
Machias Seal Island

Demographic Data Summary 1995 - 2025

Banding, phenology, productivity, chick growth rates, and fledgling condition



UNB's research program on MSI is directed toward the overall objective of understanding seabird responses to long-term changes in their marine ecosystem. This requires annual monitoring of the demographics (population size, productivity, and survival) and feeding behaviour (feeding rate, and quantity and quality of diet species) of each species.

This document provides summary data related to our demographic data collection on MSI, including a summary of our banding activities and phenology, productivity, chick growth rates, and fledgling condition of the species we monitor.

Note, we do not have data for all measures of demography for all species.

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Banding

Atlantic Puffin (*Fratercula arctica*):

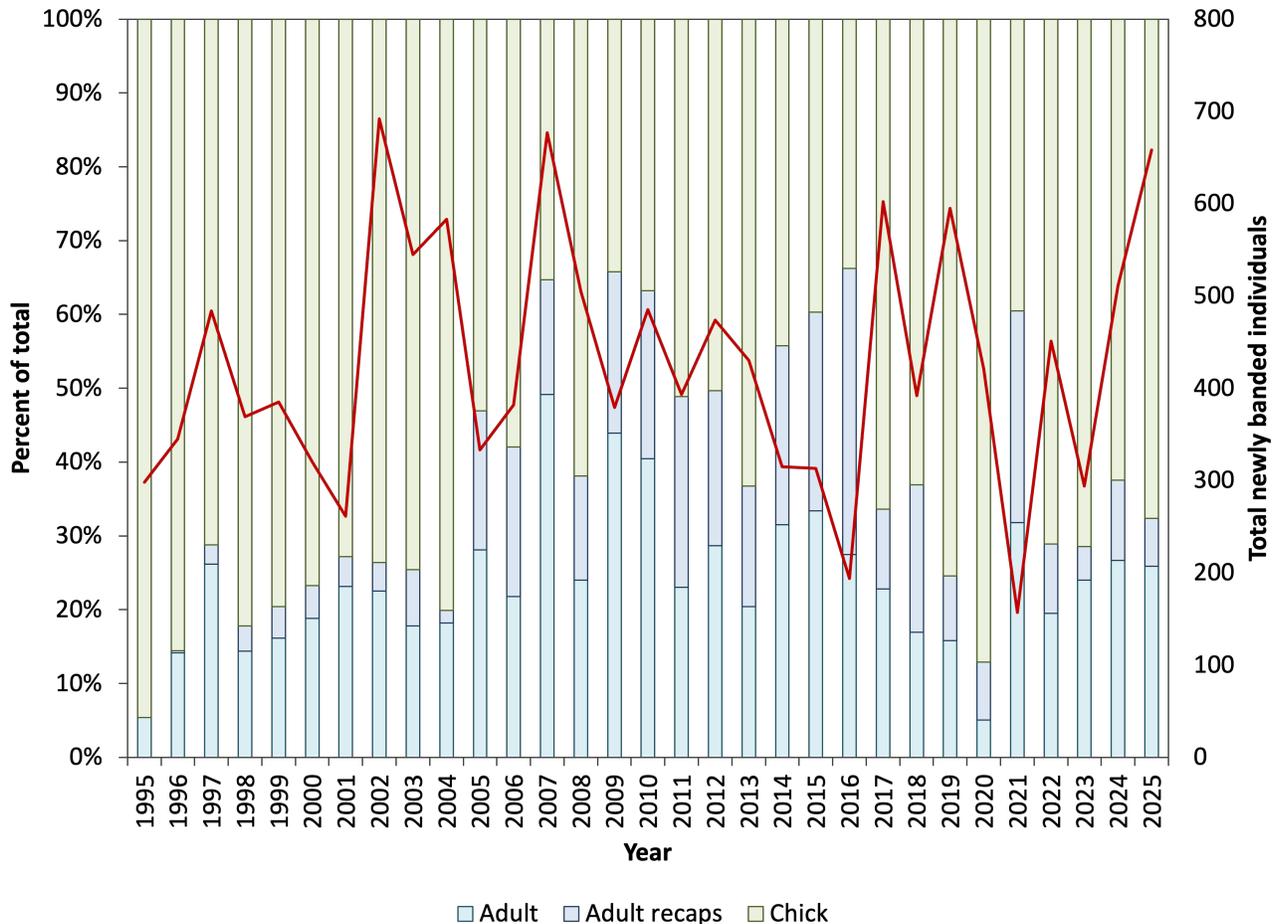


Figure 1. Comparison of percent total of **Atlantic Puffin** adults, adult recaps, and chicks banded between 1995 - 2025 on MSI and the total number of individuals banded at MSI in those same years.

Pre-1995 banding:

- 1955-1977 a total of 125 puffins were banded
- 1978-1994 a total of 1272 puffins were banded

Notes:

Due to COVID-19 restrictions, our crew arrived at MSI on July 4th2020, puffin chicks were already large and limited effort was put into capturing/recapturing adults, focusing instead of capturing and banding as chicks.

Razorbill (*Alca torda*):

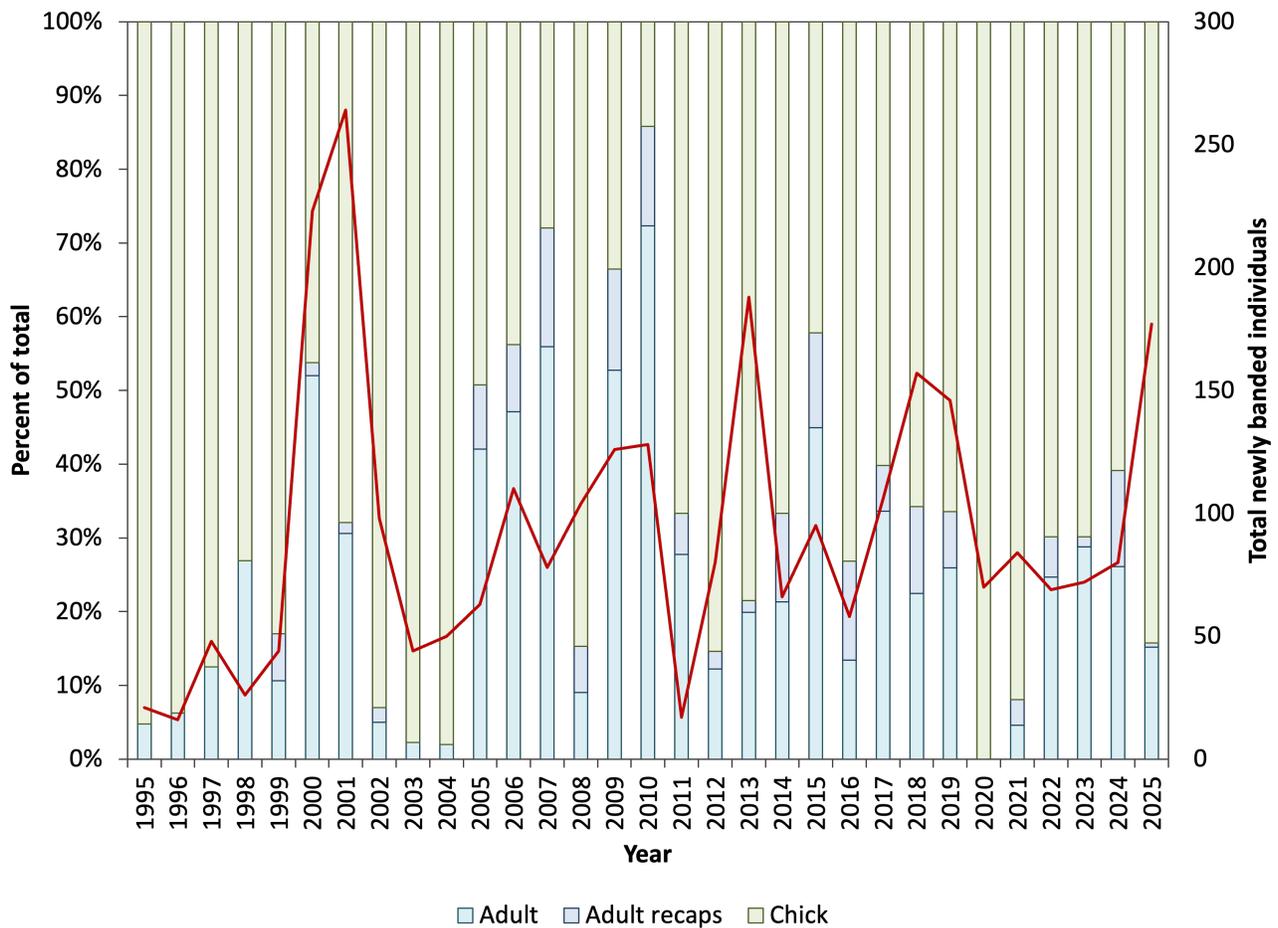


Figure 2. Comparison of percent total of **Razorbill** adults, adult recaps, and chicks banded between 1995 - 2025 on MSI and the total number of individuals banded at MSI in those same years.

Pre-1995 banding:

No Razorbill bill banding prior to 1995

Notes:

- Due to COVID-19 restrictions, our crew arrived at MSI on July 4th 2020, when Razorbill chicks were already fledging. No adults were captured/recaptured.

Common Murre (*Uria aalge*):

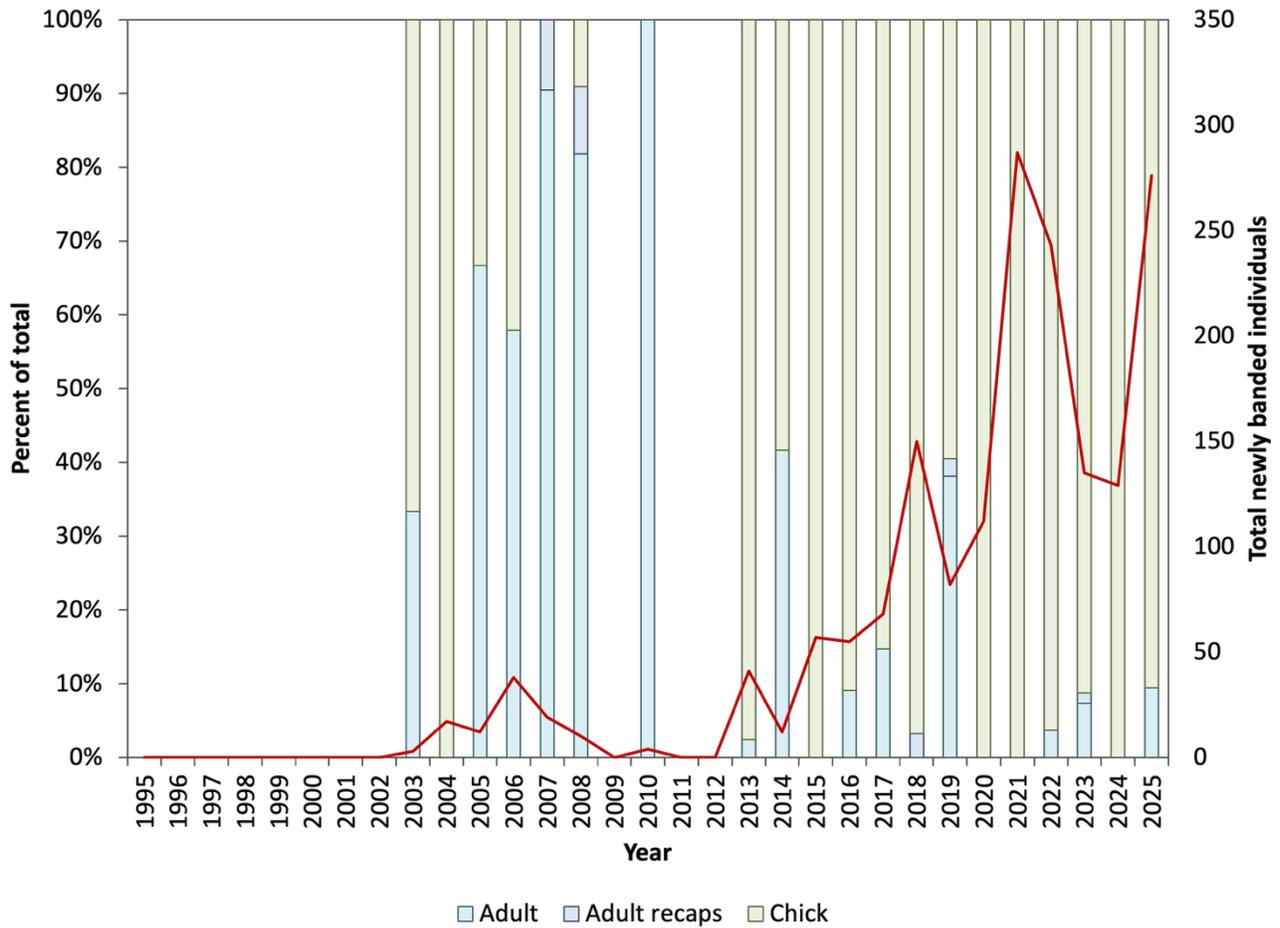


Figure 3. Comparison of percent total of **Common Murre** adults, adult recaps, and chicks banded between 1995 - 2025 on MSI and the total number of individuals banded at MSI in those same years.

Pre-1995 banding:

No Common Murre banding prior to 1995

Leach's Storm-petrel (*Oceanodroma leucorhoa*):

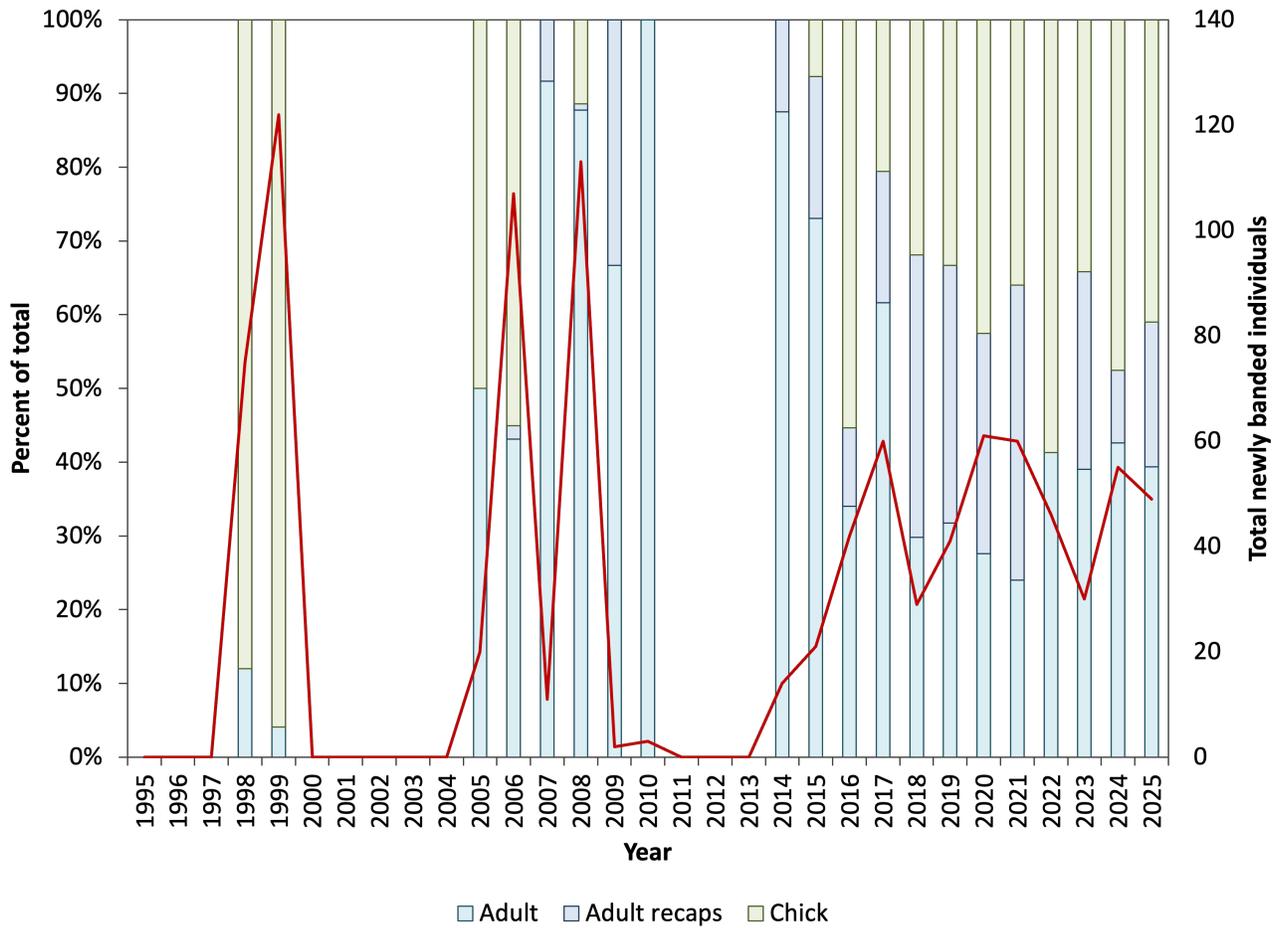


Figure 4. Comparison of percent total of **Leach's Storm-petrel** adults, adult recaps, and chicks banded between 1995 - 2025 on MSI and the total number of individuals banded at MSI in those same years.

Pre-1995 banding:

1955-1977 a total of 46 petrels were banded

1978-1994 a total of 70 petrels were banded

Common Tern (*Sterna hirundo*):

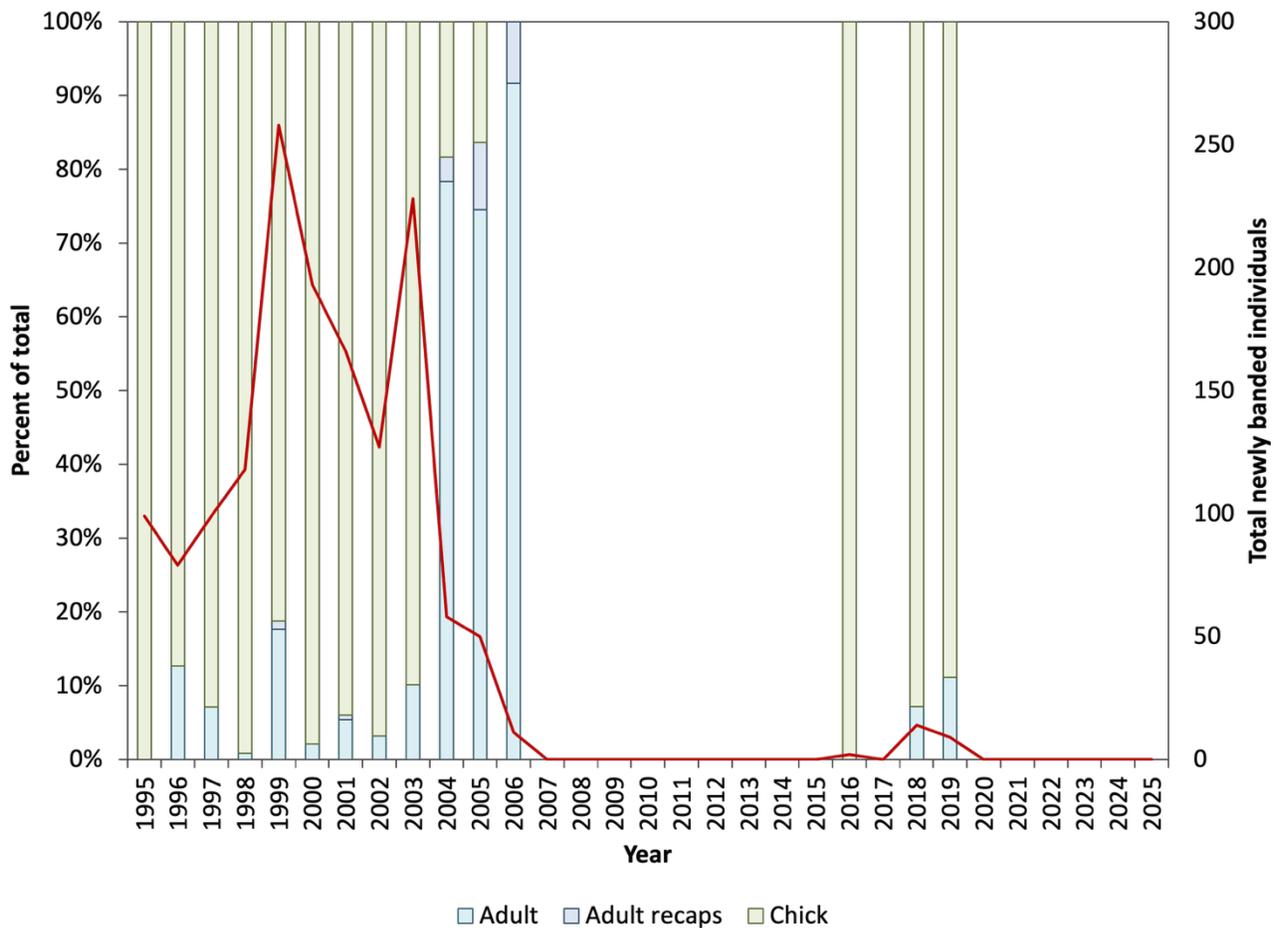


Figure 5. Comparison of percent total of **Common Tern** adults, adult recaps, and chicks banded between 1995 - 2025 on MSI and the total number of individuals banded at MSI in those same years.

Pre-1995 banding:

1955-1977 a total of 1 Common Tern was banded

1978-1994 a total of 3 Common Terns were banded

Notes:

Due to COVID-19 restrictions, our crew arrived at MSI on July 4th 2020, by which time the tern colony had abandoned the island, presumably because of gull predation and disturbance.

Arctic Tern (*Sterna paradisaea*):

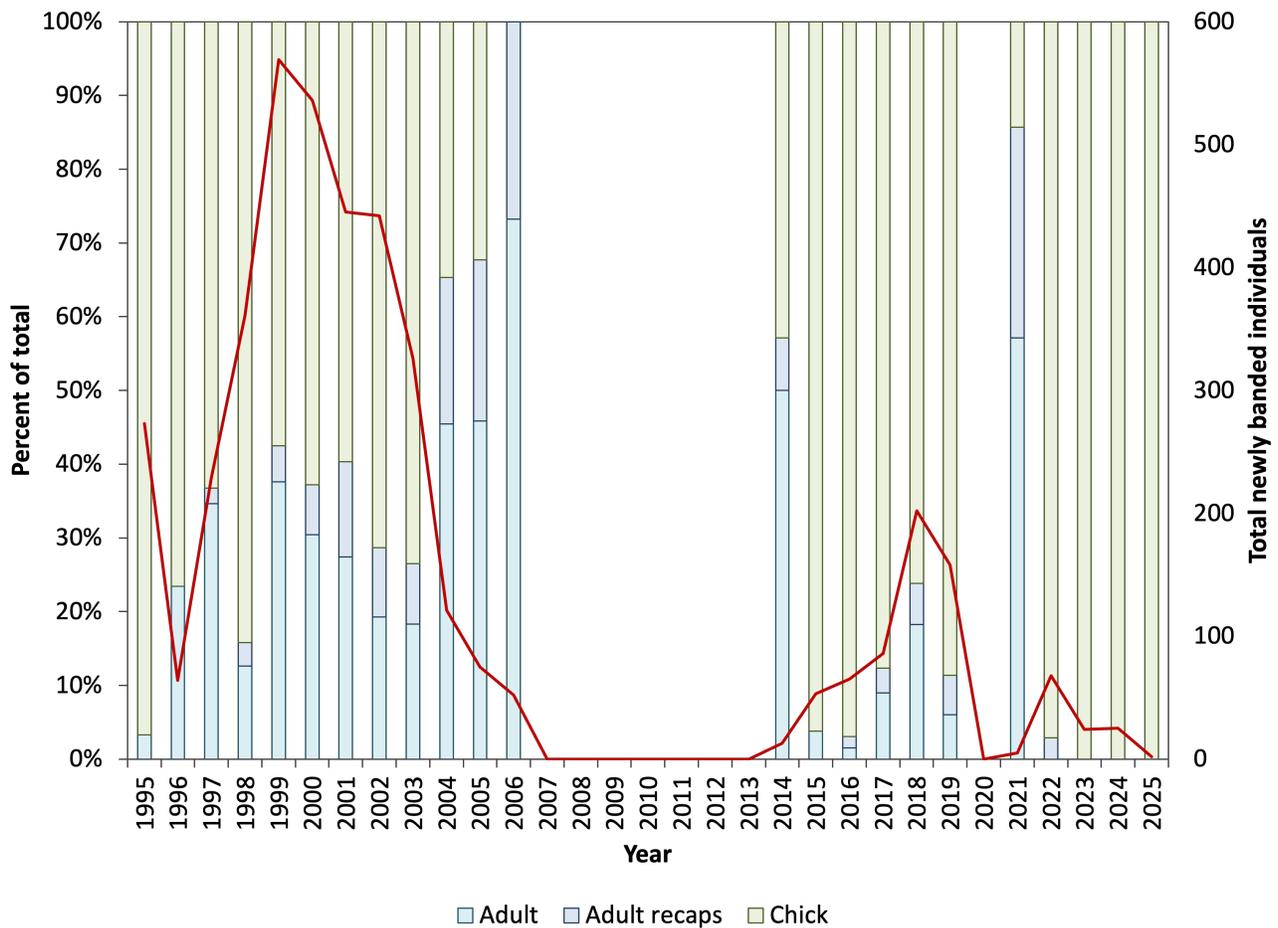


Figure 6. Comparison of percent total of **Arctic Tern** adults, adult recaps, and chicks banded between 1995 - 2025 on MSI and the total number of individuals banded at MSI in those same years.

Pre-1995 banding:

- 1955-1977 a total of 449 Arctic Terns were banded
- 1978-1994 a total of 1075 Arctic Terns were banded

Notes:

Due to COVID-19 restrictions, our crew arrived at MSI on July 4th 2020, by which time the tern colony had abandoned the island, presumably because of gull predation and disturbance.

Phenology

Atlantic Puffin (*Fratercula arctica*):

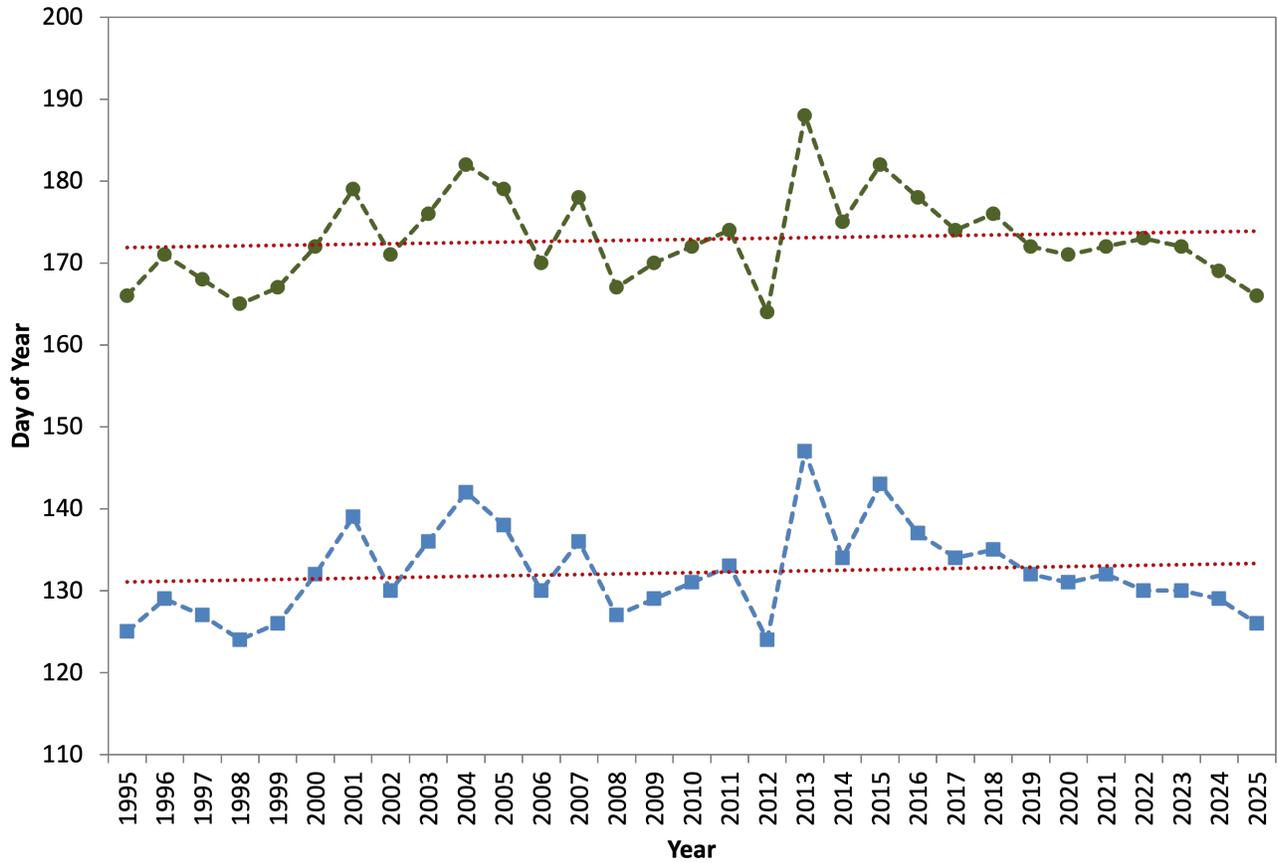


Figure 7. Comparison of **Atlantic Puffin** mean lay date (blue) and peak hatch date (green), between 1995 - 2025 at MSI. Lines of best fit are given to indicate change over time.

Razorbill (*Alca torda*):

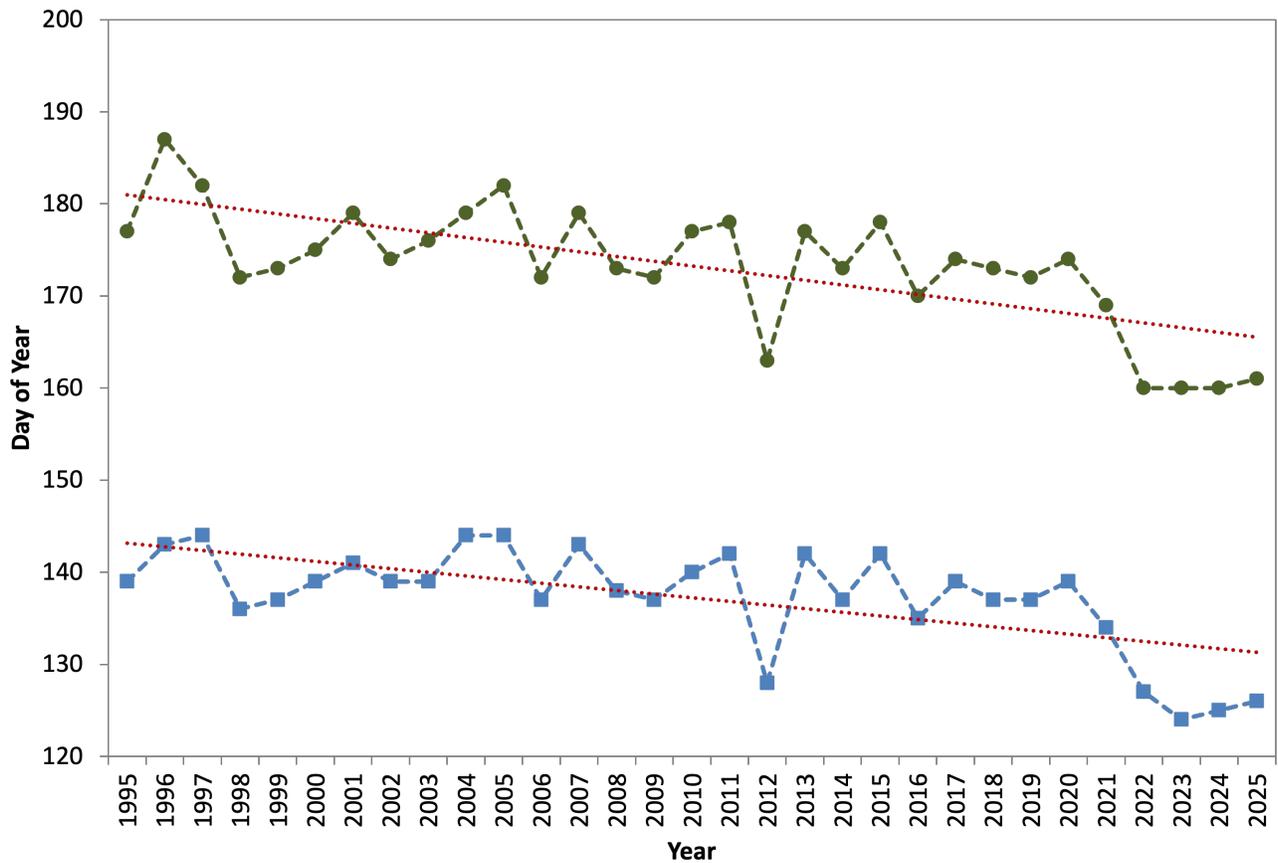


Figure 8. Comparison of **Razorbill** mean lay date (blue) and peak hatch date (green), between 1995 - 2025 at MSI. Lines of best fit are given to indicate change over time.

Common Tern (*Sterna hirundo*):

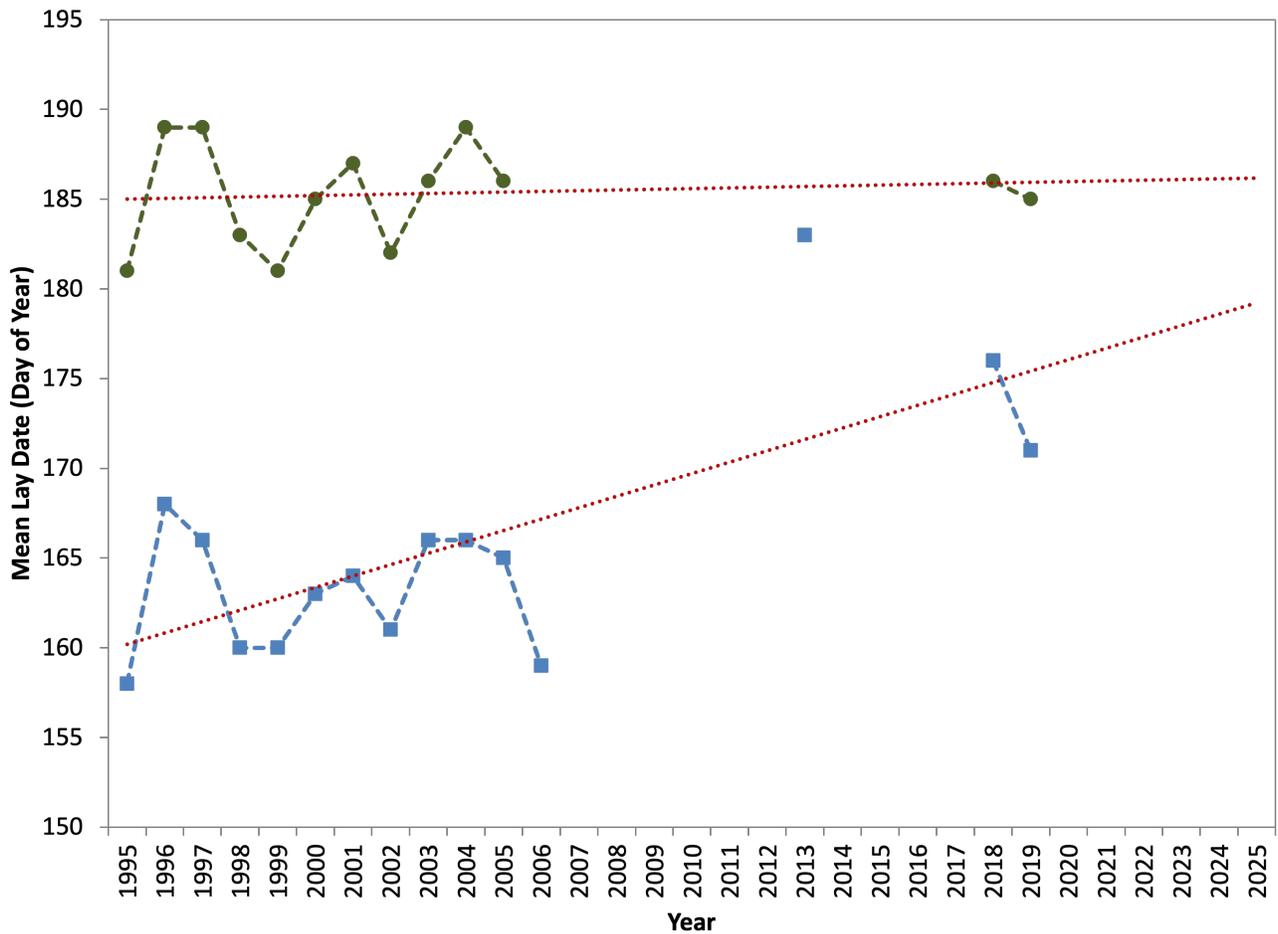


Figure 9. Comparison of **Common Tern** mean lay date (blue) and peak hatch date (green), between 1995 - 2025 at MSI. Lines of best fit are given to indicate change over time.

Notes:

- Total number of tern nests monitored in 2013 was 1 and in 2018 was 8; all years before 2006 had > 30 nests monitored.
- Tern colony abandoned in spring 2020, no nests were initiated.

Arctic Tern (*Sterna paradisaea*):

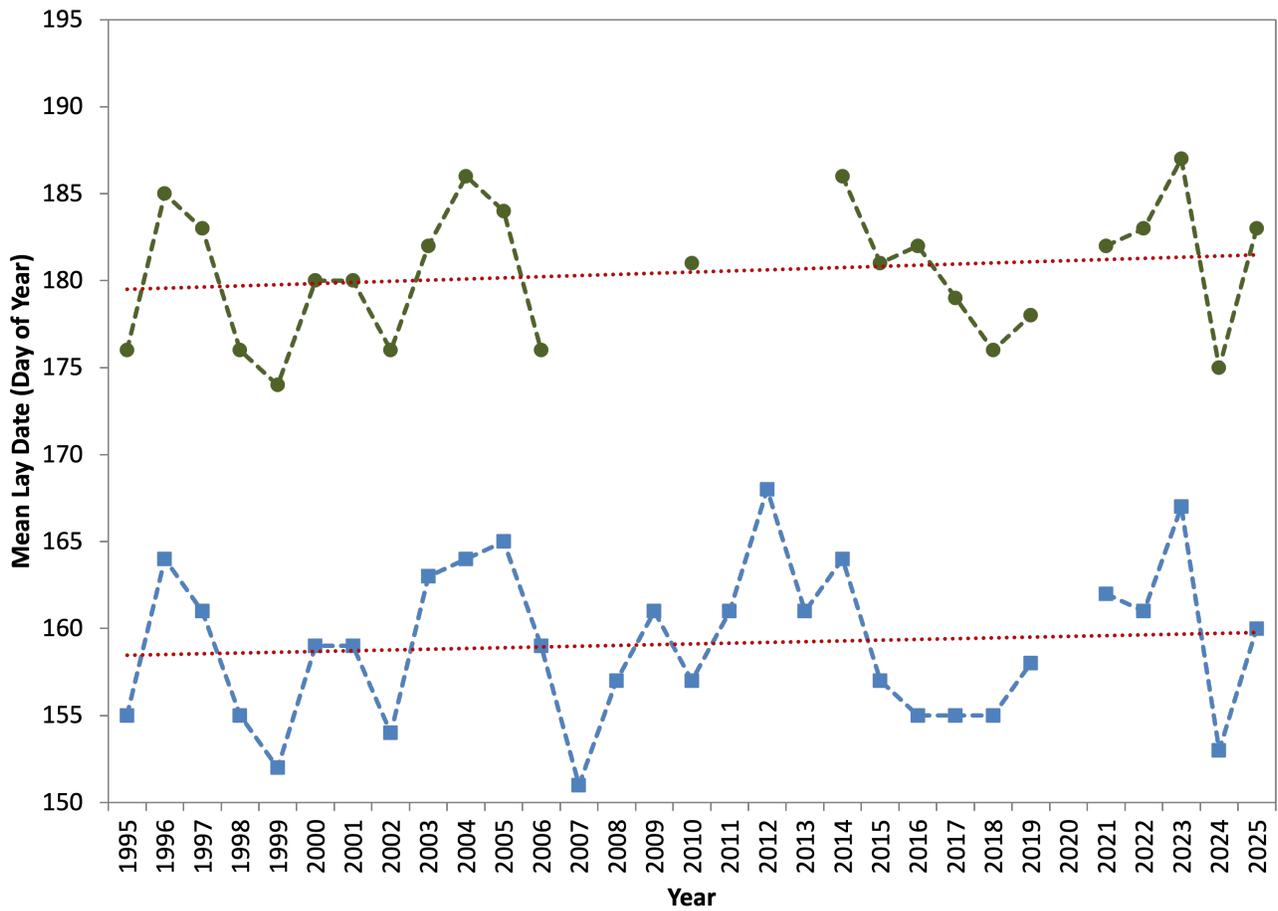


Figure 10. Comparison of Arctic Tern mean lay date (blue) and peak hatch date (green), between 1995 - 2025 at MSI. Lines of best fit are given to indicate change over time.

Notes:

- Tern colony abandoned in spring 2020, no nests were initiated.

Productivity

Atlantic Puffin (*Fratercula arctica*):

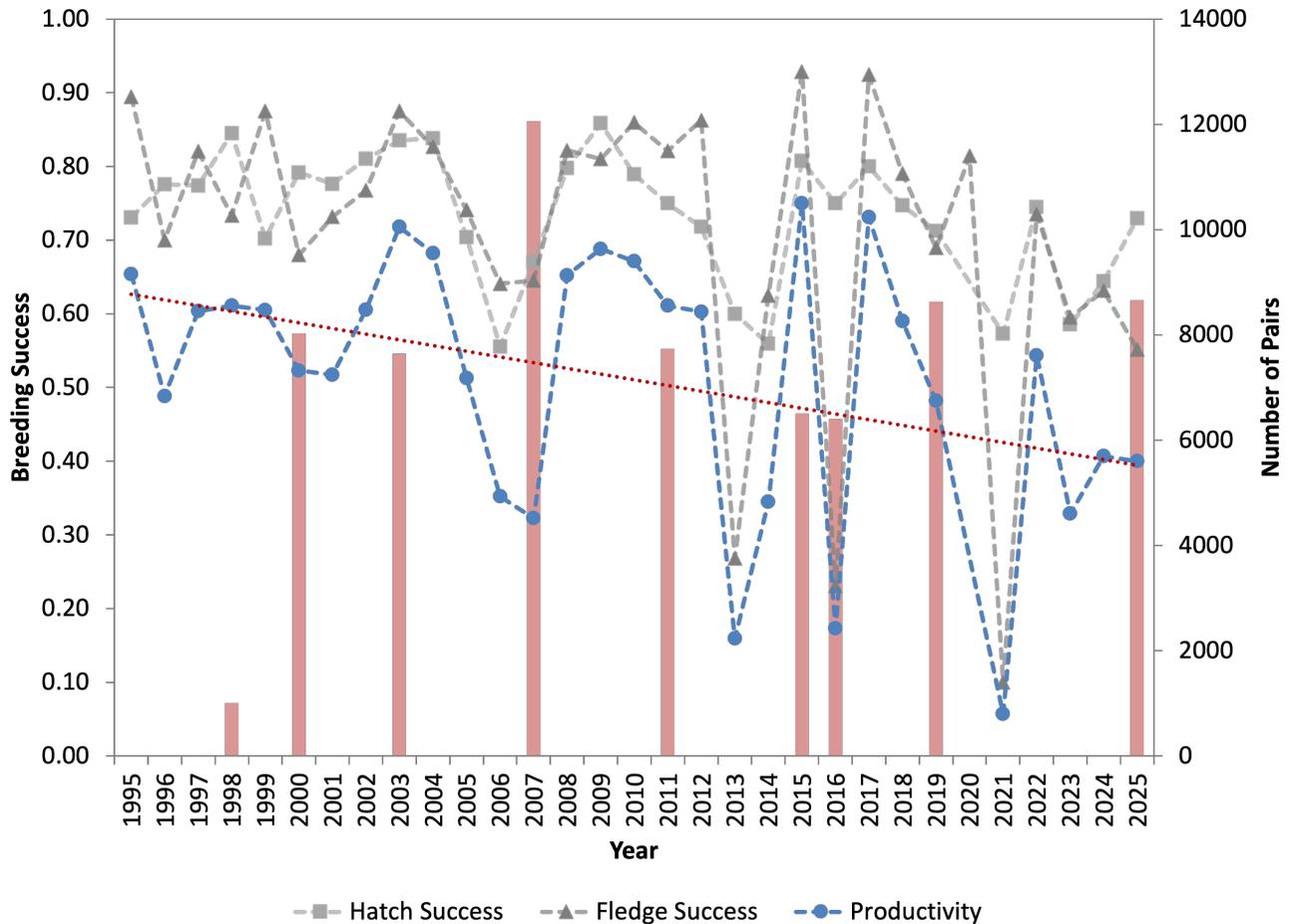


Figure 11. Summary of **Atlantic Puffin** breeding success including hatch success (light grey squares; # eggs that produced a chick), fledge success (darker grey triangles; # chicks that fledged), and productivity (blue circles; # of fledgers per active nest) and the estimated number of breeding pairs from census counts (red bars) between 1995 – 2025 on MSI. Line of best fit is given to indicate change over time for productivity.

Notes:

- Due to COVID-19 restrictions, only fledge success was estimated for 2020.

Razorbill (*Alca torda*):

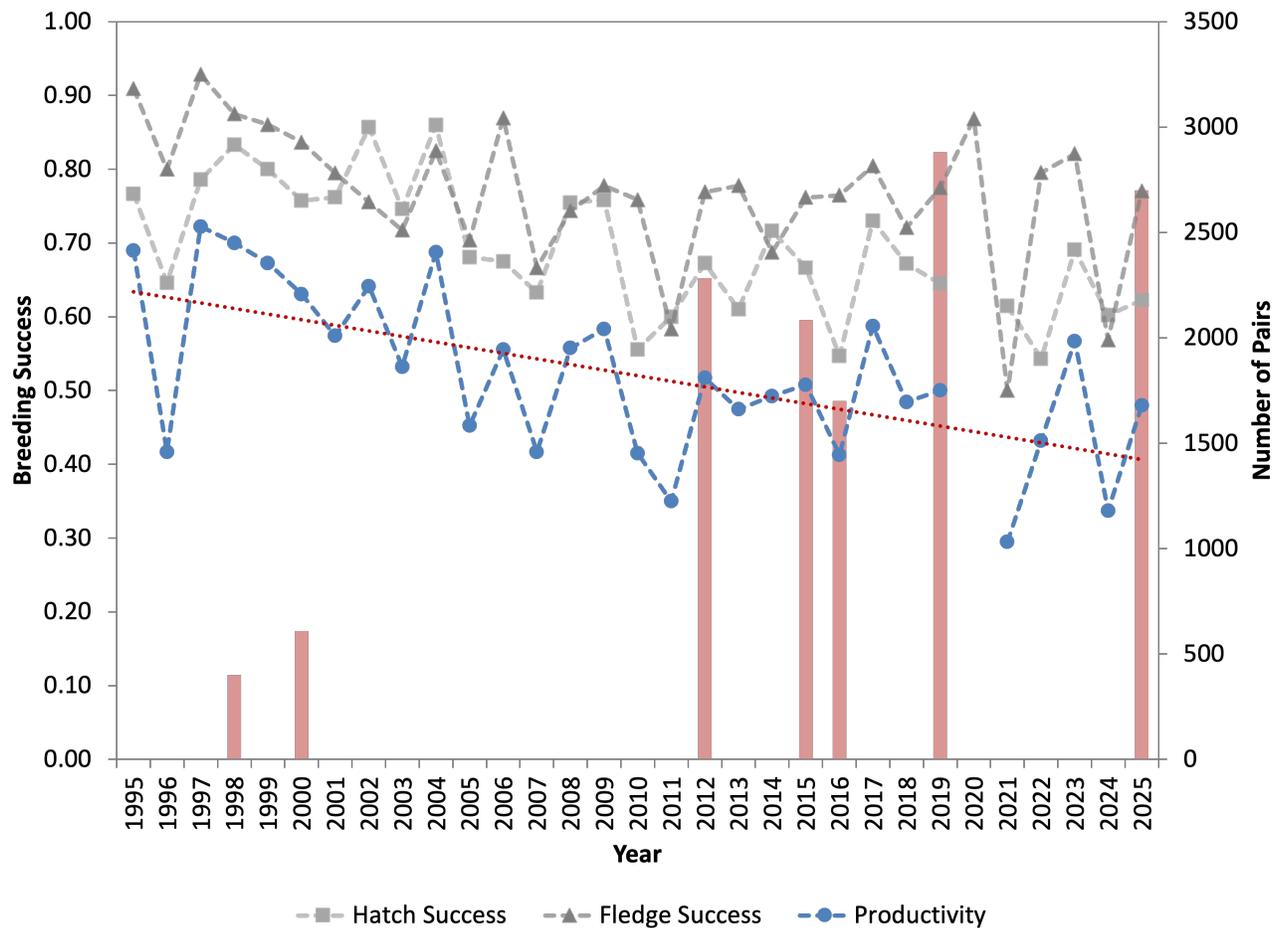


Figure 12. Summary of **Razorbill** breeding success including hatch success (light grey squares; # eggs that produced a chick), fledge success (darker grey triangles; # chicks that fledged), and productivity (blue circles; # of fledgers per active nest) and the estimated number of breeding pairs from census counts (red bars) between 1995 - 2025 on MSI. Line of best fit is given to indicate change over time for productivity.

Notes:

- Due to COVID-19 restrictions, only fledge success was estimated for 2020.

Common Murre (*Uria aalge*):

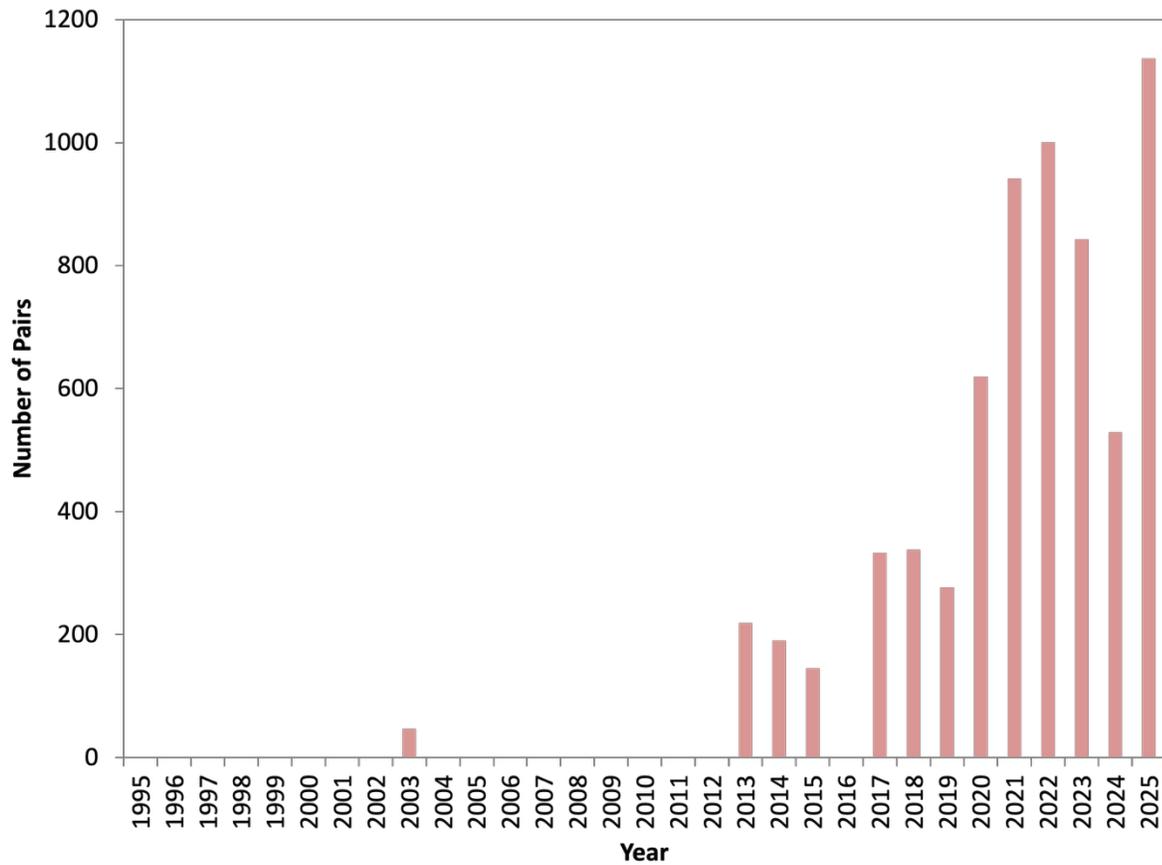


Figure 13. Summary of **Common Murre** breeding attempts (i.e., total number of eggs and chicks counted) between 1995 - 2025 on MSI.

NB: We do not monitor Common Murre productivity, but we do counts of every egg and chick to estimate the number of breeding pairs. Counts in 2023 and 2024 were completed late and may not be indicative of the total number of breeding attempts.

Common Tern (*Sterna hirundo*):

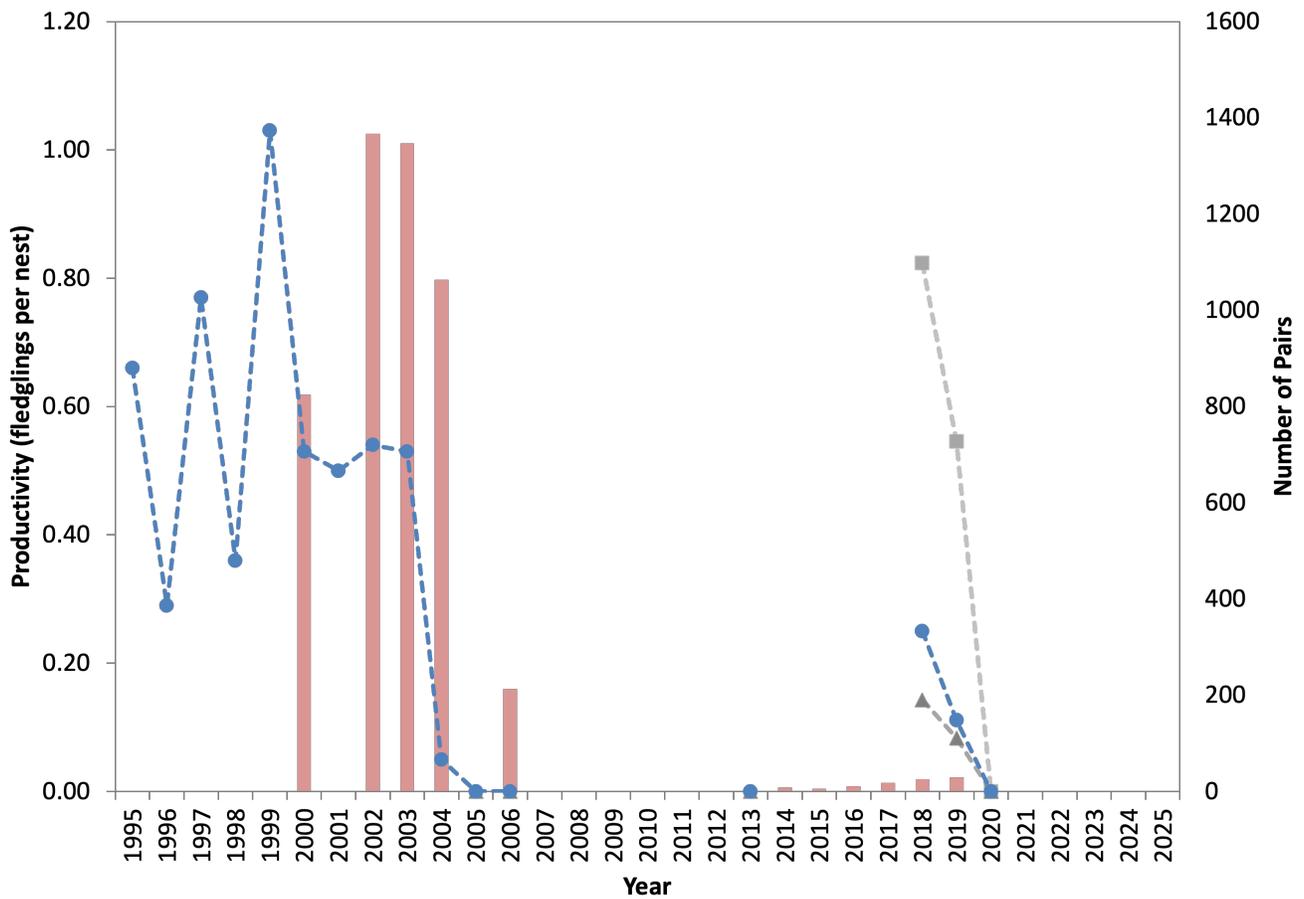


Figure 14. Summary of **Common Tern** breeding success including hatch success (light grey squares; # eggs that produced a chick), fledge success (darker grey triangles; # chicks that fledged), and productivity (blue circles; # of fledglers per active nest) and the estimated number of breeding pairs from census counts (red bars) between 1995 - 2025 on MSI.

Arctic Tern (*Sterna paradisaea*):

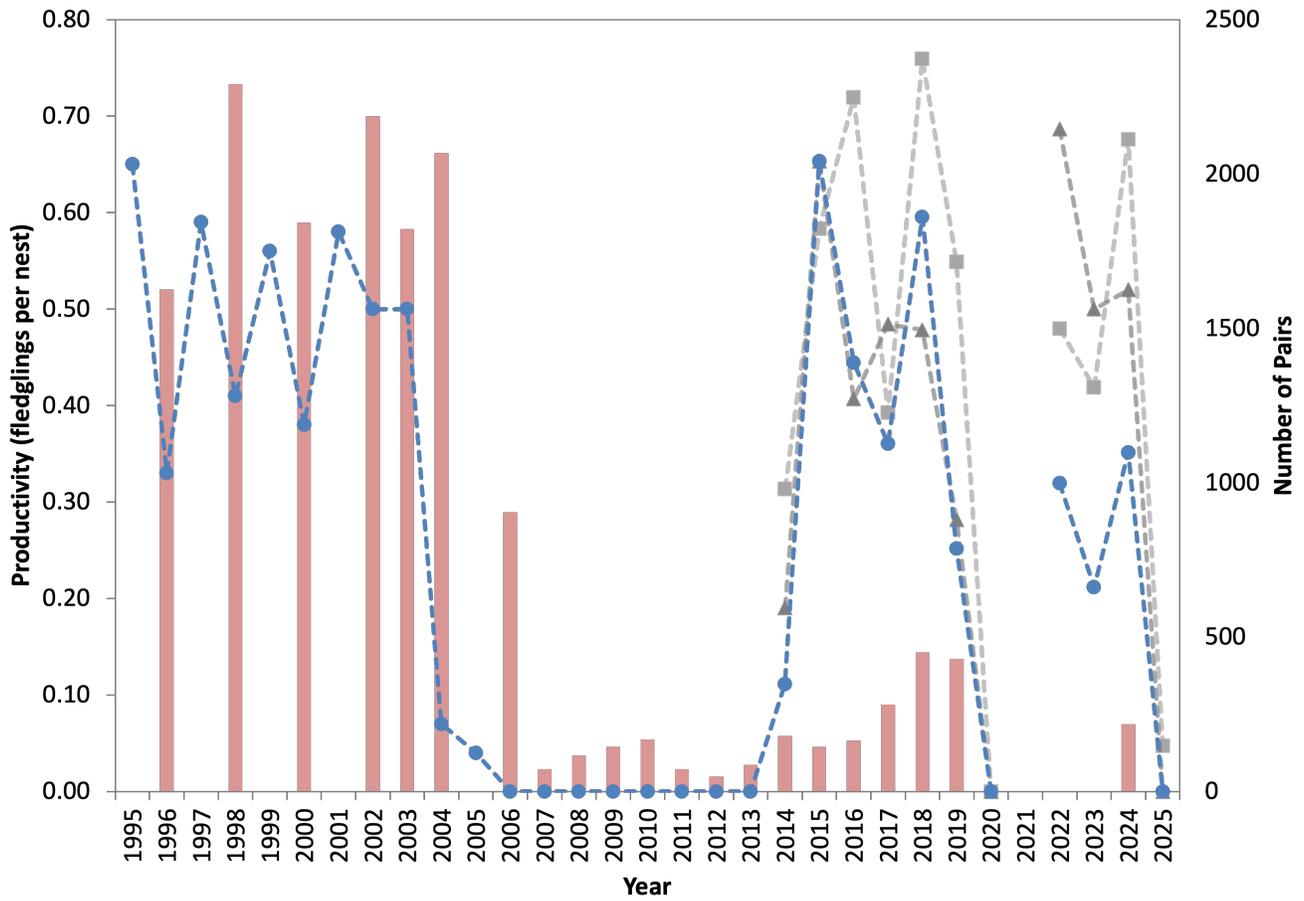


Figure 15. Summary of **Arctic Tern** breeding success including hatch success (light grey squares; # eggs that produced a chick), fledge success (darker grey triangles; # chicks that fledged), and productivity (blue circles; # of fledgers per active nest) and the estimated number of breeding pairs from census counts (red bars) between 1995 – 2025 on MSI.

Chick Growth Rates

Atlantic Puffin (*Fratercula arctica*):

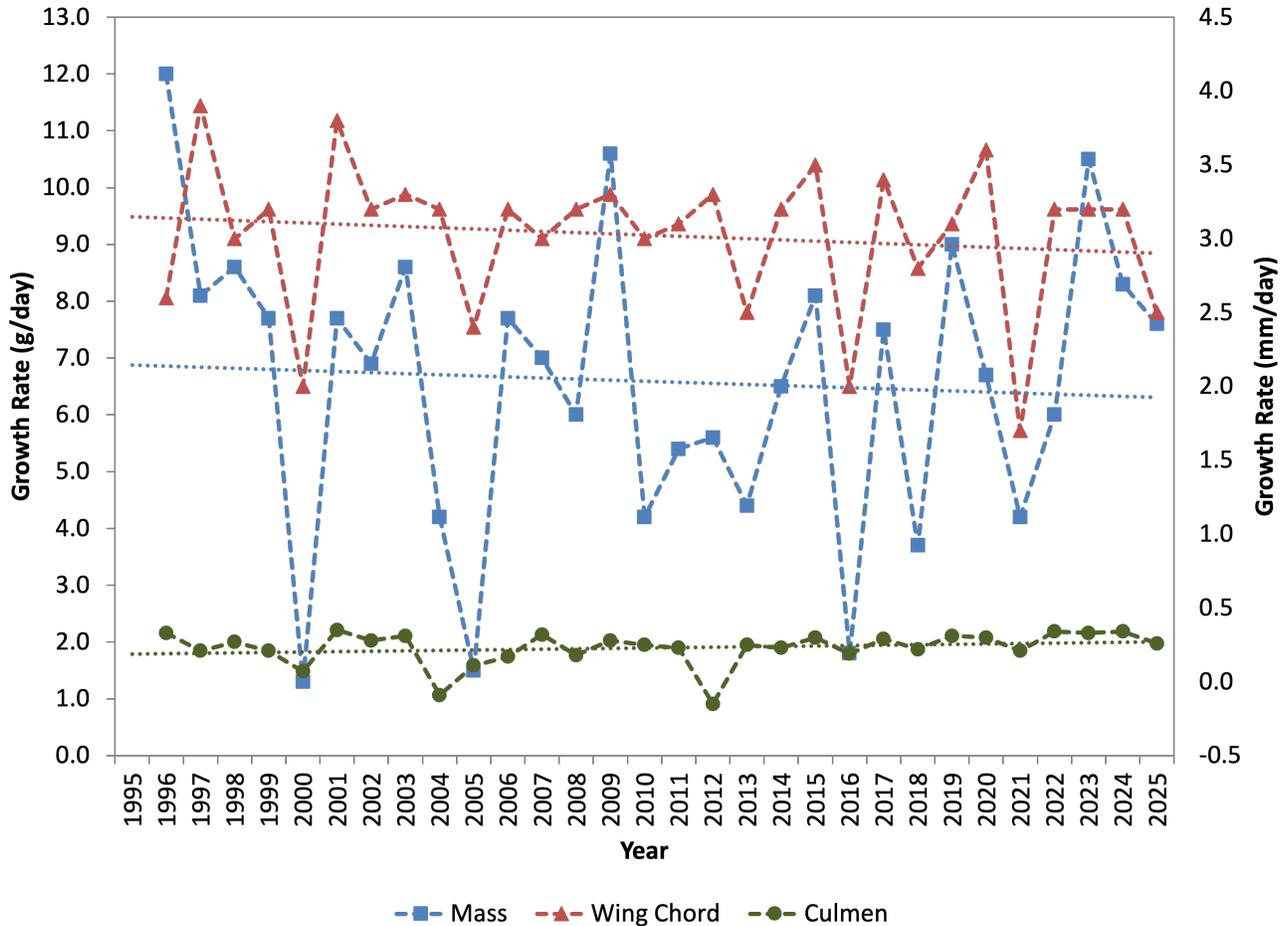


Figure 16. Comparison of Atlantic Puffin chick growth rate, during the linear phase of growth, for mass (blue), wing chord (red), and culmen (green) between 1995 - 2025 on MSI. Lines of best fit are given to indicate change over time.

Razorbill (*Alca torda*):

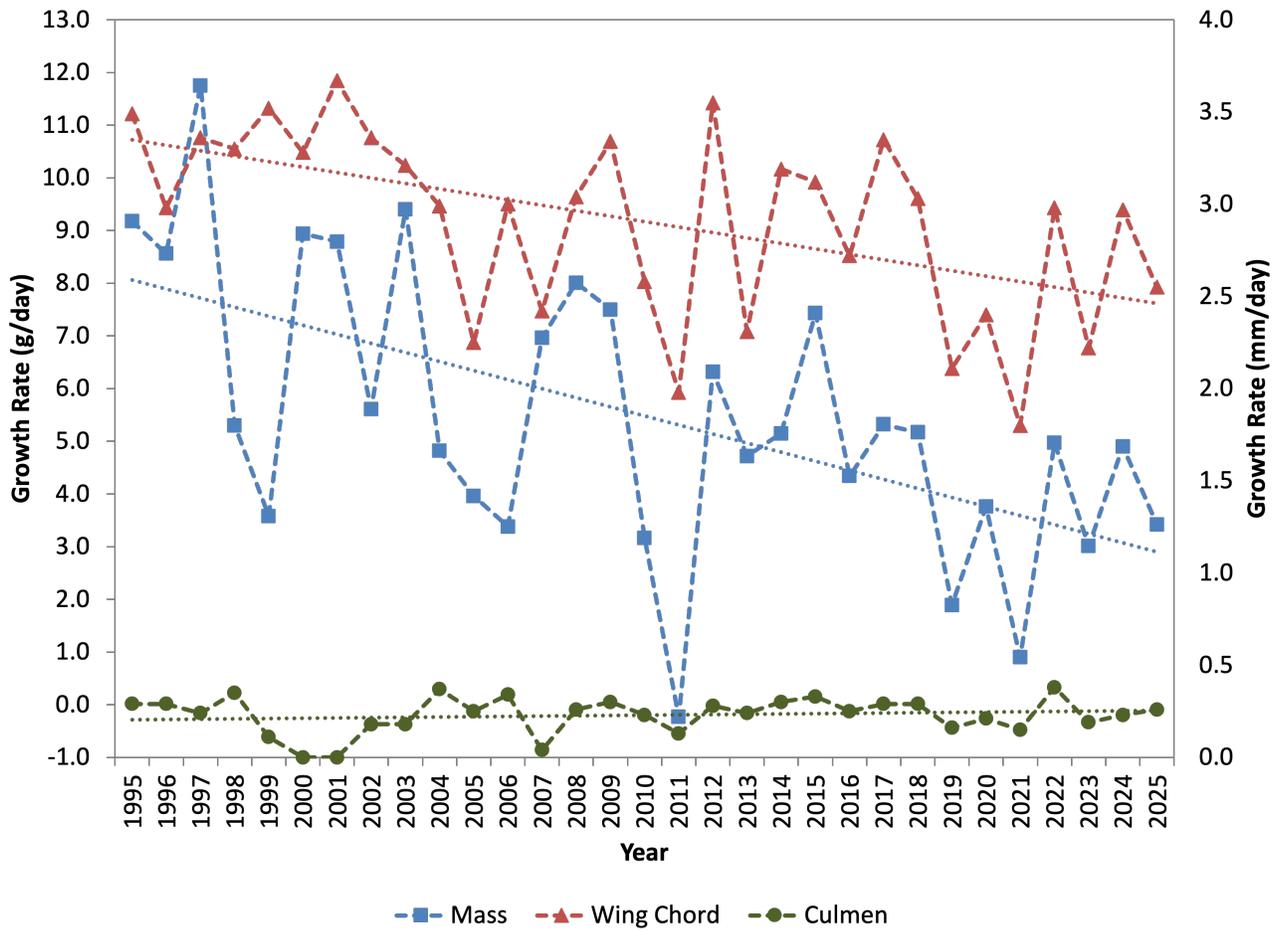


Figure 17. Comparison of Razorbill chick growth rate, during the linear phase of growth, for mass (blue), wing chord (red), and culmen (green) between 1995 - 2025 on MSI. Lines of best fit are given to indicate change over time.

Common Tern (*Sterna hirundo*):

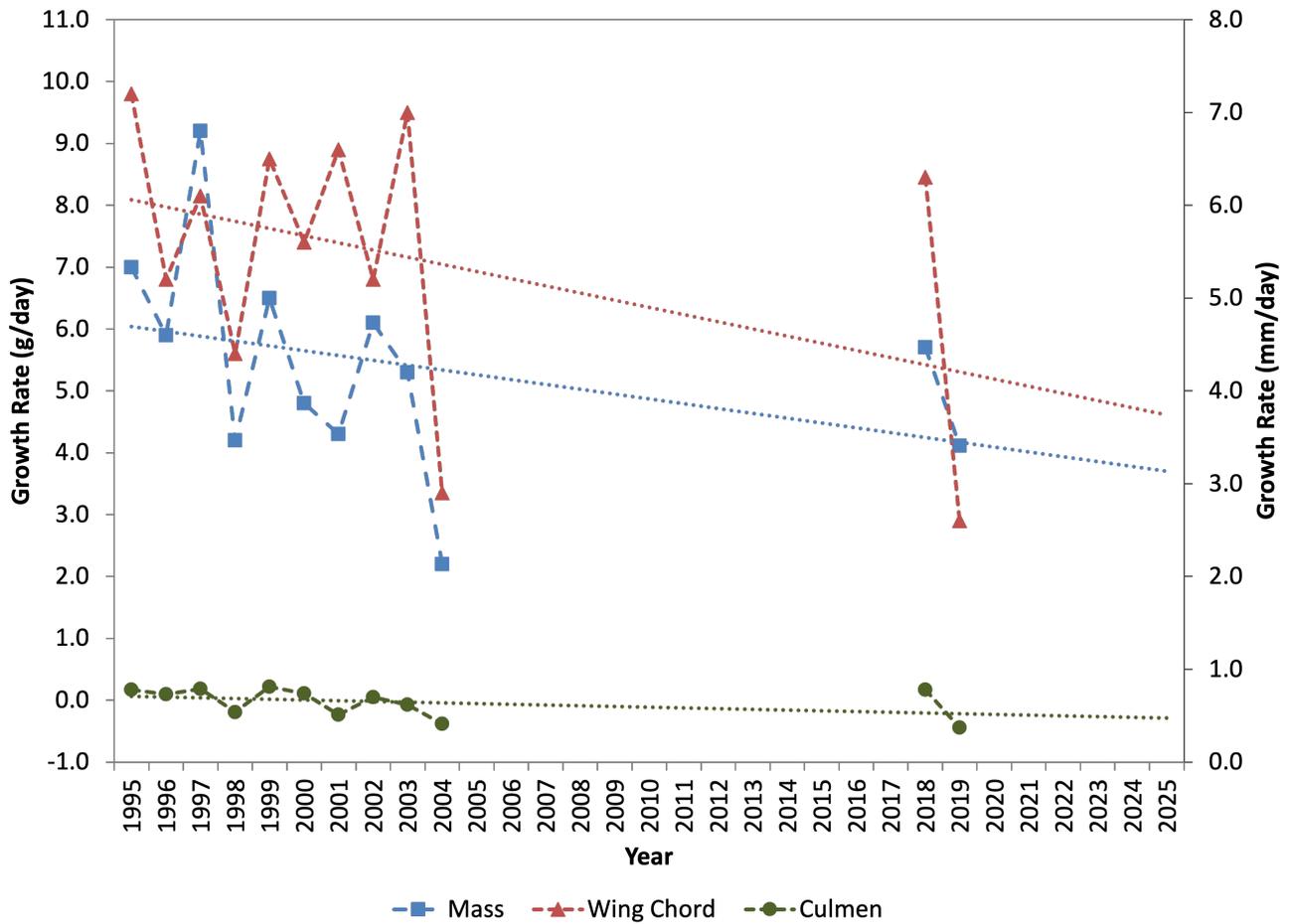


Figure 18. Comparison of **Common Tern** chick growth rate, during the linear phase of growth, for mass (blue), wing chord (red), and culmen (green) between 1995 – 2025 on MSI. Lines of best fit are given to indicate change over time.

Note missing data between 2005-2017 and 2020-2024 when Common Terns were absent or in insufficient number to monitor.

Arctic Tern (*Sterna paradisaea*):

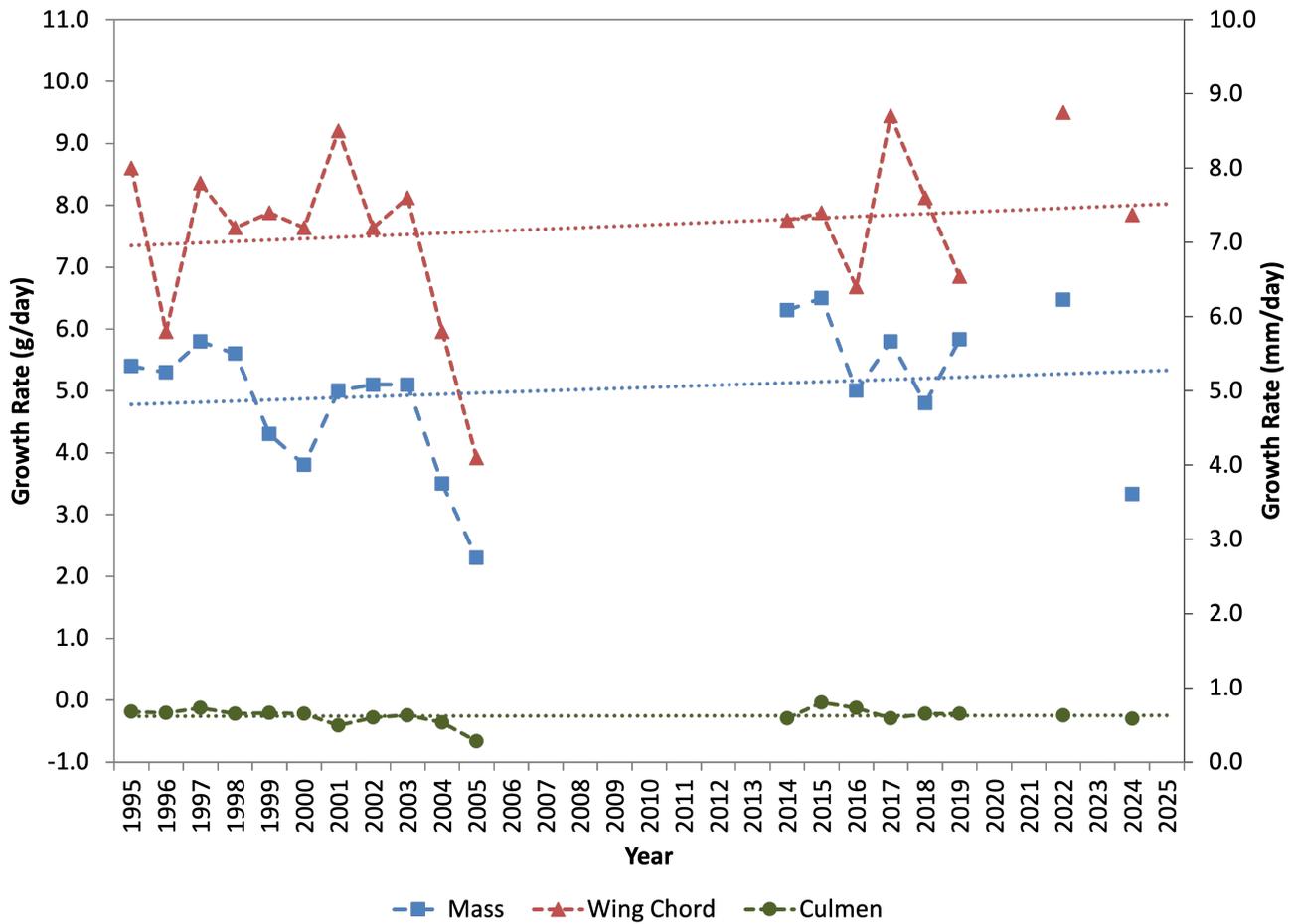


Figure 19. Comparison of Arctic Tern chick growth rate, during the linear phase of growth, for mass (blue), wing chord (red), and culmen (green) between 1995 - 2025 on MSI. Lines of best fit are given to indicate change over time.

Note missing data between 2006-2013 and 2020-2021 and 2023 when Arctic Terns were absent from MSI.

NB: Arctic Terns initiated nesting in 2021, but all nests failed during incubation and early chick rearing.

Fledgling Condition

Atlantic Puffin (*Fratercula arctica*):

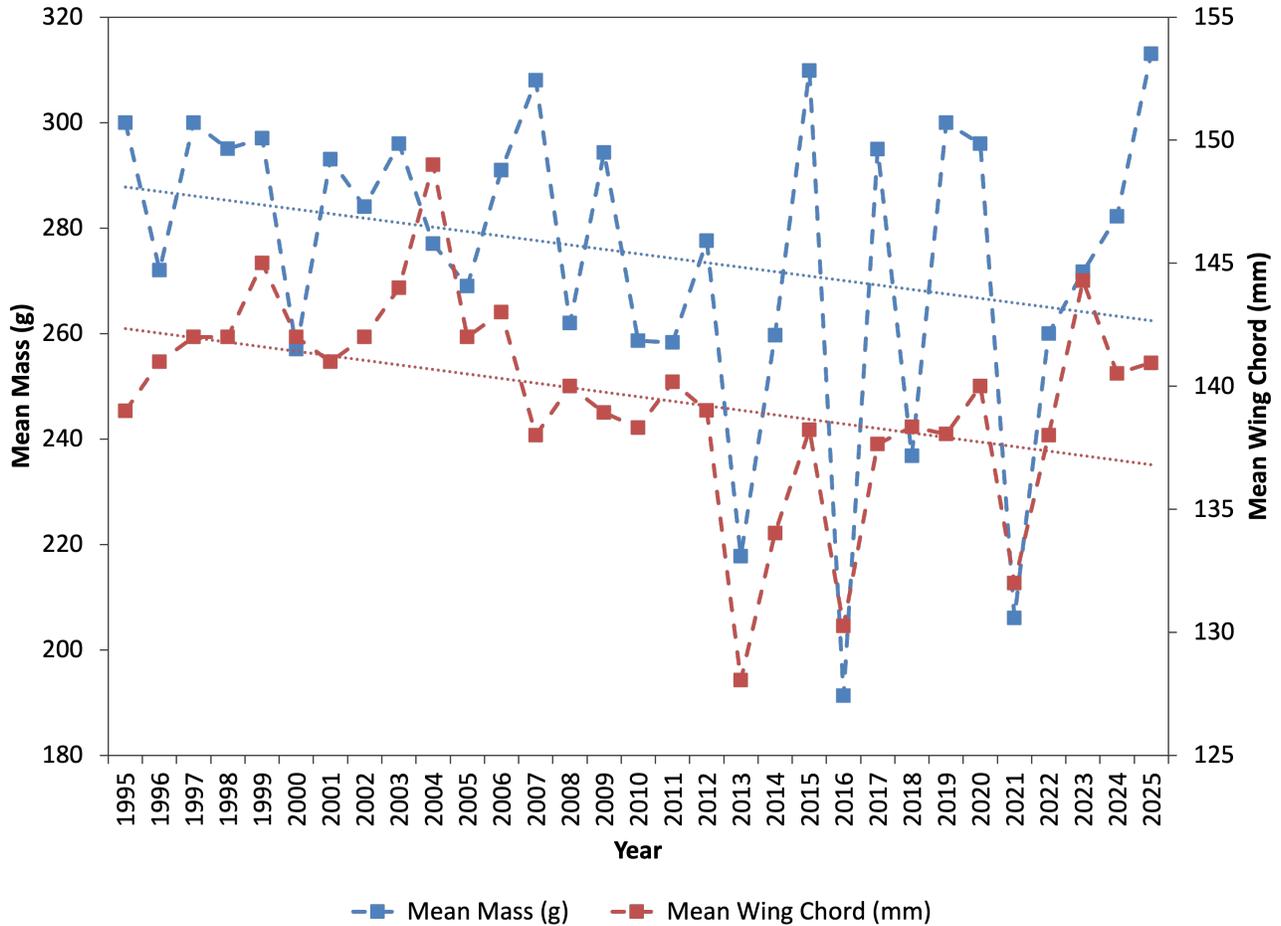


Figure 20. Mean mass in grams (blue) and wing chord in millimetres (red) for fledgling Atlantic Puffins captured on the lawn of the lighthouse during peak fledging on MSI between 1995 - 2025. Lines of best fit are given to indicate change over time.