

to detect, and therefore it is possible the nest success rate for this population is slightly higher than that reported here.

Complete clutch sizes in our population (in all cases we report mean \pm

No estimates of nestling or fledgling numbers per nest have been reported previously for Rock Wrens. We documented nests with 3 or 4 nestlings and with 2 or 3 fledglings. There are also no direct estimates of fledging success in the literature per se, though 8 of 50 nests in western Kansas suffered predation, making for a possible fledging success of 84%, which is higher than our minimum fledging success of 42.86% for the population as a whole, but similar to the success rate of 75% for our located nests (Matiasek 1998). These estimates are, by default, skewed by imperfect knowledge of nesting locations and affected by the stochastic nature of predation events, but suggest that breeding success rates are similar across the range of this species.

Camera traps provide an excellent tool to estimate parental investment at the nest and for watching natural behaviors (Swann et al. 2011). They also provide an easy way to quantify prey deliveries to nestlings, to estimate nestling diets, and to quantify parental division of labor. Previous work in northern Colorado found that food items delivered to Rock Wren nestlings included moths, crickets, grasshoppers, leafhoppers, cicadas, mantids, and robber flies (Warning et al. 2014). We found prey type delivery rates similar to Matiasek (1998) and also noted that grasshoppers were the most often-delivered identified prey items, suggesting that they make up a substantial portion of chick diets in multiple locations. The prey delivery metrics reported here do not account for quality or size of prey types delivered. Follow-up studies with more thorough investigation of prey availability on different territories in relation to nesting ecology and fledgling success would be immensely valuable (Bailey 1904; Merola 1995; Oppenheimer and Morton 2000; Warning and Benedict 2015b, 2016).

Previous work has not assessed the relative feeding contributions of male and female Rock Wren parents to the young (Wolf et al. 1985, Merola 1995, Matiasek 1998). In our study, provisioning rates were variable from nest to nest, but males consistently provisioned much more than females did when they had small chicks, providing over 86% of prey items. As chicks age and females no longer need to help them thermoregulate, it is possible that provisioning behavior becomes more evenly distributed between the parents. There is evidence, however, that

males typically continue to take the lead in feeding young fledglings for approximately 2 weeks post-fledging (Benedict et al. 2021). During this time a

biology of Rock Wrens. Results include breeding metrics and natural history data and provide a baseline from which to investigate Rock Wren breeding success in the more northern, migratory part of their range. Rock Wren population numbers are thought to be relatively stable, but negative population trends have been detected in breeding bird surveys from the past 30 years and knowing more about the species' patterns of reproductive success should help to reveal drivers of these trends (Salamacha Breeding Bird Census 1992–1996, Sauer et al. 1997, Brewer 2010, Benedict et al. 2021).

High nest predation has been proposed as a factor limiting population size and our results lend support to this possibility, as snakes depredated 3 of the 9 nests watched by trail cameras (Benedict et al. 2021). Analyzing additional behavioral, ecological, and mate choice pressures that affect reproductive success would be valuable in understanding the population fluctuations of Rock Wrens and their differential fledging success across the species' range.

Acknowledgments

We thank P. (McPhail) Love and K. Strong for assistance in the field and S. Rickford, K. Nasalroad, and R. Worley for assistance with camera trap photograph tagging. Thanks for ceaseless encouragement go to Philippe Gobert. We are grateful to the City of Fort Collins Natural Areas Program, Larimer County Department of Natural Resources, and Colorado Dip.1(A78.9(g1p.1(A79epu6171714G303.400nd)-545.40f)12.7(Rickildlifeg1p.1(A7-292.40avi)en)-3-379.598he)-4iJT*[(are)wo

nabanding.net/wp-content/uploads/2012/04/
STUDYGUIDE1.pdf

Oppenheimer SD, Morton ML. 2000. Nesting habits and incubation behavior of the Rock Wren. *Journal of Field Ornithology*. 71:650–657.

Pitt SMG. 2018. Why sing so many songs? Testing the function of song type repertoires in Rock Wrens using playback experiments and behavioral observations