

Investigating the Effects of Aging on the Reproductive Success of Female Saltmarsh Sparrows (*Ammospiza caudacuta*) in Maine and New Hampshire

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Research Question

Does age affect the reproductive success of female saltmarsh sparrows (*Ammospiza caudacuta*)?

Background

- Saltmarsh Sparrow (*Ammospiza caudacuta*) (Fig. 1)
 - Ground-nesting bird that nests only in coastal Maine to Virginia (Fig. 2)
 - Nests prone to fail due to tidal flooding
- With sea level rise, tidal floods become more severe, reducing availability of habitat and success of nests/nestlings
- Research efforts part of a long-term study of the species and its decreasing population (currently listed as globally endangered by IUCN)
- Age has been shown to affect fertility, behavior, and number of young produced, favoring older individuals



Figure 1. Banded *Ammospiza caudacuta* adult



Figure 2. Three sparrow nestlings in an active nest

Hypotheses

1. Older females have a higher proportion of nests/young hatch than younger females.
2. Older females have a higher proportion of nests/young fledge than younger females.
3. Older females have a lower proportion of nests/young failed due to flooding than younger females.
4. Older females have a higher proportion of nests/young failed due to predators than younger females do.

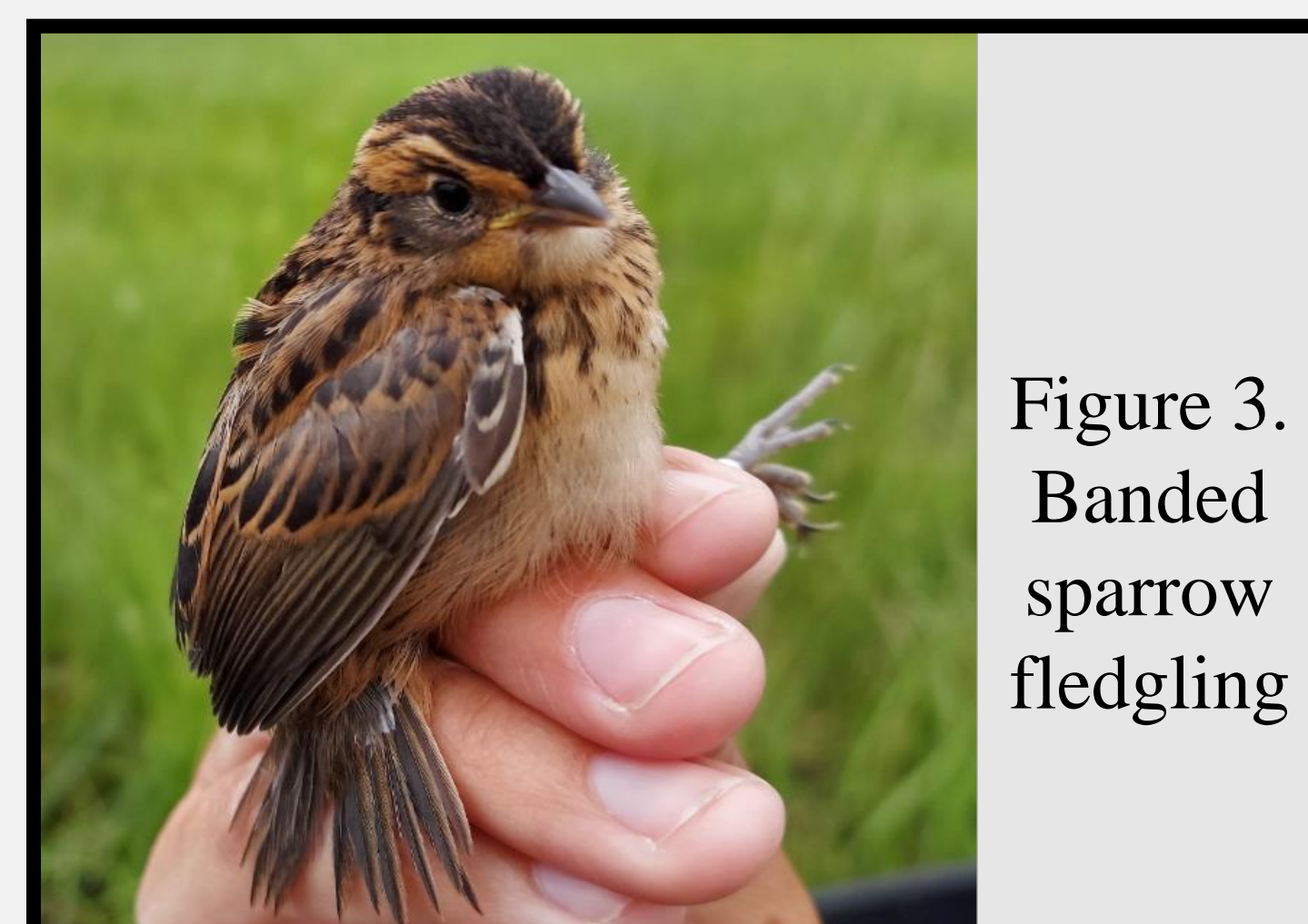


Figure 3. Banded sparrow fledgling

Methods

Field:

- Study sites: Eldridge Marsh, Popham Beach, and Maquoit in ME and Chapman's Landing in NH (Fig. 4) from 2011-2022
- Mist-netting to capture and band (individually identify) adults (Fig. 5)
 - Female age based on the year they were banded as a nestling
- Nest-searching and monitoring
 - Monitored egg, nestling, and overall nest condition every 2-3 days
 - Outcome (fate) assessed at end of each season
 - Hatched, Fledged, or Failed (due to flooding, depredation, or unknown cause)

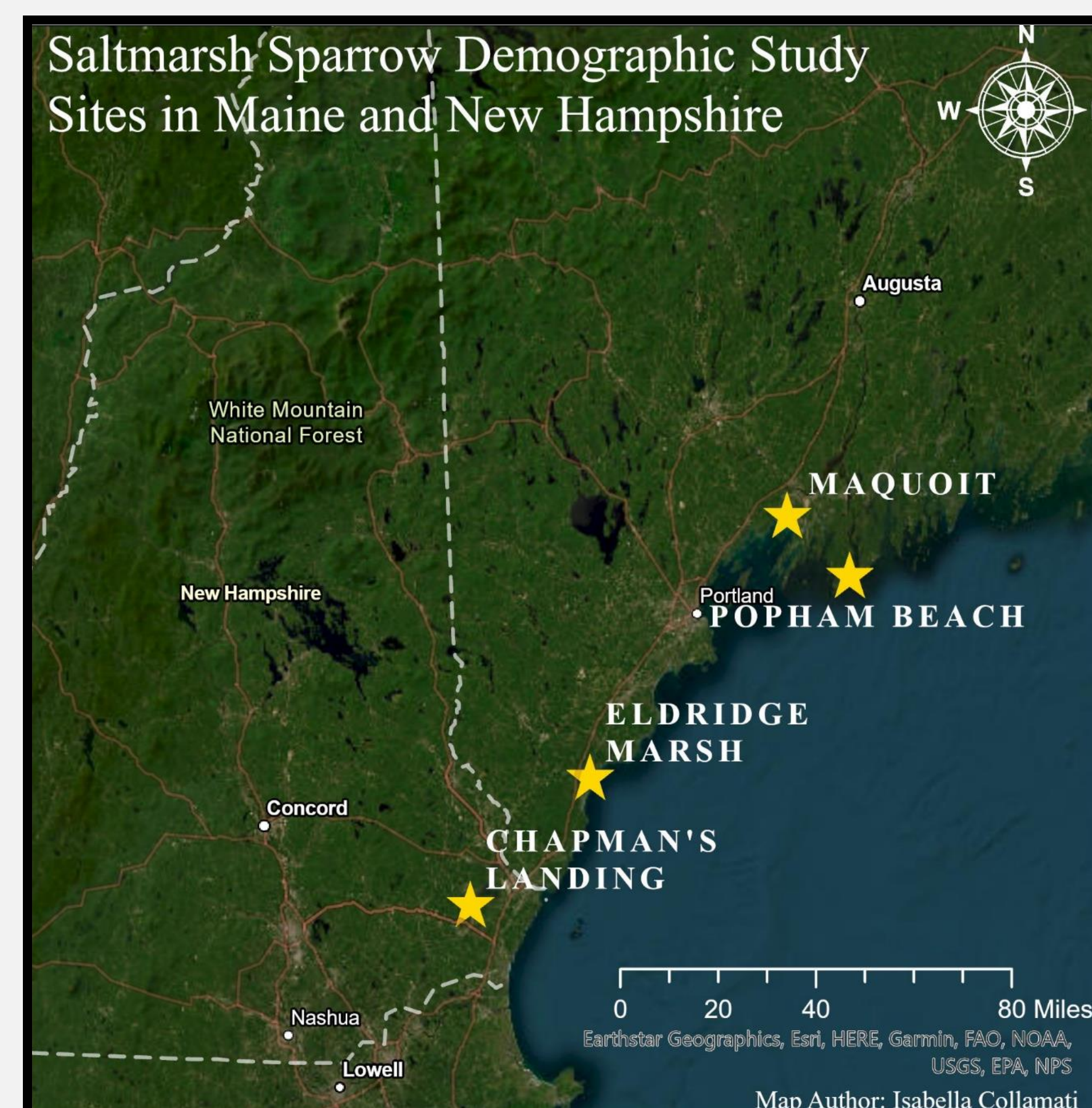


Figure 4. Stars representing sites where sparrow nesting was monitored in this study



Figure 5. Mist-net set up

Statistics:

- Only analyzed nests with known nest fate and females banded as juveniles (ensures accurate aging) (Fig. 3)
- Female age defined as 1 year and >1 year
 - T-tests to compare first-years vs. older

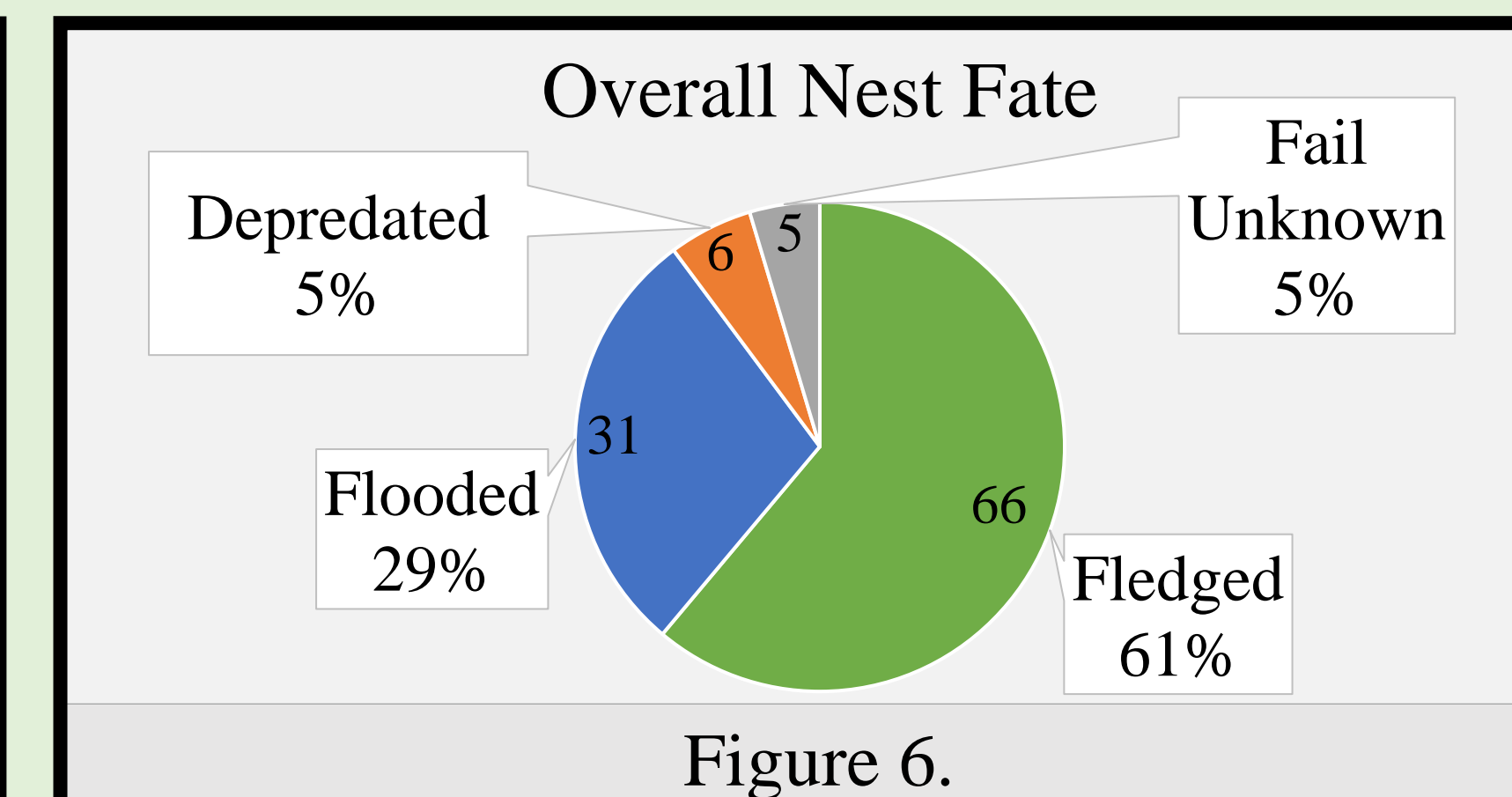


Figure 6.

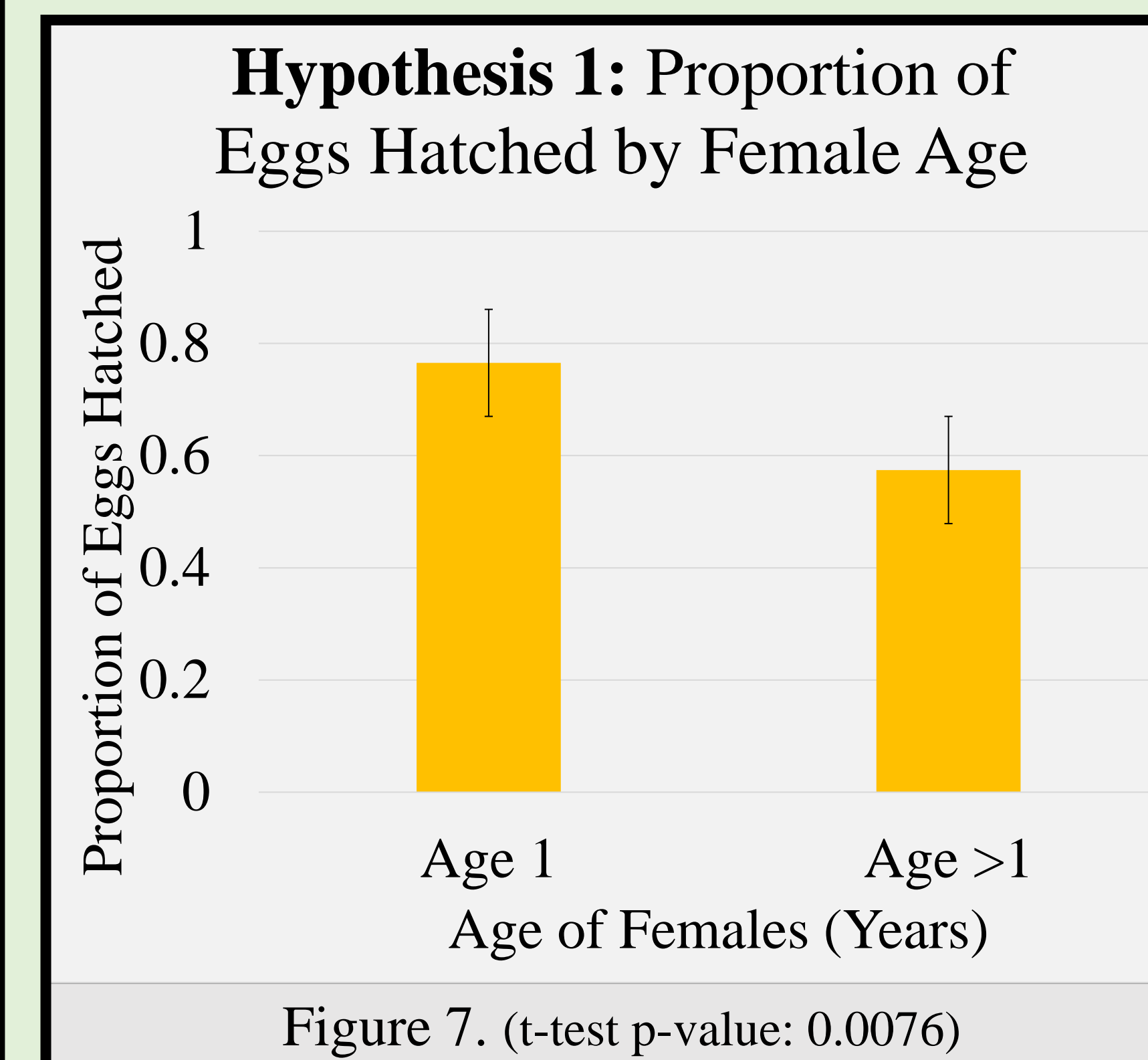


Figure 7. (t-test p-value: 0.0076)

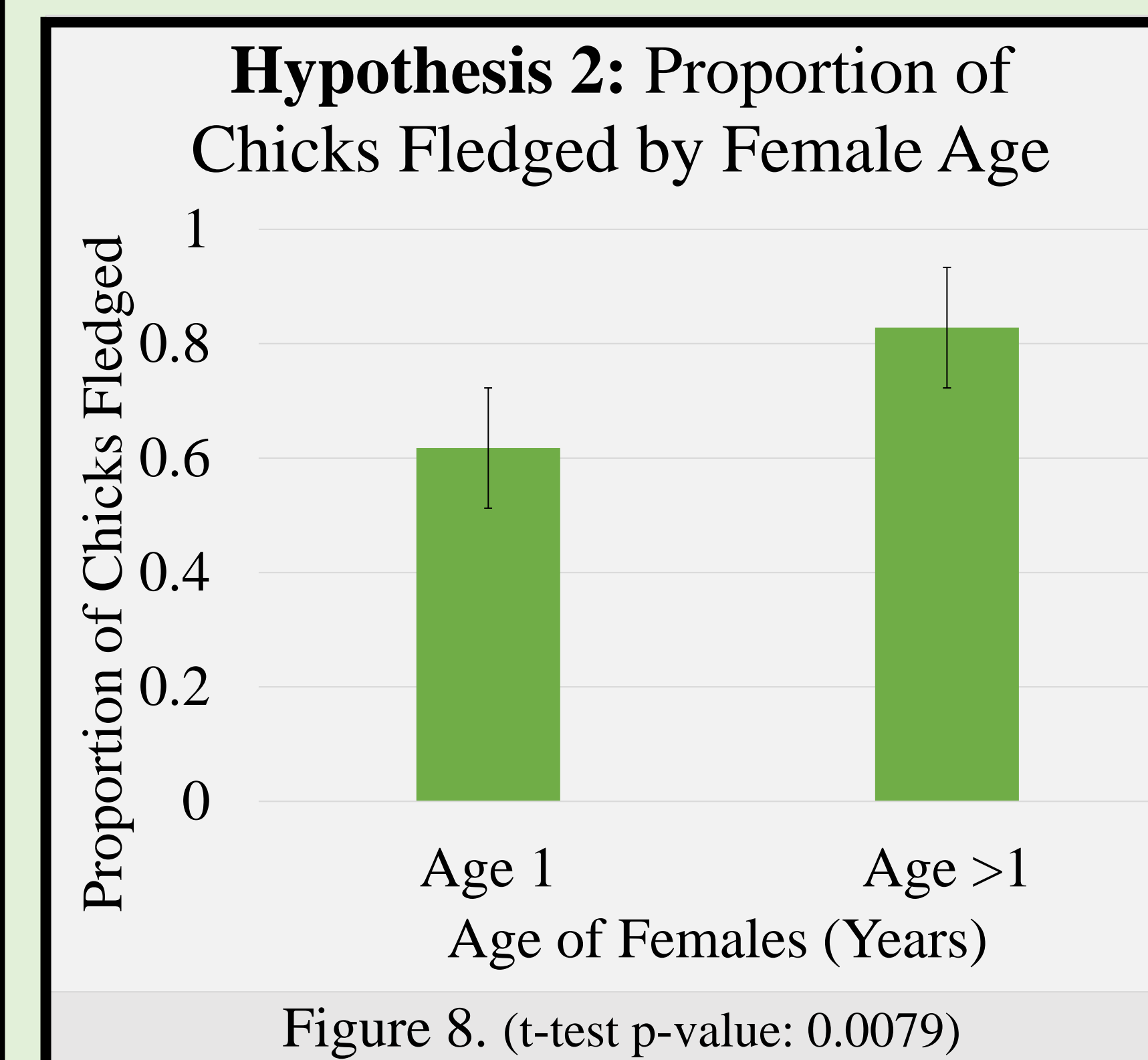


Figure 8. (t-test p-value: 0.0079)

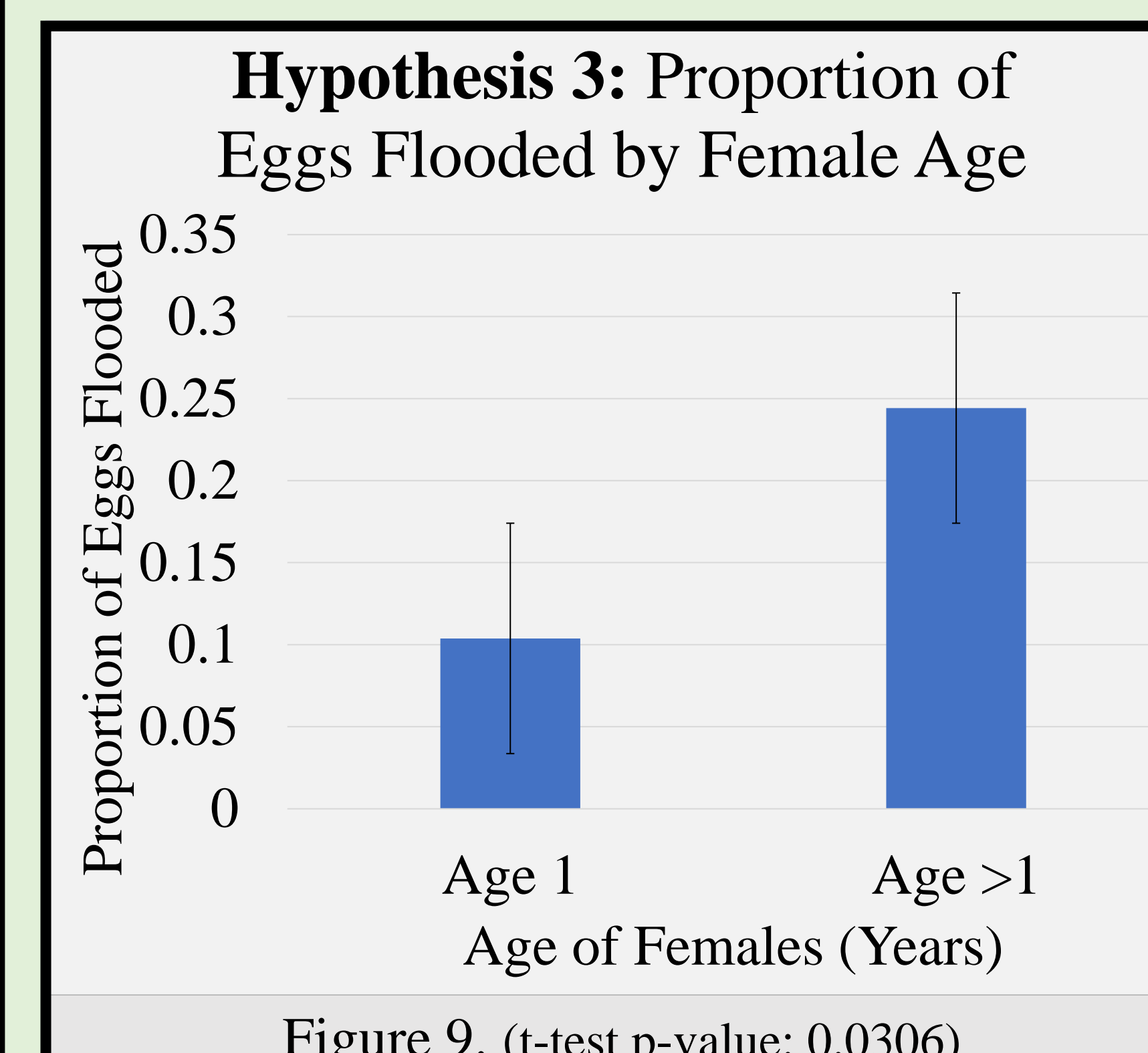


Figure 9. (t-test p-value: 0.0306)

Overall Results

- Total nests with juvenile-banded female: 108
 - 1 year-old females: 64 nests (167 nestlings)
 - >1 year-old females: 44 nests (95 nestlings)
- Nest Fates (Fig. 6)

Analysis and Discussion

1. Hypothesis not supported ❌
 - BUT Older females had a significantly lower proportion of nests/eggs hatch than younger females (Fig. 7)
2. Hypothesis supported ✅
 - Older females had a higher proportion of nests/young fledge than younger females (Fig. 8)
3. Hypothesis not supported ❌
 - BUT Older females had a significantly higher proportion of eggs flood than younger females did (Fig. 9)
4. Hypothesis unable to be tested ❓
 - Insufficient data for effective analysis



Figure 10. Volunteer planting grass for marsh restoration

Conclusion

- Findings suggest that age does affect the reproductive success of female saltmarsh sparrows (*Ammospiza caudacuta*)
 - Younger females hatched greater % of eggs BUT older females fledged greater % of nests/young
 - Older females may be more efficient foragers, improving chances of chick success
 - Older females lost a greater % of their eggs than younger females to flooding
 - Prior experiences of success may no longer connect to quality nest locations due to rising sea levels
- Demographic studies recording the age of captured individuals could better assess the growth potential of existing populations (Fig. 10)

Acknowledgements

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