

2021 Shearwater Nesting at Freeman Seabird Preserve: ‘Ua‘u kani Enjoy Persistent La Niña Conditions

by
K. David Hyrenbach, Professor of Oceanography, Hawai‘i Pacific University, khyrenbach@hpu.edu
and
Michelle Hester, Executive Director, Oikonos Ecosystem Knowledge, michelle@oikonos.org

We report on the ongoing monitoring and restoration efforts of the Freeman Seabird Preserve (FSP) by Hawaii Audubon and Hawai‘i Pacific University since 2009, share findings from the 2021 breeding season, and briefly discuss the plans for future monitoring, habitat restoration, and predator control at the site.

2021 Update

With participation by over 20 volunteers, we documented 408 active nests of ‘Ua‘u kani, Wedge-tailed Shearwaters (*Ardenna pacifica*), at FSP. Once more, this year’s nest count is the highest to date, surpassing the previous peak of 358 nests in 2020 (Hyrenbach & Hester 2021).



Figure 1. A record 408 wedge-tailed shearwater pairs attempted to breed this year at the Freeman Seabird Preserve.

Overall, the annual population surveys continue to show a statistically significant trend ($F = 224.494$; $df = 1, 11$; $p < 0.001$) with an average increase of 24.5 (± 5.9 S.D.) nests per year, which captures 95 % of the variability in the 13-year time series (2009-2021; Fig. 2). This trend suggests that the colony continues to grow, in part due to the collaborative restoration efforts. The July 14 count of 408 active nests (occupied by an incubating adult or an egg)

Shearwaters at Freeman Seabird Preserve

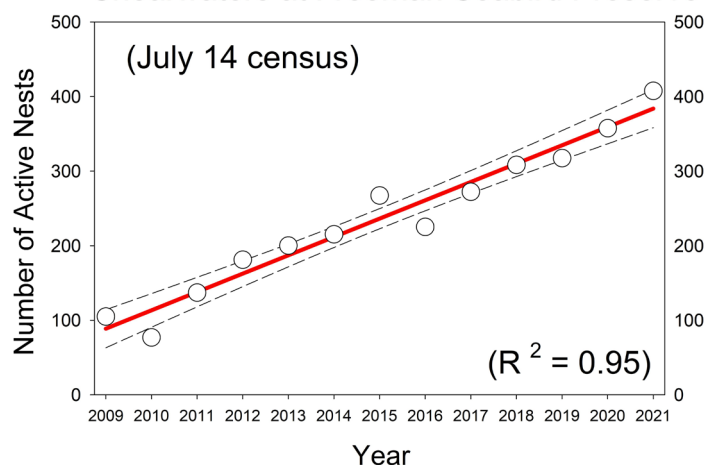


Figure 2. Trend in the number of Wedge-tailed Shearwater active nests at the Freeman Seabird Preserve, derived from the annual colony-wide census during the peak incubation period (July 14), showing the best-fit linear regression (solid line) and the 95% confidence interval envelope (dashed lines).

was followed by a count of 276 chicks on September 14. This represents a loss of 25.0 % of the nests during the two-month period following peak egg laying and the first half of chick rearing. Furthermore, by monitoring 60 nests weekly between July and November, we learned that 21.7 % of eggs failed before hatching while only 4.3 % of the chicks were lost. This loss rate is similar to the one documented in 2020, when 26.8 % of the nests were lost during the same time period (Hyrenbach & Hester 2020). These observations suggest that the foraging conditions were good during chick rearing in 2021. The weekly monitoring also revealed that 2021 was characterized by a slightly earlier timing of breeding (phenology), compared with previous years. In 2021, chick hatching dates spanned from July 28 to August 25, with a mean of August 6 (± 5.4 S.D. days).

While the growth curves were similar to those recorded in previous years of good food provisioning (2011 and 2020), the chicks attained the largest masses recorded to date in 2021. The maximum chick weights ranged from 461 to 650 grams, with a mean of 555.2 (± 51.7 S.D. grams).

Chick masses started declining in the middle of October, and fledging started the first week of November (Fig. 3).

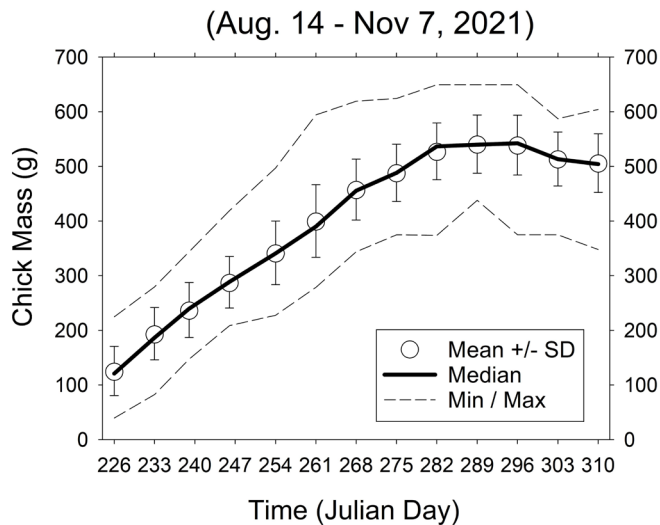


Figure 3. Time series of chick mass collected during the 2021 breeding season, showing the mean $\pm$ S.D., the median, and the range (maximum – minimum) of weekly measurements. Sample size = 47 chicks.

We continue to learn how ocean conditions impact shearwater breeding success and 2021 added another La Niña year (the cool phase of the El Niño-Southern Oscillation climate pattern) to our time series. In fact, this was an unusual “double-dip” event, with La Niña conditions persisting from late spring (May – June) of 2020 through early winter (January – February) of 2022. Breeding Wedge-tailed Shearwaters likely benefitted from enhanced tradewinds and ocean productivity during the last two breeding seasons (2021 and 2022), as evidenced by the high chick survival and peak masses. With forecasters estimating a 51% chance that neutral oceanographic conditions will return to the Pacific Ocean in April – June 2022 (See NOAA’s Climate Prediction Center **ENSO Diagnostic Discussion**, www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/), we anticipate that 2022 will be an “average” year for ‘Ua‘u kani breeding at the Freeman Seabird Preserve.

Ongoing Efforts

Habitat restoration efforts continued during 2021. From January through March, while the shearwaters were at sea, Hawaii Audubon Society members and other volunteers removed alien plant species and improved natural nesting sites. This was also the third season we deployed 14 ceramic nests before shearwaters returned to prospect for breeding sites, and monitored them weekly for occupancy. Thirteen of the fourteen artificial ceramic nests were occupied by pairs who laid eggs. Eleven of the thirteen eggs hatched, and nine chicks successfully fledged from the ceramic nests,

with a hatching success of 84.6 % and a fledging success of 81.8 %. Overall, the reproductive success, expressed as the proportion of pairs that laid an egg in July and successfully fledged a chick in November, was not significantly different when we compared the ceramic nests (69.2 %) and the other nests (68.5 % in natural rock crevices and roof tile burrows) (Fisher’s Exact Test, Chi-squared = 0.0024, df = 1, p = 1). We are encouraged by the quick acceptance of the customized ceramic nests by the shearwaters, with occupancy increasing from 71.4 % in 2020 to 92.8 % in 2021. Moreover, for the third year in a row, the breeding performance in the new ceramic nests was not statistically different from the control nests, ensuring these new artificial nests provide safe nesting sites (Hyrenbach & Hester 2020, 2021).

With participation from the community, additional restoration and management efforts in 2022 will involve monitoring the colony and enhancing the breeding habitat at the Freeman Seabird Preserve.

Habitat Restoration: From January through March, volunteers will remove alien weeds, plant native species, and improve the existing rock nesting sites on the terrace.

Research: Population censusing and nest monitoring for phenology, chick growth, and reproductive success will continue in 2022, to augment our 13-year time series. Fundraising efforts will focus on a tracking study to finally learn where in the big Pacific Ocean the FSP breeders spend winter.

Predator Control: Ongoing surveillance for predators is planned during the 2022 nesting season, to minimize and document predation by rats, cats and mongooses on breeding shearwaters.

Acknowledgements

Funding from Disney Conservation Fund, Atherton Family Foundation, and the Hawaii Audubon Society. In-kind support from HPU and Oikonos. We thank the many volunteers and students who contributed to the restoration and monitoring efforts.

Literature Cited

- Hyrenbach, K.D., and Hester, M.M. 2020. 2019 Shearwater Nesting at Freeman Seabird Preserve: Highest breeding pairs, average chick success, and first eggs in ceramic homes. ‘Elepaio 80(2): 13-14.
- Hyrenbach, K.D., and Hester, M.M. 2021. 2020 Shearwater Nesting at Freeman Seabird Preserve: Highest breeding pairs, average chick success, and increasing occupation of ceramic homes. ‘Elepaio 81(2): 13-14.