). During these extensive surveys, *Calidris canutus* was observed only in Tierra del Fuego and the Patagonian coast of Argentina, the north coast of Brazil, and western Venezuela (Morrison and Ross 1989 Vol. 1, pp. 37, 40–41). Although Morrison and Ross (1989) did not observe *C. canutus* along the Pacific coast of South America, they recorded substantial numbers of unidentified medium-sized shorebirds in several locations, including some areas with reports of *C. canutus* from other sources (eBird.org 2014; Carmona *et al.* 2013, pp. 175, 180; Ruiz-Guerra 2011, p. 194; Morrison and Ross 1989 Vol. 1, p. 40; Hughes 1979, pp. 51–52). In the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 38–42), we presented the data of Morrison and Ross (1989) as well as all available results of more recent survey efforts for the known and possible range of *C.c. rufa,* which includes the east and north coasts of South America. These data have been updated in the Supplemental Document (Population Surveys and Estimates). Based on new information indicating that at least some of the *C. canutus* on the central Pacific coast of Chile are also *C.c. rufa,* we have also added best available abundance data for the west coast of South America (Population Surveys and Estimates—Central America and Pacific South America). We are unaware of any published or unpublished *C. canutus* reports from the Falkland Islands, there are no reports of these species for that area in eBird (eBird.org 2014), and no other datasets for the Falkland Islands were provided during the comment period. The lack of data may be explained by an apparent lack of survey efforts.

(44) Comment: One State commented that, based upon its review of the threats analysis published in the listing proposal, it does not find compelling evidence that the *rufa* subspecies of the red knot warrants listing as a federally threatened species throughout the eastern half of the United States. Other commenters stated that listing of the rufa red knot is not warranted based on a lack of compelling evidence in the proposed rule, and that the threatened determination relies on speculative future conditions. An additional commenter stated that a reasonable determination could also be made that adequate conservation measures already exist to reasonably protect red knot populations and that forecasting cumulative worst case scenarios to determine species risk does not meet the test of 50 CFR 424.4(a)(1) for adding a new species to the list of threatened and endangered species. Conversely, other commenters stated that we should list

the red knot as endangered or use our authorities for emergency listing, while another commenter mentioned that the previous change in the rufa red knot's listing priority number was no guarantee that it would be listed.

Our Response: See *Our Responses 27, 36, and 71* regarding how we satisfied the Act's information standard. The proposed rule and its underlying data were available for extensive public and peer review and comment. The commenters did not provide additional substantive information to refute our analysis or assumptions. We disagree that this listing determination relies on cumulative-worst case scenarios, and instead find that the red knot meets the definition of a threatened species based on several population-level threats. Particularly considering the cumulative effects of ongoing and emerging threats, and considering that several populations of red knots have already undergone considerable declines and remain at low levels, we conclude that the best available data constitute compelling scientific evidence that the red knot meets the definition of a threatened species.

As noted in the proposed rule (Previous Federal Actions, p. 2), the listing priority number was changed (from 6 to 3) in 2008. The commenter is correct that candidate species of any listing priority number are not guaranteed to be listed—new information may become available that causes us to change our conclusion that listing is warranted. However, this is not the case for the red knot. As for the need to emergency list, this request is moot because the red knot will become listed as threatened upon the effective date of this rule. As noted in the proposed rule (Previous Federal Actions, pp. 1–2), we previously determined that emergency listing was not warranted, and we had no new information to indicate emergency listing was warranted at the time of, or subsequent to, the proposed rule.

We have carefully reviewed all new information since the proposed rule, and continue to find that the red knot meets the definition of a threatened species under the Act. We do not find that the red knot warrants listing as endangered based largely on the fact that red knot populations in Tierra del Fuego and Delaware Bay, although still at historically low levels, appear to have stabilized since about 2009, suggesting that the red knot is not currently at risk of extinction, but is likely to become so in the foreseeable future.

(45) Comment: One State and an additional commenter expressed concerns that threats in other habitats outside of Delaware Bay are having a disproportionate effect on the red knot because the Delaware Bay remains in a "depauperate state," at least as it pertains to shorebirds (*i.e.,* HSC population levels are too low to provide the "super-abundance of eggs"). Because of this egg insufficiency, threats in other habitats used during the red knot's annual cycle will have a proportionately greater effect on red knot population viability. Thus, addressing the HSC egg food supply in the bay must remain at the forefront of red knot recovery efforts.

Our Response: We disagree that the bay is currently "depauperate" for shorebirds, but agree that the HSC egg supply should remain a focus of red knot recovery work. As noted in the proposed rule (78 FR 60024, p. 60063), most data suggest that the volume of HSC eggs is currently sufficient to support the Delaware Bay's stopover population of red knots at its present size. This conclusion seems to be holding, as red knot weight gain was good during spring 2014, for a third consecutive year (A. Dey pers. comm. July 23, 2014). However, it is not yet known if the egg resource will continue to adequately support red knot population growth over the next decade. Thus, we agree that sustained focus on protecting the red knot's food supply is vital to the recovery of the red knot, and will be addressed during the recovery planning process. Further, we intend to continue our active role in the ASMFC's management of the HSC fishery. Under the ARM we do not anticipate the bait harvest will slow red knot population growth (see *Our Response 48*) (Smith *et al.* 2013, p. 8).

We also agree that a number of other threats are likely contributing to habitat loss, anthropogenic mortality, or both, and thus contribute to the red knot's threatened status, particularly considering the cumulative effects of these threats, and that populations of this species have already undergone considerable declines in key areas.

(46) Comment: One State and several other commenters stated that the Delaware Bay HSC population has not recovered and concluded that management of this fishery to date has not accomplished its objectives and has proven inadequate to reverse declines. Several commenters noted that no class of HSC (by sex or age) has shown any recovery as measured by the Virginia Tech Horseshoe Crab Trawl Survey or the Delaware Bay 16-foot Trawl Survey. Further, positive trends in female HSC populations are absent, even after 7 years of male-only harvest, which is consistent with significant unaccounted losses of female crabs, for example, from mortality caused by biomedical harvest, poaching, and bycatch. In addition, one State commented that the 2013 defunding of the Virginia Tech Trawl Survey adds to uncertainty that the data sources relied upon in the ARM models will be consistently available. In contrast, one commenter stated that, while the benthic trawl survey is the best survey to support the ARM, a sound strategy has been developed to use the NEAMAP data to support the 2014 modeling efforts for the 2015 fishery, and the ASMFC Horseshoe Crab Management Board and ARM Working Group anticipate the continued use of the ARM framework for management.

Our Response: Numerous data sets are available regarding the Delaware Bay HSC population. We rely on ASMFC's periodic stock assessments to appropriately weigh and statistically analyze these data sets to draw conclusions regarding HSC population trends, as discussed in the proposed rule (78 FR 60024, p. 60066). The Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) has been updated to include the results of the 2013 stock assessment update. The 2013 stock assessment update concluded that, in the Delaware Bay Region, there is evidence of increases in certain age or sex classes, but overall population trends have been largely stable (neither increasing nor decreasing) since the previous stock assessment in 2009 (ASMFC 2013b, p. 22). These 2013 stock assessment findings are consistent with our conclusions in the proposed rule (78 FR 60024, p. 60066) that HSC population declines were observed during the 1990s, increases (though not a full return to 1980s levels) and stabilization occurred in the early 2000s, and various data sets have differed with no consistent trends since 2005. We note that the ARM framework does not define a "recovery" population level for Delaware Bay HSCs, but instead seeks to set the crab harvest at a level that does not slow the achievement of an agreed-upon red knot population target.

We disagree that ASMFC's regulatory approach has been inadequate. In addition to restricting harvests through the Fisheries Management Plan (including the most recent iteration, the ARM), the ASMFC has taken several proactive steps including establishment of a Technical Committee to focus on shorebirds, requesting the establishment of an HSC reserve in Federal waters, supporting work on alternative baits, and reducing demand by promoting bait-saving devices. These efforts reduced reported landings (ASMFC 2009a, p. 1) from 1998 to 2011 by more than 75 percent (78 FR 60024, p. 60064). We believe it is premature to state that the ASMFC's regulatory approach has not accomplished its objectives. Rather, we anticipate that this regulatory approach, currently reflected in the ARM framework, will allow for HSC and red knot population growth to meet ASMFC objectives. However, even highly successful harvest management under the ARM will only meet its objectives to the extent that the HSC population remains limited by harvest. For example, food resources, habitat conditions, and other conditions that affect growth, survival, and carrying capacity of HSCs in the Delaware Bay Region may have changed over time and cannot be affected by management of the fishery.

Regarding when to expect female HSCs to show an increase based upon existing monitoring programs, several areas need to be considered including the ability of the monitoring programs to detect change in the populations, our understanding of how the population may respond, and other factors such as food availability for HSCs, as well as bait and biomedical mortality. Horseshoe crabs take 9 to 12 years to reach breeding age, and modeling suggests that it will likely take longer than one generation for adult abundance to increase. See *Our Response 49* below regarding possible sources of HSC mortality not explicitly accounted for in the ARM models.

We agree that the Virginia Tech survey is the best benthic trawl survey to support the ARM. In the absence of the Virginia Tech survey, we support the ongoing efforts of the ASMFC to adapt the NEAMAP data for use in the models. However, efforts to date have not identified a method by which the NEAMAP data can allow for the functioning of the ARM models (ASMFC 2014b). Stable funding sources for the other baywide monitoring programs are also a concern. Insufficient monitoring has already impacted the ability of the ASMFC to implement the ARM as intended (ASMFC 2014b; ASMFC 2012c, p. 13). If the ARM cannot be implemented in any given year, the ASMFC would choose between two options based on which it determines to be more appropriate—either use the previous year's harvest levels (as previously set by the ARM), or revert to an earlier management regime (ASMFC 2012e, p. 6). Although the HSC fishery would continue to be managed under either of these options, the explicit link to red knot populations would be lost. Absent the necessary HSC monitoring data to use the ARM models for the 2015 season, ASMFC (2014b) has opted to use the 2014 harvest levels which we considered at the time to adequately ensure the red knot's food supply. We have revised the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management) to reflect this new uncertainty about the future of the ARM.

(47) Comment: One State commented that recent efforts to develop an artificial bait for the conch and eel fisheries could reduce demand for HSCs as bait and reduce the HSC harvest, thereby benefitting HSC (and red knot) rebuilding. However, to realize a significant benefit to the HSC population, the use of artificial bait would need to reduce harvest/demand for HSCs to a level below quota levels.

Our Response: We agree that HSC alternatives offer the possibility of substantial conservation benefits to the red knot. In the proposed rule (78 FR 60024, p. 60067), we noted efforts to develop an artificial bait to replace HSCs, as well as work toward alternatives to the biomedical HSC product Limulus Amebocyte Lysate. We have updated the Supplemented Document (Factor E—Reduce Food Resources—Horseshoe Crab Harvest—Link A, Park 2) with new information on artificial bait from the University of Delaware (Wakefield 2013). We support these efforts, which would reduce or eliminate the demand for harvesting HSCs. However, until bait or lysate alternatives are widely adopted, we anticipate that management of HSC harvests under the ARM will continue to adequately abate the food supply threat to red knots from HSC harvest in the Delaware Bay. (However, see *Our Response 46* regarding new uncertainty about the future of the ARM.)

(48) Comment: One State and several other commenters expressed concern that, under the ARM, Delaware Bay HSC populations are not expected to recover for 60 years. One State indicated that the carrying capacity of Delaware Bay for female crabs is estimated at 14 million individuals while the current female population estimate is 4.5 million, and growth to carrying capacity would take more than 100 years according to simulations by Smith *et al.* (2013). Another commenter stated that the number of crabs must return to the levels of the early 1990s to support the recovery of the red knot. Several of these commenters believed that the ARM models value harvest (give it ''utility'') above a speedy recovery of HSCs. Another commenter stated that it remains to be seen if the HSC population will respond to recent harvest quotas set by the ASMFC and that the food supply for red knots in Delaware Bay remains uncertain for at least the near term. Conversely, one commenter stated that assertions that the HSC population must increase by an order of magnitude to have a beneficial impact on survival of the red knot population are not supported by defensible data.

Our Response: We disagree with these conclusions regarding HSC population growth rates and target population levels. In a recent study, Smith *et al.* (2013, entire) ran computer simulations to test how uncertainty affects the management of the Delaware Bay HSC population under the ARM. These authors presented charts with simulated population trajectories of both HSCs and red knots. However, these simulations were intended to illustrate the role of uncertainty in the ARM framework, not to predict recovery times. Because it is adaptive in nature (*i.e.,* each year's harvest limits are based on the previous year's crab and knot population estimates), the ARM is not designed to answer the question of how long it will take to achieve any particular HSC or red knot population size in Delaware Bay. The findings of Smith *et al.* (2013) have been incorporated into the Supplemental Document (Factor E—Reduce Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management).

As explained above in *Our Response 46,* the ARM framework does not define a ''recovery'' population level for Delaware Bay HSCs. We do not assert that any particular HSC population level is necessary to have a beneficial impact on the red knot stopover population in Delaware Bay. Further, we do not have any information to indicate that the HSC population must reach carrying capacity—or must return to early 1990s levels, or increase by an order of magnitude—to support the full recovery of the Delaware Bay's red knot stopover population. Instead, we rely on the adaptive, scientific modeling of the ARM framework to determine the appropriate HSC harvest level necessary to maximize red knot population growth.

We disagree that the ARM framework values harvest over maximum HSC population growth. Under the ARM framework, utility is given to harvest (*i.e.,* harvest is ''valued,'' and, therefore, allowed) only when knot and crab populations are above a threshold. Although the simulations by Smith *et al.* (2013, p. 8) are not intended to predict actual timeframes for population growth, they did show that the bait harvest levels allowed by the ARM did not slow red knot population growth relative to a complete moratorium (see *Our Response 121*). The simulations by Smith *et al.* (2013) suggest these species will take a long time to rebuild (although we cannot predict how long) due to their inherent biology (long time to maturity and low survival in early life stages), not due to the ARM utility values.

We agree that food supply for red knots in Delaware Bay remains a point of concern. As long as the ARM is in place and functioning as intended (see *Our Response 46* regarding new uncertainty about the future of the ARM), we anticipate future quotas will continue to be set at levels that ensure the bait harvest does not impede progress toward achieving maximum red knot population growth. However, even with highly successful harvest management under the ARM, the HSC population will continue to grow only to the extent that it remains limited by harvest; other factors affecting crab populations cannot be affected by management of the fishery (see *Our Response 46* and Supplemental Document section Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2). Our assessment of the best available data concludes that the volume of HSC eggs is currently sufficient to support the Delaware Bay's stopover population of red knots at its present size; but because of the uncertain trajectory of HSC population growth, it is not yet known if the egg resource will continue to adequately support red knot population growth over the next decade. This conclusion is unchanged from the proposed rule (78 FR 60024, p. 60063).

(49) Comment: One State and several other commenters stated that the ARM model is based on a number of assumptions that the ASMFC has not adequately tested, and includes a high degree of uncertainty in many of the data inputs. These include a lack of information on crab mortality to sufficiently inform the adaptive management process. These assumptions and sources of uncertainty render the model less risk-averse than the commenters find acceptable given the dependence of red knot recovery on a sufficient growth in Delaware Bay's spawning HSC population. Assumptions and uncertainties noted by the commenters include (a) the boundary (geographic extent) of the Delaware Bay Region (which, if incorrect, could allow for harvest of Delaware Bay crabs that would not be accounted for in the models); (b) illegal harvest; (c) crabs harvested and used at sea (not landed in any State); (d) crabs harvested in Federal waters; (e) bycatch; (f) underreporting, inaccurate or missing reporting of the sex of harvested crabs; and (g) mortality from the biomedical harvest.

Our Response: While we agree that there is good correlation between declines in red knots and declines in HSC abundance based on the best data available, we note that late arrivals of red knots in Delaware Bay (for unknown reasons) was a key synergistic factor accounting for the knot's decline in the 2000s (Baker *et al.* 2004, p. 878). We recognize the uncertainties and assumptions raised by the commenters. Such uncertainties were one reason the ARM was developed, as the purpose of adaptive management is to allow decisions under uncertainty. The uncertainties and assumptions, many of which are common to all managed fisheries, mentioned by the commenters were taken into account when the ARM was developed. We have reviewed the ARM framework at length and have spoken with the authors of the modeling. We conclude that the ARM is risk averse and deals explicitly with uncertainties, and that these uncertainties do not preclude effective decision-making, a conclusion supported by Smith *et al.* (2013).

Updates regarding our previous analysis of each uncertainty or assumption are presented below. While the ARM framework does not currently account for these factors explicitly, mortality from sources other than the bait harvest is potentially reflected in the survival parameters used in the ARM. Based on best available information, we conclude that explicit addition of these factors to the models would not change the harvest levels set by the ARM process. However, we have revised the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management) to clarify that we expect the ARM framework will continue to adapt as substantive new information becomes available about important factors (other than the bait harvest) that may limit the continued growth of the Delaware Bay HSC population (see *Our Response 50*). In addition, we note that, since New Jersey has a full moratorium in place, the actual harvest of HSCs is less than that recommended by the ARM models.

(a) *Delaware Bay Region boundary.* In the proposed rule (78 FR 60024, p. 60070), we concluded that the ASMFC's current delineation of the Delaware Bay Region HSC population is based on best available information and is appropriate for use in the ARM modeling, but we acknowledged some uncertainty regarding the population structure and distribution of Delaware Bay HSCs. The commenters have not provided any new data to help resolve this uncertainty, or alternate boundaries for consideration. In documenting the technical underpinnings of the ARM, the ASMFC (2009b, p. 7) acknowledged that the proportion of Maryland and Virginia landings that come from Delaware Bay is currently unresolved, but stated that their approach to estimating this proportion, based on genetic analysis, was conservative. We have revised the Supplemental Document (Factor E—Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management) to state that we anticipate the ARM process will adapt to substantive new information that reduces uncertainty about the Delaware Bay HSC population structure and geographic distribution. See *Our Response 114*.

(b) *Illegal harvest.* In the proposed rule (78 FR 60024, pp. 60066–60067), we evaluated available information regarding illegal harvest (poaching) of HSCs. We have revised the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) to update the poaching discussion with new findings from the ASMFC (2014a). Although notable poaching has been reported outside the Delaware Bay Region, we have no data to indicate that poaching in the Delaware Bay Region is occurring at levels that would have population-level effects. See also *Our Response 52* below.

(c) *Crabs used at sea.* In the proposed rule (78 FR 60024, p. 60067), we discussed the unregulated harvest of HSCs from Federal waters that are not landed in any State, but exchanged directly to a dependent fishery. We have updated the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) with new information from the ASMFC (2014a) regarding the possibility of such crabs, mainly crabs caught as bycatch, being harvested and used at sea. While there is no indication of the extent or amount of this activity or whether it exceeds the legal bycatch allowances that are set by each State, there is also no direct evidence of significant illegal activity and no enforcement cases (ASMFC 2014a, p. 2; M. Hawk pers. comm. May 27, 2014). We continue to conclude that the level of any such unreported and unregulated harvest (*i.e.,* that does not result in landings) is small and unlikely to have population-level effects (M. Hawk pers. comm.

April 29, 2013; G. Breese pers. comm. April 26, 2013).

(d) *Harvest from Federal waters.* Horseshoe crabs caught in Federal waters and landed in any State count toward the quotas established by the ASMFC. Horseshoe crabs caught in Federal waters and not landed in any State (used at sea) were discussed under item (c), above.

(e) *Bycatch.* Bycatch was discussed in the proposed rule (78 FR 60024, p. 60067). We have updated the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) with new information about bycatch as well as commercial discard. Horseshoe crabs caught as bycatch that are landed in any State count toward the quotas established by the ASMFC and may be kept only if the harvester holds a permit (M. Hawk pers. comm. May 27, 2014). Horseshoe crabs caught as bycatch that are not landed in any State (used at sea) were discussed under item (c), above.

(f) *Reporting problems.* We have no data that underreporting and inaccurate or missing reporting of the sex of harvested crabs is impeding the functioning of the ARM process.

(g) *Biomedical harvest.* See *Our Response 50* below regarding biomedical harvest of HSCs.

(50) Comment: One State and several other commenters expressed concern that the mortality of HSCs bled for biomedical use is not included in the ARM models, and that mortality rates have been documented well above those used by the ASMFC (*e.g.,* for assessing if the biomedical threshold has been surpassed). In addition, sublethal effects on bled crabs are not considered, and the biomedical harvest is expected to continue growing. Further, it is unclear if bled crabs captured in Delaware Bay are released near the location of their capture or nearer to the bleeding facilities, all of which are outside of the Delaware Bay region and would represent a loss of these crabs to the Delaware Bay population. One commenter noted that the ASMFC's Delaware Bay Ecosystem Technical Committee recommended in September 2013 that the ASMFC investigate options to incorporate biomedical data into future stock assessments, which has not been possible to date due to confidentiality issues.

Our Response: In the proposed rule (78 FR 60024, pp. 60064–60065), we noted that biomedical collection is currently not capped, but the ASMFC may consider implementing action to reduce mortality if estimated mortality exceeds a threshold of 57,500 crabs. This threshold has been exceeded several times, but thus far the ASMFC has opted only to issue voluntary ''best practices'' guidelines to the biomedical industry (ASMFC 2009a, p. 18). We also noted that, using a constant 15 percent mortality of bled crabs, the estimated contribution of biomedical collection to total (biomedical plus bait) mortality coastwide rose from about 6 percent in 2004 to about 11 percent in 2011. We have updated the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) with new information on sublethal effects from bleeding (Anderson *et al.* 2013), and to note that, despite a recommendation by the ASMFC's Horseshoe Crab Technical Committee to use of a range of 5 to 30 percent mortality (ASMFC 2013c, p. 8; ASMFC 2012a, p. 6), the ASMFC continues to assume a constant 15 percent mortality rate for bled crabs (M. Hawk pers. comm. May 28, 2014; ASMFC 2013b, p. 9; ASMFC 2009a, p. 3). Available data suggest the biomedical industry generally returns bled crabs to their waters of origin.

As shown in the Supplemental Document (table 23), the 2012 estimate of coastwide biomedical mortality (about 80,000 crabs) remains small compared to the coastwide bait harvest (about 730,000 crabs) (note that these figures are not specific to the Delaware Bay Region). Given the relative magnitude of biomedical mortality, we conclude that even considerable uncertainty around this estimate would not currently prevent the ARM framework from functioning as intended. However, we support the recommendation of the Technical Committee for ASMFC to investigate options to incorporate biomedical data into future stock assessments while avoiding breaches in confidentiality (ASMFC 2013e, p3). Further, we have revised the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management) to clarify that we expect the ARM framework will continue to adapt as substantive new information becomes available about any important factors (other than the bait harvest) that may limit the continued growth of the Delaware Bay HSC population. Such factors are not currently well known, but could include demographic and ecological constraints on population growth, as well as sources of direct mortality that are not currently captured by the ARM models (*e.g.,* biomedical, poaching, bycatch). In particular, accounting for biomedical mortality may become important if the contribution of the biomedical harvest to total mortality continues to increase. It should be noted, however, that much of the biomedical harvest occurs outside the Delaware Bay Region and would, therefore, fall outside of the ARM framework.

(51) Comment: One State commented that removing Mispillion Harbor from the analysis of annual Delaware Bay egg density estimates has no biological or statistical justification and introduces bias. The Delaware Bay Ecosystem Technical Committee reviewed these data and determined that the high egg densities observed in Mispillion Harbor are not an outlier because they are consistently high from year to year and play a significant role for red knots in the Delaware Bay ecosystem. Furthermore, HSC egg densities in Delaware are increasing since 2005 (see Kalasz 2013 interim report).

Our Response: In the proposed rule (78 FR 60024, p. 60068), we stated that Mispillion Harbor consistently supports a substantial portion of the red knots in Delaware Bay, and that exclusion of Mispillion Harbor from statistical analyses is problematic. Thus, we discussed the statistical relationship between egg density and red knot weight gain both with and without Mispillion Harbor, as reported by Dey *et al.* (2013, pp. 18–19). We have added the findings of Kalasz (2014) to the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link B, Part 2).

(52) Comment: One State commented that the proposed rule contains an unsubstantiated allegation of HSC poaching as a factor impacting HSC populations, which is unreasonable given that the current HSC population is likely no less than the estimated 20 million HSCs in the Delaware Bay in 2003, indications that the spawning HSC population in the Delaware Bay has been stable or increasing, the scrutiny and capabilities of State enforcement officials, the fact that HSC bait prices have increased tremendously in response to restrictions put in place (as evidenced by the import of Asian HSCs), and the difficulty in concealing large quantities of [illegal] HSCs. Conversely, another commenter stated that they have witnessed HSC harvest in a salt marsh on the North Shore of Long Island, New York, and found that oversight of harvest regulations is lacking. In addition, this commenter also believes that the harvest limit is too high.

Our Response: We disagree with this characterization of our conclusions in the proposed rule. In the proposed rule (78 FR 60024, p. 60066), we reported that the ASMFC's Delaware Bay

Ecosystem Technical Committee had speculated about possible factors that may explain the lack of recent HSC population growth in the Delaware Bay Region, but committee members did not reach consensus regarding which factors are more likely (ASMFC 2012c, p. 12; ASMFC 2012d, p. 2). The possibility of excessive documented and undocumented mortality was among these factors (ASMFC 2012d, p. 2). Therefore, we further investigated several possible sources of additional mortality outside the authorized bait harvest quotas, including biomedical mortality, poaching, bycatch, and unregulated harvest (*i.e.,* from Federal waters and not landed in any State) (see *Our Response 49*). Specific to poaching, we presented documented instances of enforcement actions in New Jersey and New York. We have updated the poaching discussion in the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A—Part 2) with new findings from the ASMFC (2014a), which further document notable levels of illegal harvest outside of Delaware Bay, but which have not changed our conclusion that minimal poaching (well below the levels that would cause population-level effects) has been observed in the Delaware Bay Region. Specific to oversight in New York, officials are aware of significant harvest pressure in the spring, and anticipate possible illegal activity by implementing significant spring enforcement details (ASMFC 2014a, p. 1). We agree that the best available estimate of the HSC population in Delaware Bay is about 20 million crabs and that spawning HSC abundance has been stable, though not increasing (see *Our Response* 109). We also agree that poaching is receiving appropriate scrutiny from enforcement officials (ASMFC 2014a). See *Our Responses 2* and *120* regarding the price of bait and the import of Asian HSCs.

(53) Comment: One commenter stated that dredging beginning in the 1960s has degraded HSC habitat.

Our Response: In the proposed rule (78 FR 60024, p. 60039), we addressed effects to HSC spawning habitat from shoreline stabilization including hard structures and beach nourishment, but not from dredging. We do not doubt that dredging has and continues to degrade HSC habitat in some locations. However, we do not address this issue in the Supplemental Document because we have no information that dredging is impacting HSC habitat in Delaware Bay, which is the only region in which red knots are highly reliant on HSC eggs as a food resource. That said, we have revised the Supplemental Document (Migration and Wintering Food) with new information that HSC eggs are eaten, and often preferred, by red knots along other parts of the U.S. Atlantic coast, and may be a locally important component of the knot's spring diet. Thus, we anticipate that the recovery planning process will include evaluating threats to the HSC egg supply in other areas outside Delaware Bay.

(54) Comment: One State commented that the recent reduction in food availability in Delaware Bay was identified as the most detailed and persuasive threat, but this threat affects only those birds that migrate along the Atlantic coast, and it may not affect all migrating birds equally. The birds wintering along the northern coast of South America or along the Florida peninsula should have a lesser need to gain as much weight because of their shorter migration and may be minimally affected by food reduction. Another commenter stated that the Tierra del Fuego wintering population, which relies most heavily on HSCs, has declined disproportionately.

Our Response: We agree that best available data suggest southern-wintering red knots (from Argentina and Chile) are more reliant on Delaware Bay than are northern-wintering birds (*e.g.,* from northern Brazil and the Southeast), as discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 31–33). We have revised the Supplemental Document (Wintering and Migration Food—Possible Differential Reliance on Horseshoe Crab Eggs) to more clearly present these data, and to emphasize observed differences between red knots that winter in Argentina and Chile versus knots that winter farther north (Wintering—Northern Versus Southern Wintering Regions; Migration—Differences in Migration Strategy by Wintering Area). However, we conclude that the best available data are insufficient to evaluate effects of the HSC harvest on northern-wintering red knots over recent decades, and we cannot conclude they were ''minimally affected'' by food reduction in Delaware Bay. We presented information about the Tierra del Fuego wintering population decline in the proposed rule (Rufa Red Knot Ecology and Abundance pp. 39–45; 53) and have revised the Supplemental Document (Wintering—Northern Versus Southern Wintering Regions) to clarify and emphasize this point.

(55) Comment: One State commented that the 70 percent loss of HSC spawning habitat in Delaware Bay reported in the proposed rule due to Hurricane Sandy is only reflective of New Jersey and not, necessarily, Delaware. The State said it is also difficult to determine how the 70 percent loss was quantified or how much of any such loss can actually be attributed to that one event. Another commenter agreed with the estimate of a 70 percent decrease in HSC spawning from Hurricane Sandy and noted that, while the beach was restored in time for the red knot spring stopover because of successful fundraising efforts, a similar winter or early spring storm could result in beaches stripped of sand with no time or funds for restoration.

Our Response: As noted in the proposed rule, biologists found a 70 percent decrease in optimal HSC spawning habitat in New Jersey following Hurricane Sandy (Niles *et al.* 2012, p. 1), and beach nourishment is being pursued as a means of restoring this habitat (Niles *et al.* 2013a, entire Niles *et al.* 2013b, entire). We have revised the Supplemental Document (Factor A—Accelerating Sea Level Rise—United States—Northeast and Mid-Atlantic—Delaware Bay Horseshoe Crab Habitat) to clarify that the 70 percent loss refers to the New Jersey side of Delaware Bay only, and that this loss is relative to 2002 but was identified by Niles *et al.* (2012) to be mostly a result of Hurricane Sandy.

We agree that changes in storm patterns may be a threat to the red knot. While variation in weather is a natural occurrence and is normally not considered a threat to the survival of a species, persistent changes in the frequency, intensity, or timing of storms at key locations where red knots congregate (*e.g.,* key stopover areas) due to climate change can pose a threat. Storms impact migratory shorebirds like the red knot both directly and indirectly, including through changes in habitat suitability. Beach losses accumulate over time, mostly during storms, and even the long-term coastal response to sea level rise depends on the magnitudes and timing of stochastically unpredictable future storm events (Ashton *et al.* 2007, pp. 7, 9). Should storm patterns change, red knots in Delaware Bay would be more sensitive to the timing and location of coastal storms than to a change in overall frequency. Changes in the patterns of tropical or extra-tropical storms that increase the frequency or severity of these events in Delaware Bay during or just prior to May would likely have dramatic effects on red knots and their habitats (Kalasz 2008, p. 41) (*e.g.,* through direct mortality, delayed HSC spawning, delayed departure for the breeding grounds, and short-term habitat loss) (78 FR 60024, pp. 60028–

60029, 60032, 60034, 60037, 60073). This information is presented, unchanged and under the same headings, in the Supplemental Document.

(56) Comment: One State commented that the potential near-term threat posed by sea level rise is reduced by the fact that coastal habitats are likely to shift and re-form as sea level changes, except in those areas that are armored or constrained by coastal infrastructure (78 FR 60024, p. 60032).

Our Response: We agree. However, as noted in the proposed rule (78 FR 60024, p. 60035), if shorelines experience a decades-long period of high instability and landward migration, the formation rate of new beach habitats may be slower than the rate at which existing intertidal habitats are lost. In addition, low-lying and narrow islands may disintegrate rather than migrate, representing a net loss of red knot habitat. Furthermore, the extent to which habitat migration is constrained by human activity is extensive—about 40 percent of the U.S. coastline within the range of the red knot is already developed (78 FR 60024, p. 60042). These conclusions are supported by new studies evaluating the vulnerability of shorebirds (including *Calidris canutus*) to sea level rise (Galbraith *et al.* 2014, p. 7; Iwamura *et al.* 2013, p. 6; National Wildlife Foundation 2013, p. 28; Whitman *et al.* 2013, pp. 2, 19, 64); we have added these updates to the Supplemental Document (Factor A—Sea Level Rise).

(57) Comment: One State commented that, within the listing proposal, all of the potential impacts that are predicted to occur as a result of sea level rise are based upon geomorphic modeling that assumes a 1-meter (m) increase in sea level. At the current rate of sea level rise, which ranges from 2.5 to 3.5 millimeters (mm)/year (78 FR 60024, pg. 60030), the 1-m threshold will not be reached for another 140 to 300 years. Even the low end of this range is well beyond the temporal scope that should be applied to a listing decision.

Our Response: We disagree with the commenter's projected rate of sea level rise, and conclude that appreciable effects to red knot habitats from accelerating rates of rising sea levels are likely to begin over the next few decades, not centuries (Iwamura *et al.* 2013, p. 6; Miller *et al.* 2013, pp. 3, 14; Vargas *et al.* 2013, pp. 22, 80; Galbraith *et al.* 2002, pp. 177–178). In fact, erosion has already led to loss of roost habitat in Delaware Bay (Niles *et al.* 2008, p. 97) and we expect ongoing erosion due to sea level rise to accelerate. As discussed in the proposed rule (78 FR 60024, p. 60029), and updated in the Supplemental Document (Factor A—Sea Level Rise—Rates), the rate of sea level rise has accelerated and is ''very likely'' to increase further (IPCC 2013a, p. 25). Although estimated future rates remain rather uncertain, some research suggests that sea levels could potentially rise another 2.5 to 6.5 ft (0.8 to 2 m) by 2100. The IPCC (2013a, p. 26) recently concluded there is ''low confidence'' in sea level rise projections over 3.3 ft (1 m) by 2100. However, for the most recent National Climate Assessment (Melillo *et al.* 2014), Parris *et al.* (2012, p. 2) evaluated various sea level rise scenarios and have ''very high confidence'' that global mean sea level rise will be between 0.7 and 6.6 ft (0.2 and 2.0 m) by 2100, which is generally the range we considered in this listing determination.

(58) Comment: Several States noted the beneficial effects of beach nourishment in maintaining habitat for red knots and other shorebirds. These States urged the Service to use caution when discussing the detrimental impacts of hard structures and beach nourishment as restoration or coastal protection strategies. These States commented that experience clearly demonstrates the value of such techniques to red knot beach habitats in Louisiana, and that beach nourishment is the best and only method to maintain and prevent the loss of suitable HSC spawning habitat due to erosion and sea level rise in a hydrologic system with limited sediment input, such as Delaware Bay. Likewise, one commenter noted that not all portions of the coast are equally impacted by erosion (*i.e.,* from sea level rise); thus, restrictions stemming from listing should be allowed to vary geographically and should leave open management options for habitat and beach restoration projects.

Our Response: We make a distinction between beach nourishment and beach stabilization structures (*i.e.,* hardening structures). With few exceptions, we have concluded that hard structures are detrimental to red knot habitat (Winn *et al.* 2013, p. 22). In contrast, beach nourishment may be either detrimental or beneficial depending on the circumstances (Nordstrom and Mauriello 2001, entire; Defeo *et al.* 2009, p. 4; Rice 2009, entire; Peterson *et al.* 2006, entire; Peterson and Bishop 2005, entire; Greene 2002, p. 5). The effects of beach nourishment are expected typically to be short in duration. Human attempts to harden the shoreline are considered generally a threat to the red knot, because hardening curtails the natural coastal processes that create and maintain the most suitable red knot habitats. Notwithstanding our overall conclusion on stabilization, we noted in the proposed rule (78 FR 60024, p. 60037) that, in a few isolated locations, hard structures may enhance red knot habitat, or may provide artificial habitat. We also noted that, where shorebird habitat has been severely reduced or eliminated by hard stabilization structures, beach nourishment may be the only means available to replace any intertidal habitat for as long as the hard structures are maintained (78 FR 60024, p. 60037). Further, wholesale reorganizations of barrier systems and the loss of some low-lying islands may occur under scenarios of rapid sea level rise, and shorelines may experience a decades-long period of high instability during which the formation rate of new red knot habitats may be slower than the loss of existing habitats, as indicated in the proposed rule (78 FR 60024, pp. 60032, 60035).

We agree with the commenters that, under such circumstances, human intervention in coastal processes may be the only means of maintaining shorebird habitat. Due to local and regional factors, Louisiana is already experiencing extreme rates of land loss and barrier island disintegration; we acknowledge that Louisiana's stabilization efforts may be maintaining habitat in areas where it would otherwise be lost. We likewise acknowledge the benefits of beach nourishment to red knot foraging habitat in Delaware Bay. Thus, we have revised the Supplemental Document (Factor A—U.S. Shoreline Stabilization and Coastal Development) to further note that both hard and soft (beach nourishment) stabilization efforts may also benefit red knots under circumstances of rapid erosion and land loss due to accelerating rates of sea level rise, locally or regionally exacerbated by limited sediment inputs. Coastal management projects generally involve Federal funding or authorization and may, therefore, be reviewed on a case-by-case basis under section 7 of the Act, thus ensuring flexibility for geographic differences.

(59) Comment: One State and several other commenters stated that the loss or impairment of other migration staging areas (outside of Delaware Bay) is of great importance to the red knot especially at low population levels. Geolocator data show that red knots spend considerable portions of their life cycle along the Atlantic coast, and that their habitat use and needs during fall migration demand greater attention. July and August are the months when the

greatest numbers of red knots occur along the Atlantic coast. This period is also the time when beaches and other coastal areas are under the most pressure from human activities, thus creating the greatest potential for disturbance to migrating red knots. Wintering areas used by red knots, particularly in the Southeast, also are subject to intense and persistent recreational use.

Our Response: We agree. In the proposed rule and in the Supplemental Document, we present a comprehensive analysis of threats to the red knot from habitat loss (Factor A) and disturbance (Factor E) throughout its range. Conservation actions to abate these threats will be evaluated during the recovery planning process.

(60) Comment: One State and several other commenters noted that red knots are part of one of the largest congregations of migrating shorebirds in North America, a congregation that converges along the shores of the Delaware Bay and contributes significantly to the local economy (*e.g.,* through ecotourism). The threatened status of the red knot is substantiated by the similar decline in a long list of other Arctic-nesting shorebirds, including other species that use Delaware Bay as a primary staging area during spring migration and rely on HSC eggs during the spring staging period. Further, listing the red knot and creating the basis for recovery will improve the situation for all of these shorebirds. Likewise, some commenters concluded that listing the red knot will benefit other shorebirds that share its wintering habitat in the United States. Conversely, some commenters suggested that listing the red knot may not be necessary because this species already receives incidental protections due to its geographic overlap with other protected species and protected areas.

Our Response: The Service recognizes the importance of Delaware Bay to other shorebird species besides the red knot, and the importance of the bay's ecosystem to local communities. We also recognize that listing the red knot may bring incidental conservation benefits to other species that share its habitats in Delaware Bay and rangewide. However, the Act requires that we use only the best available scientific and commercial data to evaluate whether a species meets the definition of a threatened or endangered species based on the five ''listing'' factors (section 4(a)(1)(b)). Thus, in making a listing determination, we may not consider the implications of possible listing for other species, the broader ecosystem, or local communities. (Once a species is listed, however, conservation of its supporting ecosystems is a principal focus of our recovery planning, and a central purpose of the Act.) We evaluated the conservation efforts that are already benefitting the red knot, including those that accrue from its overlap with other listed species and its occurrence in some protected areas. Notwithstanding several important ongoing conservation efforts, we conclude that the rufa red knot meets the definition of a threatened species, based on best available data. See *Our Response 2* regarding other implications of listing that we may not consider in evaluating whether a species meets the definition of a threatened or endangered species under the Act.

(61) Comment: Juvenile red knot survival and recruitment into the adult population may currently be the most significant factor facing the species. Over the past decade, juvenile survival has been low and recruitment into the adult population has been limited. Little is known about where juveniles spend their first 2 years or their survival rate. Given the suggestion that their range is in the Caribbean or northern South America, there is potential that hunting could impact survival, as juveniles would be more vulnerable to hunting pressure.

Our Response: We agree it is possible that low juvenile survival and recruitment may be limiting population growth, and that juvenile survival may be impacted by hunting (*e.g.,* if juveniles spend a large percent of their annual life cycle in regions where shorebirds are hunted, if juveniles are naïve to hunting, or both). Because we find these theories plausible and worthy of further investigation, we have mentioned them in the Supplemental Document (Longevity and Survival; Factor B—Hunting—Caribbean and South America). However, we note that these theories currently lack supporting documentation. We have also updated the Supplemental Document (Breeding—Nonbreeding Birds; Wintering—Juveniles; Migration) with the first two available geolocator results from juvenile birds showing where they spent their first years.

(62) Comment: Several States and other commenters stated that wind energy development was an unlikely threat to the red knot in the interior United States because research by Newstead *et al.* (2013) indicates that midcontinental migrating birds travel at a rate of approximately 58 km per hour. It is unlikely that birds could migrate this rapidly by flying at low altitude. Most likely, these birds are migrating at a height of several thousand feet and are passing well above all wind turbines and communications towers. Conversely, one commenter rebutted that the referenced speed is an average of the minimum flight speeds of those individuals. In reality, birds experience both headwinds and favorable tailwinds over the duration of a 2- or 3-day nonstop flight, which would effectively reduce or increase their speed, respectively. It is also likely that the birds would increase or decrease their altitude in response to those conditions, so it is not appropriate to infer that all flights follow the same trajectory or altitude. Further, red knots and other shorebirds are capable of considerable speeds in still air, approaching or exceeding 58 km per hour. Thus, red knots would not necessarily need the wind assistance found at high altitudes to achieve the estimated (average, minimum) flight speed.

Our Response: As discussed in the proposed rule (78 FR 60024, p. 60090), some experts estimate the normal cruising altitude of red knots during migration to be in the range of 3,281 to 9,843 ft (1,000 to 3,000 m), well above the estimated height of even a 10-MW turbine (681 ft; 207.5 m). However, much lower flight altitudes may be expected when red knots encounter bad weather or high winds, on ascent or descent from long-distance flights, during short-distance flights if they are blown off course, during short coastal migration flights, or during daily commuting flights (*e.g.,* between foraging and roosting habitats) (Burger *et al.* 2012c, pp. 375–376; Burger *et al.* 2011, p. 346). Supporting evidence for these expert opinions comes from other *Calidris canutus* subspecies and other shorebirds in Europe (see Supplemental Document section Factor E—Wind Energy Development—Offshore). Although the aforementioned sources constitute best available information, we lack any direct empirical data to verify the typical migration altitude of rufa red knots, or the degree to which they adjust their migration altitudes in response to weather or other factors. We agree that, typically, red knots on long-distance, nonstop flights likely migrate at high altitudes of 3,281 feet (1,000 m) or more (Burger *et al.* 2011, p. 346). However, we disagree with the interpretation that the minimum flight speed calculated by Newstead *et al.* (2013) indirectly indicates the migration altitude of red knots along the Central Flyway; thus, we have not incorporated this interpretation into the Supplemental Document. (Also see *Our Response 22.*)

(63) Comment: One State commented that the proposed rule failed to include the dwarf surf clam (*Mulinia lateralis*)

as an important food resource to fall migrating red knots in Georgia. This State noted densities of dwarf surf clam vary widely from year to year, appearing to drive the number of red knots using certain areas, and they are concerned that a number of predicted changes associated with global climate change (ocean acidification and warming) may negatively affect this important prey item.

Our Response: In the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 26–27), we noted that the spatial distribution of red knots has been correlated with prey availability in Georgia, and that the dwarf surf clam is a prey species in Georgia during winter. We have revised the Supplemental Document (Migration and Wintering Food) to indicate that the dwarf surf clam is also a primary prey species for knots during fall. We have also revised the Supplemental Document (Factor E—Reduced Food Availability—Ocean Acidification; Temperature Changes) to include new information provided by the commenter regarding the likely impacts of climate change on the dwarf surf clam in Georgia.

(64) Comment: Several States and other commenters provided new information regarding habitat and prey in inland areas (*e.g.,* some knots may use saline lakes in southern Canada, such as Reed, Chaplin, and Quill Lakes, that are known to support large, mixed-species shorebird concentrations due to abundant invertebrate resources), while other commenters contend that red knots may not use inland stopover sites during migration because of the unpredictable availability of appropriate prey. Within the interior portion of the Central Flyway, water levels fluctuate dramatically; therefore, few sites have reliable gastropod resources, and none support freshwater mussels at a depth that would be available to red knots.

Our Response: We agree that new information available since the proposed rule was published suggests that some red knots likely use inland saline lakes as stopover habitat in the Northern Great Plains. We have no information to indicate whether red knots may also use inland freshwater habitats during migration, but some of the new information discussed under *Our Response 29* suggests that certain freshwater areas may warrant further study as potential stopover habitats. We have added this new information to the Supplemental Document (Migration—Midcontinent; Migration and Wintering Habitat—Inland). We also agree that inland prey resources may be unpredictable. Newstead *et al.* (2013, p. 57) supported the idea that inland prey resources may be unpredictable, but showed inland stopovers are used by red knots in some years. At least on smaller geographic scales (*e.g.,* stopover areas in Argentina, Georgia, South Carolina, Virginia, the Atlantic coast of New Jersey, and Delaware Bay), knot distribution has been shown to follow areas of high prey availability, suggesting some plasticity in migration strategy as prey resources vary in time and space (Musmeci *et al.* 2011). Likewise, Newstead *et al.* (2013, pp. 57–58) have suggested that knot use of the Northern Great Plains may vary from year to year based on water levels. Geolocator data indicate the midcontinental flyway is consistently used by some birds, but the stopovers within this migratory route may vary depending on environmental conditions. These conclusions continue to be borne out by many more geolocator tracks that have yet to be published (D. Newstead pers. comm. May 8, 2014).

(65) Comment: Several States and other commenters suggested the Service should conduct a thorough literature review of all available resources to determine where the red knot occurs regularly because the species' conservation and recovery will be most effective if they remain focused on the important coastal habitats that are used by all individuals.

Our Response: We agree with this conclusion, but assert that we have already conducted a thorough review of the literature available. Identifying and protecting the network of important red knot sites is work that has been ongoing by an international community of shorebird researchers and conservationists since the late 1970s and continues today. The results of this extensive work were reviewed in depth for the proposed rule and the Supplemental Document, and will be further utilized and built upon during recovery planning.

Public Comments

(66) Comment: A commenter stated that the proposed rule does not comply with applicable law because the ''foreseeable future'' used by the Service in this instance is not expressly identified or otherwise explained. Upon reconsideration, should the Service decide to proceed with a threatened listing, it must issue a new proposed rule that clearly identifies the applicable ''foreseeable future,'' explains the Service's bases for identifying that foreseeable future, and describes how the Service's interpretation is consistent with the language and intent of the Act. The best available scientific data and information, previous findings by the Service, and applicable case law all dictate that a foreseeable future premised upon climate change impacts does not extend past mid-century.

Our Response: The Act does not define the term ''foreseeable future,'' and the Act and its implementing regulations and policies do not require the Service to quantify the time period of foreseeable future. For each threat evaluated in the proposed rule and in the Supplemental Document, we have specified, when possible, the time horizon over which we conclude likely effects to the red knot can be reasonably foreseen.

(67) Comment: A commenter stated that if the Service proceeds with a determination to list the rufa red knot as threatened, the Service must issue a special rule pursuant to section 4(d) of the Act that exempts from the section 9 take prohibition all lawful activities that have not been found to directly and adversely impact the rufa red knot species. To avoid unnecessary and unintended burdens, or the misuse of the Act, the Service should propose a special 4(d) rule. Further, the Service's rationale in support of the polar bear 4(d) rule applies equally to the red knot.

Our Response: The Act does not specify particular prohibitions for threatened species. Instead, under section 4(d) of the Act, the Secretary of the Interior was given the discretion to issue such regulations as she deems necessary and advisable to provide for the conservation of such species. Exercising this discretion, the Service has developed general prohibitions (50 CFR 17.31) and exceptions to those prohibitions (50 CFR 17.32) under the Act that apply to most threatened species. At this time, we have no information to suggest that the take prohibitions are not ''necessary and advisable to provide for the conservation'' of the rufa red knot to justify a species-specific 4(d) rule that exempts certain activities from the take prohibition. However, we will reevaluate this decision in the future if new information becomes available that indicates a change in the 4(d) regulations may be necessary and advisable for the red knot's conservation.

(68) Comment: One commenter requested clarification regarding how the public comments are evaluated by the Service, and how different comments are weighed, so that the analysis and decision-making are based on the input received.

Our Response: We have reviewed all the public comments for substantive new information and for any substantiated alternative interpretations of information we previously considered. To the extent that such new information and new interpretations represent best available data, we have incorporated them into the Supplemental Document and evaluated them in light of our threats assessment using the five listing factors set forth in section 4 of the Act. Oral testimony on a proposed rulemaking given at a public hearing is given the same weight as written comments received during the open public comment period.

(69) Comment: One commenter stated that the Service failed to conduct, and provide for comment on, analysis required by the Act in its proposal to list the rufa red knot.

Our Response: We disagree. As stated above, the proposed rule to list the red knot as threatened under the Act was published in the **Federal Register** on September 30, 2013 (78 FR 60024) and made available for public comment for a total of 133 days (78 FR 60024; 79 FR 18869; 79 FR 27548). In addition, three separate public hearings were held on the proposal, which exceeded the requirement to hold one hearing if requested. As explained above under numerous responses to comments, we appropriately evaluated whether the red knot meets the definition of a threatened or endangered species under sections 4(a) and 4(b) of the Act.

(70) Comment: Several commenters expressed concern about how we conduct peer review or use peer-reviewed documents, stating that scientific peer review should happen before proposing a species for listing, not during the public comment period, and that the Service should include the peer review results next to any cited information that it disseminates to the public in hearings, documents, and the **Federal Register**. Likewise, one commenter stated that designation of a species as threatened must be based on unquestionable scientific evidence gathered and analyzed before the designation, not after.

Our Response: As detailed in *Our Response 71* below, we use several sources of data in our listing determinations, including articles from peer-reviewed journals. In addition, the Service's 1994 Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities (59 FR 34270) specifies that we will ''(a) Solicit the expert opinions of three appropriate and independent specialists regarding the pertinent scientific or commercial data and assumptions . . . (b) Summarize in the final decision document (rule or notice of withdrawal) the opinions of all independent peer reviewers received.'' We have complied with the Policy by soliciting peer review during the open public comment period so that any peer review comments received would be transparently available to the public; peer reviewer comments were posted in the proposed rule's docket at *www.regulations.gov* along with all other received comments. In addition, we made the list of references reviewed and cited for the proposed rule available via the proposed rule's docket at *www.regulations.gov,* properly identified those citations in the proposed rule, and made it clear in the proposed rule (78 FR 60024, p. 60025) that these references, along with other information in the decision record, were available for public inspection by appointment at the Service's New Jersey Field Office. Information about the proposed rule summarized in presentations at the public hearings may not have explicitly identified the citations due to size limitations on the PowerPoint© slides, but hearing participants could obtain this information by reading the proposed rule and supporting documents, visiting *www.regulations.gov,* or making an appointment with the New Jersey Field Office. As required by the Act, we relied on best available data in determining that the red knot meets the definition of a threatened species in both the proposed and final rules. We disagree that listing requires ''unquestionable scientific evidence.'' Rather, as discussed in *Our Response 27,* the Service is required to rely solely upon the ''best available'' science, even if that science is uncertain. New information that becomes available after listing will be considered during recovery planning and implementation, and in the course of status reviews we conduct every 5 years to determine if the species continues to meet the definition of a threatened or endangered species.

(71) Comment: One commenter suggested that the quality of the data in the proposed rule was undermined by the number of personal communications and unpublished sources cited in the document. The reliance on unpublished data and personal communications suggest a link to falsified data. Likewise, one commenter stated that the information contained in the proposal and in supporting documents does not meet the scientific standards, and another commenter found that the best available science is poor and incomplete science at best.

Our Response: We disagree. The Service is required to make listing determinations based on the best scientific and commercial data available. Sources of data include peer-reviewed journal articles; field notes and other unpublished data; and personal communications from species, habitat, and policy experts. We analyze all available sources of data and use our best professional judgment to determine their credibility, in accordance with applicable data standards (Interagency Policy on Information Standards Under the Endangered Species Act (59 FR 34271); Information Quality Act (P.L. 106–554, section 515); Information Quality Guidelines and Peer Review (USFWS 2012f, entire)). As required by the Interagency Policy on Information Standards Under the Endangered Species Act, all sources we reviewed have been retained as part of the decision record, and all sources we relied upon are listed in the Literature Cited section of the Supplemental Document and were available for public review. We are not aware of any documented instances of falsification or any other scientifically unethical practices associated with any of the data we cited in the proposed rule, this final rule, or the Supplemental Document. As discussed in *Our Response 27,* the ''best available science'' requirement does not equate to the best possible science. Although we acknowledge certain data gaps (78 FR 60024–60025) and uncertainties, some of which are inherent in all natural systems and all evaluations of future conditions, we conclude that overall the best available data are sufficient to document several population-level threats to the red knot, as well as its reduced population size relative to the early 1980s, and thus conclude that the red knot meets the definition of a threatened species.

(72) Comment: One commenter suggested that some red knot researchers inappropriately published the same data in two or more publications; designed research to give inaccurate results; and excluded, altered, or manipulated data. Further, vague or ambiguous language in the red knot data may rise to falsification, fabrication, and scientific fraud. This commenter states that the inclusion of flawed data in the 2007 red knot status assessment prepared for and disseminated by the Service violates the Service's information quality standards; the Service was informed during peer review of the 2007 status review that several of the citations were in error, including inappropriate interpretation of data as evidence of red knot declines.

Our Response: We disagree. We are not aware of any documented instances of falsification or any other scientifically unethical practices associated with any of the data we cited in the proposed rule, this final rule, or the Supplemental

Document. See *Our Response 71* above on our data standards. The 2007 document ''Status Review of the Red Knot (*Calidris canutus rufa*) in the Western Hemisphere'' was prepared for the Service by a group of independent red knot experts and made available on our Web site. An updated version was published independent of the Service in 2008 (Niles *et al.* 2008, entire). While some of the information in Niles *et al.* (2008) has been subsequently updated with new information and improved insights, we have used appropriate information from Niles *et al.* (2008) in our listing determination whenever we consider it reliable, current, and best available.

(73) Comment: One commenter stated that the Service has red knot bird banding data from North and South America and will not release these data, citing privilege to authors.

Our Response: This comment is incorrect. Most data regarding the marking and resighting of red knots are housed and maintained by BandedBirds.org, which is affiliated with the New Jersey Audubon Society. Although the Service has provided support to BandedBirds.org, we do not operate this database, nor set the policies regarding the dissemination of the data it contains. Throughout the proposed rule and the Supplemental Document, we present summary information, analysis, and conclusions drawn from BandedBirds.org data. This is possible because we obtained limited excerpts from the database through a data sharing agreement with BandedBirds.org, and we coordinated with the database manager to ensure that we obtained all necessary permissions from the individual contributors of the data, as per the policies of BandedBirds.org. These excerpts have been and remain available to the public by appointment at the Service's New Jersey Field Office. Certain red knot resightings data are also available to the public directly at BandedBirds.org, and access to additional data can be requested from the database administrator.

(74) Comment: One commenter noted that there are six subspecies of *Calidris canutus* and that the Service needs to know more about the other five subspecies to make a decision about *C.c. rufa.* This commenter contends that all the subspecies migrate to the same area, albeit by different routes, and breed in the same area. However, no one knows for certain if they interbreed or not.

Our Response: We disagree with this assessment. In the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 4–7, 9), we presented best available data that the three recognized North American subspecies do not interbreed. We have updated the Supplemental Document (Subspecies Nonbreeding Distributions) with new information regarding the nonbreeding ranges of *Calidris canutus rufa* and *C.c. roselaari.* There are a few areas of known overlap and additional regions of potential overlap between the nonbreeding distributions of these two subspecies. However, all newly available information supports our previous conclusions that the breeding areas of these two subspecies are distinct, with *C.c. roselaari* breeding in Alaska and eastern Russia, and *C.c. canutus* breeding in the central Canadian Arctic. Although *C.c. islandica* breeds in Canada just north of *C.c. rufa,* the *islandica* subspecies migrates and winters in Europe and does not occur in the United States. The other three subspecies do not occur in North America.

(75) Comment: One commenter stated that the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, cited by the respected Cornell University Lab of Ornithology, lists the conservation status of the red knot as one of ''Least Concern'' and, therefore, concludes the science does not support the Service's proposal.

Our Response: Under section 4 of the Act, a species shall be listed if it meets the definition of a threatened or endangered species because of any of the five factors, considering solely best available scientific and commercial data. We may not adopt the conservation classification criteria of other agencies or organizations, such as the IUCN. However, we do evaluate and consider the underlying data other agencies or organizations have relied upon in making their own conservation classifications. Thus, we have reviewed the IUCN Red List (BirdLife International 2012), and found that the data presented by this source are for the entire global population (all six subspecies) of *Calidris canutus,* and are not specific to the rufa red knot, and are thus not relevant to this listing determination for the *rufa* subspecies. However, based on this review of the IUCN's underlying data sources, we have made a minor revision to the Supplemental Document, specifically, the addition of a new reference (Goldfeder and Blanco *in* Boere *et al.* (2006, p. 193)), which supports several of the threats that were already detailed in the proposed rule.

(76) Comment: One commenter stated that many threats to red knots are pervasive across the Gulf coast. For example, habitat loss is occurring across the Gulf Coast (from alteration of hydrology to development and from sea level rise to mismanagement of the Mississippi River), and disturbance of migrating and wintering birds is common.

Our Response: We agree that these and other threats are likely contributing to habitat loss, anthropogenic mortality, or both, along the Gulf coast, and thus contribute to the red knot's threatened status, particularly considering the cumulative effects of these and other threats rangewide.

(77) Comment: Several commenters expressed concern over the apparent contradiction between the Service justifying a threatened status for red knot while acknowledging difficulty in estimating the total population of red knots and recognizing that knot numbers have been stable in recent years.

Our Response: First, we disagree that there is a contradiction. While a precise estimate of a species population is an ideal piece of information to have, it is not a required piece of information for a listing determination. Under section 4 of the Act, a species shall be listed if it meets the definition of a threatened or endangered species because of any (one or more) of the five factors (threats), considering solely best available scientific and commercial data. Although many species proposed for listing have undergone, or are undergoing, a population decline, declining numbers are not required for listing if a species is facing sufficient threats, now or in the foreseeable future, to meet the definition of a threatened or endangered species. Based on our analysis of the five factors, we conclude the red knot meets the definition of a threatened species, particularly considering the cumulative effects of ongoing and emerging threats, and considering that several populations of red knots have already undergone considerable declines and remain at low levels. Second, although we have concluded that no current, reliable, rangewide population estimate is available, we disagree that no reliable population statistics are available. We have evaluated the best available population data, consisting of survey data for specific regions (Rufa Red Knot Ecology and Abundance, pp. 38–52; Population Surveys and Estimates in the Supplemental Document); see *Our Responses 37, 38,* and *44* for additional information.

(78) Comment: One commenter stated that the threat identified by the Service as driving the recent population decline has been addressed by management of

the HSC fishery. Therefore, the red knot may already be on a course to recovery without listing.

Our Response: We disagree with this conclusion. Although the threat from HSC harvest is adequately managed under the ARM and red knot populations have stabilized, knot numbers remain at low levels. We continue to conclude that reduced food availability at the Delaware Bay stopover site due to commercial harvest of the HSC—combined with late arrival of birds in Delaware Bay for unknown reasons—were the primary causal factors in the decline of rufa red knot populations in the 2000s (78 FR 60024, pp. 60063, 60076). The threat of late arrivals has not been abated, and further asynchronies are likely in the future due to climate change. In addition, we conclude that a number of other threats are likely contributing to habitat loss, anthropogenic mortality, or both, and thus contribute to the red knot's threatened status, particularly considering the cumulative effects of these threats, and that several populations of this species have already undergone considerable declines. (Also see *Our Response 46* regarding new uncertainty about the future of the ARM.)

(79) Comment: Several commenters stated that there are insufficient data to draw credible conclusions about the possible adaptation and recovery of this species. One commenter stated that the species having existed for at least hundreds of years is evidence that it has adapted and survived many previous cycles of natural change without human intervention. Likewise, another commenter stated that, in the millions of years red knots have been in existence, extreme variance in predation, climate, food sources, and other factors have surely occurred, yet, the birds have survived and thrived at times.

Our Response: We disagree that the red knot's ability to survive past cycles of natural change—or even past anthropogenic threats like hunting—are evidence that its adaptive capacity is adequate to survive the threats it currently faces. First, population declines in the 2000s demonstrate the red knot's vulnerability to inadequate food resources and asynchronies. Second, the nature and extent of current threats are unprecedented, as are the scope and rates of some changes that are likely to occur over coming decades. For example, the extent of coastal development and shoreline stabilization has likely never been greater, rates of sea level rise continue to accelerate, and arctic ecosystems are projected to change more in the next 100 years than they did over the last 6,000 years, which is longer than the rufa red knot is thought to have existed as a subspecies. We also disagree that the rufa red knot has been in existence for millions of years. As discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, p. 4), the rufa red knot is thought to have diverged from other subspecies within the past 1,000 to 5,500 years. However, we agree that information is quite limited regarding the adaptive capacity of the rufa red knot. Where we have such information, we stated it in the proposed rule (78 FR 60024, pp. 60028, 60035, 60047–60049, 60054, 60057, 60061, 60071, 60072, 60074, 60075, 60093, 60095).

(80) Comment: One commenter stated that there is no upward trend in rufa red knot populations as measured by any consistently applied methodology.

Our Response: As discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 53–54), we generally concur with this conclusion. One shorter-term data set (2007 to 2013) based on ground counts in Virginia did show an upward trend through 2012 but was down sharply in 2013, and a 2013 count from Brazil was markedly higher but this was likely due, at least in part, to favorable tidal conditions during the survey. However, two data sets associated with high confidence (Tierra del Fuego, Delaware Bay) show stabilization at low levels in recent years following sharp declines in the 2000s. Two other data sets (South American and Virginia spring stopovers) suggest declines in the 2000s relative to the 1990s. All other available data sets are insufficient for trend analysis. Our conclusions regarding trends in available population data are presented, with only minor updates, in the Supplemental Document (Summary—Population Surveys and Estimates).

(81) Comment: One commenter stated that the apparent red knot decline is based on the inconsistent methodologies, geographic areas, dates, and times of day, and compares multiple years' estimates against a single day. Further, total rangewide population estimates reported by some authors in certain years (*e.g.,* 2004, 2005) have been lower than counts at individual migration stopovers. Likewise, one commenter stated that data are insufficient to draw credible conclusions about the decline of this species.

Our Response: We disagree. We did not rely upon or cite the total rangewide population estimates mentioned by the commenter. In the proposed rule (Rufa Red Knot Ecology and Abundance, p. 53), we concluded that substantial declines occurred in two key red knot areas in the 2000s: The Patagonia and Tierra del Fuego wintering area and the Delaware Bay stopover area. We associated these trends with higher confidence levels based on consistency of methods, coverage, and observers (Rufa Red Knot Ecology and Abundance, pp. 39, 48).

(82) Comment: Several commenters expressed concern with the Service's apparent reliance on eBird data because it is citizen science and not considered scientifically rigorous, is skewed towards recreational birders and easily accessible locations, and is not representative of all the places, known or unknown, red knots utilize. The red knot population does not breed in colonies, which makes gathering credible population data beyond the reach of recreational birders. There are certain areas where red knot counts are made, mostly where birdwatchers are. Many more red knots may be utilizing unknown habitats and thus may be missed by surveys.

Our Response: First, we disagree that citizen science cannot be scientifically rigorous. Specific to eBird, we have reviewed the quality control protocols, which include vetting to minimize the risk of mistaken bird identification. Second, we conclude that, for some parts of the red knot's range (*e.g.,* interior States) during some seasons (*e.g.,* migration), eBird data represent the best available information. However, we agree that eBird data include reports from recreational birdwatchers, which are likely skewed toward those times and places that birdwatchers are active. The data are also temporally skewed, with far more recent than historical records, likely due to the growing access and popularity of recording observations electronically. For these reasons, we have not interpreted eBird records as a complete geographic representation of the range, nor have we relied upon these data for trend analysis. We did consider eBird, along with other data, for certain purposes relevant to listing, such as documentation or seasonality of occurrence in a particular area. We note that eBird records for *Calidris canutus* do not distinguish among subspecies; see *Our Response 35* and the Supplemental Document (Subspecies Nonbreeding Distribution) regarding how we have delineated the nonbreeding ranges of *C.c. rufa* versus *C.c. roselaari* based on best available data.

Third, we have relied on numerous data sets for our analysis of population trends (see Population Surveys and

Estimates in the Supplemental Document). Long-term professional (as opposed to volunteer) surveys have been conducted in several key areas because these areas are known to support important concentrations of red knots and other shorebirds, not based on convenient locations. Sharp and protracted declines in two of these areas (Tierra del Fuego and Delaware Bay) in the 2000s were an important consideration in our listing determination, although declining numbers (rangewide or in portions of the range) are not necessary for listing if a species is facing population-level threats (see *Our Responses 27* and *77*). We agree that the vast and remote breeding range of the rufa red knot, along with its solitary nesting habits, largely preclude any comprehensive surveys on the breeding grounds, either professional or volunteer. Nonetheless, we conclude that credible population data can and are collected in certain nonbreeding areas through consistent ground and aerial counts and, more recently, have been calculated by mathematical modelling based on resightings of marked birds.

Finally, we agree that not all red knot habitats are fully known, and some portions of the range are difficult to access or accurately survey. Although new information continues to emerge about such areas, new information available since the proposed rule has not changed our assessment of red knot population declines in Delaware Bay and Tierra del Fuego in the 2000s, or our evaluation of threats facing this species.

(83) Comment: One commenter stated that no controlled studies have been done to compare current red knot populations to prior red knot populations for the same area. In addition, the two areas (breeding and wintering) where this species spends most of the year are remote and not conducive to accurate population and biological studies.

Our Response: We disagree. While the size and remoteness of the breeding grounds have generally precluded comprehensive surveys, red knots typically spend only about 4 to 6 weeks per year in the Arctic. The rest of the year the birds use migration and wintering habitats. Repeated annual counts are available for several nonbreeding areas, some of them remote. Some of these counts date back to the early 1980s (see Population Surveys and Estimates in the Supplemental Document). In addition, we have gathered best available historical data dating back to the mid-1800s, as presented in the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 33–36) and the Supplemental Document (Historical Distribution and Abundance). Although these historical data do not permit a quantitative analysis, they do convey a consistent qualitative account of historical population trends.

(84) Comment: One commenter stated that the notion that Delaware Bay is the only place used by rufa red knots omits Virginia's red knot counts, which the commenter states represent 74 percent of the red knot population in some years.

Our Response: We agree that Delaware Bay is not the only important spring stopover area. However, due to the HSC egg resource, we conclude that no single stopover area is more important for the red knot than the Delaware Bay (Harrington 1996, p. 73). As discussed under *Our Response 38,* we have analyzed more recent population data and conclude that Delaware Bay continues to supports the majority of red knots each spring. Notwithstanding the importance of Delaware Bay, the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 17–23) and the Supplemental Document (Migration) also present information about numerous other stopover areas across the species' range, including Virginia. We agree that Virginia is an important spring stopover site, but disagree that it supports 74 percent of the total red knot population. We do not have an estimate of the percent of the total rufa red knot population that uses Virginia. However, by comparing late-May peak counts from Virginia and Delaware Bay, we can estimate how the total mid-Atlantic stopover population is typically distributed between these two areas in spring. Across those years with available data (1995, 1996, 2005 to 2014), average peak counts in Virginia were about 40 percent as large as those in Delaware Bay.

(85) Comment: Several commenters noted that annual counts of red knots stopping at Delaware Bay dropped from around 95,000 in 1982 and 1989 to fewer than 15,000 in 2007, 2010, and 2011. Peak counts in 2009, 2012, and 2013 were higher, between 24,000 and 25,000.

Our Response: We agree that the size of the red knot population stopping in Delaware Bay has declined substantially since the 1980s. However, we note that 1982 and 1989 were the all-time high counts in the bay and, therefore, not typical of annual peak counts recorded during this time period. From 1981 to 1983, average peak counts were 59,946, and from 1986 to 1994, average peak counts were 46,886. (See *Our Response 37* regarding the extent of the decline.) We also agree that, on average, counts since 2009 have increased somewhat, and we conclude that the population has apparently stabilized at a relatively low level (compared to baseline data from the 1980s), or slightly increased over this period. The proposed rule (Rufa Red Knot Ecology and Abundance, pp. 48–50) and Supplemental Document (Population Surveys and Estimates—Spring Stopover Areas—Delaware Bay) present the best available data regarding population trends in Delaware Bay.

(86) Comment: One commenter stated that data collection methods in North Carolina are incomplete. Only birds sighted within Cape Hatteras National Seashore are counted and not the birds on surrounding land or the dredge islands in the sound.

Our Response: We agree that data collection in North Carolina is incomplete, but we disagree that surveys occur only in Cape Hatteras National Seashore. While Cape Hatteras staff only survey areas within the National Seashore, additional areas are monitored by others. A public comment letter from North Carolina Wildlife Resource Commission (NCWRC 2013) summarized all red knot data that could be obtained in a timely manner, and shows numbers of red knots along North Carolina's coast, not only in the Cape Hatteras area. Survey efforts outside of Cape Hatteras include aerial surveys of the North Carolina coast, surveys at Cape Lookout National Seashore, surveys at shoals in the New Drum Inlet area, contract shorebird surveys at beach nourishment project areas, shorebird surveys at a storm-created inlet, and red knot observations incidental to other surveys (NCWRC 2013). Although data collection in North Carolina already goes well beyond the Cape Hatteras area, additional survey improvements can be made to increase understanding of the seasonal locations and numbers of red knots in the State (S. Schweitzer pers. comm. June 29, 2014). We anticipate that a holistic, rangewide review of data collection efforts and gaps will be an important component of the recovery planning process.

(87) Comment: Several commenters noted information about red knots along the Gulf Coast. One commenter stated that although several data sets do exist to provide some red knot abundance data, rigorous surveys that are typically used to detect long-term species trends are lacking for many parts of the Gulf coast. Other commenters provided new data, including some anecdotal, regarding declines in the population of red knots wintering on the Gulf of

Mexico from Florida to Texas. Likewise, one commenter stated that long-term data show significant declines of rufa red knots across the Gulf of Mexico.

Our Response: We agree that long-term data sets for the Gulf Coast are lacking and anticipate that a holistic, rangewide review of data collection efforts and gaps will be an important component of the recovery planning process. However, we consider the existing and new data received to be the best available data and have used it appropriately to draw conclusions in the Supplemental Document (Population Surveys and Estimates). Available information is quite limited and localized for Louisiana and Texas, but suggest that declines may have occurred (D. Newstead pers. comm. May 8, 2014; Johnson 2013, p. 1). In eastern parts of the Gulf, any declines likely reflect (at least in part) the shifting of some southeastern knots to the Atlantic coast.

(88) Comment: One commenter stated that the red knot marked with flag B95 has lived at least 20 years. Thus, red knots have a very slow repopulation rate.

Our Response: We do not dispute the age of B95, but we disagree with the conclusion the commenter derives from it. We agree red knot reproductive rates are likely low, but note that little information is available on this issue. First, B95 is the oldest known rufa red knot, and thus believed to be not typical of the average life span. In the proposed rule (Rufa Red Knot Ecology and Abundance, p. 7), we stated that few red knots live for more than about 7 years. We have revised this section of the Supplemental Document (Longevity and Survival) with new information about long-lived individuals, such as B95, that suggests the typical life span may be somewhat longer than 7 years, but 20 years is still considered an outlier. Second, although long life spans can be related to slow reproductive rates in some groups of animals, we have little data to indicate typical reproductive rates in rufa red knots. The Supplemental Document (Breeding Chronology and Success) presents what little data we have regarding red knot reproductive rates. Although there is much uncertainty around typical reproductive rates, certainty is high that the red knot's reproductive success varies widely among areas and years and is highly sensitive to predation and weather, as discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 11–12).

(89) Comment: Several commenters stated that the United States serves only as a migration corridor twice a year. What little bit of time the red knot spends in the eastern United States is a situation that has not been fully studied.

Our Response: We disagree. First, red knots winter along parts of the U.S. coast, mainly from North Carolina to Florida and from Louisiana to Texas. Geolocator data show that red knots wintering in the Southeast-Caribbean and in Texas spent about 60 and 78 percent of their year, respectively, along the U.S. coasts (Newstead *et al.* 2013, p. 55; Burger *et al.* 2012b, p. 1). Second, red knots would be unable to complete their annual migrations without a network of high-quality stopover sites at which to rest and gain weight, as discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, p. 23) and the Supplemental Document (Migration—Stopover Areas).

(90) Comment: One commenter stated that virtually the entire North American population of red knots uses the shores of the Delaware Bay during their migration in the spring. Likewise, another commenter stated that the red knot in North Carolina is at the extremity of its range because 90 percent of the entire population can be found in a single day in Delaware Bay.

Our Response: We disagree. The range of the rufa red knot extends from the central Canadian Arctic to the southern tip of South America. We acknowledge that no single stopover area is more important for the red knot than the Delaware Bay (Harrington 1996, p. 73). However, as discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, p. 29), Delaware Bay provides the final Atlantic coast stopover each spring for the majority of the red knot population, but not the entire population (see *Our Response 38* above). The proposed rule (Rufa Red Knot Ecology and Abundance, pp. 17–23) and the Supplemental Document (Migration) present information about numerous other stopover areas across the species' range. Specific to North Carolina, habitats in this State support wintering red knots, and provide stopover during spring and fall migration (see Population Surveys and Estimates in the Supplemental Document). Some of the same birds that stop in Delaware Bay also winter or stopover in North Carolina (BandedBirds.org 2012; Niles *et al.* 2012a, entire), and new geolocator data from two juveniles show these birds spent much of their first (nonbreeding) year (winter and summer) in the Southeast between North Carolina and Georgia (S. Koch, L. Niles, R. Porter, and F. Sanders pers. comm. August 8 and 12, 2014).

(91) Comment: One commenter provided new geolocator results that several Texas-wintering knots followed a fall migration route along the Atlantic coast, rather than exclusively through the interior of the United States as stated in the proposed rule. While a midcontinental migration is probably the most common strategy, there are exceptions that are potentially important with respect to distinctness of the population, and the caveat about the inherent bias in geolocator studies should be given appropriate consideration. Further, high interannual variability in migratory strategy is illustrated by one individual red knot for which the commenter has 3 full years of migration data. Though some sites were used in multiple years, the actual routes and number of sites varied considerably among years.

Our Response: We thank the commenter, and have added this new information to the Supplemental Document (Migration—Midcontinent). We have also eliminated the referenced statement from the proposed rule, which we agree was an oversimplification, and we have noted the caveat about the inherent bias in geolocator studies (Research Methods). We referenced the new data about the migration of Texas-wintering knots along the Atlantic coast in *Our Response 31*.

(92) Comment: One commenter stated that red knots have not declined, but have instead changed their migratory path and habitat use. Red knots seem to be in smaller groups in many remote places in both North and South America.

Our Response: We agree there is evidence of changes in the use of particular migration stopover areas, both historically (Cohen *et al.* 2008) and more recently (Harrington *et al.* (2010a, pp. 188, 190). We also agree that many additional rufa red knot wintering and stopover areas have been documented in recent decades, some supporting relatively small numbers of birds. However, we attribute these recent findings to increased survey efforts, rather than a shift in migration strategy toward smaller and more widely distributed nonbreeding areas. In fact, there is evidence that, as numbers declined in the 2000s, red knot populations wintering in Argentina and Chile actually become more concentrated, contracting to the core sites on Tierra del Fuego and leaving few birds at the ''peripheral'' Patagonian sites (Committee on the Status of Endangered Wildlife in Canada (COSEWIC) 2007, p. 11). Further, we disagree that any such distributional changes can explain the observed declines in the 2000s in Delaware Bay in spring, and in Argentina and Chile in winter. We have revised the Supplemental Document (Population Surveys and Estimates—Spring Stopover Areas—Delaware Bay) to clarify that, although we cannot rule out the possibility that some or all of the decline in Delaware Bay could have been caused by birds switching to other U.S. Atlantic stopover areas, we consider this unlikely based on surveys from Virginia, and on similarities in the magnitude and timing of the declines in Delaware Bay relative to Tierra del Fuego and several South American stopover sites.

(93) Comment: Several commenters stated that the longest distance migrants (*i.e.,* those red knots that winter in Tierra del Fuego) are entirely reliant on HSC eggs since the extreme physiological changes that they undergo for migration, including to their digestive systems, restrict their diet to soft prey at stopover sites. While knots from the southeast U.S. wintering areas may still be able to consume small bivalves, the Tierra del Fuego birds cannot.

Our Response: We disagree with the conclusion that red knots from Tierra del Fuego cannot digest bivalves during spring migration. We do recognize that red knots from the Tierra del Fuego wintering area may be more reliant on HSC eggs than other migrating red knots during the spring stopover in Delaware Bay, as we discussed in the proposed rule (Rufa Red Knot Ecology and Abundance, pp. 31–33). However, this section of the proposed rule also discussed data from Virginia and the Atlantic coast of New Jersey, where knots from Tierra del Fuego are known to feed on small bivalves (P. Atkinson pers. comm. November 8, 2012; Smith *et al.* 2008, p. 16). The Supplemental Document (Wintering and Migration Food—Possible Differential Reliance on Horseshoe Crab Eggs) has been revised to more clearly present these data; see *Our Response 54.*

(94) Comment: One commenter stated that recent studies from Dr. Allan Baker at the Royal Ontario Museum in Canada show genetic differences between the rufa population that winters in Florida, the population that winters along the northern coast of Brazil, and the longest distance migrant population that winters in Chile and Argentina. This commenter cites conclusions from Buehler and Piersma (2008) that Argentina-Chile populations are more vulnerable to energy, nutritional, timing, and immune ''bottlenecks'' with potential fitness consequences than the shorter-distance migrant populations of red knots. The commenter believes the red knot is only one species with several populations, but shows that what happens on the tip of one continent can have effects across the flyway.

Our Response: We are aware of this study by Dr. Baker investigating possible genetic differences between red knots by wintering area, but we do not have permission to cite his preliminary results, which have not yet been published. Therefore, we do not consider it to be ''available,'' and thus, we may not consider its findings in our listing determination. We have reviewed Buehler and Piersma (2008) and conclude that both shorter- and longer-distance migrants face tradeoffs among the various ''bottlenecks'' they face throughout their annual cycles. However, we have also revised the Supplemental Document (Wintering—Northern Versus Southern; Migration—Differences in Migration Strategy by Wintering Region) to discuss more fully the observed differences between northern- and southern-wintering knots, including evidence of greater vulnerability of the southern-wintering group (the longest-distance migrants) to food supplies and arrival times in Delaware Bay. Based on the best available data, we agree that the rufa red knot represents one subspecies with several wintering populations. We also agree that substantial threats anywhere along the flyway can potentially result in population-level effects.

(95) Comment: One commenter stated that, while *Calidris canutus* is somewhat unique among shorebirds as being a specialized molluscivore during much of its annual cycle, consumption of prey aside from mollusks in nonbreeding areas is well-documented, especially during prolonged migratory stopovers (*e.g., C.c. rufa* and HSC eggs in Delaware Bay and *C.c. roselaari* and Pacific grunion eggs in the Gulf of California). The documented red knot stopovers in the Northern Great Plains and the seasonal emergence of insect populations in the Central Flyway, various invertebrates on riverine sandbars, and brine shrimp in the saline lakes of Saskatchewan may be an ecological correlate to HSC eggs in the Atlantic flyway.

Our Response: Because we find these ideas plausible, based on our knowledge of red knot biology, and worthy of further investigation during forthcoming recovery efforts, we have mentioned them in the Supplemental Document (Migration and Wintering Food—Inland). However, we note that these ideas currently lack supporting documentation and did not rely on this information for our analyses.

(96) Comment: One commenter stated that, in 2012, only 55 percent of red knots studied in New Jersey reached the departure weight necessary to ensure their chance to breed in the Arctic. The remaining birds likely fail to survive the journey or reproduce, which results in serious population declines.

Our Response: The proportion of red knots attaining the target departure weight in Delaware Bay should not be confused with the annual survival rate. Amanda Dey (pers. comm. October 12, 2012) reported that 54 percent of red knots in Delaware Bay reached the target weight by the end of May 2012. Although this metric fell to 46 percent in 2013, these 2 years continued an overall upward trend in the percentage of birds reaching the target departure weight since the mid-2000s (Dey *et al.* 2014, pp. 1, 4), and remained relatively high for a third consecutive year in 2014 (A. Dey pers. comm. July 23, 2014). Further, although we agree that adequate weight gain in Delaware Bay is vital to red knot conservation, we disagree that most birds under the target weight fail to survive the subsequent year (*i.e.,* most low-weight birds do not die). Using data from 1997 to 2008, McGowan *et al.* (2011a, p. 13) confirmed that heavy birds had a higher average survival probability than light birds, but the difference was small (0.918 versus 0.915), as discussed in the proposed rule (78 FR 60024, p. 60069). These survival rates, averaged over the period 1997 to 2008, could mask more pronounced effects of low departure weights on survival over shorter periods. For example, the lowest survival estimates occurred in 1998, just before the period of sharpest declines in red knot counts (McGowan *et al.* 2011a, p. 13). The 1998 to 1999 survival rate estimate was 0.851 for heavy birds and 0.832 for light birds (McGowan *et al.* 2011a, p. 9). Based on best available information, we agree that low departure weights (caused by insufficient food supplies and late arrivals) were a primary causal factor in the decline of the *rufa* subspecies in the 2000s.

(97) Comment: One commenter stated that, for the most part, the barrier islands along the Atlantic coast are in public ownership, not private, and are not frequently used for development.

Our Response: We disagree. Land ownership varies widely along the U.S. Atlantic coast. Past and ongoing coastal development in some areas is extensive (78 FR 60024, pp. 60038–60043).

(98) Comment: Several commenters expressed concern over how the Service

characterized threats to the red knot stemming from climate change and how that same climate information could be applied to other species. One commenter acknowledged that effects to the red knot from climate change could be significant in the future, but noted they are not currently. Other commenters stated that the proposed rule does not cite scientific data or information linking red knot population declines with any climate-related effects, nor does the proposed rule present a detailed analysis of how or whether climate-related impacts will result in either reductions in fitness to the red knot species or future population declines, nor are there models showing the expected effects of climate change on rufa red knot abundance. The proposed rule acknowledged that the effects of climate change on the rufa red knot are unknown, uncertain, and speculative. Further, the proposed rule purports to forecast the effects of a complex global issue (climate change) up to 100 years into the future. This approach requires the Service to rely upon controversial modeling projections of complex data to forecast a future that is well beyond our reasonable ability to predict, and to imagine what the speculative biological consequences of these forecasts will be for the rufa red knot. This is an exercise in speculation, not an analysis based on existing scientific evidence, and if used as such then virtually every species may be considered threatened and this establishes a precedent that renders the Act's listing process unworkable. These same commenters stated that many of the threats identified by the proposal (*e.g.,* sea level rise and other effects of climate change) are by no means unique to the rufa red knot and may, therefore, be an unreasonable basis for listing since so many other species would be likewise affected.

Our Response: We disagree with these conclusions. Based on our review of best available information, we conclude that threats to the red knot, including those stemming from climate change, are likely to place this species in danger of extinction in the next few decades (see *Our Response 66* regarding ''foreseeable future''). Not all threats contributing to a species' threatened or endangered status must be tied to past or ongoing population declines, if future declines are likely (see *Our Responses 27* and *77*). While we continue to conclude that reduced food availability and late arrivals at the Delaware Bay stopover site were the primary causal factors in the decline of rufa red knot populations in the 2000s (78 FR 60024, pp. 60063, 60076), climate-induced environmental changes likely to affect the red knot are already occurring and likely to intensify. We have updated the Supplemental Document (Overview of Threats Related to Climate Change) with information from recent assessments of the red knot's vulnerability to climate change indicating a large increase in extinction risk (Galbraith *et al.* 2014, p. 7; National Wildlife Federation 2013, p. 28; Whitman *et al.* 2013, pp. 2, 19, 64).

We disagree that this listing determination relies upon ''controversial modeling projections of complex data to forecast a future that is well beyond our reasonable ability to predict.'' Instead, we relied upon mainstream and thoroughly vetted climate science publications (*e.g.,* from the IPCC, the U.S. Global Change Research Program, the National Research Council, and the Arctic Climate Impact Assessment) that present scientifically based ranges of likely future climate conditions under various emissions scenarios. The IPCC (2013b) defines a scenario as a coherent, internally consistent, and plausible description of a possible future state of the world; it is not a forecast; rather, each scenario is one alternative image of how the future can unfold. Various levels of uncertainty are associated with all scientific data and with all analyses of future conditions. The uncertainty levels associated with different aspects of climate change have been standardized by the IPCC (see Supplemental Document table 14). We used this standardized terminology transparently and consistently in the proposed rule (Climate Change Background, p. 2) and in the Supplemental Document (Climate Change—Background). The key findings of climate science—that human-caused climate change is occurring and will continue to affect temperatures, precipitation patterns, sea levels, and ocean pH levels—continue to be associated with high levels of certainty (Melillo *et al.* 2014, pp. 20–49; IPCC 2013a, p. 7).

We also disagree that the effects of climate change on the rufa red knot are ''unknown, uncertain, and speculative'' and that the proposed rule does not present a detailed analysis as to ''how or whether climate-related impacts will result in either reductions in fitness to the red knot or future population declines.'' Throughout the proposed rule (and summarized at 78 FR 60024, pp. 60028–20029), we presented detailed analyses of best available data (and associated levels of uncertainty, when available) regarding how red knot habitats and populations are likely to respond to climate changes over the coming decades. While biological modeling showing the expected effects of climate change on rufa red knot abundance may be helpful in future recovery efforts, such models are not currently available and research to generate them is not required for the Service to make a listing determination under the Act's ''best available'' data standard. We acknowledge that climate change is a complex global issue and that uncertainties exist. However, the best available science indicates climate change is expected to affect red knot fitness and, therefore, survival through direct and indirect effects on breeding and nonbreeding habitat, food availability, and timing of the birds' annual cycle. Ecosystem changes in the arctic (*e.g.,* changes in predation patterns and pressures) may also reduce reproductive output. Together, these anticipated changes will likely negatively influence the long-term survival of the rufa red knot.

Finally, we disagree that virtually every species may be considered for listing due to the effects of climate change, or that climate-related threats are equally applicable to all species within the coastal zone. The Act requires the Service to evaluate each species of concern or petitioned species individually to assess whether listing as threatened or endangered is warranted. Not all species will be affected by the effects of climate change in the same manner; each species' biological traits and population dynamics will make it more or less resilient to any stressor. That said, it is likely that additional species will be found to meet the definition of a threatened or endangered species based on threats stemming from climate change as its effects intensify in the future.

(99) Comment: One commenter stated that climate change has affected the red knot because wintering zones have moved farther up in South America than in the past.

Our Response: We agree that climate change effects are a primary threat to the red knot, but disagree that such effects have caused a range shift to date. Although we anticipate that changing climatic conditions will likely cause latitudinal shifts in the position of some red knot habitats, we expect such habitat shifts will primarily affect the red knot within its breeding range (78 FR 60024, pp. 60047–60049), because the nonbreeding range already spans the entire latitudinal gradient from Tierra del Fuego to southern Canada. We have no evidence that red knots have shifted their winter ranges in response to climate change. We do note that the

Argentina-Chile wintering area has contracted by about 1,000 mi (1,600 km) poleward (south), which is the direction that would be consistent with the effects of climate change (Root *et al.* 2003, p. 57). However, we conclude that this contraction was not primarily caused by climate change, but instead a result of an overall decreasing winter population size in this region (COSEWIC 2007, p. 11). Population declines are often accompanied by abandonment of ''peripheral'' habitats and a geographic contraction into only the best (''core'') habitats. A similar phenomenon was noted for HSCs within Delaware Bay (Lathrop 2005, p. 4).

(100) Comment: One commenter stated that Congress did not intend for the Act to be used to regulate greenhouse emissions or climate change. This commenter is concerned that a final listing rule may be misused or impose undue burdens on American industries or activities, particularly those that have greenhouse gas emissions. Another commenter stated that the Service has previously recognized there is insufficient evidence to establish a causal connection between greenhouse emissions from particular activities and impacts to certain species.

Our Response: As stated in the proposed rule (78 FR 60024, p. 60097), a determination to list the rufa red knot as a threatened species under the Act will not regulate greenhouse gas emissions. Rather, it will reflect a determination that the rufa red knot meets the definition of a threatened species, thereby establishing certain protections for it under the Act.

(101) Comment: One commenter stated that no field data have been gathered or analyzed to compare the status of red knot populations that are isolated from human activity to those that are exposed to human activity.

Our Response: We disagree that field data are not available regarding the effects of disturbance. In the proposed rule (78 FR 60024, pp. 60076–60079), we presented several studies that include field data on the effects of human disturbance on red knots and other shorebirds. We are not aware of any comparative studies of red knot population trends in high-disturbance versus low-disturbance areas, but conclude that such studies would be confounded by the migratory connectivity of red knot sites (*i.e.,* factors affecting survival in any part of the range may affect populations rangewide), and by other site-specific factors (*e.g.,* habitat quality, food availability, predation rates) influencing local or regional population trends.

(102) Comment: Several commenters stated that anecdotal data from long-term barrier island residents suggest that red knots feed and carry on unaffected by the presence of some human activity (*e.g.,* surf fishing) and that operation of offroad vehicles (ORVs) driving within 10 yards of a cluster of red knots that are feeding does not cause them to be disturbed or fly. Further, drivers of ORVs do not drive in the same part of the beach used by red knots for feeding, and if there is any reaction, the flock goes up while the vehicle goes by only to land again either in the same spot or a little farther away. Thus, the birds are not being harassed to the point their life cycle is being threatened. These commenters also contend that cannon netting by researchers causes a higher degree of disturbance than these recreational activities.

Our Response: We disagree that red knots are unaffected by human activity. We agree that red knots may have a minimal response to low levels of disturbance, and that reaction distances and durations likely vary with the type and intensity of the disturbance, as well among sites and among seasons. We also agree that no one particular disturbance event is likely to impact a red knot's fitness or survival. However, the cumulative effects of repeated or prolonged disturbance have been shown to preclude shorebird use of otherwise preferred habitats and can impact the birds' energy budgets (*i.e.,* their ability to gain and maintain adequate weight) (78 FR 60024, p. 60079). We disagree that ORV drivers always remain out of the wet sand of the intertidal zone where red knots feed. On some beaches, driving on the dry beach is restricted to prevent damage to dunes and wrack, and in some areas drivers avoid the dry sand to prevent getting stuck. Even where driving is restricted to the dry beach, ORV use may disturb roosting, instead of foraging, red knots.

We agree that certain research methods are highly disturbing to red knots. Therefore, we anticipate that any recovery permits issued under the Act will include conditions to strictly limit the extent and duration of disturbance to red knots from research activities, typical of the best practices that are already generally followed by the research community.

(103) Comment: Several commenters stated that the Delaware Bay-wide HSC egg densities show no upward trend. Another commenter stated that the decline in HSC egg density on New Jersey's Delaware Bay beaches as described in the 2007 status assessment is deceptive, there are no data supporting a problem of egg availability for the red knots on the Delaware Bay beaches, and the Delaware Bay egg density data and studies should not be used for management or listing of red knots.

Our Response: We concur that the Delaware Bay-wide HSC egg densities show no upward trend, but note that we have only moderate confidence in this data set. We recognize the importance of surface egg availability to red knots in Delaware Bay, and egg densities have been statistically correlated with red knot weight gain (Dey *et al.* 2013, pp. 18–19; H. Sitters pers. comm. April 26, 2013). However, methodological concerns with the egg density surveys are described in the proposed rule and in the Supplemental Document, and limit our confidence in this data set. The ASMFC recently dropped the requirement for the States of New Jersey and Delaware to conduct the egg density surveys, largely because these data are not used in the ARM framework; however, New Jersey plans to continue the survey on its side of Delaware Bay (M. Hawk pers. comm. April 8, 2014; ASMFC 2013e, p. 4).

We did rely partly, but not solely, on the egg density analysis as presented in the 2007 status assessment (which was later updated and published independent of the Service as Niles *et al.* 2008). Based on our own analysis of the egg density data (78 FR 60024, pp. 60067–60068 and Supplemental Document section Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link B, Part 2), and considering several different data sources, we regarded trends in egg density data as a secondary line of supporting evidence that insufficiency of food resources was an important factor (along with late arrivals) contributing to the decline of the Delaware Bay stopover population. Thus, Delaware Bay egg density data were a relatively minor consideration in our determination of the threatened status of the red knot. Despite the lack of upward trends in baywide egg densities, our assessment of the best available data from several lines of evidence concludes that the volume of HSC eggs is currently sufficient to support the Delaware Bay's stopover population of red knots at its present size. However, because of the uncertain trajectory of HSC population growth, it is not yet known if the egg resource will continue to adequately support red knot population growth over the next decade. This conclusion is unchanged from the proposed rule (78 FR 60024, p. 60063).

(104) Comment: One commenter stated that the number of HSC eggs on Delaware Bay shores dropped from

40,000 eggs per square meter (m^2) in the 1990s to only 1,500 eggs per m^2 in 2005.

Our Response: In the proposed rule (78 FR 60024, pp. 60067–60068), we discussed methodological concerns with the HSC egg density data, particularly prior to 2005. We attached somewhat higher confidence to trends since 2005 because methodologies have been more consistent over that period—there was no significant trend in baywide egg densities from 2005 to 2012. However, the Delaware Bay egg density data were a relatively minor consideration in our determination of the threatened status of the red knot, and are not used in management of the HSC fishery under the ARM (see *Our Response 103* above).

(105) Comment: One commenter stated that the early (1981 through 2000) declines in red knot counts in Delaware Bay were not reflected in the Argentina-Chile wintering area, which contradicts the assertion that later (after 2000) declines in this wintering area were caused by inadequate weight gains in Delaware Bay. Conversely, another commenter stated that, with fewer eggs to feed on, up to 75 percent of red knots surveyed on the Delaware Bay suffered a year-on-year decline in their rate of weight gain between 1990 and 2006. Further, lower weight birds have been shown to have lower survival rates, and scientific models predicted that the red knot may become extinct by 2010.

Our Response: We agree there may have been declines in the Delaware Bay's red knot stopover population prior to 2001, but we also note considerable variability in the peak count data set that makes it difficult to detect trends. In contrast, the decline in peak counts in the 2000s was sufficiently pronounced and sustained that we have confidence in the downward trend over this time period despite the variability of the data set. We agree that a number of data sets have been used to draw conclusions about the correlation between HSC harvest and red knot population trends. Not all of the data sets agree completely, suggesting that other factors likely contributed to the red knot decline (*e.g.,* late arrivals in Delaware Bay, other threats discussed in the proposed rule). Keeping in mind the limitations of the various data sets and the biology of HSCs and red knots and looking at the general trends, we find a temporal correlation between high harvest levels leading up to the year 2000, and a relatively sudden decline in the red knot Argentina-Chile wintering population around that same time period, concurrent with a pronounced decline in Delaware Bay. Moving from correlation to causation, our conclusion is based on a detailed analysis (78 FR 60024, pp. 60063–60071 and Supplemental Document section Factor E—Reduced Food Availability—Horseshoe Crab Harvest): Although the causal chain from HSC harvest to red knot populations has several links associated with various levels of uncertainty, the weight of evidence supports these linkages, points to past harvest as a key factor in the decline of the red knot, and underscores the importance of continued HSC management to meet the needs of the red knot.

In the proposed rule (78 FR 60024, p. 60069), we discussed trends in red knot weight gain, relying mainly on the percentage of red knots greater than the target weight at the end of May. This metric for weight gain showed a downward trend in the percentage of heavy birds starting in 1997, which started to reverse by the late 2000s. In the proposed rule (78 FR 60024, pp. 60069–60079), we also evaluated the best available data regarding the link between red knot spring weight gain in Delaware Bay and the birds' subsequent survival. In this analysis, we relied primarily on Baker *et al.* (2004) and McGowan *et al.* (2011a), both of which found a link between spring weight gain in Delaware Bay and survival. We acknowledge the following statement by Baker *et al.* (2004, p. 879), ''if the 1997/1998 to 2000/2001 levels of annual survival prevail, the population is predicted to approach extremely low numbers by 2010 when the probability of extinction will be correspondingly higher than it is today.'' However, we did not evaluate this statement in the proposed rule because the newer results of McGowan *et al.* (2011a) indicate those earlier (and lower) survival rates were no longer prevailing.

(106) Comment: One commenter suggested that other threats such as disease and research activities may have been responsible for red knot and HSCs declines, rather than overharvesting of HSCs. Conversely, another commenter believes gross mismanagement of the HSC fishery has dramatically decreased the availability of HSC eggs for the red knot and other migratory shorebirds.

Our Response: As discussed in the proposed rule (78 FR 60024, p. 60063), we completed a detailed analysis of all three threats (disease, research, HSC harvest) and recognize the effect that formerly excessive harvesting of HSCs had on the red knot's food resources and the contribution this activity had to the knot's population decline. See *Our Responses 45* and *46* regarding egg availability and the ASMFC's regulation of the HSC fishery, respectively.

(107) Comment: Several commenters suggested that supplemental feeding of red knots in Delaware Bay may be needed until HSC populations return to levels that provide adequate egg supplies for the birds.

Our Response: As noted in the proposed rule (78 FR 60024, p. 60063), most data suggest that the volume of HSC eggs is currently sufficient to support the Delaware Bay's stopover population of red knots at its present size. However, ensuring the future HSC egg supply will be addressed during the recovery planning process, and we intend to continue our active role in the ASMFC's management of the HSC fishery. We acknowledge considerable uncertainty around the future food supplies for red knots, in Delaware Bay and in nonbreeding habitats rangewide. We would not rule out direct human intervention (*e.g.,* supplemental feeding) as an appropriate conservation response if food supplies in any part of the range should someday become so depleted as to present an imminent, population-level threat. However, we would consider such a step only as a last resort because it fails to fulfill a central purpose of the Act, ''to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.'' Although supplemental feeding of wild birds is not the same as controlled propagation, it has similar conservation implications (*e.g.,* direct human intervention as opposed to the conservation of the supporting ecosystem). Thus, we feel this excerpt from the Policy Regarding Controlled Propagation of Species Listed Under the Endangered Species Act (65 FR 5690) would also apply to supplemental feeding: ''Controlled propagation is not a substitute for addressing factors responsible for an endangered or threatened species' decline. Therefore, our first priority is to recover wild populations in their natural habitat wherever possible, without resorting to the use of controlled propagation.''

(108) Comment: One commenter stated that since the ARM framework establishes a conservative HSC harvest level for the Delaware Bay spawning population of HSCs, significant threats are more likely to occur at other points along the migratory flyways.

Our Response: We agree that, as long as the ARM is in place and functioning as intended, the ongoing HSC bait harvest should not be a threat to the red knot (see *Our Responses 46* and *48*). We also agree that a number of other threats throughout the knot's range are contributing to habitat loss, anthropogenic mortality, or both, and that these threats are likely to increase in the future. Thus, new attention to these emerging threats will be imperative for red knot recovery. However, we also conclude that a sustained focus on protecting the red knot's food supply—in Delaware Bay and throughout the range—will also be vital to red knot recovery (see *Our Responses 45, 78,* and *126*).

(109) Comment: One commenter stated that the HSC population in Delaware Bay has fluctuated between 1.5 and 2 million since 2007. Several commenters stated that there have been no increases in the number of female HSCs, or of total crabs, spawning in Delaware Bay.

Our Response 109: We disagree that the HSC population in Delaware Bay has fluctuated between 1.5 and 2 million. This estimate of 1.5 to 2 million crabs is for spawning adults, and is not the same as the size of the total baywide HSC population. As indicated in the proposed rule (78 FR 60024, p. 60065), Smith *et al.* (2006, p. 461) estimated the population of HSCs in the Delaware Bay Region in 2003 at about 20 million adults, based on modeling of marked HSCs. We have updated the Supplemental Document (Factor E—Food Availability—Horseshoe Crab Harvest—Link A, Part 1) with newer estimates from Smith (2013), based on a different methodology but showing similar results. Smith (2013, p. 2) reported annual estimates of the baywide population size from 2002 to 2012, with an average over this period of about 19 million and consistently more males than females.

Specific to spawning crab counts, Swan *et al.* reported season-long total counts of roughly 1.3 to 2 million spawning adults along the Delaware Bay shoreline from 2007 to 2012 (Swan *et al.* 2012, p. 1; Swan *et al.* 2011, p. 1; Swan *et al.* 2010, p. 1; Swan *et al.* 2009, p. 1; Swan *et al.* 2008, p. 1; Swan *et al.* 2007, p. 1). We reviewed but, for methodological reasons, did not rely on this data set from Swan *et al.* (2007 to 2012) to evaluate trends in numbers of spawning adult crabs. Instead, we have relied on spawning HSC density reports prepared for the ASMFC. We agree there have been no increases in the number of female HSCs spawning in Delaware Bay. The most recent report of the density data concluded that baywide spawning activity shows no statistically significant trends from 1999 through 2012 (Zimmerman *et al.* 2013; p. 1). This is a change from Zimmerman *et al.* (2012, pp. 1–2), which reported that, although there was no trend in females, numbers of spawning males showed a statistically significant increase from 1999 through 2011. This new information has been incorporated into the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link B, Part 1). See *Our Response 46* for more discussion of female HSC population trends.

(110) Comment: One commenter stated that, due to the bait harvest, the Delaware Bay population of HSCs declined by 90 percent between 1990 and 2006.

Our Response: We disagree that the percent decline for the HSC population in the Delaware Bay Region can be determined over this time period, because there are no estimates of the size of this population prior to 2003 (done by Smith *et al.* 2006). As no population size estimates are available prior to the 1990s increase in harvest levels, we rely on the ASMFC's periodic stock assessments to appropriately weigh and statistically analyze available data sets to draw conclusions regarding HSC population trends, as discussed in the proposed rule (78 FR 60024, p. 60066) and the Supplemental Document (Factor E— Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2); see *Our Response 46.*

(111) Comment: One commenter stated that females are the limiting sex within the HSC population and have a direct ecological link to migratory shorebirds through their eggs. Under the ARM, female HSCs in the Delaware Bay region are fully protected for the benefit of migratory shorebirds. The ARM does not authorize the harvest of females until the HSC population reaches 80 percent of its carrying capacity, which is well beyond the realm of traditional fishery management parameters, reflecting the ecological importance of the resource, and the risk-averse characteristics of the current management plan. The ARM model builds upon a male-only or male-biased regulatory strategy for Delaware Bay HSCs that was adopted by the ASMFC in 2006. The biological and ecological basis for the male-only harvest is based on the best available science for the species; males are not limiting within the HSC population dynamics, and are not ecologically limiting with respect to HSC egg availability for shorebirds. Well before the adoption of the male-only harvest strategy in 2006 and the ARM implementation in 2012, the ASMFC had already reduced the coastwide harvest of HSCs by approximately 70 percent from reference period landings, through a series of increasingly restrictive addenda. The HSC quotas in the Delaware Bay region have been specified by the ASMFC at very low rates of removal that are fully consistent with both population growth and ecological sustainability. The 2009 HSC stock assessment indicated the fishing mortality rates for HSCs in the Delaware Bay region were consistent with population growth.

Our Response: We agree with this assessment of the importance of female HSCs. We agree that the strongly male-biased fishery management was appropriate prior to adoption of the ARM, and a male-only harvest continues to be warranted based on the current ARM outputs. We conclude that the ARM provides adequate protection for females from the bait harvest, but we note that some female mortality does occur as a result of the biomedical harvest. Other commenters noted that positive trends in female HSC populations are absent, even after 7 years of male-only harvest, possibly suggesting losses of female crabs from unregulated or undocumented sources including biomedical mortality. We discuss this and other possible explanations for the lack of growth in measures of female abundance under *Our Responses 46* and *49.* In the proposed rule (78 FR 60024, pp. 60064–60065), we noted the shift to a strongly male-biased harvest, and the successive harvest restrictions that reduced reported landings from 1998 to 2011 by over 75 percent. We also discussed the findings of the 2009 stock assessment (78 FR 60024, pp. 60064–60065). The Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) has been updated to include the results of the 2013 stock assessment update.

(112) Comment: One commenter stated that the 2009 HSC stock assessment indicated the mortality rates were approximately 70 to 75 percent below the fishing mortality rate associated with maximum sustainable yield (FMSY). Even without the benefit of the subsequent ARM model, these removal rates were already well below conservative levels for important forage species. The 2012 Lenfest report included a comprehensive examination of marine ecosystems and concluded that fishing at half of traditional FMSY values results in a low probability of collapse for forage fish and lower risk for dependent species. The quotas set by the ASMFC under addenda IV, V, and VI were already well below these guidelines, and were specifically male-biased to ensure the ecological sustainability of the fishery.

Our Response: We agree that the 2009 stock assessment reflects substantial reductions in harvest levels, from their peak at 2 to 3 times FMSY in 1998 and 1999 to 23.2 percent of FMSY (both sexes combined) in 2008 (ASMFC 2009a, pp. 25, 57). However, we disagree that the findings of the 2012 Lenfest report can be extrapolated to HSCs (e.g, to suggest a harvest level relative to FMSY that is adequate for dependent species such as red knot and other shorebirds). The authors of the Lenfest report (Pikitch *et al.* 2012, p. 4) defined forage fish characteristics, some of which are not shared by HSCs (*e.g.,* provide energy flow from plankton to higher trophic levels, relatively small body size, fast growth, early maturity). Instead, we rely on the ARM to establish conservative harvest limits that ensure an adequate supply of HSC eggs to support red knots in Delaware Bay.

(113) Comment: One commenter stated that under addenda IV, V, and VI to the ASMFC's fishery management plan, HSC harvests in Delaware and New Jersey were limited, by quota, to 100,000 male HSCs annually per State. New Jersey's legislature closed its HSC fishery. If both States utilized their quotas at that time, total harvest would have been less than 2 percent of the adult male HSC population, which was estimated at 12 million.

Our Response: We agree with this estimate of the percentage of the male population annually authorized for harvest under these addenda. In the proposed rule (78 FR 60024, p. 60065), we noted that recent annual harvests of roughly 200,000 HSCs from the Delaware Bay Region (which reflects New Jersey's moratorium as well as harvest from the other three States in the Region) represent about 1 percent of the total adult (male and female) population. Our estimate of 1 percent is unchanged in the Supplemental Document (Factor E—Food Availability—Horseshoe Crab Harvest—Link A, Part 1) even upon updating the landings and estimated population size with new data.

(114) Comment: One commenter stated that the analysis of HSC tagging data by the ASFMC's Technical Committee has suggested that approximately 13 percent of Maryland's catch of HSCs and approximately 9 percent of Virginia's catch, east of the COLREGS line (which delimits internal from ocean waters), are of Delaware Bay origin. A line of genetic evidence suggested that 51 percent of Maryland's catch and 35 percent of Virginia's catch, east of the [International Regulations for Preventing Collisions at Sea] COLREGS line, is of Delaware Bay origin. When the ASMFC implemented the ARM model in 2012, it required all of Maryland's catch and all of Virginia's catch east of the COLREGS line to be male-only, as a precautionary measure, to ensure the ecological sustainability of these fisheries in waters adjacent to the Delaware Bay Region.

Our Response: In the proposed rule (78 FR 60024, p. 60070), we concluded that the ASMFC's current delineation of the Delaware Bay Region HSC population is based on best available information and is appropriate for use in the ARM modeling, but we acknowledged some uncertainty regarding the population structure and distribution of Delaware Bay HSCs. In documenting the technical underpinnings of the ARM, the ASMFC (2009b, p. 7) acknowledged that the proportion of Maryland and Virginia landings that come from Delaware Bay is currently unresolved, but stated that their approach to estimating this proportion was conservative. We have revised the Supplemental Document (Factor E—Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management) to state that we anticipate the ARM process will adapt to substantive new information that reduces uncertainty about the Delaware Bay HSC population structure and geographic distribution. See *Our Response 49.*

(115) Comment: One commenter stated that table 9 (reported Atlantic coast landings) in the proposed rule does not describe the conversion between pounds and numbers of HSC harvested; thus reviewers cannot provide meaningful comment on the data.

Our Response: As explained in the proposed rule (78 FR 60024, p. 60064), the HSC landings data given in pounds come from the National Marine Fisheries Service (NMFS), but should be viewed with caution as these records are often incomplete and represent an underestimate of actual harvest (ASMFC 1998, p. 6). In addition, reporting has increased over the years, and the conversion factors used to convert crab numbers to pounds have varied widely (ASMFC 2009a, p. 2), thus we are unable to convert the pounds to numbers of crabs. (For this same reason, the ASFMC also retains these data in pounds in its stock assessments.) Despite these inaccuracies, the reported landings show that commercial harvest of HSCs increased substantially from 1990 to 1998 and has generally declined since then (ASMFC 2013b, p. 8; ASMFC 2009a, p. 2). The ASMFC (1998, p. 6) also considered other data sources to corroborate a significant increase in harvest in the 1990s. Despite the known problems with this data set, no other data are available regarding harvest levels prior to 1998; thus, we have considered these data only to document the very sharp increase in harvest levels that occurred in the mid-1990s. The ASMFC relies on these data for the same purpose in its periodic stock assessments (ASMFC 2013b; ASMFC 2009a; ASMFC 2004)—we consider these stock assessments the best available information regarding trends in harvest levels. We have revised the Supplemental Document (added a footnote to table 23) to clarify that the landings reported to NMFS are provided for context only and cannot be converted to numbers of crabs and thus cannot be directly compared to the data reported to the ASMFC.

(116) Comment: One commenter stated that the proposed rule does not make clear in the discussions of egg availability or harvest pressure that female HSC harvest in the Delaware Bay bait fishery has been prohibited since 2006.

Our Response: We have revised the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A) to clarify this point.

(117) Comment: One commenter stated that efforts to restrict the HSC fishery are inconsistent from State to State, and that restrictions imposed by individual States are being successfully challenged and overturned by the commercial fishing industry. One commenter stated that other States (besides New Jersey) still do not have a ban on HSC harvesting, and this needs to be changed. Another commenter stated that the New Jersey moratorium on HSC fishing in its portion of Delaware Bay is insufficient to protect the red knot from continued population decline in the face of coastal development and constant disturbance at migratory stopover sites and with climate change affecting food availability in the Arctic.

Our Response: Regulation of the HSC fishery by the ASMFC is consistent coastwide, in that all member States follow the same Fisheries Management Plan. However, due to regional and local differences (*e.g.,* status and trends of HSC populations; nature and intensity of harvests), each State ends up with different quotas. In addition, each member State within the ASMFC is required to establish and enforce its own harvest regulations that ensure compliance with the Fishery Management Plan, and the specifics of these regulations vary from State to State. Each ASMFC member State may opt to adopt harvest limits that are more restrictive than those mandated by the ASMFC, but these limits would be subject to legal challenges within the regulatory framework of that State. New

Jersey's moratorium, which is more restrictive than required by the ASMFC, results in implementation of the ARM being more conservative (see *Our Response 49*), but has also raised concerns about unintended consequences (see *Our Response 120*). Notwithstanding the potential risks and benefits of New Jersey's moratorium, we continue to conclude that management of HSC harvests under the ARM is adequate to abate the food supply threat to red knots from HSC harvest in Delaware Bay. However, even with highly successful harvest management under the ARM, the HSC population will continue to grow only to the extent that it remains limited by harvest; other factors affecting crab populations cannot be affected by management of the fishery. (See *Our Response 46* regarding these other factors, as well as new uncertainty about the future of the ARM). In addition, we agree that, beyond the supply of HSC eggs, there are other substantial and widespread threats to the red knot (see *Our Response 108*).

(118) Comment: One commenter stated that New Jersey's moratorium on HSC harvest does not appear to have a scientific basis.

Our Response: Each ASMFC member State may opt to adopt harvest limits that are more restrictive than those mandated by the ASMFC. We factored New Jersey's moratorium into our analyses of current harvest levels and management practices, but we recognize that the New Jersey legislature could decide to lift the moratorium at any time. If that happens, New Jersey would be required to abide by the ASMFC harvest recommendations set forth by the ARM process. We conclude that harvest levels set through the ARM process are adequate to manage the threat to red knots from insufficient food resources in Delaware Bay.

(119) Comment: One commenter doubted that overharvest of HSCs could have occurred based on the successively restrictive harvest regulations implemented in New Jersey from 1993 through 1997.

Our Response: We disagree. No definitions of ''overfishing'' or ''overfished'' have been adopted by the ASMFC for HSC (ASMFC 2013b, p. 21). That said, Delaware Bay's HSC population is affected by harvests in Delaware and parts of Maryland and Virginia, as well as in New Jersey. Our evaluation of best available data (78 FR 60024, pp. 60064–60067 and Supplemental Document section Horseshoe Crab—Harvest and Population Levels) shows that coastwide harvest levels grew sharply from 1993 through 1997, and that the 2004 stock assessment found a clear preponderance of evidence that HSC populations in the Delaware Bay Region declined from the late 1980s to 2003 (ASMFC 2004, p. 27).

(120) Comment: One commenter stated that the State of New Jersey still maintains its ultraconservative HSC management strategy of a moratorium when the ARM framework would allow commercial fishermen to harvest 162,000 male HSCs from New Jersey outside of the spawning season. New Jersey's insistence of maintaining a moratorium has led to some negative biological consequences in redirecting fishing effort to New York and Massachusetts spawning populations of HSCs, which are now in decline. The HSC bait shortage has also led to the dangerous importation of Asian HSCs, all species of which are highly depleted, to meet the bait needs of the domestic whelk/conch and eel fisheries.

Our Response: We are aware of the finding that decreased harvest of the Delaware Bay population has redirected harvest to other parts of the Atlantic coast that now may be at unsustainable levels (ASMFC 2013b, p. 22). As discussed in the proposed rule (78 FR 60024, p. 60067; Factor D: The Inadequacy of Existing Regulatory Mechanisms, p. 12), we also agree the importation of Asian HSCs is a threat to both the native HSC and the red knot. We have updated the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link A, Part 2) with new information regarding efforts by individual States to restrict the import of Asian HSCs. The Service will evaluate the need to expand Lacey Act restrictions on the import of Asian HSCs at the Federal level. In addition, a Service biologist was recently selected by the IUCN as one of six scientists to assess and make recommendations on the status of the HSC throughout its range, with a counterpart team assessing the Asian species. The Service shares the concern of this commenter for the coastwide management and conservation of the HSC, and we intend to continue our active role in the ASMFC's management of the HSC fishery that considers the Delaware Bay population in a coastwide context.

We are aware that some ASMFC members have expressed concern that harvest levels in the Delaware Bay Region, which are set by the ASMFC and further reduced by New Jersey's moratorium, have raised the price of bait crabs and thus contribute to both the redirecting of harvest to other parts of the coast and the increasing interest in importing Asian crabs as alternative bait (ASMFC 2013f, p. 1). We lack data to determine the relative roles, if any, of the New Jersey moratorium versus the coastwide regulation by the ASMFC in driving these trends. We continue to support the ARM as a scientifically sound mechanism for managing Delaware Bay's HSC fishery that adequately abates the threat to red knots from food supply issues in the bay. See *Our Responses 117* and *118* regarding New Jersey's moratorium.

(121) Comment: Several commenters disagreed with our conclusion that, as managed under the ARM, current HSC harvest levels are not a current threat to the red knot. Conversely, several other commenters stated that the ARM framework adopted by the ASMFC appears to be an effective approach to managing harvest in Delaware Bay so that conservation of red knots and other shorebirds and HSCs are balanced with societal demands. In addition, since the model was favorably peer-reviewed in 2009, its management strategy prioritizes the needs of migratory shorebirds, and it is based on the best available science, it should fully satisfy section 9 of the Act if the listing is approved.

Our Response: We have reviewed information and analyses of the ARM provided by several commenters, but continue to conclude based on the best available data that, as long as it is functioning as intended, the ARM framework adequately abates the threat to the red knot from the HSC bait harvest. We agree that the ARM is based on best available science and is a sound process. The Supplemental Document (Factor E—Reduce Food Availability—Horseshoe Crab Harvest—Adaptive Resource Management) has been updated to clarify that our conclusions about the ARM are based on (1) the technical soundness of the peer-reviewed models; (2) the explicit linking of HSC harvest quotas to red knot population targets; and (3) the adaptive nature of both the models and the framework, which are intended to regularly adjust as new information becomes available. Our conclusion is supported by recent computer simulations by Smith *et al.* (2013, entire). Although these simulations are not intended to predict actual timeframes for population growth, they did show that simulated red knot population trajectories under HSC harvest scenarios governed by the ARM almost matched simulated red knot population trajectories under a fixed HSC moratorium scenario; thus, the bait harvest levels allowed under the ARM are expected to have a negligible effect on the red knot's Delaware Bay stopover population.

In the proposed rule (78 FR 60024, p. 60097), we concluded that the harvest of HSCs in accordance with the ARM, provided the ARM is implemented as intended (*e.g.,* including implementation of necessary monitoring programs) and enforced, is not likely to result in a violation of section 9 of the Act. Thus, we do not anticipate recommending additional HSC harvest restrictions in Delaware Bay (beyond the ARM) as a result of listing the red knot. (However, see *Our Response 46* regarding new uncertainty about the future of the ARM.) We intend to continue our active role in the ASMFC's management of the HSC fishery, and will provide recommendations and technical assistance to ensure that future harvests of HSCs do not result in take of red knots under section 9 of the Act.

(122) Comment: One commenter stated that both the HSC trawl survey and spawning survey have generally experienced difficulty detecting changes in the regional HSC population, although the trawl survey measured some significant increases in response to management, and both surveys have shown some improvement since the early 2000s. The temporal and spatial extent of the spawning survey may be inadequate to detect population growth, and it may not be able to accommodate changing shoreline conditions caused by erosion and flooding. Similarly, the Virginia Tech trawl survey did not originally sample any stations within the Delaware Bay, and the scale and design of the survey may not be sufficient to detect population changes consistently. With quotas that have been specified at levels consistent with population rebuilding since Addendum III, the power of the existing surveys to detect population changes warrants review.

Our Response: We disagree. Evaluations of these surveys and their methods have been done in the past and continue to be done by the ASMFC. See *Our Response 46* regarding discontinuation of the Virginia Tech trawl survey.

(123) Comment: One commenter stated that existing data to evaluate trends in red knot weight gain at Delaware Bay are flawed. This commenter cited statements from a peer-reviewed report prepared for the ASMFC: ''existing data . . . are not adequate to evaluate their relative importance [late arrivals versus insufficient food supply] for any year of record . . . attempts to estimate growth rate based on independent samples of body mass are inherently flawed'' (USFWS 2003, p. 6). Based on these statements, this commenter concluded that all the weight gain data from 1997 to 2002 are flawed.

Our Response: While we agree that these statements appear in a USFWS report (2003, p. 6), we disagree with the conclusion of the commenter. On the previous page, this report states, ''there is agreement that a smaller percentage of rufa red knots are making threshold departure weights by the end of May in recent years,'' and goes on to discuss the two possible explanations (late arrivals and insufficient food supply), as well as different analytical methods for determining weight gains (USFWS 2003, p. 5). Although the available weight gain data set could not be used to determine the relative importance of late arrivals versus insufficient food supply, USFWS (2003, p. 6) concluded, ''the two hypotheses forwarded to explain changes in weight gain in Delaware Bay red knots are not mutually exclusive, but instead represent two factors which operate in tandem to affect departure weights from Delaware Bay.'' That these two factors (late arrivals and insufficient food supplies) worked synergistically to cause a decline in red knot departure weights was the same conclusion we reached in the proposed rule (78 FR 60024, pp. 60072, 60094). We agree that attempts to estimate growth rates (*i.e.,* rates of weight gain) from samples of birds taken over the course of the stopover period are problematic for the same reason cited by USFWS (2003, p. 6) (*i.e.,* uncertainty in arrival times of the birds in each sample), as we noted in the proposed rule (78 FR 60024, p. 60068). That said, we did not rely on this parameter (rates of weight gain over the course of the season) in our analysis. Instead, we relied on a different analytical parameter, the proportion of red knots above a threshold weight at the end of May, which we conclude is an appropriate index for trends in red knot weight gain since 1997, as discussed in the proposed rule (78 FR 60024, p. 60068) and in the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest—Link B, Part 2).

(124) Comment: One commenter, citing comments of individual Service representatives at meetings of various ASFMC bodies, concluded that Service managers find the basic red knot science is flawed.

Our Response: Various levels of uncertainty are associated with all scientific data. As an active participant in the ASMFC's management of the HSC fishery, Service representatives routinely engage in robust discussions regarding the strengths and weaknesses of available HSC and red knot data sets. Our current agency conclusions, based on a detailed analysis, are presented in the proposed rule (78 FR 60024, pp. 60063–60071) and the Supplemental Document (Factor E—Reduced Food Availability—Horseshoe Crab Harvest). Our key conclusion is that, although the causal chain from HSC harvest to red knot populations has several links associated with various levels of uncertainty, the weight of evidence supports these linkages, points to past harvest as a key factor in the decline of the red knot, and underscores the importance of continued HSC management to meet the needs of the red knot.

(125) Comment: One commenter reported anecdotal information that no red knots had been observed by mid-May 2014 in Delaware Bay, and that HSCs were unusually small and few.

Our Response: Red knot distribution and abundance within Delaware Bay vary considerably from year to year, and within years, based on weather, food availability, disturbance patterns, and other factors. Likewise, spatial and temporal patterns of HSC spawning are highly dependent on weather (especially water temperature) as well as habitat conditions. We may consider anecdotal data when no other data sets are available. However, in Delaware Bay, other data sets (*e.g.,* red knot peak counts, red knot total passage population estimates, red knot weight gain data, HSC spawning and trawl surveys) are available that are based on consistent methodologies, such that these data sets can be evaluated for long-term trends despite the naturally high variability in these natural systems. Preliminary reports from two of these data sets show both red knot abundance and weight gain in Delaware Bay continued at a somewhat improved level in 2014, for a third consecutive year (A. Dey pers. comm. June 30 and July 23, 2014).

(126) Comment: Several commenters stated that commercial fishermen from Maine through Florida have made great sacrifices for well over a decade of increasing regulation of the HSC bait fishery. Some fishermen went out of business, not only because the allowable harvest for bait was severely restricted, but also because the other fisheries that relied on HSCs as bait (*e.g.,* whelk/conch, eel, and minnow) experienced a bait shortage and spiraling bait costs. The Service maintains that a serious red knot population decline occurred in the 2000s caused primarily by reduced food availability from increased harvests of HSCs, but the Service also

acknowledges that red knot numbers appear to have stabilized in the past few years. Since knot numbers have stabilized, the restrictions placed on the HSC harvests (*i.e.,* the Fishery Management Plan and subsequent addenda, most recently the ARM framework), appear to have been effective in providing sufficient food resources for the shorebirds. The regulatory regime for the HSC fishery was designed to meet the feeding needs of migratory shorebirds. Based on the success of these harvest restrictions in stabilizing the knot population, the commercial industry has done its part. The commercial fishermen and related industries have borne a disproportionate share of protecting these migratory shorebirds.

Our Response: We agree that the actions of the ASMFC and the commercial fishing industry have been instrumental in halting the decline of the red knot's stopover population in Delaware Bay. In addition to restricting harvests through the Fisheries Management Plan (including the most recent iteration, the ARM), the ASMFC has taken several proactive steps to substantially reduce landings (see *Our Response 46* and proposed rule 78 FR 60024, p. 60064). We recognize and appreciate these efforts. As noted in the proposed rule (78 FR 60024, p. 60063), most data suggest that the volume of HSC eggs is currently sufficient to support the Delaware Bay's stopover population of red knots at its present size. However, it is not yet known if the egg resource will continue to adequately support red knot population growth over the next decade. Further, the red knot population in Delaware Bay appears to have stabilized at a notably low level. Therefore, sustained focus on protecting the red knot's food supply continues to be vital to the recovery of the red knot, and will be addressed during the recovery planning process. We intend to continue our active role in the ASMFC's management of the HSC fishery and do not anticipate recommending additional HSC harvest restrictions in Delaware Bay (beyond the ARM) as a result of listing the red knot (however, see *Our Response 46* regarding new uncertainty about the future of the ARM). Also see *Our Response 2* regarding economic and other implications of listing that we may not consider in listing determinations, and *Our Response 120* regarding bait prices.

(127) Comment: One commenter suggested that focusing efforts on the many foreign countries that continue to allow the legal and illegal hunting of red knots would be more productive in producing tangible results for the long-range survival of the species than imposing further restrictions in the United States where red knot hunting is no longer permitted.

Our Response: We agree that the effects of legal and illegal hunting on the red knot should continue to be assessed and minimized through international conservation partnerships. Work in this area has already begun and changes are in progress, as noted in the Supplemental Document (Factor B—Hunting). As noted in the proposed rule (78 FR 60024, p. 60053), we have no evidence that hunting was a driving factor in red knot population declines in the 2000s, or that hunting pressure is increasing. However, while not currently a threat in the United States, hunting is one of many threats affecting the knot. The Service will continue to enhance our work with partners across the range of the knot to reduce or ameliorate all ongoing or emerging threats.

(128) Comment: Several commenters believe that legal and illegal hunting of shorebirds is a major issue facing red knots and other shorebirds that migrate through the Caribbean basin and winter along the northern coast of South America, and that the proposed rule understates the overall importance of direct mortality from hunting on driving population change in shorebird populations. These commenters cite recent evidence suggesting that at least 2,000 red knots pass through the Guianas during southbound migration and that many birds likely stage in this area and coastal Venezuela during northbound migration. Further, documented hunting pressure is significant in Suriname, with estimates that between 20,000 and 100,000 shorebirds are taken annually. While the proposed rule suggests that Suriname is not likely an important area for red knot, there are suitable habitats and observations of hundreds of birds from this country. Likewise, another commenter asked how the Service can find that individual hunting mortality does not seem to affect the population as a whole if there are no data on hunting anywhere, especially illegal hunting.

Our Response: We appreciate this new information and have incorporated it into the Supplemental Document (Migration and Winter Habitats; Population Surveys and Estimates; Factor B—Hunting—Caribbean and South America). We have made minor changes to our conclusions regarding the overall importance of hunting as a threat to the red knot. While only low to moderate red knot mortality is documented, we acknowledge that additional undocumented mortality is likely. The findings of Watts (2010) suggest that even moderate (hundreds of birds) direct human-caused mortality may begin to have population-level effects on the red knot. However, we do not have adequate information to reasonably know if hunting mortality is or was previously at this level in the Guianas (CSRPN 2013; Niles 2012b; D. Mizrahi pers. comm. October 16, 2011; Harrington 2001, p. 22), though we conclude that it was likely much lower (tens of birds) in the Caribbean islands (G. Humbert pers. comm. November 29, 2013; W. Burke pers. comm. October 12, 2011; A. Levesque pers. comm. October 11, 2011; Hutt and Hutt 1992, p. 70). We expect mortality of individual knots from hunting to continue into the future, but at stable or decreasing levels due to the recent international attention to shorebird hunting.

(129) Comment: One commenter stated that red knots are still heavily hunted in many places and in many places are called ''snipe.'' Snipe are legally hunted, but the average person in the field cannot tell the difference between a red knot and a snipe. This commenter contends that the Service has data on hunted red knots from the bands returned during snipe hunts, and the August 13, 2011, shorebird hunting workshop summary shows close to 500,000 shorebirds, including snipes and red knots, have been killed by hunters in the Caribbean and South America in just a few years. Further, one red knot researcher has in the past (2005) publicly denied any hunting of shorebirds, but has full knowledge of the hunting.

Our Response: We disagree with the conclusions of the commenter. In the proposed rule (Rufa Red Knot Ecology and Abundance, p. 4), we discussed the numerous common names for red knot that were historically used by hunters in the United States. We agree that red knots have been historically called snipe, and that hunting of Wilson's snipe (*Gallinago delicata*) (previously called common snipe (*Gallinago gallinago*)) is still legal in the United States (USFWS 2012c); however, we have no data to suggest that red knots are being killed in the United States incidental to the legal hunting of Wilson's snipe. Lowery (1974, p. 309) notes that, even in winter plumage, the red knot's shape and bill make this species comparatively easy to distinguish from common snipe and other similarly sized shorebirds. Snipe occupy different habitats (flooded, shallow emergent marsh) than do red knots (exposed flats), and snipe are solitary while red knots tend to occur in flocks (C. Dwyer pers. comm. July 18, 2014). Although the margins of error are large, the best available estimates (Raftovich *et al.* 2014, p. 54) show very few snipe hunters in the Atlantic Flyway States (C. Dwyer pers. comm. July 18, 2014).

We agree that a rough understanding of red knot mortality levels from hunting in South America has come from band returns, as discussed in the proposed rule (78 FR 60024, pp. 60050–60052) and the Supplemental Document (Factor B—Hunting). Throughout our analysis of hunting, we relied heavily on the 2011 shorebird hunting workshop report (USFWS 2011e), and agree that this report documents high levels of shorebird hunting in some parts of the Caribbean and South America. However, much of the information in this report is not specific to red knot. Thus, we supplemented this information with data from other sources. We cannot respond to comments about the public statements of any particular red knot researcher. However, based on our review, we conclude that most of the international red knot research and conservation community has become gradually aware of the hunting issue over the past decade, and now regard it as an important area for conservation actions, many of which are underway. See *Our Responses 127* and *128* above for additional information on our conclusions regarding hunting as a threat to red knot.

(130) Comment: Several commenters contend that the Service must revise its oil- and gas-related findings in the proposed rule to more accurately state that (1) based upon the best available data and information, oil spills and leaks have had, at most, minimal impacts, and there is no available information to suggest that the risk of future oil spills is likely to be other than minimal; and (2) there is no available information demonstrating that permitted oil and gas activities have had any adverse effects on the rufa red knot, and such activities do not pose a threat to the species. Further, based upon the current record, there is no information available to support a conclusion that potential future spills are ''likely'' to impact red knots.

Our Response: We agree that documented effects of oil and gas extraction and transport on red knots and their habitats to date have been minimal, as stated in the proposed rule (78 FR 60024, p. 60087). However, we disagree that the future risk is minimal. Based on the review and analysis we presented in the proposed rule (78 FR 60024, pp. 60083–60087), we found that red knots are exposed to large-scale petroleum extraction and transportation operations in many key wintering and stopover habitats. We also found that a number of spills and leaks have occurred in red knot areas. The minimal effects to red knots from these past incidents is attributable to fortunate (for the knots) timing or weather conditions, and we conclude that such fortunate circumstances are unlikely to accompany all future spills and leaks affecting red knot habitats. Thus, we continue to conclude that high potential exists for small or medium spills to impact moderate numbers of red knots or their habitats, such that one or more such events is likely over the next few decades, based on the proximity of key red knot habitats to high-volume oil operations. A major spill affecting habitats in a key red knot concentration area while knots are present is less likely but would be expected to cause population-level impacts.

(131) Comment: Several commenters stated that the proposed rule relied on inappropriate and nonscientific sources to erroneously associate mosquito control adulticides (specifically the pesticide fenthion) with adverse effects to birds, and that there is no scientific evidence to link the bird deaths referenced in the proposed rule to a particular pesticide or mosquito control operation. In addition, the proposed rule erroneously stated that fenthion had been banned by the U.S. Environmental Protection Agency (USEPA), when actually the USEPA regulates, but does not ban, pesticides. In fact, the manufacturer of fenthion voluntarily cancelled its label for mosquito control, thereby withdrawing it from the mosquito control market. Labels for other uses of fenthion were not affected by the withdrawal of the mosquito control label.

Our Response: Although we believed the data to be accurate at the time we reviewed and used them in the proposed rule (78 FR 60024, p. 60088), we could not, upon further review, verify that fenthion caused the mortality of piping plovers. We agree that we erroneously misstated that fenthion had been banned by the USEPA. We have withdrawn the Contaminants—Florida section entirely from the final rule and Supplemental Document.

(132) Comment: One commenter asked what data support the emerging threat on the breeding grounds since the Service states that comprehensive counts from the breeding grounds are not available because nesting knots are thinly distributed across a huge and remote area of the Arctic.

Our Response: First, we conclude that changing relationships between red knots and their predators are likely a part of overall ecosystem changes due to rapid arctic warming. Although there is high uncertainty about how such ecosystem changes will unfold, there is high certainty that ecosystem changes are already occurring and will continue. We have updated the Supplemental Document (Factor A—Arctic Warming) with the IPCC's new findings of early warning signs that arctic ecosystems are already experiencing irreversible regime shifts (Summary for Policymakers *in* IPCC 2014, p. 12). Given the sensitivity of red knots to predation rates on the breeding grounds (78 FR 60024, p. 60057), we conclude that these ecosystem changes constitute a threat to the red knot.

Second, Fraser *et al.* (2013, entire) found preliminary evidence for one mechanism by which ecosystem changes may have already impacted red knot populations—through rodent-mediated changes in predation pressure. Additional studies would be needed to support this hypothesis (Fraser *et al.* 2013, p. 13). However, we have updated the Supplemental Document (Factor C—Predation—Breeding Areas) with new information that, although factors other than climate change may also be important, the documented collapse or dampening of rodent cycles in some parts of the Arctic over the last 20 to 30 years can be attributed to climate change with ''high confidence'' (Chapter 28 *in* IPCC 2014, p. 14). Thus, we conclude that the geographic extent and duration of future interruptions to these rodent cycles is likely to intensify as the arctic climate continues to change. Disruptions in the rodent-predator cycle pose a substantial threat to red knot populations, as they may result in prolonged periods of very low red knot reproductive output. Red knot counts from the breeding grounds are not necessary to reach this conclusion.

(133) Comment: One commenter asked how confident the Service is in dismissing predation in the geographically large nonbreeding portion of the red knot's range.

Our Response: We disagree that we have ''dismissed'' predation in nonbreeding areas (see proposed rule 78 FR 60024, pp. 60055–60057 and Supplemental Document section Factor C—Predation—Nonbreeding Areas), and conclude that predation in these areas is likely to exacerbate other threats to red knot populations.

(134) Comment: Several commenters noted that areas offshore of Delaware Bay are being studied for potential installation of wind turbines. The Wind

Energy Areas (WEA) proposed for the States of Delaware and Maryland appear to be placed precisely in the path of the red knots arriving in May after flying nonstop from northeast South America.

Our Response: We have updated the Supplemental Document to reference these WEAs, as well as leases that have been, or are scheduled to be issued for development of offshore wind energy. Our analysis of risks to red knots from the likely future development of wind energy in the Atlantic OCS is presented in the Supplemental Document, with only minor changes from the proposed rule (see *Our Responses 21* through *25*).

(135) Comment: One commenter stated that, while the Service may ''expect ongoing improvements in turbine siting, design, and operation [to] help minimize bird collision hazards'' in the future, there is no indication this has happened or will happen. There is no Federal, State, or local ability or willingness to regulate wind energy projects in Texas or to deter poor siting decisions through prosecution of Migratory Bird Treaty Act violations. Thus, projects continue to be built in areas where risk to avian resources, including red knots, is potentially high.

Our Response: The commenter is correct that the Service cannot control or regulate the development of projects that lack a Federal nexus, including wind energy projects in any State. However, we do work with project developers to find locations that pose less of a risk to migratory birds and other species, and to find methods to reduce the risk of collisions during operation. This voluntary process is informed by an improved understanding, through research, of migratory bird behavior and project design. Researchers from a wide variety of government agencies, academic institutions, and nongovernmental organizations continue to study factors related to birds' wind turbine collision risks. As the science evolves and our understanding of these risk factors increases, measures are developed and implemented to help minimize bird fatalities. Specifically, research and post construction observations have led companies to strictly control lighting at their projects, thus reducing the collision risk for night migrating birds. More information is available on our Web site at *http://www.fws.gov/windenergy/.*

(136) Comment: One commenter stated that, though the Service is ''not aware of any documented red knot mortalities at any wind turbines to date,'' it is not appropriate to make any conclusion based on a lack of data. This commenter contends that the wind energy projects along the Texas coast may represent the highest risk exposure red knots face from wind energy anywhere, yet data are either not being gathered or not being shared by these projects. In either case, effectively zero data are available on which to base a conclusion, and a precautionary principle should apply since it is well known that wind energy installations have the potential to be sources of mortality. Further, without data it seems unjustifiable to assume that this is either currently insignificant or that the cumulative impacts from current and future buildout in the area will be insignificant.

Our Response: We have revised the Supplemental Document (Factor E—Wind Energy Development—Terrestrial) with new findings from Loss *et al.* (2013, pp. 201, 202, 207) that accessibility to relevant data remains a problem, particularly for the tallest (greater than 262 ft (80 m)) turbines, because most of the mortality data are in industry reports that are not subjected to scientific peer review or available to the public. We have also revised the Supplemental Document to conclude that, based on the higher frequency and lower altitudes of red knot flights along the coasts, as well as the coastal location of most large, known U.S. nonbreeding red knot roosting and foraging areas, collision and displacement risks per turbine (notwithstanding differences in specific factors such as turbine size, design, operation, siting) are likely higher along the coasts than in areas either far offshore or far inland. In the Supplemental Document (Factor E—Wind Energy—Summary) we state that we do not believe any turbine related mortality is causing subspecies level effects. However our primary concern is that as buildout of wind energy infrastructure progresses, especially near the coasts, mortality from turbine collisions may contribute to a subspecies-level effect due to the red knot's modeled vulnerability to low levels of mortality (Watts 2010, p. 1).

(137) Comment: One commenter stated that red knots will not be killed by wind turbines. The claim of red knot mortality will be used to stop the placement of wind turbines at a time when clean energy is needed.

Our Response: We disagree that red knots will not be killed and that risks to red knots will prevent wind energy development (see *Comments 21* and *22*). The Department of the Interior supports the development of wind energy, and the Service works to ensure that such development is bird- and habitat-friendly (USFWS 2012d; Department of Energy and Bureau of Ocean Energy Management, Regulation, and Enforcement 2011; Manville 2009).

(138) Comment: Several commenters requested that we recognize North Carolina's proactive coastal oversight at the State and local levels, which has resulted in the construction and maintenance of high-quality sandy shorelines via beach nourishment and inlet relocation. These commenters contend that North Carolina has done a great deal to create the right balance between use of beaches and protection of wildlife and that the State's regulatory approach to coastal storm damage reduction projects, borrow source and native beach compatibility, and inlet location management is ensuring these sandy habitat areas continue functioning in multispecies resilient manners. One commenter stated that North Carolina does not allow hard structures.

Our Response: We recognize that North Carolina is working to sustainably manage sandy habitats to meet multispecies resiliency. We have revised the Supplemental Document (Factor D—United States—Coastal Management) to recognize North Carolina's Technical Standards for Beach Fill (15A NCAC 07H .0312), which address sediment compatibility of material proposed to be placed on beaches. We have also revised the Supplemental Document (Factor A—U.S. Shoreline Stabilization—Hard Structures) to recognize that, as a result of a 1985 State prohibition on new hard structures, there are only a few permanent, hard stabilization structures along North Carolina's beaches. Despite such measures, however, some red knot habitats in North Carolina are vulnerable to degradation due to beach hardening practices. For example, 2011 legislation authorized an exception for construction of up to four new terminal groins in North Carolina (Rice 2012a, p. 8, discussed at 78 FR 60024, p. 600369), and some of North Carolina's coastal communities have begun seeking authorization from the State legislature for additional hard structures. Although the construction of new hard stabilization structures remains highly restricted in North Carolina, extensive temporary structures have been utilized including sand tube groins, sand tube bulkheads, and approximately 350 sandbag revetments (Rice 2012a, p. 9). Finally, beach nourishment and beach bulldozing are prevalent in North Carolina. Most of these beaches are nourished at least every 3 years, some as often as every year (K. Matthews pers. comm. May 2, 2014). Even with State regulations to ensure sediment compatibility, such frequent nourishment can interfere with natural coastal processes and affect shorebird habitat (*e.g.,* benthic prey availability) (K. Matthews pers. comm. May 2, 2014; Zajac and Whitlatch 2003, p. 101; Greene 2002, p. 25; Peterson and Manning 2001, p. 1; Hurme and Pullen 1988, p. 127). However, it is noted that beach nourishment can be important in establishing or maintaining beachfront red knot habitat in some areas. Depending on the site and situation, beach nourishment can be beneficial or detrimental to red knot habitat (see *Comment 58*). The negative effects to habitat associated with beach nourishment are expected typically to be short term, though repeated renourishing may prolong the adverse effects to habitat.

Determination

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the rufa red knot. We have identified substantial threats to the red knot attributable to Factors A, B, C, and E. The primary driving threats to the red knot are from habitat loss and degradation due to sea level rise, shoreline hardening, and Arctic warming (Factor A), and reduced food availability and asynchronies (mismatches) in the annual cycle (Factor E). Other factors may cause additive red knot mortality. Individually these other factors are not expected to have subspecies level effects; however, cumulatively, these factors could exacerbate the effects of the primary threats if they further reduce the species' resiliency. These secondary factors include hunting (Factor B); predation in nonbreeding areas (Factor C); and human disturbance, oil spills, and wind energy development, especially near the coasts (Factor E). All of these factors affect red knots across their current range and are expected to continue or intensify into the future.

Conservation efforts are being implemented in many areas of the red knot's range (see Factors A, B, C, and E in the Supplemental Document—Summary of Factors Affecting the Species). For example, in 2012, the ASMFC adopted the ARM (ASMFC 2012e, entire) for the management of the HSC population in the Delaware Bay Region to meet the dual objectives of maximizing crab harvest and red knot population growth. In addition, regulatory mechanisms exist that provide protections for the red knot directly (*e.g.,* MBTA protections against take for scientific study or by hunting) or through regulation of activities that threaten red knot habitat (*e.g.,* section 404 of the Clean Water Act, Rivers and Harbors Act, Coastal Barrier Resources Act, Coastal Zone Management Act, and State regulation of shoreline stabilization and coastal development) (see Supplemental Document—Summary of Factors Affecting the Species—Factor D). While these conservation efforts and existing regulatory mechanisms reduce some threats to the red knot (see Factor D discussion in the Supplemental Document—Summary of Factors Affecting the Species), significant risks to the subspecies remain.

Red knots migrate annually between their breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the spring and fall migrations, red knots use key staging and stopover areas to rest and feed. This life history strategy makes this species inherently vulnerable to numerous changes in the timing of quality food (Factor E) and habitat resource availability (Factor A) across its geographic range. While a few examples suggest the species has some flexibility in migration strategies, the full scope of the species' adaptability to changes in its annual cycle is unknown.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the rufa red knot meets the definition of a threatened species due to the present and likely continued destruction and modification of habitat and curtailment of the species' range driven by the effects of climate change, and reduced food resources and further asynchronies in its annual cycle that result in the species' reduced redundancy, resiliency, and representation. We base this determination on the immediacy, severity, and scope of the threats described above. Therefore, on the basis of the best scientific and commercial data available, we are listing the rufa red knot as a threatened species in accordance with sections 3(6) and 4(a)(1) of the Act. We find that an endangered species status is not appropriate for the rufa red knot because, while there is uncertainty as to how long it may take some of the climate-induced changes to manifest in population-level effects to the rufa red knot, we find that the best available data suggest the rufa red knot is not at a high risk of a significant decline in the near term such that it is currently in danger of extinction and, therefore, meeting the definition of an endangered species under the Act. However, should the reduction in redundancy, resiliency, or representation culminate in an abrupt and large loss, or initiation of a steep rate of decline, of reproductive capability and success (corresponding to Factor E) or we subsequently find that the species does not have the adaptive capacity to adjust to shifts in its food and habitat resources (corresponding to Factor E), then the red knot would be at higher risk of a significant decline in the near term and we would reassess whether it meets the definition of an endangered species under the Act.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The rufa red knot is wide-ranging, and the threats occur throughout its range. Therefore, we assessed the status of the subspecies throughout its entire range. The threats to the survival of the subspecies are not restricted to any particular significant portion of that range. Accordingly, our assessment and proposed determination applies to the subspecies throughout its entire range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies site-specific management actions that set a trigger for review of the five factors that control whether a species remains endangered or may be downlisted or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our Web site (*http://www.fws.gov/endangered*), or from the New Jersey Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (*e.g.,* restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. We also recognize that for some species, measures needed to help achieve recovery may include some that are of a type, scope, or scale that is independent of land ownership status and beyond the control of cooperating landowners.

Following publication of this final listing rule, additional funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Alabama, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming and Puerto Rico and the U.S. Virgin Islands would be eligible for Federal funds to implement management actions that promote the protection or recovery of the rufa red knot. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants.*

Please let us know if you are interested in participating in recovery efforts for the rufa red knot. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and landscape-altering activities on Federal lands administered by the Department of Defense, the Service, and NPS; issuance of section 404 Clean Water Act permits and shoreline stabilization projects implemented by the U.S. Army Corps of Engineers; construction and management of gas pipeline rights-of-way by the Federal Energy Regulatory Commission; leasing of Federal waters by BOEM for the construction of wind turbines; and construction and maintenance of roads or highways by the Federal Highway Administration.

Under section 4(d) of the Act, the Service has discretion to issue regulations that we find necessary and advisable to provide for the conservation of threatened species. The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to threatened wildlife. The prohibitions of section 9(a)(1) of the Act, as applied to threatened wildlife and codified at 50 CFR 17.31, make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these) threatened wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any listed species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, NMFS, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.32. With regard to threatened wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities. There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

(1) It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a final listing on proposed and ongoing activities within the range of a listed species.

Based on the best available information, the following activity is unlikely to result in a violation of section 9, if this activity is carried out in accordance with existing regulations and permit requirements; this list is not comprehensive: Harvest of HSC in accordance with the ARM, provided the ARM is implemented as intended (*e.g.,* including implementation of necessary monitoring programs), and enforced.

Based on the best available information, the following activities may potentially result in a violation of section 9 the Act; this list is not comprehensive:

(1) Unauthorized collecting, handling, possessing, selling, delivering, carrying, or transporting of the species, including import or export across State lines and international boundaries, except for properly documented antique specimens of these taxa at least 100 years old, as defined by section 10(h)(1) of the Act;

(2) introduction of nonnative species that compete with or prey upon the rufa red knot, or that cause declines of the red knot's prey species;

(3) unauthorized modification of intertidal habitat that regularly supports concentrations of rufa red knots during the wintering or stopover periods; and

(4) unauthorized discharge of chemicals or fill material into any waters along which the rufa red knot is known to occur.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the New Jersey Field Office (see **FOR FURTHER INFORMATION CONTACT**). Requests for copies of the regulations concerning listed animals and general inquiries regarding prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Endangered Species Permits, 300 Westgate Center Drive, Hadley, MA, 01035 (telephone 413–253–8615; facsimile 413–253–8482).

Required Determinations

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act need not be prepared in connection with listing a species as an endangered or threatened species under the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. We coordinated with applicable Tribes throughout the U.S. range of the rufa red knot, but received no information indicating that the species is known to occur on Tribal lands.

References Cited

A complete list of references cited in this rulemaking is available on online at *http://www.regulations.gov* under Docket Number FWS–R5–ES–2013–0097 and upon request from the New Jersey Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this final rule are the staff members of the New Jersey Field Office (see **FOR FURTHER INFORMATION CONTACT**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

■ 2. In § 17.11(h), add an entry for ''Knot, rufa red'' to the List of Endangered and Threatened Wildlife in alphabetical order under Birds to read as set forth below:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	
BIRDS.							
*	*	*	*	*	*	*	
Knot, rufa red.	*Calidris canutus rufa*.	Argentina, Aruba, Bahamas, Barbados, Belize, Brazil, British Virgin Islands, Canada, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, France (Guadeloupe, French Guiana, Martinique), Guatemala, Guyana, Haiti, Jamaica, Mexico, Panama, Paraguay, Suriname, Trinidad and Tobago, Uruguay, Venezuela, U.S.A. (AL, AR, CO, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, WV, WY, Puerto Rico, U.S. Virgin Islands).	Entire	T	855	N/A	N/A
*	*	*	*	*	*	*	

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Dated: November 21, 2014.

Matthew Huggler,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2014–28338 Filed 12–10–14; 8:45 am]

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