

Climate Change and Shorebird Migration

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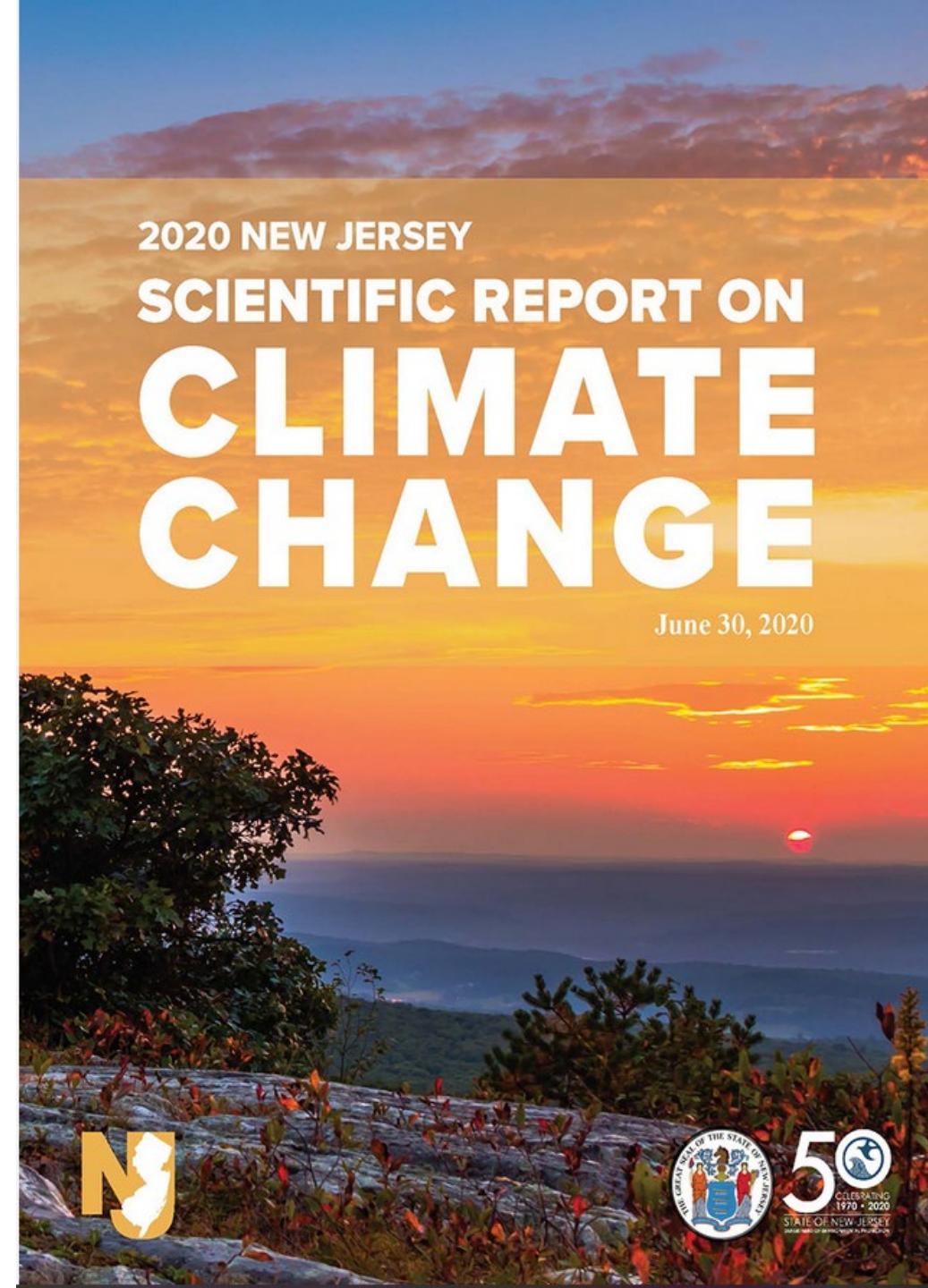
Coastal Biologist

- Beach-nesting Birds (i.e. plovers, skimmers)
- Long-legged Wading Birds (i.e. herons, egrets)
 - Secretive Marsh Birds (i.e. rails, bitterns)



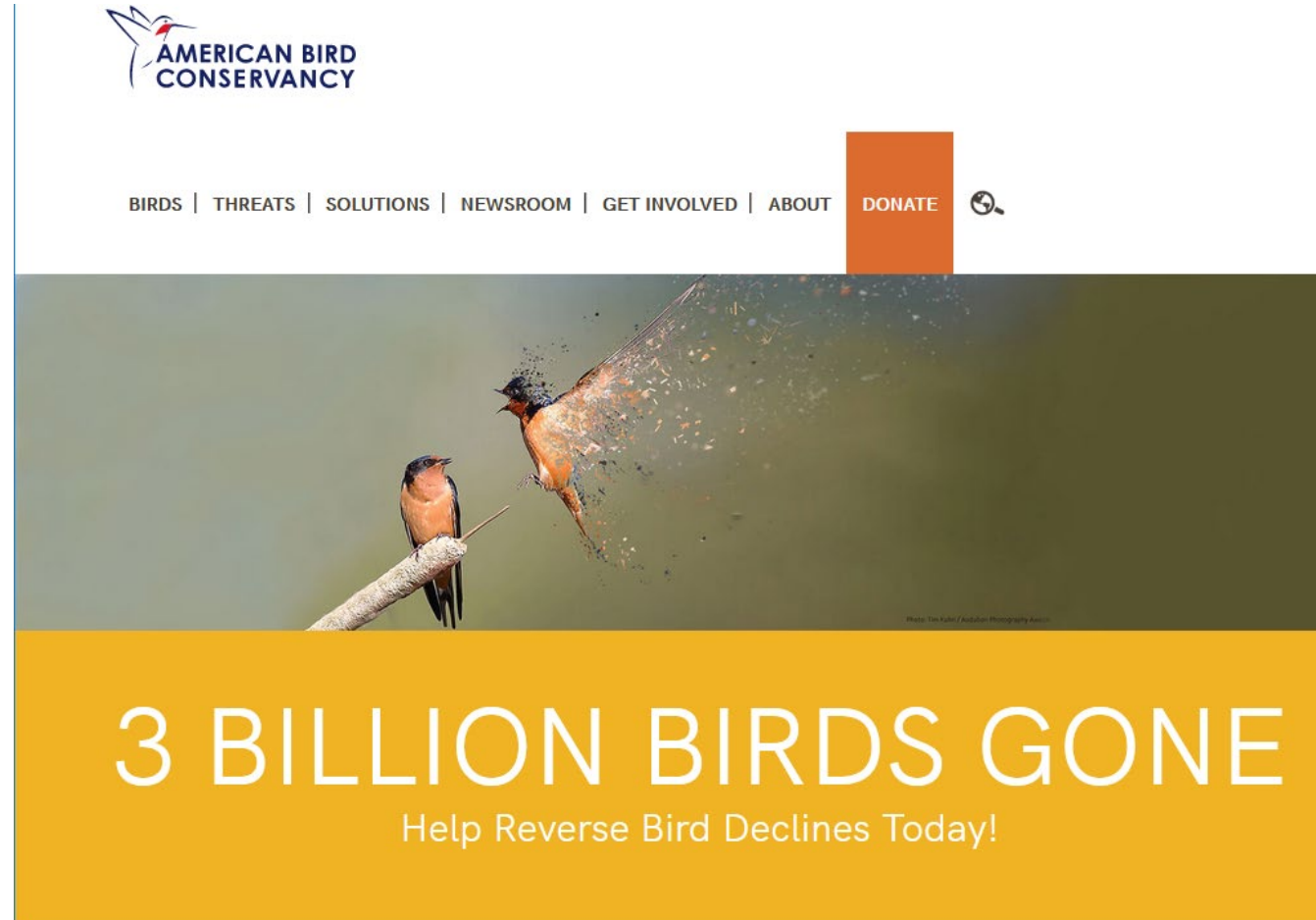
Climate Change in NJ

- Rising sea-levels, inundating habitat
- Temperature and Precipitation Fluctuations
- Overall warming trend



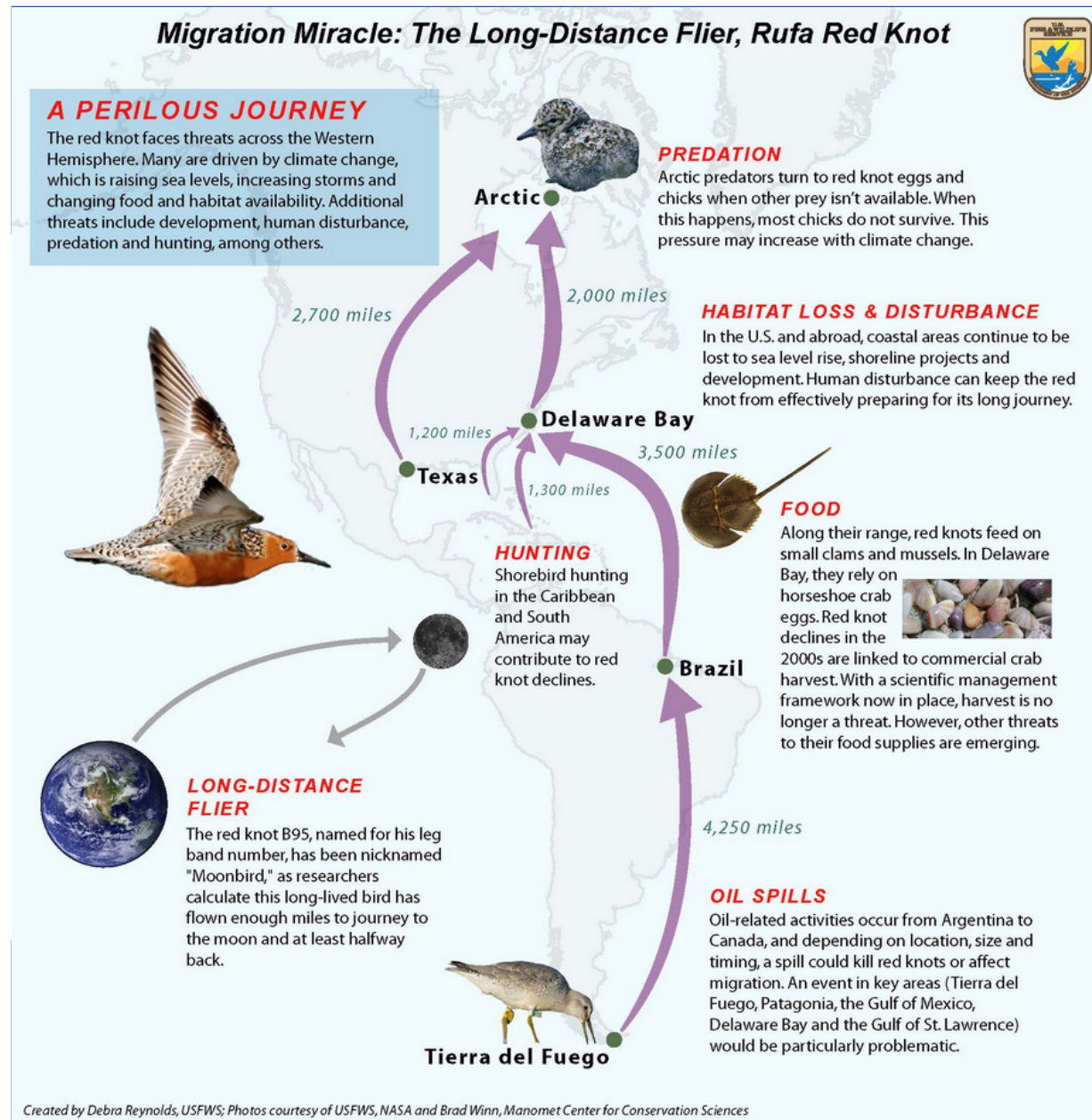
Climate Change as an Amplifier

- Published in journal *Science*
- 2.9 billion birds lost since 1970
- Primary drivers: habitat loss, habitat degradation, invasive species, collisions with glass and communication towers, exposure to pesticides.
- Climate change “expected to exacerbate” these threats.



Shorebird Biology


- 80+ species that occur in the Americas for all or part of their life cycle.
- Life histories can vary widely. This includes migration distances and strategies.
- For example, Piping Plovers are a short-distance migrant. NJ breeders winter anywhere from North Carolina to the Bahamas.
- Rufa Red Knot, on the other hand, is a globe trotter as a long-distance migrant. They breed in the Arctic and winter in South America, making a twice-yearly journey from one pole to another.




Climate Change Impacts to Migration

- Widely variable and difficult to predict.
 - Depends on human actions to mitigate or adapt to climate change.
 - Depends on how adaptable each species will be.
- We can say that it is likely that there will be negative consequences to some species. One study ran a model on 49 shorebird species and predicted that 47 (90%) were expected to experience an increased risk of extinction due to factors relating to climate change.

Predicting Vulnerabilities of North American Shorebirds to Climate Change

Hector Galbraith, David W. DesRochers, Stephen Brown, J. Michael Reed 

Published: September 30, 2014 • <https://doi.org/10.1371/journal.pone.0108899>

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Abstract

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Acknowledgments

Author Contributions

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Reader Comments (0)

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Abstract

Despite an increase in conservation efforts for shorebirds, there are widespread declines of many species of North American shorebirds. We wanted to know whether these declines would be exacerbated by climate change, and whether relatively secure species might become at-risk species. Virtually all of the shorebird species breeding in the USA and Canada are migratory, which means climate change could affect extinction risk via changes on the breeding, wintering, and/or migratory refueling grounds, and that ecological synchronicities could be disrupted at multiple sites. To predict the effects of climate change on shorebird extinction risks, we created a categorical risk model complementary to that used by Partners-in-Flight and the U.S. Shorebird Conservation Plan. The model is based on anticipated changes in breeding, migration, and wintering habitat, degree of dependence on ecological synchronicities, migration distance, and degree of specialization on breeding, migration, or wintering habitat. We evaluated 49 species, and for 3 species we evaluated 2 distinct populations each, and found that 47 (90%) taxa are predicted to experience an increase in risk of extinction. No species was reclassified into a lower-risk category, although 6 species had at least one risk factor decrease in association with climate change. The number of species that changed risk categories in our assessment is sensitive to how much of an effect of climate change is required to cause the shift, but even at its least sensitive, 20 species were at the highest risk category for extinction. Based on our results it appears that shorebirds are likely to be highly vulnerable to climate change. Finally, we discuss both how our approach can be integrated with existing risk assessments and potential future directions for predicting change in extinction risk due to climate change.

Figures



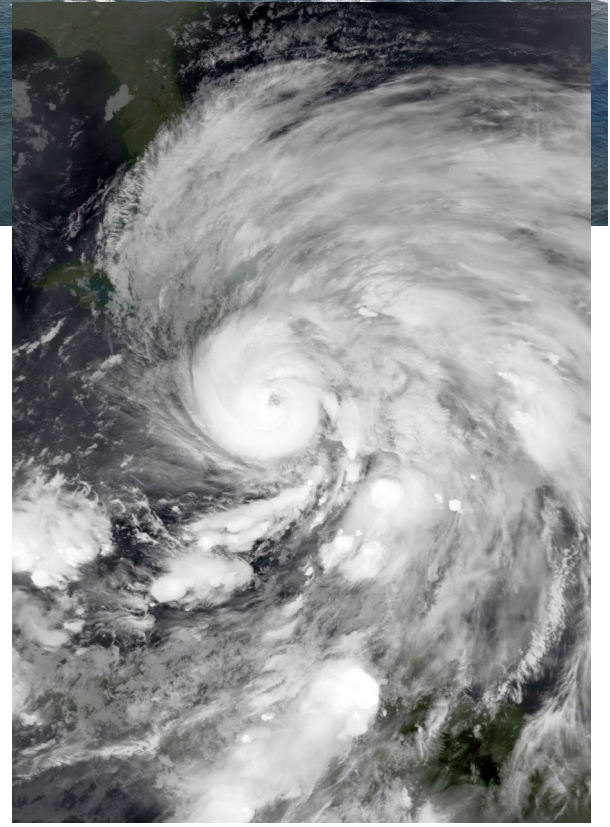
Examples of Impacts on Migration

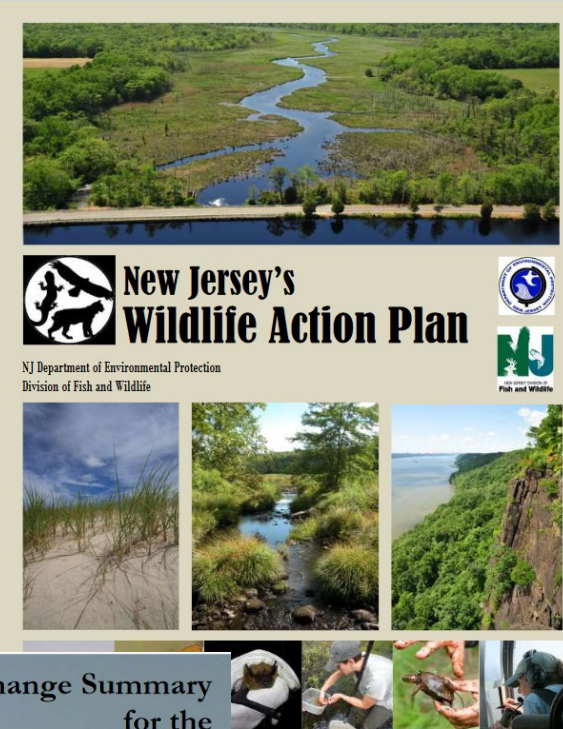
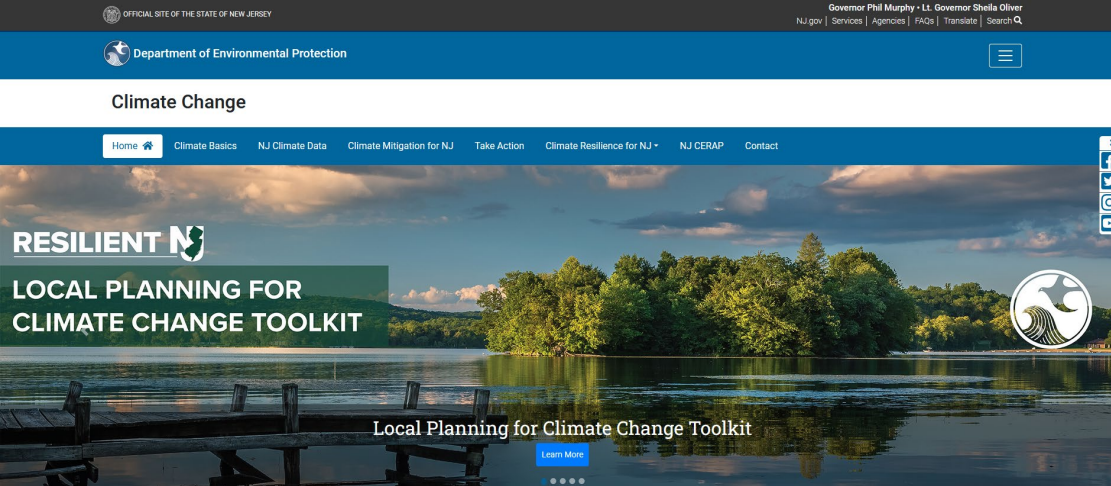
- Interruption of synchronicity of foraging resources and migrating birds – the most well-known example being Red Knot and horseshoe crab eggs.
- Ocean acidification and warming waters will lead to changes in invertebrate phenology and species make-up.



Example of Impacts on Migration

- Loss of stopover habitat due to sea-level rise, flooding, erosion, and subsidence.
- Navigating through and around stronger hurricanes will require greater energy expenditures.





More Information:

NJDEP Climate Change Website – <https://www.nj.gov/dep/climatechange/>
 NJ Wildlife Action Plan – <https://www.state.nj.us/dep/fgw/ensp/waphome.htm>
 Rutgers Climate Institute - <https://climatechange.rutgers.edu/>

Western Hemisphere Shorebird Reserve Network -
<https://whsrn.org/site-support/climate-change/>

Predicting Vulnerabilities of North American Shorebirds to Climate Change
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0108899#abstract0>

Climate Change Could Overturn Bird Migration: Transarctic flights and high-latitude residency in a sea ice free Arctic
<https://www.nature.com/articles/s41598-019-54228-5>

