U.S. Fish and Wildlife Service Rufa Red Knot Research Priorities, 2019 to 2022

1 = Highest Priority. 2 = High Priority. 3 = Medium Priority.

- [1] On the breeding grounds, document baseline conditions and establish metrics that can be monitored over time for the effects of ecosystem change. Important parameters include vegetative conditions, snow conditions, phenology, hatch rates, fledge rates, and predation rates (including through indirect ecosystem effects such as lemming cycles and snow geese). Capitalize on emerging tracking technologies (e.g., GPS geolocators, nanotags, satellite transmitters) to maximize success in locating red knots in the Arctic. Develop cost-effective methods for future monitoring of key metrics (e.g., imagery, remote sensing, surrogate species, geolocators to estimate hatch rates, indices of southbound juvenile migrants to estimate fledge rates).

- Conduct genetic, stable isotope, and other research to:
  - [1] Determine if rufa red knots from different wintering regions segregate on the breeding grounds.
  - [2] Better characterize the nonbreeding distributions of the rufa and roselaari subspecies.

- [1] Develop a full-life-cycle population viability analysis (PVA) to determine what demographic targets (e.g., population sizes, reproductive rates, and survival rates) are necessary to maintain sufficient viability of the four major wintering regions. This effort should build on existing modeling developed for portions of the red knot’s range, and may involve a full re-evaluation of survival rates over the past 20 to 30 years.

- Support existing and emerging tracking technologies (e.g., leg flags, bandedbirds.org, geolocators, nanotags, GPS geolocators, satellite transmitters) and data analysis in order to:
  - [2] Identify and better map recurrent U.S. coastal wintering and stopover areas in need of increased surveys, study and/or management.
  - [3] Identify any recurrent non-coastal U.S. stopovers for further field work.
  - [3] Identify any recurrent wintering areas in the Caribbean, Central America, and Pacific South America for further field work.
  - [1] Identify and assess important areas (winter, summer, and migration) used by juvenile birds.
  - [2] Better characterize the prevailing migration routes and phenologies across birds from different wintering areas.
  - [2] Better characterize the non-breeding distributions of the rufa and roselaari subspecies, by season.
  - [3] Better characterize the degree of fidelity to wintering and stopover areas.
  - [2] Assess survival rates across different segments of the annual cycle (e.g., seasonal survival), across different wintering regions, across age classes, and between sexes.

- [1] Support international partners in efforts to obtain consistent and reliable winter population estimates of northern Brazil and Patagonia/Tierra del Fuego.
- [1] Develop a reliable and cost-effective method for estimating the size of the populations wintering from North Carolina to Texas (possibly into northeast Mexico), to be implemented at regular intervals.

- [1] Support ongoing efforts to obtain regional population size estimates where needed to inform management decisions at major migration staging areas (e.g., Delaware Bay, Virginia, South Carolina, Georgia). [3] Expand such efforts to additional areas as important new stopovers are identified.

- [3] Better characterize red knot use of Delaware Bay (e.g., intra- and inter-annual fidelity to the bay; percentage of the total red knot population that stops in the bay each year; relative importance of the bay to birds from different wintering regions; intra- and inter-annual movements of individual birds with the bay; relative importance of foraging habitats across the intertidal zone).

- [2] Support efforts to revitalize the International Shorebird Survey, as a cost-effective method of obtaining data on localized red knot numbers, habitats, and seasonal timing, and to inform management decisions, and to promote awareness of red knots through citizen science.

- [2] Better characterize the nonbreeding diet, and document baseline conditions regarding food resources. Assess the effects of horseshoe crab harvest on red knot food availability outside of Delaware Bay. Assess the effects of vehicle use and ecosystem change on food availability at spring and fall staging areas.

- [1] Support studies and monitoring to facilitate the ASMFC’s Adaptive Resource Management of horseshoe crabs in Delaware Bay.

- [1] Characterize the nature and degree of human activity likely to result in “take” under the ESA from disturbance (i.e., establish types, rates, and durations of disturbance likely to affect the ability of individual knots to gain or maintain weight or to impact survival rates).

- [1] Document the habitat, prey, and bird responses to coastal engineering projects and develop conservation measures to minimize or mitigate adverse effects.


- [3] Collect species-specific information to characterize the red knot’s wind turbine collision risk (e.g., through behavioral studies such as long-distance and short-distance flight altitudes, avoidance capability, flight response to low cloud ceiling during migration).

- [2] Communicate scientific findings to partners and the public, emphasizing the red knot’s linkages to climate change, other shorebirds, the Arctic, and other imperiled coastal species.