The Effect of Sea-Level Rise on Black Skimmer Nesting Colonies

Authors: Sadiqah Quadery\textsuperscript{1,3} Sudipta Barua\textsuperscript{1,4}, Brianna Francis\textsuperscript{1}, Jason Smith\textsuperscript{2}, Giselle Herrera\textsuperscript{1}

Affiliations: Rockaway Initiative for Sustainability and Equity (RISE); New York State Department of Environmental Conservation (NYSDEC); Bronx High School of Science; Stuyvesant High School

**Introduction**

- *Rynchops niger* = Black Skimmer
- Listed as “Species of Special Concern” by NYSDEC
- Migratory Colonial Waterbird
- Live in Salt Marshes and Coastal Beaches
- Global Warming leads to flooding, climate change & sea-level rise
- Upward Sea-Level Rise = Salt Marsh Erosion
- Extremely picky about nesting colonies
- 89% Abandonment Rate
  - Flooding
  - Predation
  - Human Disturbances

**Hypothesis:** If there is an increase in sea-level rise, then the number of Black Skimmer nesting colonies will decrease.

**Materials & Methods**

- A spreadsheet provided by the NYSDEC displayed Black Skimmer colonies in each of the beach and island colonies (1985-2020).
- Using data from the spreadsheet, we created 3 graphs:
  1. Tracking the annual population of Black Skimmers (Figure 2)
  2. Listing the number of annual Black Skimmer colonies (Figure 3)
  3. Creating a 5-year rolling average for total population and colonies (Figure 4)
- Google Earth was used to visualize the loss of colonies from 1985-2020 (Figures 1.1.1)
- NOAA was used to observe sea level rise in specific marsh islands (Figure 5)
- NASA Goddard Space Station tracked the sea level rise all over North America from 1993-2021 (Figure 5)

**Results**

- Black Skimmer population begins decreasing (2017-2020)
- Number of Black Skimmer Colonies decrease
  - 1985 (n=35)
  - 2020 (n=3)
  - 76.2 mm (about 3 inches) increase in sea-levels in the last 25 years
  - 3.4 mm (about 1/10 inches) increase annually

**Discussion**

We realized that areas that experienced flooding and erosion as a result of sea level rise had caused a decline in Black Skimmer’s population and reproductive success.

As a result, we recommend that Black Skimmers should be labeled as endangered.

- The Department of Environmental Conservation lists general criteria for animals qualifying as endangered, in which Black Skimmers fit 5 of the 11 listed criteria.

Future Initiatives:

1. Use our results to identify habitat nesting requirements
2. Continue to survey Black Skimmers during nesting season (April to May)
3. Test the effectiveness of various Black Skimmer conservation strategies

**Acknowledgements**

We’d like to thank Brianna Francis, Jason Smith, and Giselle Herrera; without the NYSDEC and RISE, this opportunity would not be possible. We would like to extend our thanks to the Pinkerton Foundation, New York Science Research and Mentoring Consortium, and the Simons Foundation!

**References**


**Figure 5.** Sea-level measurement in millimeters from NASA’s Goddard Space Flight Center via satellite from 1993-2021.