NON-BREEDING SEASON BEHAVIOR OF THE THREATENED SAN CLEMENTE BELL'S SPARROW (*Artemisiospiza belli clementeae*)

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Introduction

The San Clemente Bell's sparrow (*Artemisiospiza belli clementeae*) is a nonmigratory subspecies only found on San Clemente Island, the southernmost of the Channel Islands located off the coast of California. The US Navy, which owns the island, has monitored the breeding population for over a decade, but until 2013, no formal research was conducted during the non-breeding season.

Published accounts of mainland *Artemisiospiza* species describe the sparrows leaving breeding territories to form loose roaming flocks (Martin and Carlson 1998, Unitt 2004) and rarely singing (Unitt 2004). Previous observations from San Clemente Island during the non-breeding season suggest similar activity occurs to varying degrees, with adults congregating on upper terraces in flocks consisting of up to 30 individuals (Docherty et al. 2011, Ehlers et al. 2012, Ehlers et al. 2013). If Bell's sparrows congregate together during the non-breeding season, identifying the areas used during this period could be important for managing habitat and reducing the impact of training exercises on this species.

Methods

We collected data describing singing and group behavior while monitoring survey plots for non-breeding season occupancy during 2013–2015 (242 plots in 2013, 215 in 2014, and 200 in 2015). We surveyed randomly selected plots (ranging in size from 4-20 ha) from July–December. Each survey consisted of 3 separate visits on consecutive days, and on average, we surveyed 2,800 ha per non-breeding season. During surveys we recorded Bell's sparrow locations, group size, singing, and color-band combinations for any banded individuals. We also recorded locations of banded sparrows during the breeding season. Rainfall data was collected by the San Diego State University Soil Ecology and Restoration Group (SERG) at 5 sites from 2013–2015 and averaged across sites to estimate minimum rainfall.

To describe singing behavior, we developed graphs illustrating singing rates (singing individual/total encounters per week) in relation to rainfall events and the time of year. To explore group sizes we mapped distribution of group (>2 Bell's sparrows) locations, and examined graphs of grouping rates (group size/total encounters) in relation to rainfall events and time of year. Finally, we estimated movement distances for banded sparrows by calculating the distance between locations from both breeding-season and non-breeding-season observations.

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Results

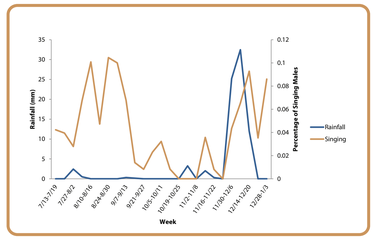

Figure 1. We observed singing at 7.1% of encounters in 2013, 5.6% in 2014, and 13.7% of encounters in 2015. When singing was summed each week, peaks of singing did not increase or decrease during the non-breeding season and rainfall events did not appear associated with singing rates.

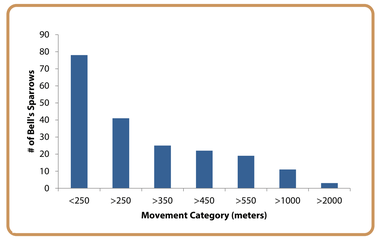

Figure 2. From 2013 to 2015, 119 banded adult sparrows were observed at least once in both the breeding (1/1-6/30) and non-breeding seasons (7/1-12/31). Of those, 78 (66%) were never seen further than a 250m radius from any other observation point, year-round.

- **Singing Locations 2013-2015**

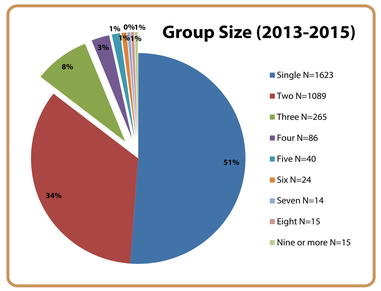

Figure 3. Only 15% of groups encountered were of 3 or more individuals together at one time. Groups ranged in size from single individuals up to flocks of 15.

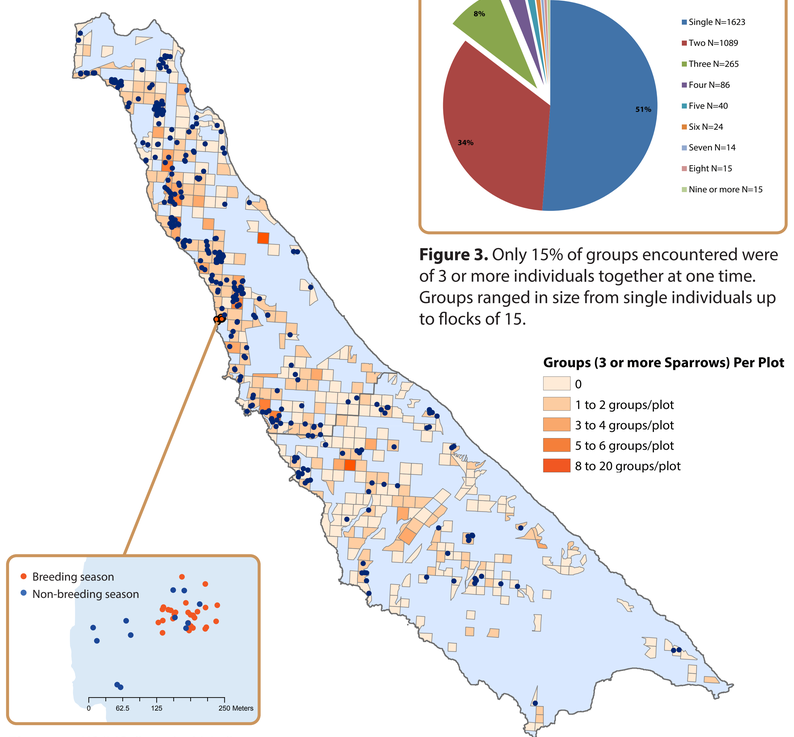

Figure 4. KS/MR (banded bird): All observation points, 2013-2015.

Conclusions

Few studies have documented the behavior of non-migratory *Artemisiospiza* species throughout the non-breeding season, but understanding behavioral ecology during this period of the year could be important for conservation efforts. Areas with high levels of seasonal emigration or immigration, evidence of non-breeding season territoriality, or usage by large groups, could all be indicative of habitat quality.

We occasionally observed Bell's sparrows singing during the non-breeding season. Singing has been associated with territoriality or resource defense during the non-breeding season in other populations of migratory sparrows (Wingfield and Monk 1992). Our findings for Bell's sparrows were consistent with our expectation that behaviors indicative of territory defense are rare, but not absent, during the non-breeding season. We also found little evidence of sparrows congregating in large groups during the non-breeding season, which was surprising in light of anecdotal observations from previous years when much larger groups were observed in various areas of SCI. Although our surveys included locations where large groups were previously seen, the conditions that drove such assemblies may not occur consistently. Finally, we found high inter-seasonal site fidelity. This suggests that resources are available in these habitats to support populations year-round, and also may suggest occupying a breeding territory in the non-breeding season facilitates securing that territory for the breeding season. Understanding how Bell's sparrows behave and utilize the landscape during the non-breeding season allows the US Navy to better monitor and manage the recovery of this threatened passerine.

Literature Cited

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