

2022 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

Alyssa Piauwasdy, Ecologist
Hawai'i Pacific University & Oikonos Ecosystem
Knowledge, alyssa@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 2022 breeding season, and briefly discuss the plans for future monitoring, habitat restoration, and predator control at the site.

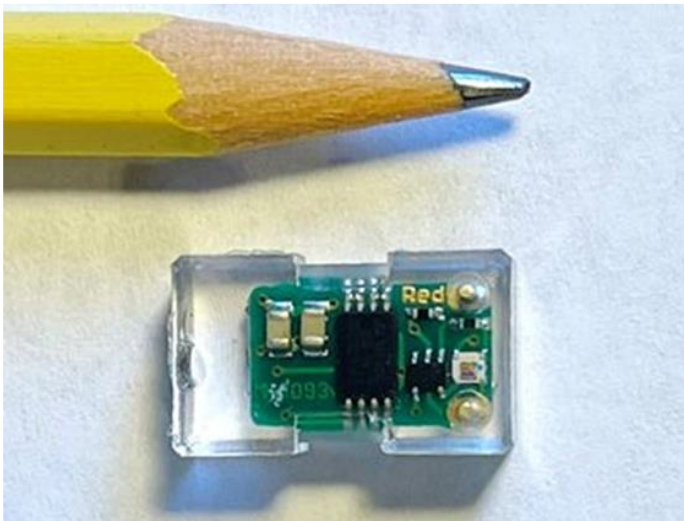


Figure 1. A geolocator tag used to track the Wedge-tailed Shearwater migration. The tag, which is attached to a metal band and deployed over the winter migration period, records light intensity continuously for up to two years. These data allow researchers to calculate two locations per day using day length (latitude) and the time of local apparent noon (longitude).

2022 Update

With participation by over 20 volunteers, we documented 423 active nests of 'Ua'u kani, Wedge-tailed Shearwaters (*Ardenna pacifica*), at the Freeman Seabird Preserve. Once more, this year's nest count is the highest to date, surpassing the previous peak of 408 nests in 2021 (Hyrenbach & Hester 2022). Overall, the annual population surveys continue to show a statistically significant trend ($F = 307.756$; $df = 1$, which captures 96 % of the variability in the 14-year time

series (2009-2022; Fig. 2). This trend suggests that the colony continues to grow, in part due to the collaborative restoration efforts.

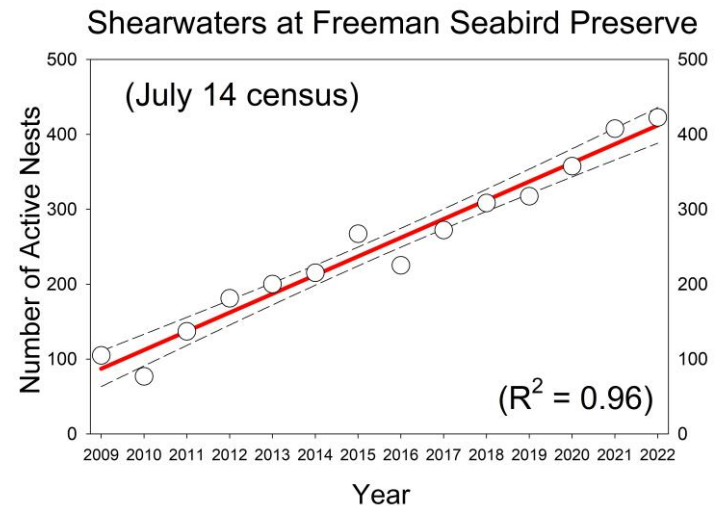


Figure 2. Trend in the number of Wedge-tailed Shearwater active nests at the Freeman Seabird Preserve, derived from the annual colony-wide census during the peak incubation period (July 14), showing the best-fit linear regression (solid line) and the 95% confidence interval envelope (dashed lines).

The July 14 count of 423 active nests (occupied by an incubating adult or an egg) was followed by a count of 327 chicks on September 14. This represents a loss of 22.7 % of the nests during the two-month period following peak egg laying and the first half of chick rearing. This loss rate is similar to those documented during the same time period in 2021 (25.0 %) and in 2020 (26.8 %) (Hyrenbach & Hester 2021, 2022).

The weekly monitoring also revealed that 2022 was characterized by a slightly earlier timing of breeding (phenology), compared with previous years. In 2022, chick hatching dates spanned from July 26 to August 21, with a mean of August 5 (+/- 5.9 S.D. days). The growth curves were similar to those recorded in previous years of good food provisioning (2011) and the last two La Niña years (2020 and 2021). In 2022, the maximum chick weights ranged from 442 to 630 grams, with a mean of 531.3 (+/- 42.5 S.D. grams). Chick masses started declining in the middle of October, and fledging started the first week of November (Fig. 3). Altogether, these observations suggest that the foraging conditions were good during the 2022 chick rearing.

For a third year in a row, the tropical Pacific Ocean has experienced the cool phase of the El Niño-Southern Oscillation climate pattern.

In fact, this highly unusual “triple-dip” event, with La Niña conditions persisting from late spring (May – June) of 2020 through (January – February) of 2023, has likely enhanced shearwater foraging opportunities during the last three breeding seasons (2020, 2021, 2022), as evidenced by the high chick survival and peak masses.

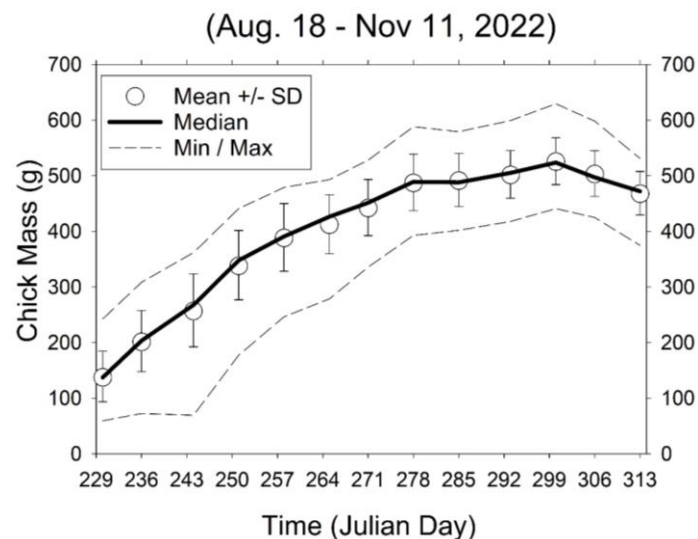


Figure 3. Time series of chick mass collected during the 2022 breeding season, showing the mean \pm S.D., the median, and the range (maximum – minimum) of weekly measurements. Sample size = 40 chicks.

Although weak La Niña conditions were still apparent across the tropical Pacific Ocean during January 2023, the most recent oceanographic models predict a transition from La Niña to ENSO-neutral in the next couple of months. The likelihood of El Niño remains low through May - July (44% chance), but becomes the most likely (55 - 65% probability) thereafter (See NOAA’s Climate Prediction Center ENSO Diagnostic Discussion, www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/). Thus, we anticipate that 2023 will be an “average” year for ‘Ua‘u kani breeding at the Freeman Seabird Preserve.

Ongoing Efforts

Habitat restoration efforts continued during 2022. 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 first year of a tracking study to determine where in the big Pacific Ocean the breeders spend winter, after leaving FSP in late November. In August 2022, we tagged 25 adults with a geolocator tag (GLS) mounted on a USFWS metal band (Fig. 1).

To investigate potential detrimental tagging effects, we also equipped a control group of 25 adults with a metal band but no GLS tag. Both the experimental and control birds successfully fledged 23 of their 25 chicks (92% fledging success), suggesting that provisioning during the breeding season (August – November) was not negatively affected by tagging one of the parents.

With participation from the community, additional restoration and management efforts in 2023 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: Starting in March 2023, we will check returning adult shearwaters to retrieve the GLS tags and to resight the tagged and control birds. In addition to analyzing the migration data from the 2022-2023 winter migration, we will deploy additional tags in August 2023, to study the 2023-2024 winter migration. By contrasting shearwater movements during the past La Niña and the anticipated El Niño, we seek to understand how changing oceanographic conditions influence their timing and the over-wintering destinations.

Population censusing and nest monitoring for phenology, chick growth, and reproductive success will continue in 2023, to augment our 14-year time series.

Predator Control: Ongoing surveillance for predators is planned during the 2023 nesting season, to minimize and document predation by rats, cats and mongooses on breeding shearwaters.

Acknowledgements

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

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