

GOONEY GAZETTE II

Friends of Midway Atoll NWR

Winter 2016/2017 Edition



GOONEY GAZETTE II

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Friends of Midway Atoll NWR (FOMA)

Battle of Midway National Memorial

Our Mission: “To support Midway Atoll National Wildlife Refuge / Battle of Midway National Memorial in its efforts to preserve, protect, and restore the biological diversity and historic resources of Midway Atoll, while providing opportunity for wildlife-dependent recreation, education, cultural experiences, and scientific research.”

FRONT COVER: Throughout late fall and into the summer, Laysan Albatross (*Phoebastria immutabilis*) are one of the most popular birds on Midway Atoll NWR—indeed, more than 1 million of them! Rebounding from a severe population decline in the 1990s and early 2000s, Laysan Albatross are among the few albatross species in the world that are relatively stable. 98% of the world’s Laysan Albatross breed in the Northwestern Hawaiian Islands, with an estimated 71% of the population breeding on Midway Atoll NWR. Photo by Daniel Clark/USFWS.

Friends of Midway Atoll NWR

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VISION

Friends of Midway Atoll National Wildlife Refuge plays a pivotal role in the conservation and restoration of Midway's natural and historic resources through financial and volunteer support, dynamic outreach and education, effective advocacy in the support of Refuge programs, assistance in the development of an inspirational visitor program, and productive collaboration with diverse partners.

VALUES

- Focus on highest priority actions
- Be a voice for our members
- Share science-based information
- Operate with integrity
- Be accountable with our actions and resources

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Left and top right: Wayne Sentman / USFWS. Bottom right: National Geographic.

FROM THE PRESIDENT

Dear Friends: What an exciting last few months we have witnessed for our refuge and for ocean conservation in general. In September, President Barack Obama expanded the Papahānaumokuākea Marine National Monument, making it (for a short time) the world's largest marine protected area. Then right after that announcement President Obama visited the only window into that large expanse of marine protected area: Midway Atoll National Wildlife Refuge (NWR). For a brief time, the world's attention was focused both on our Refuge and the value of protecting larger areas of the planet's "Blue Heart."

It is in events such as these that we are reminded why we must continue to devote time and energy to making sure that these special marine places do not disappear and remain in the public eye so that they receive the support and attention they need. Your support and your membership in FOMA allows our organization to play the role that it does in that effort.

On the 19th of October, 2016, the first Black-footed Albatross (*Phoebastria nigripes*) of the season returned to Midway Atoll NWR. Over the last month, that one was followed by thousands more, as the new albatross breeding season got underway. This is a progression that has happened on these islands every year for millennia. Thank you all for helping us, year in and year out, to work alongside the refuge to conserve the history and the ocean wildlife of Midway Atoll and the Papahānaumokuākea Marine National Monument. So that each year, when those million-plus albatross return, the islands of Midway Atoll and the oceans surrounding it are a bit safer for them to navigate.

Aloha,

A handwritten signature in black ink, appearing to read 'Wayne Sentman'.

Wayne Sentman, FOMA President (Midway Atoll 1999–2002)

New Deputy Refuge Manager Has Roots in the Louisiana Bayou

Meet Deisha Norwood



Bayou Cocodrie NWR by USFWS

I was born and raised in Southwest Louisiana, spending as much time as possible in the bayous and marshes along the Gulf Coast. I am the proud parent of 4 and grandparent of 7. I enjoy spending time with friends and family, teaching them about the environment and our personal responsibilities to maintain and reduce human impacts to natural environmental processes. My hobbies are church choir, service and mission projects, crafts projects, and scouting, as well as all outdoor activities.

My professional passion is to sustain habitats with a focus on protecting, maintaining, restoring, and enhancing natural and historical environmental processes for the benefit of the native species that depend on them. My favorite conservation hero is Rachel Carson. She identified a world problem and she persevered against all odds to significantly change the future for all life on earth.

Most recently I was the Refuge Manager at Bayou Cocodrie NWR for the last 8 ½ years. Bayou Cocodrie NWR is within the Lower Mississippi River NWR Complex where I also served as Acting Deputy Project Leader. I am most honored to have assisted the Louisiana Department of Wildlife and Fisheries with the radio collar and tracking program for the Louisiana Black Bear. I am also very happy to say that the Louisiana Black Bear was delisted just last year. I have worked for the National Wildlife Refuge System within the U.S. Fish and Wildlife Service for over 21 years. I have experience from 4 Refuges in Louisiana, 1 in Mississippi, 2 in Florida, 2 in Tennessee and the Atlanta Regional Office. I have a Bachelor of Science degree in Wildlife Management and Biology from McNeese State University in Lake Charles, Louisiana.

I can be reached at: deisha_norwood@fws.gov. ✉



*Deisha Norwood helps to sedate, tag, and radio collar a Louisiana Black Bear in order to collect important information to guide recovery efforts.
Photo credit: USFWS*

MIDWAY ATOLL
 NATIONAL WILDLIFE REFUGE
 VISITOR CENTER



Top row (left to right): Wieteke Holthuijzen (Kupu), Beth Wolff, Michelle Smith, Victoria Miki'ala Taylor, David Dow (Kupu). Bottom row (left to right): Kristina McOmber (Kupu), Eric Baker. Photo credit: Amanda Boyd/USFWS.

THE CREW

What Determination Can Do

By Wieteke Holthuijzen, FOMA Board Member

For the next 6 to 12 months, these volunteers will work on Midway Atoll NWR in conjunction with the Refuge's Biology Program, helping with a wide variety of projects including habitat restoration, seabird conservation and wildlife monitoring. These volunteers work closely with Refuge staff to aid with native plant propagation and out-planting, seed collection and processing, removal of invasive plants, marine debris removal, and seabird and Laysan Duck (*Anas laysanensis*) monitoring.

Volunteers are critical to the Refuge's mission and work. The National Wildlife Refuge System (which includes Midway Atoll NWR) has owed its very existence to concerned citizens eager to protect America's natural resources. Over 42,000 volunteers and more than 200 nonprofit Refuge Friends organizations (like FOMA) support National Wildlife Refuges. Friends and volunteers are crucial to conserving and protecting our nation's wildlife and teaching millions of Americans that their actions today determine the conservation legacy of tomorrow.

In addition to Refuge volunteers, Midway Atoll NWR is also hosting three Kupu interns from its Conservation Leadership Development Program: David Dow, Wieteke Holthuijzen, and Kristina McOmber. Kupu is a

Honolulu-based 501(c)(3) nonprofit organization that empowers future generations to create a more sustainable, *pono* Hawai'i. This organization, now in its 10th year of operation, provides hands-on training programs that educate and mentor youth to become stewards of their culture and environment, helping them develop a strong connection to the place in which they live.

Over the years, Kupu has risen to meet the increasing demands of the green economy by training over 3,000 youths in areas of conservation, sustainability, and environmental education. Kupu affirms the Hawaiian notion of *ma ka hana ka 'ike* or "in working one learns." This approach has led to the creation of hundreds of internships and service-learning opportunities which blend vocational training and green leadership development to support over 150 partner sites across Hawai'i and the Pacific region—now including Midway Atoll NWR! FOMA is excited to collaborate with Kupu and strongly supports additional help to further wildlife conservation and habitat preservation on the Refuge. To support these new positions, FOMA will be covering the food costs of one of the Kupu interns. Go to the next page for first-hand introductions to the crew.



David Dow, Plant Propagation Specialist (Kupu)

I graduated from Caltech with a degree in geology and moved to Hawai'i to volunteer with the Hawaiian Volcano Observatory (HVO). At HVO I worked on projects ranging from GIS, to field mapping and geophysical surveys, to the photo archive. A friend's invitation to help with the annual albatross count on Midway Atoll NWR the next winter sparked a fascination with seabirds. I have since returned to Midway for multiple albatross counts and several longer stints as a volunteer. Recent work on Midway included habitat restoration, Laysan Duck monitoring and botulism response, and stemming the predation of albatrosses by mice. Between stints on Midway, I have returned to volunteer at HVO, logged drill core with the Humu'ula Groundwater Research Project, and monitored endangered seabirds on Kaua'i. When not working, I can be found propagating native plants at home or photographing the natural world, be it seabirds or volcanoes. For this coming year on Midway, I will be focusing on plant propagation—everything from seed collection and storage, to developing propagation protocols, and managing the newly expanded nursery.



Eric Baker, Refuge Biology Program Volunteer

I've spent my career in journalism, working as both a photographer and artist at newspapers throughout the West, until the industry divested itself of journalists and laid everyone off, or so it seemed. Since I don't make a good tourist and wanted to do something worthwhile with my time, I had previously spent my vacations doing volunteer fieldwork. Being laid off opened up new opportunities, and I soon ended up doing seabird work with the USFWS in Alaska. That in turn led me here. Back home in Colorado I make an absurdly small amount of money freelancing, and spend less time than I'd like backpacking the mountains. But I'm happy to be one of the last photojournalists left who still shoots something called "film." I jumped at the rare opportunity to work on Midway Atoll NWR; in a warming world of decreasing habitat it's a place where I felt I could still make a difference. Coincidentally, my father was stationed on Midway during WWII, through 1946, where he ran the Armed Forces Radio station KMTH. Being able to "return"—70 years later—closes the circle. I plan to tell that story in future *Gooney Gazettes*.

Michelle Smith, Refuge Biology Program Volunteer

Originally from Vallejo, CA, I have lived in Hilo on the Big Island of Hawai'i for the past four years. I recently graduated from University of Hawai'i at Hilo with a Bachelor's of Science degree in Marine Science and a minor in chemistry. In Hawai'i my main focuses of study were watershed and fishpond conservation and restoration projects in Waimea and on the Kona coastline. Over the summer this year I volunteered with the NOAA Hawaiian Monk Seal Research Program, where I conducted seal surveys over a four-month period on Laysan Island. What I love so far about Midway Atoll NWR is the amazing biodiversity of plants and seabirds across the atoll.



Victoria Miki'ala Taylor, Refuge Biology Program Volunteer

Aloha! I am from Maui, Hawai'i, and have been living in Hilo on the Big Island for the past 4 years. I am a recent graduate from the University of Hawai'i (UH) at Hilo with a B.A. in Hawaiian Studies and a Beekeeping certificate. I was motivated to study at Ka Haka 'Ula o Ke'elikelani, UH Hilo's Hawaiian Language College, because of my long involvement with the Hawaiian Language revitalization movement. I started my journey in the Hawaiian immersion program from preschool and continued all the way through high school. Throughout my years at Kula Kaiapuni (Hawaiian immersion school), I learned about our interconnectedness with the environment. *He ali'i ka 'aina, he kaula ke kanaka* translates to "the land is chief and we are its servants." This ancient proverb says that it is our responsibility to take care of the land that takes care of us. My experience working in the conservation field began three years ago as a member in the Hawai'i Youth Conservation Corps under Kupu, a nonprofit organization. During this seven-week-long internship, I discovered the passion I have for conservation and how important it is for us to give back to the land that feeds us. I am able to work in pristine areas around Hawai'i, seeing a few of the last dry land and wetland forests, and it makes me realize how important it is for this generation to protect all of its resources and what is left. I believe that the environment that surrounds us is our true classroom and there is so much we could learn from it. The ancient name of Midway Atoll NWR, *Kuaihelani*, or "the backbone of heaven," signifies how important this atoll is within the Papahānaumokuākea Marine National Monument—and also how it provides perfect habitat for many migratory birds and marine species. Having the opportunity to be here especially during the albatross season is really exciting. It was an amazing sight to see how quick it took the albatross to blanket the atoll from when the first one arrived in late October. The Northwestern Hawaiian Islands are highly significant to Hawai'i and its culture and I am extremely privileged to witness first-hand how truly special this place is. My fantasies have turned into reality with the opportunity to volunteer here on Midway. I am very appreciative for this great biology volunteer program and thankful for all the people and hard work that was put into making this possible. *Mahalo nui!*

Kristina McOmber, Volunteer Crew Leader (Kupu)

I was lucky enough to be a volunteer for the 2015-2016 winter 6-month "field season," and I am extremely happy to be returning as the crew leader for this winter and the upcoming summer seasons! My pathway was made possible by a partnership between the refuge and Kupu, a Hawaiian nonprofit organization that mentors youth to protect and conserve native ecosystems. It's been great to return to Midway, to reconnect with this tiny atoll and see how so much of the work we put in last winter has grown and blossomed—literally! We were first introduced to some restoration areas as flat lots of invasive weeds that we subsequently turned into scorched earth with an aggressive offensive and then nurtured and cared for with dozens to hundreds of outplantings and surgical-precision herbicide application of hardier invasives. When I left in March, many of those outplantings were still small and required lots of care and management. When I returned in September, I was thrilled to see that the vast majority of those outplantings were thriving—protective fences have been removed; the plants were offering shelter to tropicbirds, shearwaters, terns and future albatross, and most importantly (to someone who wants to move towards an ecosystem that can take care of itself), outcompeting invasives and recruiting new individuals. I've also been enjoying this year's fall migration, puzzling over shorebirds at the Catchment Pond. One of the aspects I love about Midway Atoll NWR is its location and what it can offer for ornithologists to learn about how birds that migrate over and around the Pacific Basin are being affected by climate change and increasingly turbulent weather systems.

Beth Wolff, Refuge Program Biology Volunteer

Taking a sabbatical from my career as a wildlife biologist, I am currently volunteering with Midway Atoll NWR's Biology Program. Prior to coming to Midway, I worked as a consultant on a wide variety of projects throughout the West, such as industrial solar developments in California and Nevada and mine remediation in Arizona, where I conducted surveys for ravens, raptors, migratory songbirds, and desert tortoise. My lifestyle is highly seasonal and requires several months of travel and field work followed by a couple months of rest and recuperation. I am accustomed to living and working in remote reaches of the desert and mountains, but have never lived on an island or in a seabird colony before. All of my consulting work has taken place in cooperation with the U.S. Fish and Wildlife Service as well as the Bureau of Land Management, but this is my first foray into volunteering with the USFWS.

When I'm not working in the field, I enjoy exploring the world around me on foot, by bike, and by boat. My favorite adventures combine sports such as backpacking, pack rafting, and canyoneering in beautiful new places, and I love to get as far as possible from pavement. Although travel is a huge part of my life, I treasure my time at home in Durango, Colorado where I can work on my quilts and plan for the next season.

In addition to my work as a wildlife biologist, I have a deep love of books and hold a position as an archivist for a collector of Western literature and frontier Americana. For the past several years, I have used gaps in my schedule to assist in organizing and curating this extraordinary collection of American history and literature, which will eventually be housed at a museum in the Four Corners area.

The remote landscape of Midway Atoll is rich in history as well as wildlife, and I am thrilled for the opportunity to spend six months in such an unusual place. ☒



From the Field

Updates from the Refuge Biology Program

By Meg Duhr-Schultz, USFWS Wildlife Refuge Specialist
Midway Atoll NWR



USFWS Volunteers outplant native species in a restoration site (Hale Honu) on Sand Island, Midway Atoll NWR. Photo credit: Kristina McOmber/Kupu.

At the heart of the Refuge's Biology Program are the passionate volunteers who dedicate 6-12 months of their lives to support wildlife conservation and habitat restoration throughout the atoll. With the recent addition of three Kupu interns, the Refuge's Volunteer Program continues to grow by leaps and bounds. Shortly after the arrival of the new USFWS Volunteer Crew this fall (see "The Crew" on pg. 5-7), we plunged into three weeks of training and orientation which included presentations and hands-on training in: plant identification and weed control methods; Laysan Duck (*Anas laysanensis*) surveys and botulism detection; native plant propagation and seed collection; and operation of all the accompanying data systems for each element of the Refuge Biology program. Though the amount of information and skills that must be crammed into our orientation can be overwhelming at times (volunteers must be able to recognize a least 40 plant species before any weed control work is undertaken, for instance), we work to incorporate as many hands-on training opportunities as possible: demonstrating a new skill, then doing it as a team, then doing an entire project together with experienced staff or volunteers. The feedback we receive from our volunteers is that the training, while intense, is rewarding and successfully prepares them to rise to the challenges of the Refuge.

Restoration Site Management

We are very fortunate to have on site Dr. Robert Taylor (see "Meet the Natives" on pg. 10-11), a restoration ecologist from Oregon who will be serving as our Restoration Data Management Specialist for the next year. Rob has spent his first several months on Midway Atoll NWR restoring functionality to our GIS system and helping us use geospatial and other database technology to manage invasive plant control, our native plant nursery inventory, seed collection, and out-planting operations. Rob is also creating user-friendly systems to track native plant survival at restoration sites as well as monitoring weed control activities Refuge-wide so that USFWS staff can strategically direct our management efforts over an

increasingly complex landscape. The overall goal of this project is to create integrated restoration data management systems that will not only guide the Refuge but can be adapted for use on other Pacific Islands habitat restoration projects. We are grateful for the support of the National Wildlife Refuge Association and USFWS Region I Inventory and Monitoring Program for helping make Rob's position a reality. In August, USFWS and Defense Base Services Inc. (DBSI) contractors completed the first of several large-scale Ironwood (*Casuarina equisetifolia*) removal projects planned for the next few years. Although this invasive tree species degrades habitat quality for most species of native seabirds and prevents plant growth in its understory due to allelopathic properties, the primary reason for removing trees in the 2016 project area was to comply with Federal Aviation Association (FAA) safety regulations related to Henderson Field. Approximately 7.5 acres of ironwoods were removed from the southeast section of Sand Island because they have the potential to interfere with the visual approach of pilots landing on the east end of the runway. Removal of thousands of trees from any remote island poses myriad challenges, but at Midway, bird avoidance and harm minimization is perhaps the largest. Project timing helps avoid impacts to winter nesting seabirds (primarily albatrosses and Bonin petrels), but White Terns (*Gygis alba*)—which nest year-round with summertime breeding peaks—commonly nest in Ironwood trees. Efforts to minimize our impacts to white terns began in January 2016, with herbicide treatment of all trees in the project area in order to remove green growth which increases nest detection ability and makes the trees less attractive for nesting. Over the 4 months prior to tree felling, the site was regularly surveyed for nesting seabirds of all species to map and plan for nest impacts. Prior to and during tree removal White Tern chicks in the project area were removed and taken to a captive rearing area (nicknamed "The Orphanage"), where they were monitored and hand-fed small fish until they fledged. (Chick relocation and captive rearing is performed under Migratory Bird Special Purpose Permit # MB64615B-0)

Now that the trees are down and the orphaned chicks have fledged, we have shifted our energy toward restoration of the site.

Due to limitations on time and personnel, heavy equipment operators using a bulldozer and excavator, plus a small team of sawyers, were used to fell and pile the trees. Though this was an efficient method, it caused large-scale soil disturbance and left us with 7.5 acres of bare, disturbed ground to manage, the single largest scraped earth restoration project ever undertaken at the Refuge. Though it would not have been our first choice for a restoration site, because it was former Ironwood forest relatively devoid of other plant species, it presented high restoration potential. Areas free of deeply established invasives like Bermuda Grass (*Cynodon dactylon*), Goosegrass (*Eleusine indica*), and Sweet Alyssum (*Lobularia maritima*) are extremely rare at Midway Atoll NWR and in places such as these, we hope that initial high density outplantings and direct seeding coupled with early and aggressive weed control to ensure no non-natives are allowed to set seed in the site will help convert this former Ironwood wasteland to high quality seabirds habitat with robust native plants.

Following months of planning and preparing nursery stock for outplanting and collecting native seeds, FWS staff, volunteers, and DBSI contractors carried out the largest out-planting effort ever undertaken at Midway here in September, planting 780 pots of native bunchgrass and 300 pots of 7 other species. A few weeks later, we also implemented the largest direct seeding operation we have ever undertaken; sowing close to a full year's inventory of native seeds into the site, a total of nearly 26 pounds of pure, live seed from 12 native plant species. We have worked closely with Rob Taylor to monitor all of our efforts here including establishment of multiple experimental seeding plots where we will monitor the germination rates of rare species such as Pōpolo (*Solanum nelsonii*) and Kūnānā (*Lepidium bidentatum*).

Native Plant Propagation and Seed Collection Operations

Large scale out-plantings like that described above would not have been possible a year ago. With the new shadehouse operational as of spring 2016, we have been able to scale up propagation operations for all of our native plant species while still maintaining industrial scale propagation of native 'Emoloa / Bunchgrass (*Eragrostis variabilis*) in the original greenhouse facility. We are so grateful to the Friends of Midway Atoll NWR for supporting this important expansion as it has allowed us to significantly widen the suite of species that we propagate for restoration work out here.

This fall, volunteers have collected primarily native grass and sedge species as well as shrubby plants including Naupaka (*Scaevola taccada*) and Pōpolo. In the greenhouse, David Dow (Kupu Plant Propagation Specialist) trained volunteers in propagation from seed and by cutting and root division, with a focus on the coastal grass 'Aki'aki Grass (*Sporobolus virginicus*) and our two native vine species: Pōhuehue (*Ipomoea pes-caprae*) and Koali 'awa (*Ipomoea indica*). Native plant propagation methods and protocols continue to be refined and standardized as they are prepared for publication on the Reforestation, Nurseries, and Genetics Resources (RNGR) propagation database. Posting our methods to this open-access website will allow other restoration practitioners to benefit from our efforts on Midway Atoll NWR.

Though opportunistic seed collection happens year-round on the Refuge, late spring through early summer and fall are the busiest times for collection of native plant seeds. Housed in a climate controlled, unused office at the Refuge office, the Seed Library was established in 2015 and has continued to expand its scope this summer. Native seed collection is critical to habitat restoration at Midway Atoll NWR because of its long

history of non-native species introductions, extensive paving and island hardening, and island expansion. Due to all of these disturbances and the artificial environments we work with, the native seed bank is minimal or non-existent. Unlike in other restoration projects, removing invasive weeds will not "release the native seed bank" because Midway Atoll NWR, to large extent, does not have one.

Invasive Plant Control

In the last year, considerable progress has been made in controlling the Refuge's most notorious and challenging invasive weed species: Golden Crownbeard (*Verbesina encelioides*). Reduced to a 1% cover level, *V. encelioides* is no longer the dominant invasive plant on Midway Atoll NWR (though it remains a high threat) and conditions on the ground are changing rapidly and native plant restoration is, for many areas, one of the best tools for on-going invasive plant control, in tandem with continued herbicide application. As with many eradication projects, though, eliminating the final 1% requires a complete re-tooling of efforts. While the plant is sparse, it remains widespread across the Refuge, and is particularly common in difficult-to-access and low visibility areas such as dense Naupaka thickets. As for other invasive plant species, a long, hot summer with infrequent but intense rainfall seems to have supported the growth of many non-native and invasive species, many of which had not been seen in abundance in several years. These shifts in weed composition and abundance have spurred an assessment of invasive weed species and restoration sites in order to focus and streamline control efforts as well as prioritize habitat restoration objectives.

Invasive Vertebrate Control

Last winter, Refuge staff and volunteers discovered that invasive House Mice (*Mus musculus*) were attacking nesting albatrosses on Sand Island. Our monitoring revealed that a minimum of 480 nests had bitten birds and at least 70 nests were abandoned following a mouse attack to one of the parents. Nearly 50 Laysan albatrosses died due to mouse attacks. Working with veterinarians at the USGS National Wildlife Health Center lab in Honolulu to recover and study many of these carcasses, we found that the birds died of infections that stemmed from the bite wounds. Mortality of breeding adult albatrosses is a major concern for USFWS and eradicating House Mice has become a high priority. We recently secured grant funding to support an eradication feasibility study and in October, a team of rodent eradication experts from the non-profit group Island Conservation arrived to Midway Atoll NWR to initiate the study. The first of several site visits, the group worked with us to understand the social, biological, and abiotic factors that would influence the operations and potential success of a mouse eradication. The team found that eradicating mice, though it will be costly, challenging, and complex, is indeed feasible. Currently, the Refuge is taking proactive steps to begin the intensive permitting and regulatory work involved with a rodent eradication, as well as formulating plans for mitigating impacts to non-target species. ☒

USFWS Volunteers manually remove algae from Ballfield Seep, one of the constructed ponds on Sand Island, to reduce the risk of botulism outbreaks that severely threaten the atoll's population of Laysan Ducks. Photo credit: USFWS.



Meet the Natives

An Introduction to Midway Atoll's Native Plants

By Rob Taylor, Restoration Ecologist / Monitoring and Data Specialist
National Wildlife Refuge Association

Pōhuehue (Ipomoea pes-caprae ssp. brasiliensis) by Daniel Clark/USFWS.

When I arrived at Midway Atoll NWR last April, I was immediately immersed into its complicated botanical world. As I delved into the literature I learned that the first scientist to visit to the atoll in 1902 found only about a dozen plant species while the most recent survey, conducted in 2015, found nearly 200! What happened? It's a complicated topic that intersects strongly with the Euro-American history of the Hawaiian Islands which I struggled to summarize in an article titled "[Floral Inflation](#)" that I posted on my blog a while back. And though it was my intention at the time to highlight the native plants of these remote islands, that aspect of things kind of got lost in the broader discussion.

I thought I should revisit the topic and introduce you to some of the beautiful and interesting native plants we have out here, and so I began the task of researching the plants and taking some photos. Little did I know that I would be pulled, in an ironically metaphorical sense, "into the weeds." What is native to this place? And how do we know? What to do about the fact that the very physical environment of Midway has changed so radically over the decades? It has taken me some time to extract myself from the thicket but I hope that you will find what I have to share with you worth the wait.

Every ecologist is well-versed in concepts of "native" versus "exotic" and uses this distinction as a way to separate the "good species" from the troublesome. Back in New Mexico and Oregon it was a pretty straightforward task to take the list of plants found at a site and split them into these two categories. Generally speaking, if a plant existed in the area prior to the arrival of white people it was considered native and if it wasn't it was exotic (the exact word used changed over time as folks struggled to find something politically acceptable such as non-native, alien, and invasive). It wasn't that the indigenous peoples of North America didn't move plants around (for example, bringing corn from Mexico to the Mississippi basin), but the changes that ensued after Columbus's "discovery" were so profound in comparison that dividing things into pre- and post-Columbus has typically proven very useful. Ecosystems that still retained their native

species were judged to be more pristine while those dominated by exotics were thought of as degraded.

Early on I had noticed a few things that seemed really cool. Even though there weren't many native species, they seemed diverse in terms of their growth forms—which included bunchgrasses, sedges, sprawling vines with showy flowers, big shrubs that enable the formation of dunes, and delicate wildflowers—as well as in their life histories: a mix of opportunistic short-lived plants that produced a lot of seed and long-lived plants with more complicated ecological relationships. One thing most of them had in common was the ability to grow from cuttings or to produce large, durable seeds worthy of sea voyages—traits essential for establishing themselves on remote islands far from their source populations.

As I was putting together that post, though, I also took on the task—as part of my work responsibilities—of compiling a list of plant species for the atoll. I relied heavily on the work of Forest and Kim Starr, botanists based out of Maui who have for decades catalogued and researched Midway's flora. They listed not a dozen but 39 native species encountered here over the years. Digging deeper, I found that while the term "native" could be applied to species discovered here during the very first botanical surveys, it might also include those found on nearby islands or even on one of the Main Hawaiian Islands but encountered here at a later date. And what about species that might have been missed on those earlier surveys or those that were native to the region but only showed up once the island had extensively modified during "military occupation" or were purposefully introduced? What did it really mean to be a native plant species on Midway? This required me to examine each species, individually using whatever evidence I could acquire which included research into published journal articles and unpublished works (the "gray literature") as well as herbarium records and online databases.

In the end I reckoned 22 of the 39 species to be truly native to Midway Atoll, meaning they had a very good chance of being here before the Pacific Commercial Cable Company set up operations here in 1903.

The remaining 17 species were native to somewhere in the Hawaiian archipelago but probably had made it to Midway with the help of people—either by them acting as their couriers or by the changes wrought as a consequence of their presence here. My research also revealed what had been lost. Of the 22 native species, about half had their entire populations eliminated from Midway due to the environmental perturbations that resulted from the island's occupation (one of these was subsequently reintroduced and still struggles to survive). Three are now extinct—that is, vanished entirely from the planet. The 12 survivors are clearly a hardy bunch and play important roles in the U.S. Fish and Wildlife Service's efforts to restore the islands' ecosystems.

The first botanical surveys of Midway Atoll were conducted by ornithologist William A. Bryan who visited these remote islands for just a few hours in 1902 (a side trip taken while en route from Marcus Island back to Honolulu). Until that time, Midway had been visited primarily by bird hunters and a few unfortunates who found themselves shipwrecked here. Little had been done to modify the environment at the time and Bryan described Sand Island as a “barren, blinding, heap of sand,” noting also that nearby Eastern Island was much greener, covered in low shrubs, and more hospitable despite its smaller size and simpler topography. In his very short time at Midway, Bryan recorded a mere 13 species of plants consisting of three shrubs, four wildflowers, four grasses and two vines, but admitted that he would likely have encountered more species if he'd been there longer. Eight of these plants are still present on the atoll and are critical players in restoration efforts here, including Alena (*Boerhavia repens*), Kāwelu (*Eragrostis variabilis*), Koali 'awa (*Ipomoea indica*), and Pōpolo (*Solanum nelsonii*). Unlike some of the Northwestern Hawaiian Islands, there are no plant species endemic to Midway (species that occur here but nowhere else in the world). Of the 13 true natives, five no longer occur on Midway and of these, two are extinct. One is the grass Kāmanomano (*Cenchrus agrimonoides* var. *laysanensis*) which was once abundant on several of the Northwestern Hawaiian Islands but was last seen in 1961 on nearby Kure Island. The other, 'Ahinahina (*Achyranthes atollensis*) was a shrub in the amaranth family with hairy leaves that grew up to four feet high on sand mounds and was never seen again on Midway after 1902!

Erling Christophersen and Edward Caum, travelling with the Tanager Expedition in 1923-1924, were the next to document the flora of Midway and turned up four additional native plant species. These included the beautiful morning-glory vine Pōhuehue (*Ipomoea pes-caprae* ssp. *brasiliensis*), and the spectacular yellow-flowered 'Ilima (*Sida fallax*). 'Ilima, which also occurs on the main Hawaiian Islands, has great cultural significance and is the most desired flower when creating the traditional lei or flower wreath. Two of the four species are, however, now gone from Midway. *Phyllostegia variabilis*, appears to have vanished so quickly that there is no common name for it and virtually no information about it (try finding anything about this species using Google and you will surely be disappointed!). Moa (*Psilotum nudum*) is a rootless, fernlike plant that no longer occurs on the atoll but persists across a wide swath of sub-tropical and tropical areas of the globe and was used by native Hawaiian people to prevent chafing incurred in the wearing of loincloths!

The 1930s and 1940s were periods of profound change at Midway as the islands became a tourist destination with the establishment of a Pan American Airways Clipper Station (which included a hotel and restaurant) and then, shortly after, drew the attention of the U.S. military as global tensions rose and the atoll was recognized for its of strategic significance.

Buildings were erected, roads constructed, and runways paved. Occasional visits by botanists documented the effects that these changes had on Midway's flora. Johnson Neff and Philip Du Mont spent a month on the atoll in 1954 to study “bird problems” but also found time to document the plant life as it existed at that time. Two native species, Mau'u 'aki'aki (*Fimbristylis cymosa*) and 'Ena'ena (*Pseudognaphalium sandwicense* var. *sandwicense*) were recorded for the first time. These are species that, though native to the Hawaiian Islands, had never before had a place to grow on Midway but were now found along paved surfaces. 'Ena'ena, interestingly, mostly finds its home on lava flows on the Big Island but was thriving in this novel ecosystem. In 1980 Derryl Herbst added Ka'a/ Pu'u'ka'a (*Cyperus polystachyos*) to the list of almost-native Midway plants. This widespread and hardy sedge found a niche at the end of a runway where water pooled during the wet-season and decades later became a foundational species in creating wetland habitat for the endangered Laysan Duck (*Anas laysanensis*). The discovery of the succulent 'Ākulikuli (*Sesuvium portulacastrum*) in 1995 by Marie Brueggemann is a bit of a mystery as habitat for this plant—areas close to the beach that receive salt spray and are occasionally washed over by storm-driven waves—would seem to have been some of the least disturbed areas on the atoll.

When management of Midway was turned over to the USFWS in 1996, restoration of native plants became a priority. Ten species native to the Hawaiian Islands were either introduced or just showed up in the years that followed. These included species that were in trouble elsewhere and needed new homes. 'Āweoweo (*Chenopodium oahuense*), a robust shrub in the goosefoot family, and Bryan's Flatsedge/Coastal Flatsedge (*Cyperus pennatiformis* var. *bryanii*) were brought to Midway from Laysan Island, the former becoming an important species used for restoration while the latter failed to establish. Efforts to secure the critically endangered Loulu (*Pritchardia remota*) compelled USFWS staff to collect several hundred seeds from their source population on Nihoa island and grow them out in the nursery on Midway. Today, five of these plants survive, adding some security to the original population.

Efforts to re-establish the native plants of Midway Atoll and to provide habitat for endangered plants native to other parts of the Hawaiian archipelago are more concerted now than ever. The USFWS has stepped up its efforts to restore degraded habitat on Midway Atoll, which now includes a native seed library, a greenhouse, and a brand-new, 6,600-sq-ft shadehouse (funded by FOMA). Through its native plant propagation program Midway has become an important site for conservation of the Pōpolo at a time when populations elsewhere continue to decline. Exact definitions of what is native or not no longer seem so important in a world of changing climate and rising seas. What seems imperative now is to do the most we can with this 2 square miles of sand and coral out here in the Pacific. This will require boldness, creativity, but also humility. Of the 22 “original” native species, half had their entire populations eliminated from Midway due to environmental changes during the early part of the 20th century, and only one of these, 'Aki'aki (*Sporobolus virginicus*), has been successfully reestablished. We need to do better than that in the future and doing so will require sound science to guide future actions. And maybe a little luck! ☒

Rob Taylor currently works on Midway Atoll NWR and is spearheading efforts to set up meticulous database systems to keep track of restoration efforts and invasive plant species management. To read more about Rob's work and adventures on Midway Atoll NWR, check out his blog at 18-on-Midway.blogspot.com.



A New Colony

As a stronghold for Black-footed Albatross, Midway Atoll NWR becomes the source for a new albatross colony in the Main Hawaiian Islands.

*By Megan Dalton, Biologist
Pacific Rim Conservation*

Early next year, 15 young Black-footed Albatross (*Phoebastria nigripes*) chicks that hatch on Midway Atoll NWR will be translocated to O'ahu as part of a pioneering effort to establish a protected Black-footed Albatross colony in the Main Hawaiian Islands. The chicks will be brought to a predator-proof enclosure within James Campbell National Wildlife Refuge, located on the windswept north shore of O'ahu, where they will be raised and closely monitored for several months by biologists. Because albatross chicks imprint on their natal site sometime after one month of age, the idea is that they will return to their new home at James Campbell NWR as breeding adults to raise chicks of their own.

Headed by Pacific Rim Conservation and supported by several partnering agencies, the effort is an important step towards creating a safe, high-island (and higher elevation) refugia for a species that is projected to be heavily affected by climate change and subsequent rising sea levels. Besides a few colonies on volcanically active islands in Japan and one colony on the small islet of Lehua near Kaua'i, breeding Black-footed Albatross are currently restricted to low-lying islands in the Northwestern Hawaiian Islands. Midway Atoll NWR, Laysan Island, and Tern Island (which support 90% of the world's breeding population) all have very low elevations and are predicted to be highly susceptible to sea-level rise and storm surges in the coming century as global temperatures continue to increase. The chosen translocation site at James Campbell NWR is high enough that these effects should not be an issue. Additionally, birds nesting within the enclosure will be protected from non-native predators that are prevalent in the main islands such as mongooses, rats, and feral cats and dogs.

When choosing the nests on Midway from which to take the chicks from, priority will be given to those located in areas that experience frequent flooding and reduced chick survival under normal circumstances. At approximately 2-3 weeks of age, the chosen chicks will be placed in carriers and transported on a G3 jet to Honolulu, and (if all goes well) will be settled into their new home within just a few hours. They will then be fed a diet of fish and squid slurry for 4-5 months until they are ready to fledge and take to the open seas on their own. Sub-adult Black-footed Albatross will spend at least 5 years at sea before returning to the place they imprinted on as a chick so it will take some time before we might see a breeding colony on O'ahu start to flourish. This project will build upon two successful years of Laysan Albatross (*Phoebastria immutabilis*) chick translocations to the same site.


Partners on this project include Papahānaumokuākea Marine National Monument, U.S. Fish and Wildlife Service, the National Fish and Wildlife Foundation, and the David and Lucile Packard Foundation. For more information, please visit www.pacificrimconservation.org. 



Photo descriptions

Top: Black-footed Albatross by Megan Dalton. Bottom: Black-footed Albatross chick on Midway Atoll NWR by Rob Shallenberger (current FOMA Board Member and past Refuge Manager on Midway Atoll NWR).

'Iwa!



Once you have seen a Great Frigatebird (*Fregata minor*) soaring effortlessly several hundred feet in the air, it is unlikely you will ever mistake them for any of the other seabirds that call Midway Atoll NWR home. Their distinctive long wings, deeply forked tail, and uniquely high wing loading (ratio of wing area to body mass) makes exceptional aerobatic flight possible. These adaptations make it possible for Great Frigatebirds to snatch small fish from the ocean surface with their hooked bill. Yet, they are best known for their ability to force boobies, tropicbirds, and shearwaters to give up their hard-won prey in mid-flight. The Hawaiian name 'Iwa means thief, for obvious reasons; scientists call such birds kleptoparasites. Unlike most seabird species, Great Frigatebirds are sexually dimorphic. The males are most distinctive with their crimson inflatable throat pouch while the females have a conspicuous white breast patch. As their breeding season gets underway, male birds select sites to build stick nests on the top of Naupaka (*Scaevola taccada*) and other bushy vegetation. In contrast, the females fly over the nesting areas, in search of a prospective mate. The males display vigorously to show off their pouch, waving their wings and whinnying wildly. Eventually, they will pair off, finish their nest, and consummate their relationship—leading to the production of their single egg. ☒

Photos and note by Rob Shallenberger, FOMA Board Member



BOLUS NATION

*Students get a first-hand feel for life at sea—
through dissecting albatross boluses.*

By Amy Olliffe, Education Specialist
U.S. Fish and Wildlife Service

Photo credit: Bahamas Plastic
Movement and The Island School.

Every summer, the open fields on Midway Atoll NWR are filled with Laysan Albatross chicks, remnants of down protruding from newly grown layers of shiny, adult feathers. Clumps of indigestible remains of past meals litter the ground around them.

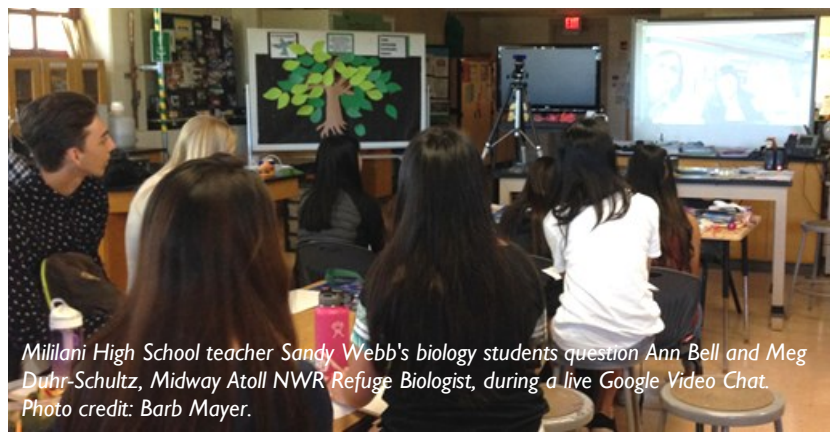
As undesirable as that may seem, these regurgitated bundles, called boluses, have become a highly sought-after resource for teachers around the globe. Midway Atoll NWR hosts the largest albatross colony in the world and the numbers continue to grow. This past summer, a record-breaking 1,200 boluses were collected by dedicated volunteers during their six-month stint on the Refuge. Once harvested, the boluses are dried and shipped to Honolulu to be divvied up and sent to educators across the country where they will be dissected.

The bolus dissection has inspired various lesson plans including *Winged Ambassadors*, a product of some of our partner organizations. The inspiration behind these lesson plans is only in part the “natural” elements of an albatross chick’s stomach contents (squid beaks, flying fish egg filament, pumice stone, and more). What has really caught the world’s attention are the elements of marine debris also found inside the boluses. Bits of plastic and fishing material, such as fishing line, have become increasingly common in boluses. Although it seems devastating, it has inspired thousands to act. More than 4,600 students have actively participated in these dissections this past year. These students went on to spend over 7,000 hours on activities like beach cleanups and school projects about marine debris.

The importance of the bolus program is tied to its ability to raise awareness. Marine debris, particularly within the Papahānaumokuākea Marine National Monument, is an ever-present problem. Crews deployed on National Oceanic and Atmospheric Administration (NOAA) vessels have removed an excess of 900 tons of debris in the past 20 years. The

sheer amount of marine debris that exists in the newly expanded 582,578 square miles of protected area within the Monument is astonishing and is being carried along the currents from all over the globe. Dissecting boluses demonstrates to students first-hand how marine debris is impacting our planet in a way that they might not otherwise learn, especially in land-locked areas. The hands-on experience of dissecting a bolus filled with debris resonates and is impactful with each student that has the opportunity.

We have been making efforts with biologists currently researching albatrosses to study both the impacts and the source of the debris found in the boluses. One such researcher at Hawai’i Pacific University, Dr. David Hyrenbach, is attempting to use identifying marks and serial numbers to source the plastics found in boluses. We have recently started exploring a method of using dissections done in local schools to provide interested researchers with data. This citizen science project is currently still in the trial period but the intent is to expand this information exchange nationwide. Hopefully, this initiative will not only provide a crucial teaching resource about the issue of marine debris, but also be an essential source of data that has the potential to fuel research for years to come. ☒



Midway Atoll NWR Refuge Biologist, during a live Google Video Chat. Photo credit: Barb Mayer.

Education and Outreach

By Barb Mayer, Outreach Coordinator
USFWS Volunteer

Who among us has not left a piece of their heart on Midway Atoll National Wildlife Refuge?

I know I have. After a summer of volunteering for the U.S. Fish and Wildlife Service (USFWS) on Midway Atoll NWR in 2010, I came back to O'ahu a changed person. And as a classroom science teacher, and a lifelong calling to educate, my desire was to connect youth with the remarkable wildlife living on and around those three remarkable little islands in the middle of the North Pacific.

In March 2011, I attended one of the quarterly public meetings of an entity which advises the Co-Trustees of what has become the Papahānaumokuākea Marine National Monument, with Midway Atoll NWR as the de facto “window to the Monument.” I was practically jumping out of my skin when I learned the USFWS employee leading wildlife work on Tern Island, within French Frigate Shoals about 700 miles southeast of Midway Atoll, was reaching out to four schools in the state of Hawai'i! I very quickly signed up and got my t-shirt to continue volunteering with USFWS, this time as an Outreach Educator.

In July, I and an employee from the National Oceanic and Atmospheric Administration (NOAA) side of the Monument visited a small class of upper-elementary summer school students at 'Iolani School on O'ahu. We conducted hands-on activities, utilizing wildlife artifacts from Tern Island. And we succeeded in having a *live audio-video* session, a Skype, with the Tern Island field station staff! The “Ternites” could share current experiences with the students; the students, utilizing what they had learned from the classroom activities, could ask questions directly to the islanders, living and working on tiny Tern Island (about half a mile in length and 100 yards wide)—the next best thing to a field trip to the island!

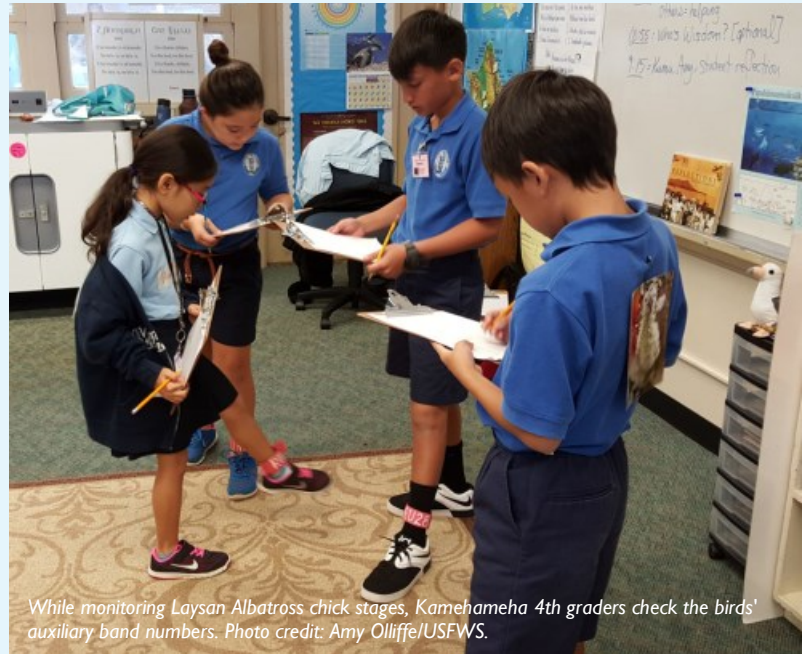
From 2011 to April 2016, this volunteer-driven effort has worked with over 15 schools or youth programs—elementary, middle, and high school—on four of the Main Hawaiian Islands and two other states, reaching a total of 1,748 youth and their educators. Many teachers requested annual sessions. In more recent years, we had been able to do Skypes or Google Video Chats (aka “Google Hangouts”) with researchers and volunteers on NOAA ships traveling to and from summer Hawaiian Monk Seal work on various Monument islands and atolls, including Midway Atoll NWR.

Also during recent years, there were a few opportunities to work directly with USFWS personnel on Midway Atoll NWR. As a result of those experiences, in November 2015 I presented a proposal for “Distance Learning between Midway Atoll NWR and Youth Audiences in the Main Hawaiian Islands” to Matt Brown, Superintendent for Policy, Partners and Support, Pacific Marine National Monuments, USFWS—and he approved!

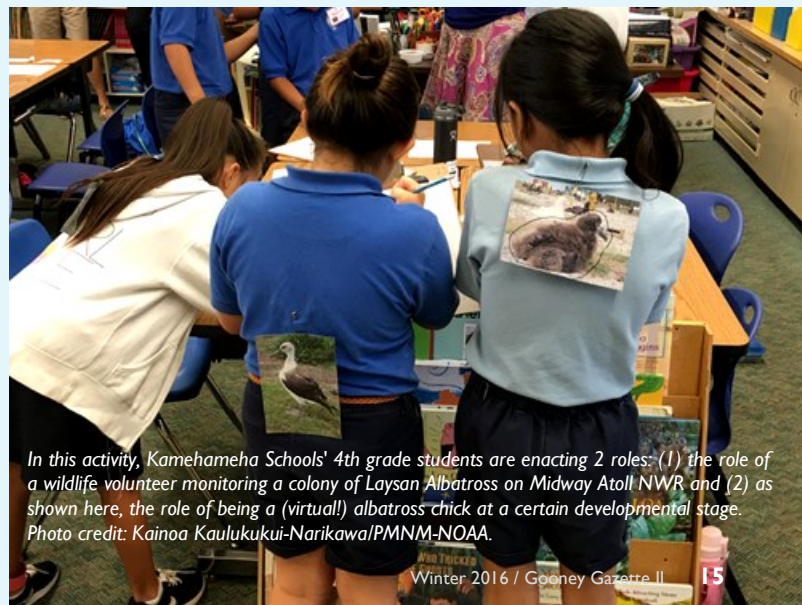
In early 2016 I was joined by Amy Olliffe (USFWS Education Specialist) and Kainoa Kaulukukui-Narikawa (NOAA Education Specialist). Together, we conducted two visits to each of three classrooms at different schools on O'ahu (one private and two public schools). In our first visit to each classroom, we conducted hands-on activities, targeting wildlife monitoring of (virtual!) Laysan Albatross. Afterward, we collected about a dozen student questions, asking about staff life on Midway Atoll NWR and albatross biology, to forward by e-mail to the Refuge.

With additional approval from Refuge Manager Bob Peyton, Ann Bell (USFWS Visitor Services Manager) spearheaded the effort from her temporary assignment on Midway Atoll NWR, assisted by four “on-island” Refuge Biology Program Volunteers. Meg Duhr-Schultz (Refuge Biologist) joined in with the high school outreach. Ann and her crew made preparations to be both indoors and outdoors with albatross in order to answer student questions—gathering photos, assembling albatross banding equipment, and other props. Then, in our second visit to each of the three classrooms, we contacted Midway Atoll for a 30- to 40-minute interactive Google Video Chat.

A total of 55 students and their teachers participated enthusiastically and appreciatively in our distance learning trial. Afterward, we asked students to evaluate their experience by answering this question: “After the activities and the video chat with Midway Atoll NWR, here's how I feel/think about Laysan Albatross (*Mōlī*). Please write or draw your answer. Thank you!” There were 76 responses where students exhibited factual knowledge about albatross, and said they wanted to learn more. In addition, there were 55 responses in which students indicated they now *valued* albatross, using words like “happy, important, hope, cool, funny, amazing, surprised, super-excited, such brave birds, cute, interesting, important, hope.” I think students have left a little (virtual!) piece of their hearts on Midway, and other ancestral Northwestern Hawaiian Islands. ☑



While monitoring Laysan Albatross chick stages, Kamehameha 4th graders check the birds' auxiliary band numbers. Photo credit: Amy Olliffe/USFWS.



In this activity, Kamehameha Schools' 4th grade students are enacting 2 roles: (1) the role of a wildlife volunteer monitoring a colony of Laysan Albatross on Midway Atoll NWR and (2) as shown here, the role of being a (virtual!) albatross chick at a certain developmental stage. Photo credit: Kainoa Kaulukukui-Narikawa/PMNM-NOAA.



My Father's Albatross

By Eric Baker, Refuge Biology Program Volunteer

What was an albatross doing in a box of family pictures? Dad was meticulous when it came to organizing his photographs, but the contents of this box were in utter chaos. A retired research scientist for a defense contractor, Dad never took much interest in the natural world, so the inclusion of an albatross—specifically a Laysan Albatross—in a box labeled “Family photos” was definitely an anomaly.

I turned the photograph over. On the back, penciled in Dad's handwriting, were the words “Gooney bird, Midway.” That's how the journey begins.

Dad enlisted in the Navy in 1943, but the war in the Pacific would end just as his training was completed. Nevertheless, he was shipped off to Midway Atoll in 1945 to run the Armed Forces Radio Station there (station KMTH) where he served until mid-1946. Dad hadn't talked much about his time on Midway. With the war over he was like every serviceman at that time; he just wanted to return home and get on with his life. Unfortunately, my discovery of the box came at a time when my father was in the later stages of Alzheimer's. The photographs would have to tell his story for him.

I was faced with a box of random photos of people and places, none of which I had ever seen before. The albatross was the only print in the box from Midway, but as I delved deeper into its contents I discovered piles of negatives, all of which turned out to be from Midway. Dad never

mentioned taking photos on Midway. Some of the negatives were still in the mailing envelopes he originally placed them in—official U.S. Navy envelopes bearing his name and the address of station KMTH on Midway. Photography had been dad's hobby, which he passed along to me when I was growing up. I, in turn, became a photojournalist, working at newspapers throughout the West, so it was natural for me to print the negatives in the darkroom. I was eager to discover what story the images might tell.

What the photographs revealed, beyond all else, is what a farm boy from Illinois chose to record while he was far away from home for the first time. Pictures of his buddies goofing off astride a Jeep. Scenes aboard a troop ship as it departed under the Oakland Bay Bridge, a stopover at Pearl Harbor en route to Midway, images from inside the KMTH studios. And, of course, the images of albatrosses. Having participated in many seabird projects in the past, it was those images I found most endearing.

My father passed away last year. The negatives which I discovered in that box provided me with a historical look into a portion of my father's life—a portion of his life I had been deprived of because of his Alzheimer's. In my wildest dreams I couldn't imagine that I would find myself on Midway two years after their discovery, completing a cycle, as it were—walking in my father's footprints seventy years later. ☒

Eric Baker is working as a volunteer on Midway Atoll National Wildlife Refuge for the winter 2016–2017 field season.



A sampling of Dad's photographs. Clockwise from top right:

Four of Dad's buddies astride a Jeep. Note the dual "Pan American World Airways" and "USN" markings; the Navy apparently acquired Pan American's vehicle during the war.

Dad and his buddies who ran radio station KMTH on Midway. Dad is standing on the right; the identity of his buddies and the dog is unknown.

An unidentified announcer on the air at KMTH on Midway.

Photographs of albatross adults and chicks on Midway.

A MARINE PAYS IT FORWARD

By Barry Christenson, FOMA Board Member

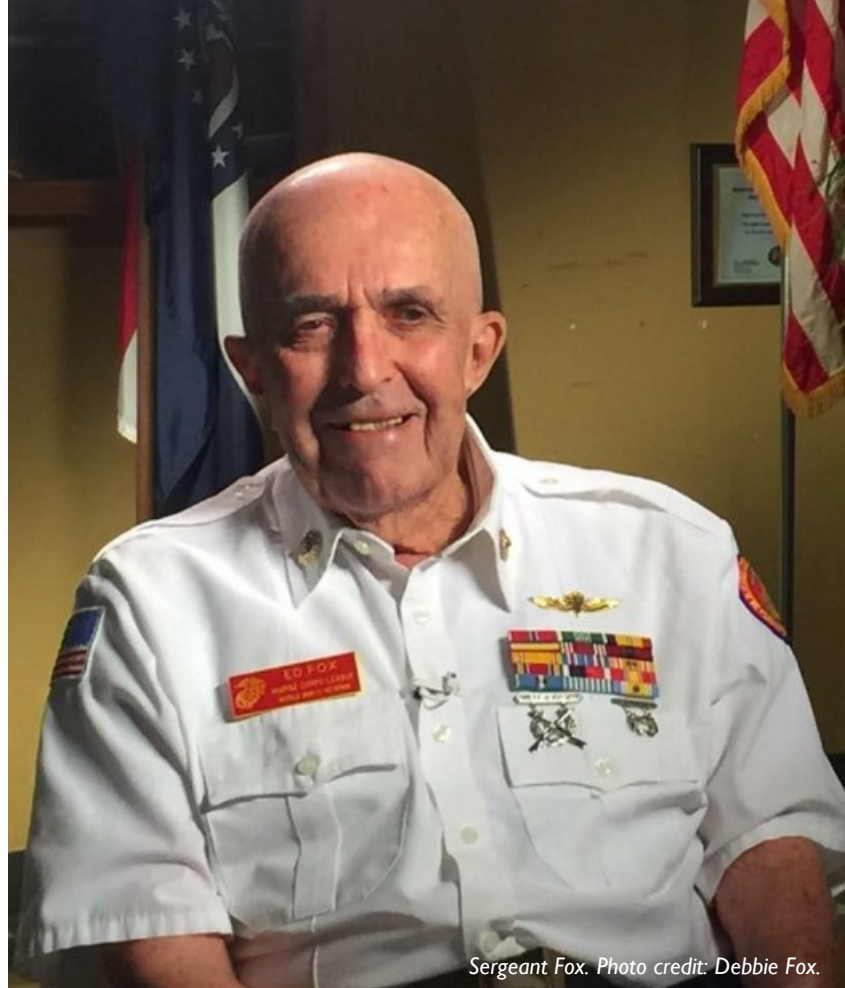
The Battle Stations siren rang loudly over Sand Island at 6:15 a.m. on June 4th, 1942. U.S. Marine Private Ed Fox wanted to man his machine gun and shoot the approaching Japanese planes, but all men not assigned to anti-aircraft guns were ordered below into the bomb shelters. Reluctantly, Private Fox and the rest of his crew went below, where they listened while more than 100 Japanese fighters and bombers attacked Eastern and Sand Islands.

Although the bombing was short-lived, the Marines on Midway knew that their time to fight was coming as a large Japanese fleet was approaching with an invasion force. Fox was assigned to one of the concrete pillboxes on South Beach—the most likely access point onto the island for the Japanese.

Isolated at his duty station, Fox and his fellow Marines had no idea what was happening some 200 miles out at sea on June 4th and 5th, 1942, but the anticipated second bombing and subsequent invasion never happened. Instead, a sea battle ensued that changed the course of World War II as Japan lost the carrier fleet that had destroyed Pearl Harbor. The Battle of Midway is now recognized as one of the most important battles of World War II.

Fox remained on Midway, manning the South Beach pillbox until August 1942. In the following three years he served as a sergeant in the Marines, with whom he fought in the Battle of Iwo Jima in 1945. He was also in Japan as part of the occupying forces in 1945.

Fox later returned to civilian life but enlisted in the Army and was sent to Springfield, Missouri to become a recruiter. Fox stayed in Springfield after



Sergeant Fox. Photo credit: Debbie Fox.

retiring in 1965 and is now a sought-after speaker for schools, service groups, and special events.

Recently, Fox gave a talk about his Midway experience to an ROTC class at Hillcrest High School in Springfield, Missouri. But this talk was a little different, as a professional video crew was there to record his presentation and follow-up question-and-answer session with the students. Opfer Productions, the onsite media company recording Sgt. Fox's talk, was hired by the U.S. Fish and Wildlife Service as part of a larger effort to raise awareness of the approaching 75th Anniversary of the Battle of Midway. Following the high school talk they also filmed an interview with Fox that specifically covered his time on Midway from January to August 1942.

Although specific plans for use of the video are not set, it will be part of a multimedia outreach effort culminating with simultaneous events at multiple locations around the country, possibly including Pearl Harbor, Washington, D.C., San Diego (at the Midway Museum and aircraft carrier), and New Orleans (National World War II Museum). Working with a host of partners, the U.S. Fish and Wildlife Service will stream anniversary events on Midway Atoll NWR to those locations to create a large national event celebrating the Battle of Midway.

Fox remains committed to honoring the memory of all those servicemen who sacrificed their lives during World War II by sharing the story of his fallen brothers who fought beside him in the Battle of Midway. It is an honor and privilege to know Sergeant Fox and to have helped him in a small way to meet that commitment to his fallen Midway brothers. ☒



Sergeant Fox presenting at Hillcrest High School. Photo credit: Debbie Fox.

Barry Christenson recently joined the FOMA Board and brings a wealth of knowledge and experience as a past Refuge Manager on Midway Atoll NWR.



A Gooneyville Lodge Souvenir Comes Home

By Rob Shallenberger, FOMA Board Member

My wife and I lived on Midway Atoll NWR for three years, beginning in 1997. We thoroughly enjoyed the wildlife and the rich history of the atoll. As a pilot, I was particularly intrigued by the story of the Pan American Clippers that stopped over at Midway Atoll on flights between San Francisco to the Orient. Pan American built a comfortable “hotel” at Midway Atoll to house the crew and passengers during their visits. Unfortunately, the flights ended with the advent of war and any physical evidence of the hotel disappeared quickly.

You can imagine my surprise and delight when I received a phone call about the Gooneyville Lodge from a fellow whose father had been stationed on Midway Atoll shortly after the war. He told me that his father had lifted a hand painted sign that had been prominently displayed on the building before its demise.

The fellow who called asked me if I would like to have the sign back where it belonged. I told him that the sign would be a wonderful addition to the historic exhibit that we were developing in the Commander’s House. It now hangs over the living room fireplace in the Midway House, along with other pictures and memorabilia.

I hope that others who may have brought home similar reminders of Midway Atoll’s rich history will send them back for display. ☒



Top: The Officer-in-Charge House (nicknamed the “Midway House”) was designed by the architect Albert Kahn and constructed in 1941 before the Battle of Midway during WWII. Currently, the U.S. Fish and Wildlife Service uses this building to house the Refuge Manager of Midway Atoll NWR. This is also where the “Gooneyville Lodge” sign is now found. Photo credit: GAO.

Bottom: Gooneyville Lodge sign; photo taken by Rob Shallenberger.



Q&A WITH PAUL TAYLOR

Communication Branch Head, Communication and Outreach Division
Naval History and Heritage Command, Washington, D.C.

By Robin Peress, FOMA Volunteer

Gooney Gazette: *How would you encourage the average American to stop and consider what the Battle of Midway was?*

Just six months after the attack on Pearl Harbor, as the United States was still building toward a wartime footing and fighting with the small, but highly trained and dedicated Sailors who served between the World Wars, the Battle of Midway was our defining moment. When the only thing standing between tyranny and freedom was America's Navy/Marine Corps team, it not only emerged victorious, but in so doing turned the tide of a world war. The importance of this moment in our Navy's and our nation's history cannot be overstated.

As the number of people who were actually there continues to dwindle, it's important for us to find creative ways to share their stories. This year, the Naval History and Heritage Command (NHHC) and the U.S. Pacific Fleet are partnering with the U.S. Fish and Wildlife Service, which currently manages Midway Atoll National Wildlife Refuge / Battle of Midway National Memorial, to highlight the history of the atoll and its role in this pivotal moment in our history. The intent, given the frail condition of the few remaining veterans, is to bring the atoll to veterans and the public, rather than the other way around. We plan to broadcast live from the atoll and make that feed available to ceremonies everywhere – including but not limited to ceremonies in Hawaii, San Diego, and the U.S. Navy's "Sea of White" ceremony held at the United States Navy Memorial in Washington D.C. Additionally, NHHC is developing a plan by which our network of 10 museums will each have the opportunity to host local "watch" events to which they'll be able to invite local Midway veterans as well as members of the communities where they reside, to watch the live broadcast of the "Sea of White" ceremony. We believe this approach will allow us to share the important story of Midway with a wider audience of Sailors and Marines past and present, their leaders and the American Public. We will also create pre-recorded, produced content from the island to be shared online in advance of the ceremony.

GG: *Will the substance of the messages at the 75th Anniversary Commemoration be different in any way from those of prior commemorations?*

Back in 1999, then-CNO Admiral Jay Johnson said in a message to the fleet that the Battle of Midway, along with the Navy's birthday, was a seminal event in our history and directed that the following year annual events be undertaken to commemorate the battle which he said "was won, not by superior numbers or daunting technology, but by the courage and tenacity

of Sailors who fought a vicious air and sea battle against overwhelming odds. Their victory helped win us the world we have today, and it is appropriate that we remember it and those who participated in it."

In the ensuing 16 years, the Navy has always attempted to instill in its Sailors and the public an appreciation for the importance of the battle which many believe is the U.S. Navy's equivalent to the British Royal Navy's Battle at Trafalgar, the celebrations of which are legendary among the world's sea services. This year's celebration will be influenced by the Navy's overarching World War II commemorative effort to remember the past and inspire the future. This will include:

- highlighting the core attributes of toughness, initiative, accountability and integrity of American Sailors and Navy civilians throughout the war and how their actions inspire the same attributes in Navy people today,
- showcasing the innovative spirit of World War II Sailors and the American industrial base which lives on today in the strong connection between the Navy and its partners in industry.
- illustrating the United States' commitment to regional security and maintaining strong alliances, and how, since the end of WWII, regional powers including Japan and Germany, have evolved and are major contributors to peace and prosperity worldwide.
- emphasizing that with partnerships spanning the vast Pacific and Atlantic oceans, America is a maritime nation whose security is tied to the sea and depends on a capable and credible U.S. Navy.

GG: *Does the Navy plan to make reference to the well-known presence of the "gooney birds" (Laysan Albatross) who figured so prominently as part of the backdrop in the wildlife setting on Midway Atoll in 1942? What about the impact of the battle on the atoll's wildlife as a whole?*

The Navy plans to focus its efforts on the impact of the battle on those who fought it and those who have benefitted from the outcome of it over the course of the past 75 years. However, we are partnering with the U.S. Fish and Wildlife Service this year to help tell the story of how they continue to maintain Midway Atoll as an important part of the nation's history. As you noted, it's impossible to tell the story of the atoll without also telling the story of its largest population of inhabitants, so we expect that will be part of the discussion about the site after the war was over.



Left: Burning oil tanks on Sand Island, Midway Atoll, following the Japanese air attack delivered on the morning of 4 June 1942. These tanks were located near what was then the southern shore of Sand Island. This view looks inland from the vicinity of the beach. Three Laysan Albatross (Gooney Bird) chicks are visible in the foreground. Official U.S. Navy Photograph, now in the collections of the National Archives.

Right: On the flight deck of USS Yorktown (CV-5) shortly after she was hit by two Japanese aerial torpedoes, 4 June 1942. Men are balancing themselves on the listing deck as they prepare to abandon ship.

GG: When was the Naval History and Heritage Command's website created? Do you track its use by educators or participate in any way with developing history curricula?

The Naval History and Heritage Command's original site was created sometime in the 1990's. After nearly twenty years it received a major overhaul, re-launching with a completely new look and improved usability in January 2015.

The command's website is the Navy's premier showcase for its rich history, heritage, and culture. It is a freely open portal holding diverse resources of materials and information that define the Navy's heritage. It is not a stagnant history site. We provide dynamic information and resources to the Fleet for immediate use during special events such as Battle of Midway and Pearl Harbor Attack commemorations, Navy Birthday celebrations, and diversity recognition. Because of this, Sailors afloat half a world away can virtually replicate ceremonies occurring in Washington. We feature breaking news stories of interest such as underwater archaeological discoveries and additions to the Navy's collections and archives. Our target audience is as diverse as the collections: everyone from older veterans to deckplate Sailors, young students to renowned researchers, and anyone who has an interest in naval history. The U.S. Navy's history is the nation's history.

The website is a living, fluid entity that is constantly undergoing revision and modification with multiple changes being made virtually daily. Links throughout the website display engaging videos, eye-catching photos, and slideshows featuring Sailors, ships, aircraft, art, artifacts, the Navy's ten official museums, and more. Researchers have at their fingertips direct links to the Navy's archives, histories, library, publications, and underwater archaeology. Students from school-age through university as well as professional researchers will find a trove of primary sources to study and to write about U.S. Navy history. With resources such as downloadable published documentary histories, manuscripts, and command operations reports, original research from the NHC archives and library can be conducted anywhere in the world. Visitors to our website have easy access to commemorations toolkits, and celebrations of diversity, exploration, innovation, and the latest historical news.

From the site, the viewer can also link to Naval History and Heritage Command social media websites including our blog, *The Sextant* (<http://usnhistory.navylive.dodlive.mil/>), Facebook (<https://www.facebook.com/usnhistory>), flickr (<https://www.flickr.com/photos/usnhistory/>), Twitter (<https://twitter.com/usnhistory>), and YouTube (<https://www.youtube.com/usnhistory/>). We're still compiling data from 2016, but in the site's first year of operation, our efforts to increase the visibility and relatable content of the Naval History and Heritage Command website resulted in a nearly 400% increase in sessions per month from 30,000 in January 2015 to nearly 120,000 in December 2015. In 2015 logged nearly 1 million sessions with 700,000 users, with more than 69% new visitors to our site. Page views averaged more than 4 per session.

GG: Who was behind the effort to imbue the website with the Navy's values such as pride, leadership, legacy, and readiness while also doing the job of amassing and logically delivering so much useful information?

The success of the website can't be credited to one individual. However, work began in earnest thanks to a commitment from senior Navy leadership. Another driver was simply efficiency. Our archivists, historians, and curators are humbled and honored to serve as custodians of these critical national holdings. We now have the means to share these holdings – and it has really been a boon to our ability to make these resources available. Since it was launched, a cadre of dedicated military, government civilian, and contract support history professionals continue to build on its success. In fact, in its first year in operation, the naval history website earned top honors in the Navy's annual awards program for websites, and was recognized as the second best in all of the Department of Defense. ☒

All images courtesy of the Naval History and Heritage Command.

Previous page photo description: Midway Atoll—airial photograph, looking just south of west across the southern side of the atoll, 24 November 1941. Eastern Island, then the site of Midway's airfield, is in the foreground. Sand Island, location of most other base facilities, is across the entrance channel. Official U.S. Navy Photograph, now in the collections of the U.S. National Archives.

President Obama Visits Midway Atoll

National Wildlife Refuge and Battle of Midway National Memorial



From the USFWS Pacific Region Blog

“I created the world’s largest marine preserve—quadrupling the size of our monument at Papahānaumokuākea...I’m going to travel to the Midway Atoll to see it for myself. Seven thousand species live in its waters, a quarter of which are not found anywhere else in the world. Ancient islanders believed it contained the boundary between this life and the next. Hundreds of brave Americans gave their lives there in defense of the world’s freedom. So this is a hallowed site, and it deserves to be treated that way. And from now on, it will be preserved for future generations.” —President Obama

On September 2nd, President Obama visited Midway Atoll National Wildlife Refuge and Battle of Midway Atoll National Memorial, making him only the second President to do so. The only other President to have visited was President Nixon in 1969, who traveled there to join with South Vietnam President Nguyen Van Thieu in early peace talks.

Only a week earlier on August 26th, President Obama signed a Presidential Proclamation to increase the Papahānaumokuākea Marine National Monument’s protection to an additional 442,781 square miles, bringing the total protected area to 582,578 square miles. However, the title of the world’s largest protected area was only temporarily bestowed upon the Monument; in late October 2016, the Ross Sea Marine Protected Area (in Antarctica) took on this new honor, protecting more than 600,000 square miles in the Southern Ocean.

On Midway Atoll, President Obama’s message was clear: the expanded Monument was not only a testament to those who served and sacrificed their lives during WWII, but it was also a larger call to action to protect vulnerable species from the ravages of climate change. While on Midway Atoll, President Obama was guided by Matt Brown (U.S. Fish and Wildlife Service Marine National Monuments Superintendent) and visited numerous memorials to honor the courage and valor of those who fought in the Battle of Midway, one of the most decisive battles in World War II.

“Amazing courage,” President Obama said, “Had it not been for the courage and bravery of those airmen, we might not have seen the tide turn.”

Touring the Refuge by golf cart (the most efficient way to get around the car-less island) the President was also able to observe key habitat restoration sites and important wildlife management projects. Without the work of the dedicated USFWS volunteers and staff as well as Monument co-managers, and the protection of the National Wildlife Refuge System and Marine National Monuments, Midway Atoll would have long been lost to human alteration and taken over by invasive plants and animals, pushing out the native species and wildlife that rely on this special place.

“This is going to be a precious resource for generations to come,” Obama said. “Twenty years from now, forty years from now, one hundred years from now, this is a place where people can still come and see what a place like this looks like when it’s not overcrowded or destroyed by human populations.”

Continuing the tour in the water, the President—while snorkeling—saw over 250 species of fish and invertebrates that call the waters of the Refuge and Memorial home—while snorkeling.

In his remarks from Turtle Beach (a popular haul-out spot for threatened Hawaiian Green Sea Turtles and endangered Hawaiian Monk Seals on the atoll), President Obama stated that it is “critically important for us to examine the effects that climate change are taking here in the Pacific Ocean, the world’s largest body of water... There are enormous effects on the human presence in the ocean that creatures are having to adapt to and, in some cases, cannot adapt to.” Places like Midway Atoll NWR and other remote island and atoll ecosystems throughout the Monument provide key habitat for myriad marine and terrestrial species; unfortunately, many of these low-lying areas are also at risk of disappearing under rising sea levels. In visiting the island, President Obama also highlighted a view of what oceans and other remote areas may have looked like a century ago—places where bird life and top predatory fish are abundant and coral are healthy and flourishing. And thanks to President Obama’s wisdom in protecting our nation’s natural resources, the +7,000 species that call the Monument home will be protected into perpetuity. From all of us at the Friends of Midway Atoll NWR, we thank you, President Obama—mahalo nui loa! 🇺🇸



Photo descriptions:

Previous page: President Obama pauses at the Battle of Midway Navy Memorial as he tours the atoll (Photo credit: Saul Loeb).

Current page (clockwise from top left):

President Barack Obama and others view the Pearl and Hermes Atoll en route to Midway Atoll NWR (Official White House Photo by Pete Souza).

President Barack Obama tours Midway Atoll NWR aboard a golf cart driven by Matt Brown, USFWS Marine National Monuments Superintendent (Photo credit: Carolyn Kaster, Associated Press).

President Obama bows as he greets workers and volunteers on the tarmac as he arrives on Air Force One at Henderson Field on Midway Atoll NWR (Photo credit: Carolyn Kaster, Associated Press).

THE YEAR IN REVIEW

A brief overview of what we have accomplished this year and what is to come.

By Wayne Sentman, FOMA President



Photo by Daniel Clark/USFWS.

On October 19, 2016, FOMA held its annual meeting conference call. Each year at the annual meeting we invite all our members to join us if they are available. This year we had a total of 19 members join us on the call—plus the entire FOMA Board and Officers!

One of the great things about the annual meetings is that it is a time for us to reflect on what we have accomplished over the last year. Something that we did a bit differently this year, given the momentous visit to Midway Atoll NWR by President Barack Obama, was to also reflect about how FOMA has worked with the Refuge since its inception in 1999.

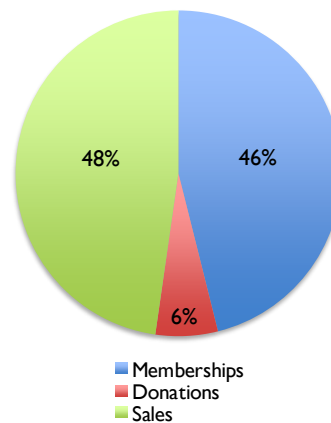
Over those 17 years, FOMA—through its membership, store sales, and individual donations and grants—has raised over \$400,000 for the refuge. Throughout that time, we have worked with nine different refuge managers and provided support for the following types of projects:

- Seabird habitat recovery efforts
- Endangered species reintroduction efforts
- Wildlife research
- Historical restoration and preservation projects
- Outreach materials and resources
- Communications through social media, public awareness, and advocacy opportunities
- Volunteer support
- Special event needs for veterans and former residents

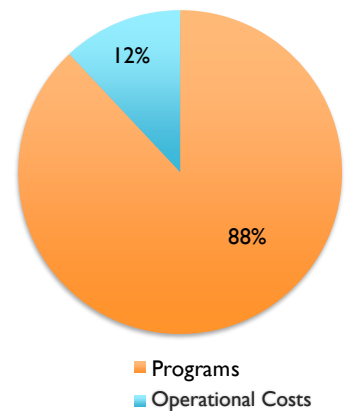
This past year was no exception to the above. Through our public events on the Main Hawaiian Islands, revival of this newsletter and launch of our new website, we have seen growth in our membership, online sales, and donations.

Thanks to all of you, we continue to fulfill our mission each year. Please do not forget to renew your membership as we move in to the new year, so we can continue to be a positive force of change for Midway Atoll National Wildlife Refuge / Battle of Midway National Memorial.

FY 2016 Revenue



FY 2016 Expenses



A total of \$12,450 or 88% of expenditures went directly to helping Midway Atoll NWR in the areas of habitat restoration, wildlife monitoring, and historical preservation, and education and outreach work. Major projects funded by FOMA include videography (\$7,000) to capture unique footage of the Refuge's myriad biological and historical resources for education, outreach as well as a new, streamlined website (\$3,582) to highlight and share news, updates, and resources about the Refuge.

75th Battle of Midway Update (per Alice Garrett, USFWS)

The 75th Anniversary of the Battle of Midway is a collaborative effort between the U.S. Fish and Wildlife Service and the U.S. Navy along with a host of partners aimed at commemorating the historical importance of the Battle in our nation's history and sharing what the remote atoll is today. In October, Alice Garrett made a trip to Midway Atoll NWR with U.S. Navy representatives; together they worked on testing livestream capabilities for the 75th Anniversary Commemoration that will occur June 5th, 2017. The approach and plan is to share the commemorations that occur at Midway Atoll NWR and the National Naval Memorial in Washington, D.C. via the Internet with audiences worldwide. U.S. Fish and Wildlife Service will be cohosting events at satellite locations at the National Naval Aviation Museum (Pensacola, Florida); the National WWII Museum (New Orleans, Louisiana); the USS Midway (San Diego, California); Pearl Harbor (Honolulu, Hawai'i); and the Mokupāpapa Discovery Center (Hilo, Hawai'i) in addition to the availability of the commemoration via the Internet. ☒



Looking for holiday gifts?

FOMA has you covered with Midway gear, gift memberships, and albatross adoptions.

Photo by Wieteke Holthuijzen/Kupu.

The albatross have returned to Midway... signaling the start of the new season: winter! Celebrate this special time and the start of the new nesting season by sharing your love for all things Midway by giving gifts that fund native plant restoration, seabird habitat protection, and wildlife conservation efforts on Midway Atoll National Wildlife Refuge / Battle of Midway National Memorial. Click [here](#) to order your Midway gifts via our online store or visit <http://www.friendsofmidway.org/merchandise/>.

Order your Midway merchandise by December 10th to ensure delivery in time for the holidays!

Looking for a different kind of gift? Consider donating to Friends of Midway Atoll NWR or sending a gift membership to your friends and family. Here are some of the amazing benefits:

- The *Gooney Gazette II*, a twice-yearly online newsletter
- Email updates with news and stories from the atoll as well as advocacy alerts
- Special benefits, including store discounts, exclusive invitations to annual FOMA board meetings, and more
- The satisfaction of knowing you have helped the Refuge restore native plants, protect seabird breeding habitat, and conserve the atoll's biological, historical, and cultural resources
- Sharing passion with others through FOMA's interactive Facebook page, especially during the albatross nesting season, and sharing your stories, experiences, and connections to Midway
- Contributing your talents and time as a volunteer
- Becoming an advocate and protecting a unique, history-rich, and biodiverse environment
- A meaningful connection to one of the most beautiful Refuges, experienced through a vibrant and educational website

Purchase a membership for yourself or others online [here](#) or visit <http://www.friendsofmidway.org/membership/>.

Doing any of your holiday shopping using Amazon? You can help Friends of Midway Atoll NWR receive donations from AmazonSmile via the

AmazonSmile Foundation which donates a percentage of eligible purchases to charitable organizations selected by customers. Go to Smile.Amazon.com (or click [here](#)) and select "Friends of Midway Atoll National Wildlife Refuge Inc" as your designated charity to start now!

And last but not least... adopt an albatross this holiday season! The perfect gift for albatross lovers and a win-win for the albatross, too: your Adopt-An-Albatross contribution will help safeguard these iconic seabirds from the harmful effects of marine pollution by providing support for ongoing habitat restoration at albatross breeding sites and public awareness efforts directed at reminding the public to refuse single-use plastic products. Famous for their soaring +6-foot wingspan and exuberant courtship displays, they face grave danger from swallowing plastic garbage in the ocean waters and then passing it on to their chicks. The fluffy albatross chick you adopt today will grow into an adult of remarkable beauty, endurance, and devotion. More than 70% of the Laysan Albatross population nests on Midway Atoll NWR—some 1 million birds at a time! Funds from your gift will go directly to FOMA to assist in raising awareness of the need to keep our oceans free of plastic pollution and to assist with efforts to restore and expand nesting habitat for Laysan and Black-footed Albatrosses alike. For your gift, you will receive:

- A personalized albatross adoption certificate for this hatch year (2017)
- The ability to select a name for your symbolically adopted chick
- Regular email updates from the field through July (corresponding with the hatching, rearing, and fledging season)
- Per request, a sample of plastic pollution collected from albatross breeding sites in Midway or Kure Atolls (sent in May) so that you can help educate others about plastic pollution
- Free domestic shipping via USPS of your certificate and plastic debris (international orders will receive a digital certificate)

Adopt-An-Albatross was created by the Oceanic Society and is conducted in partnership with the Friends of Midway Atoll NWR and the Kure Atoll Conservancy. To learn more and adopt your own albatross, visit <http://www.oceanicsociety.org/adopt/adopt-an-albatross>.

From all of us at Friends of Midway Atoll NWR, happy holidays and a gooney new year!

LEND A HAND

Volunteer Opportunities with FOMA and USFWS



BECOME A FOMA VOLUNTEER

FOMA is a volunteer-run non-profit organization. Board Members donate their time and skills to support the Refuge because of their passion for Midway Atoll NWR. The FOMA “office” is located in the hearts and minds of the Board, which means that all donations and grant funds go directly to on-atoll projects or outreach activities about the Refuge. We are always looking for volunteers to help with a variety of tasks.

General FOMA Volunteer Needs

Volunteer activities will be directed by and in concert with Board members. Even a few hours of your time can make a difference. Some possible areas for volunteer assistance and specific activities include:

- Develop marketing approaches for Midway Atoll related photography and other artwork
- Research and summarize military history on Midway Atoll
- Create new materials about FOMA for display at the Refuge
- Design and create education or outreach materials to inform students and the public about Refuge resources and challenges
- Research information and find images for our newsletter, website and blog, and social media
- Find “lost” email addresses for former members or constituents

If you are interested in helping FOMA with any of these tasks, please inquire with us at FriendsMidway@gmail.com. We look forward to hearing from you!



Photo credit: Daniel Clark/USFWS

BECOME A USFWS VOLUNTEER OR ADVOCATE

- Check out all the opportunities at: http://www.fws.gov/refuge/Midway_Atoll/. Spend up to 6 months on the atoll as a Refuge Biology Volunteer by helping with seabird monitoring and habitat restoration efforts. Not ready for a 6-month commitment? Apply as an Annual Nesting Albatross counter and spend 3 weeks over the winter time (it’s still warm!) to help to count all the albatross across the atoll.
- Not able to volunteer on Midway Atoll NWR? The saying goes that the “pen is mightier than the sword,” so consider advocating for Midway! Talk to your state representatives and senators about supporting the National Wildlife Refuge System (Midway Atoll is one of the +560 National Wildlife Refuges across the nation). Currently, the Refuge System is funded at \$474 million. However, with an operations and maintenance backlog of \$3.5 billion and counting, the Refuge System is vastly underfunded. To learn more, visit www.RefugeAssociation.org and www.FundRefuges.org.



USFWS Policy Specialist Amanda Boyd helps to feed a White Tern (*Gygis alba*) chick; these chicks were raised at the Refuge “orphanage” as their nesting trees were removed due to airport safety regulations. Photo credit: Wieteke Holthuijzen/Kupu.

Your membership supports crucial ecological conservation and historic preservation of Midway Atoll NWR's unique resources—*join or renew today!*



Photo by Daniel Clark/USFWS

Friends of Midway Atoll NWR MEMBERSHIP APPLICATION

Please fill out this application and mail (with check) to:
 Friends of Midway Atoll NWR
 17 Katrina Lane
 San Anselmo, CA 94960

Or visit our website at <http://www.friendsofmidway.org/membership/> and follow the instructions to purchase or renew your membership.

Name _____
 Address _____

 City _____
 State/Province _____
 Zip _____
 Country _____
 Email _____
 Phone _____

Membership Level:

- WWII Veteran.....**Honorary**
- Veteran.....\$20.00
- Student.....\$25.00
- Individual.....\$35.00
- Family.....\$50.00
- Contributor.....\$100.00
- Supporter.....\$250.00 or more
- Life.....\$1,500.00
- Donation.....\$_____

- New Membership
- Membership Renewal
- Donation



*All contributions are tax deductible.
 Please make checks payable to:
 FOMA or Friends of Midway Atoll NWR*