



# 'ELEPAIO

Journal of the  
Hawaii Audubon Society  
For the Protection of  
Hawai'i's Native Wildlife

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## State of the Society: Annual Report for 2019

By Linda M. B. Paul, Hawaii Audubon Society President

*Mission Statement: To foster community values that result in the protection and restoration of native wildlife and ecosystems and conservation of natural resources through education, science and advocacy in Hawai'i and the Pacific.*

The Hawaii Audubon Society (HAS) celebrated its 80th year of operations in 2019. It was established in 1939 as a private charity by a small group of dedicated birders "For the Better Protection of Wildlife in Hawaii". It was incorporated in 1954 and was granted non-profit U.S.C. §501(c)(3) status by the U.S. Department of the Treasury in 1967. It became the Hawai'i state chapter of the National Audubon Society by contract in 1976, although it is independent of that organization in matters of governance, policy, financial control, budget, and programs.

### Society Governance

The Society's programs, policies, and activities are guided by our Mission Statement, and the purpose, organization, and procedures are set forth in our Constitution and By-laws. The Society is governed by a Board of Directors. During 2019, the Board included Officers President Linda Paul, First Vice President Elizabeth Kumabe-Maynard, Secretary Kaily Wakefield, and Treasurer John Harrison, and Directors Alice Roberts, Rich Downs, Wendy Kuntz, Pat Moriyasu, Susan Scott, and Yvonne Chan. Wendy Johnson served as the Society's volunteer Executive Director. The Office and Communications Manager Susanne Spiessberger served as the Recording Secretary. The HAS 2019 Board Retreat was held January 13, 2019, at Ho'omaluhia Botanical Garden for the purposes of short and long term strategic planning. The Board approved adding the words "wildlife and" in the HAS mission statement after the word "native".

### Education and Outreach

The Society has a number of standing committees headed by Officers and Directors. In 2019, Linda Paul chaired the Conservation Policy Committee and Wendy Johnson headed the Education Committee. The 'Elepaio and Field Activities Committees included all Board members. Committee membership is open to all members of the Society. (Please see [www.hawaiiudubon.org](http://www.hawaiiudubon.org) for more information.)

**The 'Elepaio:** Our peer-reviewed science journal focuses on research and conservation work in Hawai'i and the Pacific and provides educational outreach to the Society's membership and subscribers. In 2019, Susanne Spiessberger served as Managing Editor and Glenn Metzler as the 'Elepaio's Scientific Editor. Six bi-monthly issues were published in 2019. The 'Elepaio can be received by members both, electronically and by mail. Past issues have been indexed and digitized. The 'Elepaio article submission

procedures are posted on our website. Scientific articles and notes included: 'Elepaio March/April 2018: *Peak Colony Count During Another Year of Average Productivity and Provisioning at the Freeman Seabird Preserve* by K. David Hyrenbach; 'Elepaio May/June: *A Great Year for Endangered Hawaiian Seabirds*, DLNR/USFWS/American Bird Conservancy joint release; *Aberrant Plumage in a Pacific Golden-Plover *Pluvialis fulva**, by Oscar W. Johnson & Susan Scott; *Albatross Chicks Take 1300 Mile Plane Ride from Midway Atoll to New Home on O'ahu* USFWS release; 'Elepaio July/August: *New Relocation Project Aims to Increase Habitat for Kiwikiu Bringing a Native Forest & Its Native Songs Back to the Forest*, DLNR release; *Determining Spotted Dove and Zebra Dove Diets on Oahu with Implications for Seed Dispersal*, by Sarah Gabrielson; *Seasonality and prevalence of pollen collected from Hawaiian nectarivorous birds: a summary*, by Kathryn N. van Dyk, Kristina L. Paxton, Patrick J. Hart, and Eben H. Paxton; *Six Palila Released into Newly Restored Forest on Hawai'i Island Sharp Decline in Palila Population Prompts Relocation*, DLNR release; 'Elepaio September/October *Ghosts in the Ohia: Is the Po'ouli Extinct and Does It Matter?* by David Cameron Duffy; 'Elepaio November/December *First Nesting Behavior of Released 'Alalā Almost Two Years Post-Release and Additional 'Alalā Released, Update on 'Alalā pairs, Kiwikiu Translocation Holds Promise for One of the World's Rarest Birds*, DLNR news releases.

**[www.hawaiiudubon.org](http://www.hawaiiudubon.org):** The Society's website provides a comprehensive source for up-to-date information on the Society and its activities. It includes electronic versions of the 'Elepaio, field trips, service projects, programs, meetings, volunteer opportunities, membership information, an online store, information on birding in Hawai'i, a gallery of beautiful bird photos, and links to a number of related organizations and issues. The Office and Communications Manager managed the Society's website and electronic newsletter. Director Wendy Kuntz managed the HAS Facebook page.

### Wildlife and Ecosystem Conservation

**Kawainui-Hāmākua Marsh Complex:** In January 2018, the Society reviewed the Draft Environmental Impact Statement (DEIS) for DLNR's Kawainui-Hāmākua Master Plan Project, found that it did not meet the requirements of Hawai'i's Environmental Policy Act and submitted comments, which are posted on the HAS website. Instead of a restoration plan for this

severely degraded wetland ecosystem, the Project proposed that the last wild edges of Kaiwainui Marsh be developed for human use. The Kawainui-Hāmākua Marsh Complex on windward O‘ahu is the largest remaining wetland in Hawai‘i and share international recognition as biosphere reserve sites under the auspices of UNESCO and as Wetlands of International Importance under the RAMSAR Convention.

These wetlands are part of a single mountain-to-ocean ecosystem that has been degraded by upstream and downstream diversions, pollution from an industrial park, ranching and stables, introduced alien species, and human overuse. Society members have been working for decades for its protection, including advocating for state matching funds to construct habitat ponds for endangered waterbirds and migratory birds, the return of city-owned parts of the marsh complex to DLNR, and for a master plan that has as its primary focus comprehensive wetlands ecosystem restoration and habitat management in order to protect the four endangered Hawaiian waterbirds and several migratory waterbird species that live there. These birds and wetlands are protected by the federal Endangered Species Act, the federal Migratory Bird Treaty Act, the federal Clean Water Act, the federal Coastal Zone Management Act, and their Hawai‘i state law counterparts.

The Society recommended that the Master Plan: (1) close the Marsh to all visitors during the endangered and migratory wetland birds nesting seasons; (2) prohibit leasing or granting permits to build on state land makai of the Quarry Road, Kalaniana‘ole Highway between the Quarry Road and Castle Hospital, and Kailua Road between the Highway and Hamakua Drive; (3) prohibit commercial activity on state land in and around the Marsh Complex; (4) require all toilets within 2,000 feet of the Marsh and on adjacent state land uphill from the wetlands to be connected to the nearest City and County of Honolulu wastewater treatment facility; (5) prohibit any further expansion of the Kapa‘a Industrial Park; (6) restore the historic water volume and flow through the wetlands and prioritize the removal of the central peat mat to prevent future flooding of the Coconut Grove residential area; and (7) provide detailed and comprehensive wetlands ecosystem restoration and habitat management plans to protect the four endangered Hawaiian waterbirds and several migratory waterbird species. The Final EIS was approved by the BLNR on Oct. 25, 2019. As of Dec. 31, 2019, it had not been signed by the Governor.

**Freeman Seabird Preserve:** In September 2007, the Society was given a one-acre coastal property at Black Point on the southern coast of O‘ahu thanks to an unprecedented gift from the Houghton Freeman Foundation. The Freeman Seabird Preserve (FSP) is home to the island’s only remaining south shore nesting colony of Wedge-tailed Shearwaters (‘Ua‘u kani, *Puffinus pacificus*). With the valued guidance of experts and hundreds of volunteers over the years, this vacant residential property now supports over 24 native plants typical of Hawaiian coastal habitats before human disturbance and invasive species altered the natural landscape (see 2019 updates on [www.freemanseabirdpreserve.com](http://www.freemanseabirdpreserve.com) and in the ‘Elepaio). Preserve volunteer work focused on the habitat restoration, scientific research and educational components of the Society’s conservation programs.

In May, the rock wall construction on the upper end of Diamond Head boundary of FSP was completed. A new, 10 foot long wooden fence was also built along the upper portion of the boundary to ensure that the entire structure is contained within

HAS property lines, and that the existing gate movement is not impeded. In August, Myoporum thrips were found by O‘ahu Invasive Species Committee OISC on FSP Naio plants. In December, OISC workers removed all FSP Naio and HAS volunteers began replanting other native shrubs.



*Wedge-tailed Shearwater chick, photo credit Jim Koermer.*

**Hawaiian Hoary Bat:** In 2019, a Draft Supplemental Environmental Impact Statement (SEIS) for the Kawaiiloa Wind Farm, O‘ahu, was released. The project is operating under an approved Habitat Conservation Plan (HCP) and associated Incidental Take Permit (ITP) and Incidental Take License (ITL), which authorize take of threatened and endangered species protected under the federal Endangered Species Act and HRS Chapter 195D, respectively. Post-construction mortality monitoring data indicate that operation of the wind turbines is resulting in a greater number of endangered Hawaiian hoary bat or ‘Ope‘ape‘a (*Lasiurus cinereus semotus*) fatalities than anticipated in the HCP and authorized by the ITP/ITL. As such, Kawaiiloa Wind is pursuing an amendment to the HCP as part of the request to increase the amount of Hawaiian hoary bat take authorized by the ITP/ITL. Additionally, Kawaiiloa Wind is requesting to add take authorization for the endangered Hawaiian petrel or ‘Ua ‘u (*Pterodroma sandwichensis*). Kaily Wakefield submitted comments on behalf of HAS, which are posted on the HAS website under Conservation.

**Hawaiian Black-necked Stilt or Ae‘o on Rim Island 2:** Ae‘o numbers are less than 2,000 individual breeding birds in the entire State. It was listed as "endangered" in 1967 and remains endangered most probably because of the scarcity of predator-free wetland nesting habitat due to urban development. The last Five-Year Review was completed on August 27, 2010. It did not recommend downlisting the species. Rim Island 2 (RI-2) is a small, isolated island in the middle of the urban Hawaii Kai marina. Old maps indicate it was a small, isolated island bird sanctuary before the surrounding wetlands and Hawaiian fishpond were developed. During 1959-61, a developer dredged out and filled in the surrounding wetlands to create waterfront housing and a marina. The bird sanctuary island was reconfigured as "Rim Island 2" with a depression in the middle to be used as a future dump site for dredge spoils. The depression quickly filled with water. A couple of years later, wetland birds returned to the island and the Ae‘o began nesting there. In 1996, the Hawaii Kai Marina Community Association (HKMCA) partially filled in RI-2’s internal lagoon with dredge spoils, but again the Ae‘o returned to nest. Sometime after 2010, HKMCA began making plans to dredge

the marina again and deposit the spoils in RI-2's lagoon, which will fill it completely. On July 29, 2017, the Society and the Concerned Citizens of Hawaii sent a 60-day notice letter to the U.S. Fish & Wildlife Service (USFWS), the U.S. Army Corps of Engineers (ACE), Honolulu District, the Environmental Protection Agency, the State of Hawaii Department of Health (DOH), the State of Hawaii Department of Land & Natural Resources (DLNR), the City & County of Honolulu, and the HKMCA notifying them of the intent to file suit pursuant to provisions of the Endangered Species Act, the Clean Water Act, and the Administrative Procedures Act to challenge the agencies' and HKMCA's failure to comply with all federal laws applicable to the depositing of dredge spoils onto the nesting habitat of an endangered bird on RI-2.

During the 2019 nesting season, 2-4 stilts were repeatedly observed foraging for food on RI-2 and were videotaped doing so. After nesting season ended at the end of August, HKMCA began dumping dredge spoils onto RI-2.

**Northwestern Hawaiian Islands Ecosystem Protection:** Linda Paul represented the Society and the broader conservation community on the Northwestern Hawaiian Islands (NWHI) Coral Reef Ecosystem Reserve Advisory Council and has been its vice chair since 2004. The Papahānaumokuākea Marine National Monument was the result of an initiative to protect the NWHI begun by the Society in 1999. The Reserve Advisory Council is strongly opposed to any executive action that would reduce or rescind the Marine National Monument created in 2006 and expanded in 2016.

The Society continues to support the conversion of the Reserve into a Northwestern Hawaiian Islands National Marine Sanctuary as mandated by Executive Order 13178 when the Reserve was created by President William J. Clinton. (See [www.papahānaumokuākea.gov](http://www.papahānaumokuākea.gov) for more information about the Monument and the Reserve.)

**Palila:** In 2019, six endangered Palila were released into a restored native forest on Mauna Kea on Hawai'i Island. The bird forages on immature seeds, buds and flowers of Mamani trees that grow between 5,800 and 10,000 feet on Mauna Kea's slopes. HAS efforts to protect the Palila's critical habitat began in 1978 when it filed a lawsuit under the federal Endangered Species Act (ESA) to protect Palila habitat on Mauna Kea from feral sheep and goats. In 1979, the Court determined "harm" under ESA includes habitat destruction and ordered the State to remove feral animals from Palila critical habitat on Mauna Kea. (Palila I).

**Conservation Advocacy:** In 2019, HAS Conservation Committee Chair Linda Paul reviewed and monitored environmental bills and resolutions introduced in the Legislature related to the Society's mission statement. Testimony was submitted by HAS (Linda) on the following bills & resolutions: HB 1326, HD1 HD2 SD2: opposed. Concerns stream water removal from watersheds for private purposes under month-to-month revocable permits for years without having ever completing an EA/EIS that assesses the impacts on native flora & fauna.

The bill, which did not pass, would have extended the deadline for getting a lease (and doing an EA/EIS) from 3 years to 7 years; SR 93 & SCR 124: urged Governor, in coordination with DLNR to establish and implement a tree planting program; SB 350 in opposition to an exemption from compliance with HEPA

requirements; SB 1287 in support of a lei of green along coasts of urban areas. HAS supported funding for the State's Legacy Land Conservation Program, Livable Hawaii Kai Hui's wetland restoration efforts for the 'Alae 'ula at Keawawa wetland, and hosted a pass-through grant for the Kauai Forest Bird Recovery Project.

### Events, Field Excursions, Service Opportunities and Educational Programs

**Freeman Seabird Preserve 2019 Fieldwork Season**, every Saturday morning Jan. - Mar. 2019.

Through ongoing native plant and dryland forest restoration, predator control, and seabird nest monitoring, the Society is preserving a rare urban refuge for protected Wedge-tailed Shearwaters at Black Point on O'ahu. Habitat restoration and management activities continued in 2019 with the removal of invasive species, maintenance of native plants and man-made nesting structures, along with the annual accumulation of trash and debris from the coastline area. In 2019, approximately 105 volunteers contributed 758 hours of service work.

**Aiea Loop Trail**, Feb. 16, 2019. Led by Pat Moriyasu and Amanda Talpas.

**World Wetlands Day** celebration in Kailua, Feb. 23, 2019, at Kailua United Methodist Church. HAS, Hawaii's Thousand Friends and Conservation Council for Hawaii were in charge of the activities for keiki. Linda and Susanne provided posters, information about wetlands and marine conservation, and sold HAS educational products. HAS donated a door prize basket (book, map, note cards, CD).

**O'ahu Boat Trip** out of Kewalo Basin, Mar. 31, 2019. Held in cooperation with Mandy Talpas.

**White Tern (Manu-o-Kū) walks**, Honolulu, Jan. 19, Feb. 23, Mar. 23, Apr. 20, and May 18, 2019. Led by Rich Downs.

**Paikō Lagoon Wildlife Sanctuary Farewell to Our Shorebirds**, Apr. 20, 2019, tour led by Alice Roberts. Society members and other interested participants explored the lagoon while learning about Hawai'i's visiting shorebirds.

**O'ahu Forest Birds Hike**, Palikea Trail, Apr. 20, 2019. Led by Lynette Williams and Pat Moriyasu.

**Earth Day** "Protect Our Species", Apr. 22, 2019.

**Presentations co-sponsored by the Hanauma Bay Nature Preserve and the Society**, Apr., 2019:

- **The Amazing Transpacific Life of Pacific Golden-Plover Kolea**. Apr. 4, 2019. Susan Scott, HAS Board Member.  
Abstract: Each April, Hawai'i's Kōlea fly 3,000 miles north, nonstop over the Pacific Ocean, in three days. On the mosquito-rich tundra, plover couples each raise four chicks, and in August, all fly 3,000 miles back to the same place. These remarkable birds have adapted well to life among humans, some even recognizing people who live in their territory.
- **Diet and Foraging of Red-footed Booby (Sula sula) on O'ahu**. Apr. 18, 2019. Sarah E. Donahue, Hawai'i Pacific University.

Abstract: The Earth's oceans are experiencing large scale changes in temperature that impact the structure of marine food webs and the distribution of upper-trophic-level predators. In particular, seabirds respond to year-to-year variability associated with El Niño Southern Oscillation (ENSO) phenomena and longer-term decadal variability. This study used RFBO diet as an indicator of year-to-year variability in epipelagic prey availability and oceanographic conditions, by virtue of four key traits:

1) their ability to sample localized prey distributions during breeding season, when their foraging ranges are restricted around the colony; 2) their generalist foraging habits and opportunistic diet; 3) their demonstrated ability to respond to changes in the marine environment; and 4) the logistical ease involved in the study of their diet and movements, due to their non-migratory habits and colonial breeding. More specifically, we contend that RFBO diet can be used to detect changes in the prey available within the surface oceanic environment surrounding their breeding colony on the island of O'ahu, Hawai'i.

- **Caring for O'ahu's Manu-o-Kū: It Takes a Hui!** Apr. 25, 2019. Rich Downs, HAS Board Member.

Abstract: The White Tern, or Manu-o-Kū, is the official bird of the city of Honolulu. And as residents of the city become more aware of this urban-nesting seabird and its endearing traits they are taking more of an interest in its welfare, in particular the fate of chicks that fall from their nesting spots. This talk described the network of organizations that are working together to rescue these fallen chicks and the care they receive until able to be returned to the wild.

**Manu o Kū Festival**, May 18 at 'Iolani Palace. HAS table offered a birding activity for kids (with parents participating), information about keeping cats happy indoors and the importance of that practice, and a lovely new product available for a donation of \$10. Robynn Yim, FSP volunteer awardee in 2018 and MOK/Rich Downs fan, created tiny MOK figurines out of modelling clay and stuck them to magnets, a big hit and all but one were "sold".

**Kealia Board Walk**, June 13 and June 27, Nov. 25. Led by Yolanda Solorio.

**Paikō Lagoon Wildlife Sanctuary Low Tide Walk**, June 15, 2019. Led by Alice Roberts.

**White Tern walks**, June 22, July 20, Aug. 17, Sep. 21, and Nov. 16, 2019. Led by Rich Downs.

**26th Annual Hawai'i Conservation Conference**, July 9 - 11, 2019. Susan Scott and Wendy Johnson shared information and stories at the HAS booth in the exhibits portion of the conference.

**Paikō Lagoon Wildlife Sanctuary Welcome Home to Our Shorebirds**, Sep. 14, 2019. Led by Alice Roberts.

**HAS Annual Member Meeting & Member Dinner**, Oct. 30, 2019, HAS 80th Anniversary Annual Members Meeting & Dinner was held at the Waikiki Yacht Club. Members and guests enjoyed a delicious Italian buffet and a presentation by Mark J. Rauzon on *The Legacy of The Pacific Project: The Secret Bio-Weapons Testing Program and The Role Seabirds Played in It*. The HAS

80th Anniversary 'Elepaio T-shirt was available for sale at the event.

**Nature walk from Turtle Bay Resort to Kahuku Point**, Nov. 11, 2019. Led by Anthony Leiggi.

**120th Annual Christmas Bird Count** Citizen Science Opportunity, December 14, 2019 - January 5, 2020.

Society members and friends participated in the longest running citizen science survey in the world, which provides critical data on bird population trends. Society members and volunteers counted birds within historic circles in Volcano, North Kona, and Hilo on Hawai'i Island, Kapa'a and Waimea on Kaua'i, Lanai Boat Harbor, Hana in Koki Beach State Park, 'Iao Circle, Kealia Coastal Boardwalk and Hosmer Grove on Maui, Topside and Kalaupapa on Moloka'i, and Honolulu and Waipi'o (Palikea Trail) on O'ahu. Results were submitted to National Audubon Society database and can be viewed on their website.

### Society Awards and Grants

The Society's 2019 Summer/Fall Student Research Grant went to Sara Gabrielson to support her research on determining spotted and Zebra Dove diets on O'ahu with implications for seed dispersal.

### Donations, Finances, and Fundraising

The Society depends on the many generous donations and matching gifts from our members and benefactors. The donations go directly to the Society's species conservation and ecosystem protection funds, which focus on native species research and protection, native habitat restoration, and conservation education. The Society derives the majority of its operating and programmatic funding from membership dues, grants and the proceeds from the sales of its educational products, including the indispensable book *Hawaii's Birds* and its audio companion *Voices of Hawaii's Birds* (2 vol. CD).

In 2019, work continued on the 7th edition of *Hawaii's Birds* with the goal of publishing it in 2020. In December 2019, HAS received a \$5,000 donation from the Elias Family Philanthropic Fund to honor board member and FSP botanist Alice Roberts. Additional donations of \$1,000 each were gratefully received from Eric Anderson and Roger Beck, Brad and Sherry Eichhorst, Vicki Flavell, and Susan Scott. Ethan Creps made a \$500 donation that was matched by his employer Matson Navigation, Inc., Kakoku Shoji donated \$590, and Ameriprise Financial Center donated \$500.

In 2018, Susan Scott published her beautiful new book *Hawai'i's White Tern Manu-o-Kū, an Urban Seabird* and generously donated the book's royalties to the Society. Susan's *Hawai'i's White Tern* book as well as her *Hawai'i's Kōlea* book can be purchased online from the Society.

Also on sale is the Society's book: *Hawaii's Birds*, as well as *Hidden Treasurers of O'ahu*, a birding & family hiking map, *Hawai'i's Rare & Endangered Birds Art Collection* greeting cards illustrated by Patrick Ching (pkg of 8), 'Elepaio patches, a *Field Check-Card of Birds of Hawaii*, and 'Elepaio, Kōlea, and Ruddy Turnstone "Akekeke" T-shirts.

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# 2019 Shearwater Nesting at Freeman Seabird Preserve: Highest breeding pairs, average chick success, and first eggs in ceramic homes

By

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Michelle Hester, Executive Director Oikonos Ecosystem Knowledge, michelle@oikonos.org

We report on the ongoing monitoring and restoration efforts of the Freeman Seabird Preserve by Hawaii Audubon Society and Hawai'i Pacific University since 2009, share findings from the 2019 breeding season, and briefly discuss the plans for future monitoring, habitat restoration, and predator control at the site.



**Figure 1.** A one-week old chick inside one of the new ceramic nest modules, first used by breeding shearwaters during the 2019 season, photo credit David Hyrenbach.

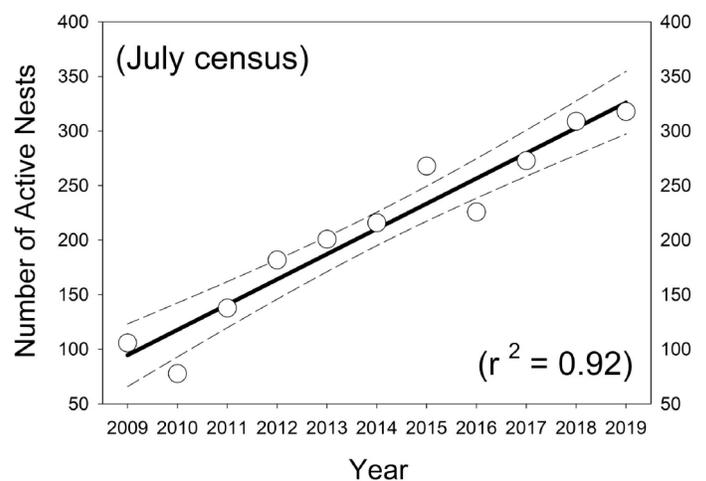
## 2019 Update

This year we documented 318 active nests of Wedge-tailed Shearwaters (*Ardeanna pacifica*, 'Ua'u kani) at the Freeman Seabird Preserve, 1.6 % higher than the count of 313 nests in 2018. In fact, this year's nest count is the highest to date, surpassing the previous peak documented in 2018 (Hyrenbach 2019). Overall, the annual population surveys continue to show a statistically significant trend ( $F = 116.611$ ;  $df = 1, 9$ ;  $p < 0.001$ ) with an average increase of 23.1 (+/- 7.1 S.D.) nests per year, which captures 92 % of the year-to-year variability in the 11 year time series (2009-2019; Figure 2). Therefore, despite two short-term declines in the number of shearwaters that attempted to nest during the 2009-10 and the 2015-16 El Niño events, the colony continues to grow.

The July 14 count of 318 nests (representing assumed parents incubating eggs) was followed by a count of 218 chicks on September 14. This represents a loss of 31.4 % of the nests during

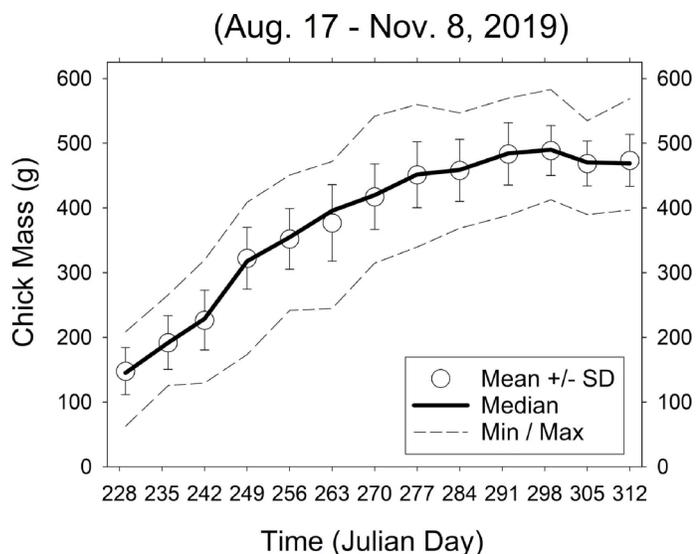
the two-month period spanning hatching and the first month of the chick's life. Furthermore, the weekly monitoring of 60 nests between July and November revealed that 2019 was characterized by very low egg loss, with 13.3 % of the monitored eggs being lost. However, chick mortality was high in 2019, with 25.0 % of the monitored chicks being lost. While the majority of the chick mortality happened early in the season (before August 30), three older chicks died during a two-week period in mid-September (13 to 27) due to a lack of food, at a time when chicks tend to gain mass at a fast rate and start growing their flight feathers. This observation suggests that some of the nests failed due to poor foraging conditions at sea.

Nevertheless, the weekly monitoring also revealed that 2019 was characterized by average phenology, similar to previous years. In 2019, chick hatching dates spanned from July 27 to August 20, with a mean of August 5 (+/- 6.1 S.D. days). Chick peak masses and growth patterns were also comparable to those recorded in the past. In 2019, peaks in weight ranged from 425 to 583 grams, with a mean of 504.6 (+/- 38.7 S.D. grams) and chick mass started declining in late November before fledging (Figure 3). This pattern contrasts with 2018, when chicks continued to gain mass through the beginning of November, suggesting parents had more difficulty feeding chicks that year and provisioned them longer (Hyrenbach 2019).



**Figure 2.** Trend in the number of Wedge-tailed Shearwater active nests at the Freeman Seabird Preserve, 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).

In summary, the monitoring data suggest that 2019 was another year of average phenology and chick productivity, in the context of the available time series (2009 – 2019). The ENSO-neutral conditions currently underway are expected to continue through the summer of 2020 (See NOAA’s Climate Prediction Center ENSO Diagnostic Discussion, [www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/)). Based on these model predictions, we anticipate that 2020 will be another “average” year for Wedge-tailed Shearwater breeding at the Freeman Seabird Preserve.



**Figure 3.** Time series of chick mass collected during the 2019 breeding season, showing the mean +/- S.D., the median and the range of values (maximum – minimum). Sample size = 36 chicks.

### Ongoing Efforts

Habitat restoration efforts continued during 2019. From January through March, while the Wedge-tailed Shearwaters were at sea, Hawai’i Audubon Society members and other volunteers worked to remove alien plant species and improve natural nesting sites. Also, more artificial ceramic nests were created and installed with multiple partners (HPU, Oikonos, California College of the Arts, Windward Community College) and ceramic artists (Nathan Lynch and Bryce Meyers).

This was the first season the newly designed ceramic nests were deployed before shearwaters returned to prospect for breeding sites. Each nest has three components: the nesting chamber, a sun shield, and an entrance. In 2019, we experimented with two entrance designs: 7 clay tunnels and 7 rock piles. Starting in March 2019, we monitored these 14 artificial nest sites weekly for occupancy and daily with motion-activated infrared cameras.

Six of the seven (85.7 %) nests with rock pile entrances were occupied by prospecting shearwaters, compared to none (0 of 7)

of the nests with clay tunnels. Birds laid eggs in 5 of the 6 occupied nests. Because most burrowing seabirds have nesting site fidelity, it can take many years for breeders to select artificial nests.

Therefore, we are encouraged by the quick acceptance of the newly designed modules. We also documented this rapid occupation with the original artificial sites created with roofing tiles. This year, we learned that the clay tunnel entrances are likely too small in diameter for the adults to feel comfortable walking completely inside. We observed adults prospecting around the tunnels but only sticking their heads inside the entrances. The rock-pile entrances were larger and more similar to their natural sites.

All five eggs hatched and four successfully fledged from the ceramic nests, with a fledging rate (4 of 5, or 80.0 %) comparable to that in the control nests (39 of 52, or 75.0%) (Fisher’s Exact Test, Chi-squared = 0.168, df = 1, p = 0.6945). Furthermore, the reproductive success, expressed as the proportion of eggs laid in July that successfully fledged as a chick in November, were not significantly different (Fisher’s Exact Test, Chi-squared = 0.463, df = 1, p = 0.6549), with 80.0 % (4 of 5) in the ceramic nests and 65.0 % (39 of 60) in the control nests, respectively. Thus, despite the small sample sizes, these results suggest that the fledging and reproductive success from these new ceramic nests are similar to those from the existing natural and roof tile nests previously installed at the Freeman Seabird Preserve.

Additional restoration and management efforts in 2020 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 plant species and will improve some of the existing rock nesting sites on the terrace.

**Colony Monitoring:** Population censusing and nest monitoring for phenology, chick growth and reproductive success will continue in 2020, to augment the ongoing time series started in 2009.

**Predator Control:** Ongoing surveillance for predators is planned during the 2020 nesting season, to minimize and document predation by rats, cats and mongooses on breeding shearwaters.

### Acknowledgements

Funding from Disney Conservation Fund and Atherton Foundation. We thank the many volunteers and students who contributed to the restoration and monitoring efforts.

### Literature Cited

Hyrenbach, K.D. 2019. Peak Colony Count During Another Year of Average Productivity and Provisioning at the Freeman Seabird Preserve. *'Elepaio* 79(2): 13-14.

## Hawaii Audubon Society Membership/Donation Form

The mission of the Hawaii Audubon Society (HAS) is to foster community values that result in the protection and restoration of native wildlife and ecosystems and conservation of natural resources through education, science and advocacy in Hawai'i and the Pacific. Founded in 1939, HAS is an independent non-profit 501(c)(3) organization and does not receive dues paid to the National Audubon Society. Thank you for supporting your local Hawaii Audubon Society.

- |   |   |
|---|---|
| <input type="checkbox"/> \$25 Hawaii Audubon Society Regular Member     | International Membership:                     |
| <input type="checkbox"/> \$15 Hawaii Audubon Society Student Member     | <input type="checkbox"/> \$28 Canada & Mexico |
| <input type="checkbox"/> \$40 Hawaii Audubon Society Family Membership  | <input type="checkbox"/> \$33 Other           |
| <input type="checkbox"/> \$100 Hawaii Audubon Society Supporting Member |   |
| <input type="checkbox"/> \$_____ Donation                               |   |

Donations are tax-deductible and greatly appreciated.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

- Email me the 'Elepaio    Mail me the 'Elepaio    Email me volunteer opportunities, updates, & field trips

Please make checks payable to **Hawaii Audubon Society**.

Mail form and payment to Hawaii Audubon Society, 850 Richards St, Suite 505, Honolulu, HI 96813.

Email: [hiaudsoc@gmail.com](mailto:hiaudsoc@gmail.com)   <http://www.hawaiiadubon.org>

**Mahalo for your concern and commitment to protecting Hawai'i's native wildlife and ecosystems.**

### Upcoming Events and Field Trips

Visit our website for details and regular updates

<http://www.hawaiiadubon.org/get-outside>

#### Hanauma Bay Presentations

Audubon Society is hosting two presentation in cooperation with Hanauma Bay Education Program in 2020:

Thursday evenings from 6:30 to 7:30 pm at Hanauma Bay Nature Preserve Visitor Center

April 2: Susan Scott (HAS Board Member): "The Miracle of Midway: A Million Albatrosses and Counting"

April 9: John Harrison (HAS Board Member): "Energy from the Ocean: It's complicated"

#### Farewell to our Shorebirds

April 18, 8:00 am, meet at the end of Kuli'ou'ou Road

Explore the Lagoon area while learning about Hawai'i's visiting shorebirds. We may see, e.g., Kōlea, Ruddy Turnstone, Wandering Tattler) as well as Hawaiian Stilts, 'Iwa, Egrets, Herons, and lots of urban birds and ducks.

Leader: Alice Roberts (HAS Board Member)

Please call or text 808-864-8122 and leave your name and phone number.

#### White Tern Walks

March 14, 2020, details tba

April 18, 2020, details tba

Leader: Rich Downs (HAS Board Member)

RSVP by text to 808-379-7555



#### Earth Day

April 22, 2020

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### **VOLUNTEER OPPORTUNITY**

#### **Fieldwork Habitat Restoration**

When: January through March, Saturdays from 8:30 am to 11:30 am

Where: Freeman Seabird Preserve, located in Southeast O'ahu at Black Point. Meet at Paikau St side of Fort Ruger Park (Triangle Park) at 8:15 am near Diamond Head Road and Kahala Ave to carpool to the Preserve.

While the migratory Wedge-tailed Shearwater birds are absent from the Preserve, volunteers are needed for habitat restoration. Activities include maintenance of native plants and artificial land-scape features, and removal of invasive plants, trash, and debris. Please bring drinking water, sun and rain protection, gloves, weeding tools, clippers or loppers, if you have them. We also have gloves and tools to share.

RSVP: Contact Alice at 808-864-8122 in advance to participate. Text or leave voicemail.

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