



# Effects of Home Range Size and Space Use Patterns on Male Saltmarsh Sparrow Reproductive Success.

Talia Kuras, Margaret Yates, Adrienne Kovach  
Department of Natural Resources, University of New Hampshire, Durham, NH



## INTRODUCTION

Saltmarsh Sparrow is a multiply mating, non-territorial, non-pair bonding passerine with a polygynandrous mating system. Males expend most of their energy searching for mates within their home range. There is some evidence for female mate choice in Saltmarsh Sparrows, however few traits have been identified as potential drivers of male reproductive success. In similarly multiply mating species, male home range size has been identified as a driver of male reproductive success.

**We used location data to investigate the relationship between male Saltmarsh Sparrow home range size and reproductive success.**

## METHODS

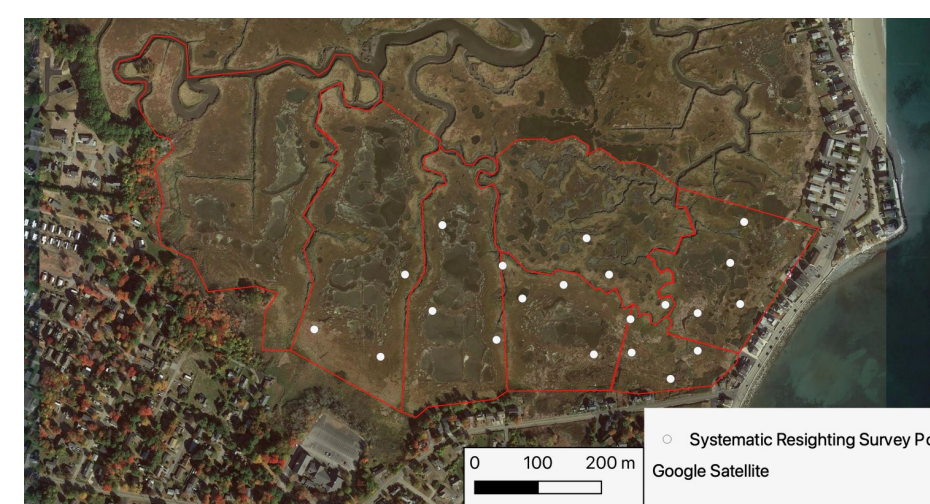
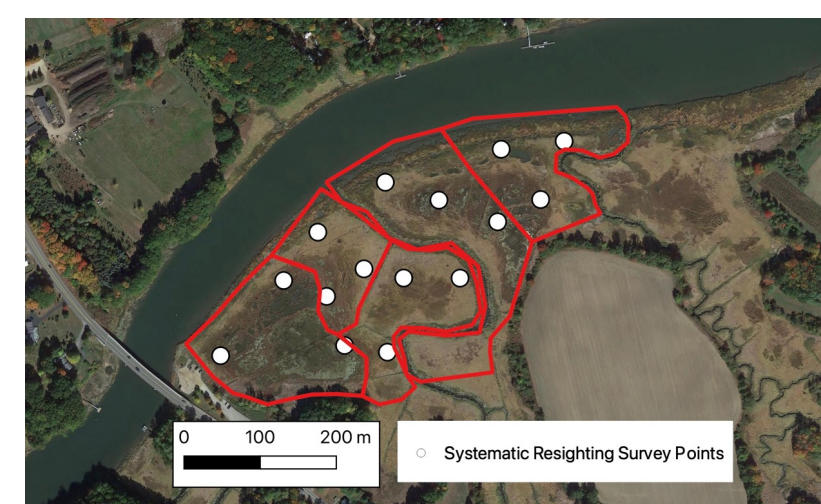


Figure 1: All males received a site-specific color band, a USGS metal band, and a unique combination of 2 additional color bands.



Figure 2: A 2m tall platform with a mounted spotting scope was used for systematic resighting surveys.

- Space use data were collected for 100 uniquely color banded male Saltmarsh and Nelson's Sparrows during the breeding season at 2 sites in Wells, Maine (n = 51) and Stratham, NH (n = 49).
- Space use data were generated from systematic surveys, incidental observations during other field activities, and mist net captures of color banded males.
- Utilization distributions (UDs) were calculated for all males with > 4 relocations throughout the breeding season.
- Individual home ranges ("HR", 95% of individual UD) and core use areas ("CUA", 50% of individual UD) were calculated for each male.
- Home range and core use area locations were compared to the locations of known Saltmarsh Sparrow nests at each site.**



Figures 3 and 4: Maps of systematic resighting survey points at Chapman's Landing (Fig. 3, left) and Eldridge (Fig. 4, right). Site boundaries and demographic subplots are highlighted in red. Survey points were randomly generated at each site in areas of known sparrow activity, and were surveyed at least 7 times throughout the breeding season for 5-15 min per visit. During each survey, the color band combination, relative location, and behavior of all males within 30 m of the survey point were recorded.

## Home Range Size Varies Among Males

### Chapman's Landing, Stratham, NH

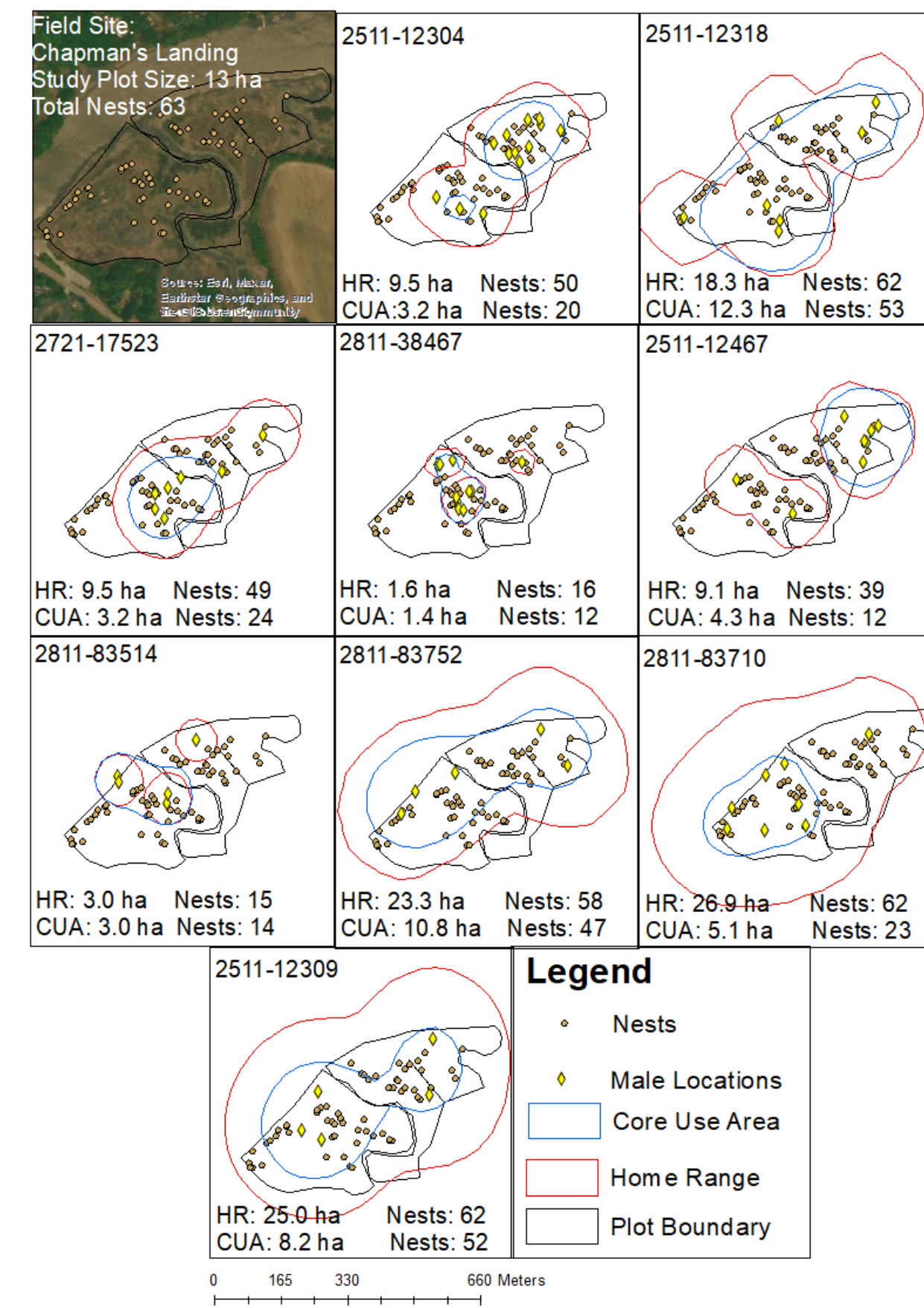


Figure 5: Resighting maps, estimated home ranges, and core use areas for males at Chapman's Landing (CL), a 13 hectare research site Stratham, NH. The site had 62 known sparrow nests. 9 out of 49 color banded males observed at this site had a sufficient number of relocations for HR and CUA estimation. All 9 of these males were Saltmarsh Sparrows. Individual IDs are provided in the top left corner of each map. HR size, number of nests within each HR, CUA size, and number of nests within each CUA are listed below each map. Mean HR size at CL = 14.0 ha (range = 1.6 - 26.9 ha), with 7 HRs encompassing 60% or more of the study site. 3 male HRs contained all 62 nests found at this site.

### Eldridge, Wells, ME

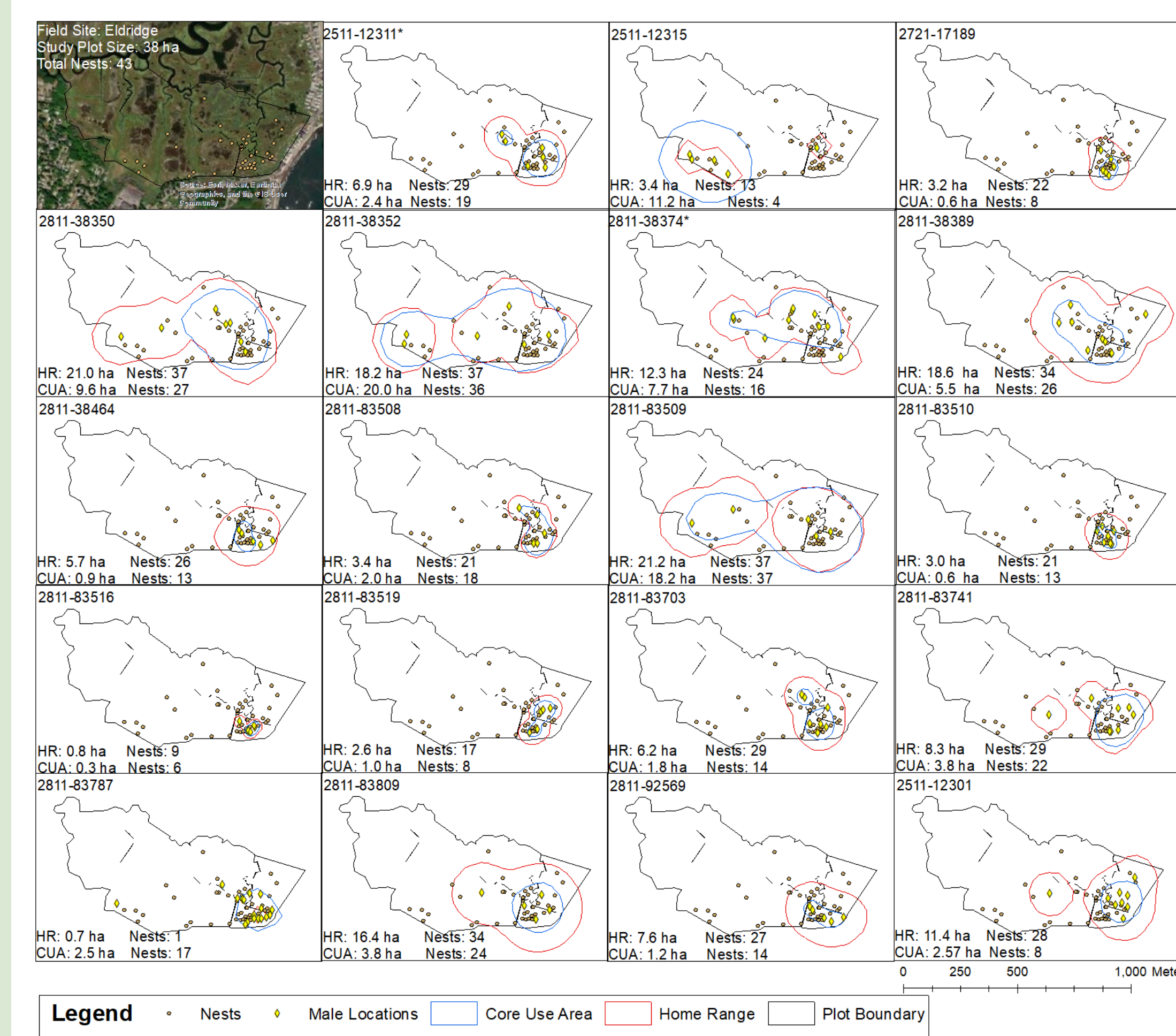


Figure 6: Resighting maps, estimated home ranges, and core use areas for males at Eldridge (EL), a 38 hectare research site in Wells, ME. The site had 43 known sparrow nests over the course of the breeding season. Of the 51 color banded males observed at this site, 19 had a sufficient number of relocations for home range and core use area estimation. 17 of these males were Saltmarsh Sparrows, and 2 males were Nelson's Sparrows, denoted by an \* next to their ID number. Individual IDs are provided in the top left corner of each map. HR size, number of nests within HR, CUA size, and number of nests within CUA are listed below each map. Mean HR size at EL = 9.0 ha, with considerable variation across individuals (range = 0.7 - 21.2 ha). All male HRs overlapped with a section of the site with relatively high nest density. Nest density in this area was 10 nests per ha, compared to 0.7 nests per ha across the remainder of the site.

## Potential Reproductive Opportunities Vary by Home Range Size

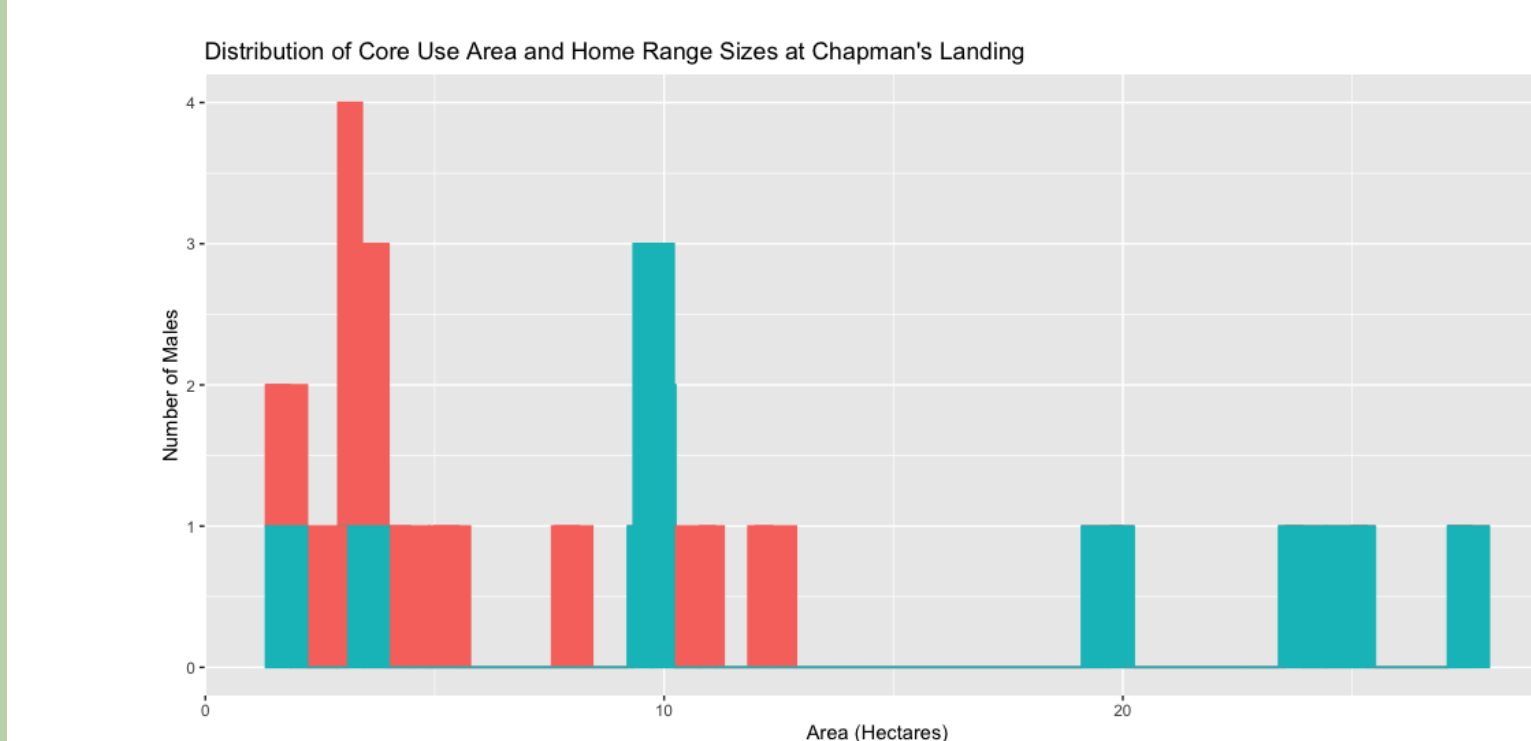


Figure 7: The distribution of core use area and home range sizes at Chapman's Landing. Both home range and core use area size varied by individual, and core use areas were smaller than home ranges for all males sampled.

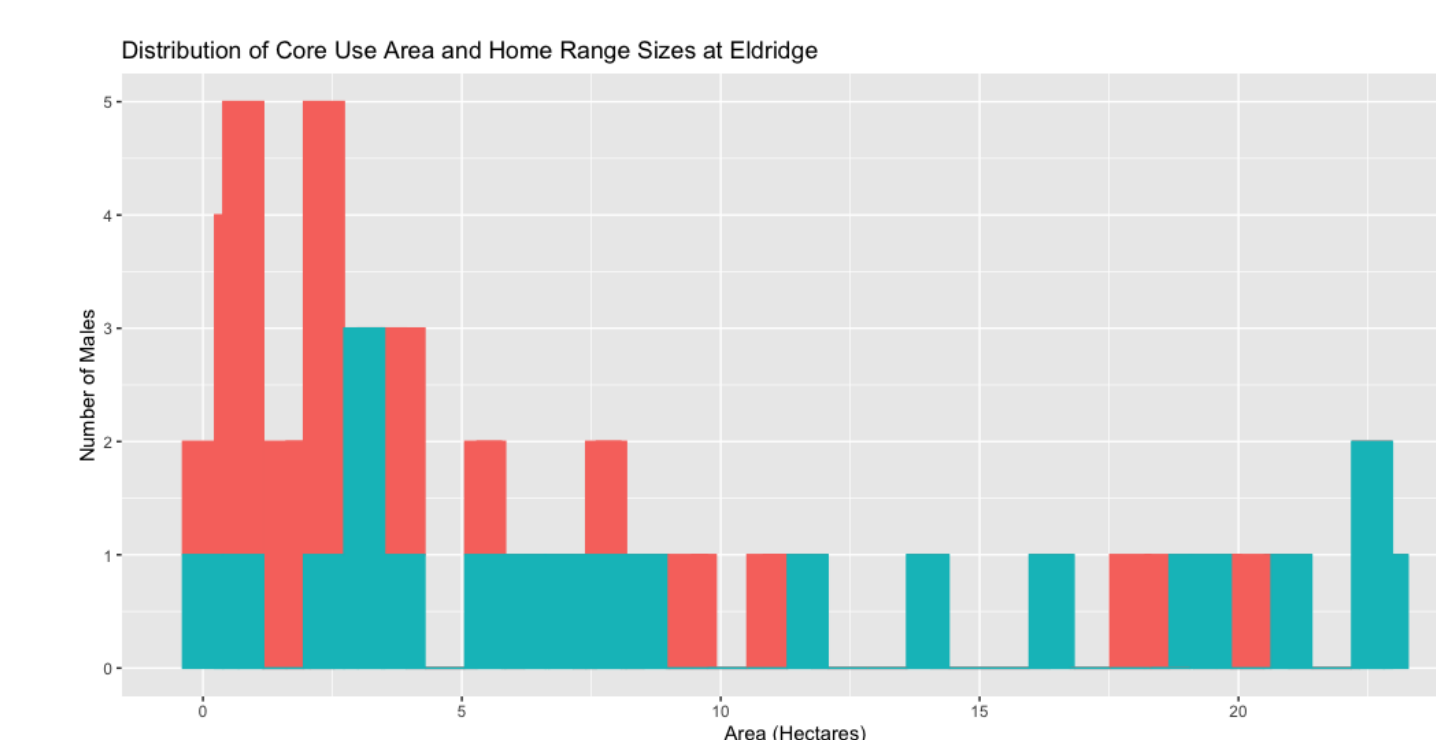


Figure 8: The distribution of core use area and home range sizes at Eldridge. Both home range and core use area size varied by individual, and for most males (n=18) core use areas were smaller than home ranges.

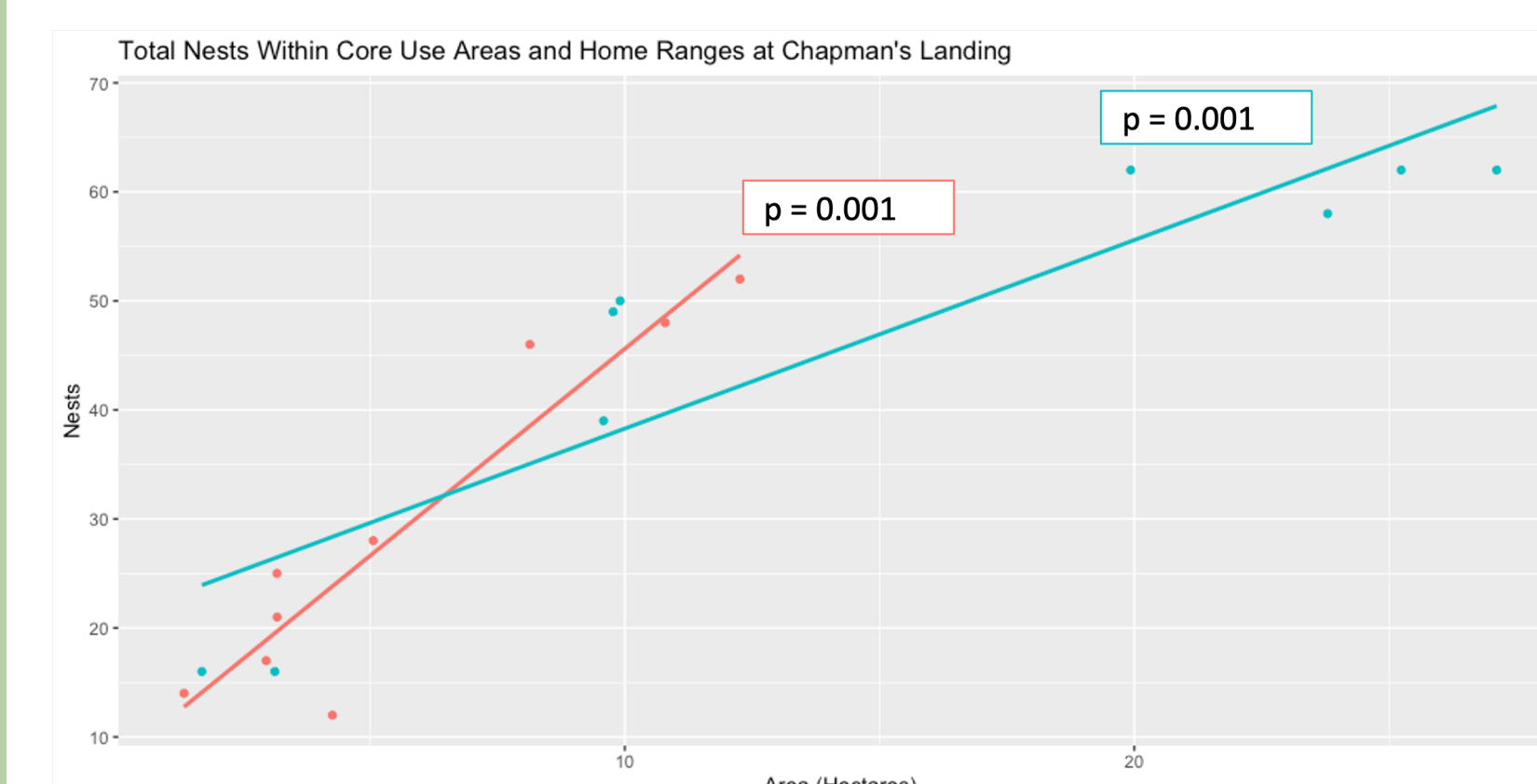


Figure 9: At Chapman's Landing, the number of nests within each male's core use area and home range increased as the size of each area increased.

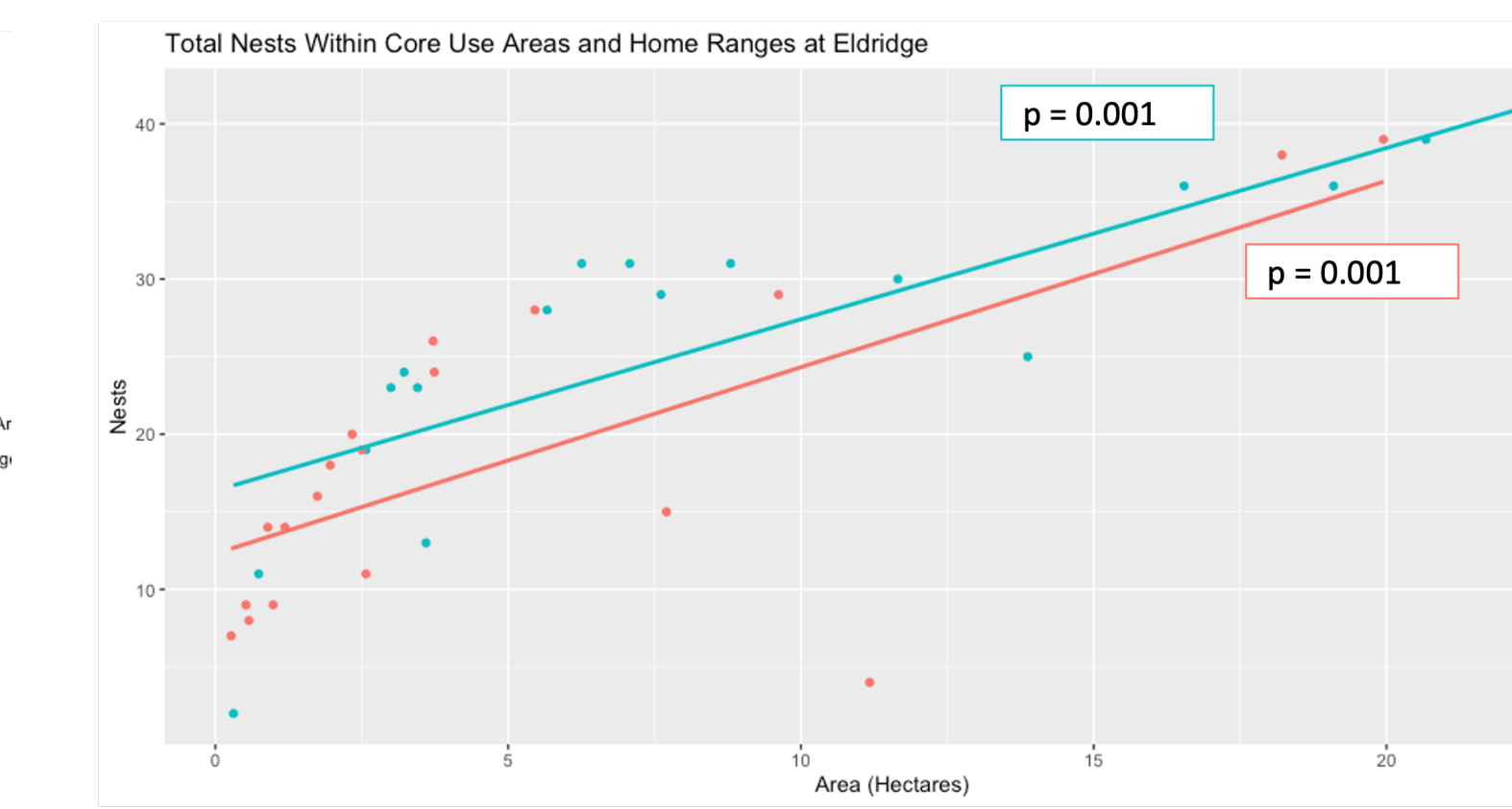


Figure 10: At Eldridge, the number of nests within each male's core use area and home range increased as the size of each area increased.

## CONCLUSION

- Home range size varies among individual male Saltmarsh Sparrows.
- There is a positive correlation between male home range size and the number of female Saltmarsh Sparrow nests within a male's home range.
- This pattern holds for core use areas as well.
- Because nest presence within a male's home range indicates female presence and suggests opportunities for mating, these data indicate that home range size may impact male reproductive success.**

## Ongoing Work

- We used restriction site-associated DNA sequencing (RAD-seq) to sequence genetic data for all adults and offspring sampled at these sites.
- We will use RAD-seq data to perform parental analysis and paternity assignment for all nestlings.
- Home range data generated in this study will then be used to investigate the relationship between male home range size, space use, and reproductive success by comparing the spatial distribution of each male's offspring at nests within and outside of its home range.**



Figure 11: Extracted DNA samples were pooled into libraries and sequenced using RAD-seq methods.



Figure 12: Saltmarsh Sparrow nestlings in a nest. Multiple paternity is common within Saltmarsh Sparrow broods due to their high levels of multiple mating.

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