

INTRODUCTION AND BACKGROUND

Mission, Population, Acreage, Geographic, and Community Setting - Marine Corps Base Hawaii (MCBH) encompasses 4,500 acres within five parcels on the Island of O’ahu, and a 12-acre parcel on Moloka’i. This includes: 223-acre Camp H. M. Smith; 162-acre Pu’uloa Range Facility; 27-acre Pearl City Warehouse Annex; 63-acre Manana Housing Area; 2,966-acre Mokapu Peninsula; 1,072-acre Marine Corps Training Area Bellows (MCTAB) in Waimanalo, and a 190-acre portion in Waikane Valley. Kāne’ohe Bay and MCTAB parcels contain the highest concentration of natural resources under MCBH jurisdiction. These locations contain nine threatened/endangered marine and terrestrial species and therefore require focused management and attention. MCBH’s mission is to provide forward-based, sustainable training through operational facilities and services to support Operational Forces so that marines and sailors can accomplish their mission. We support over 20,000 personnel including Marines, Sailors, family members, civilian/contract employees, and veterans. Hawaii is the world’s most isolated land mass, with distinctive evolution and biological diversity, but has become imperiled by habitat loss, recreation, and introduced invasive species. More than 500 threatened and endangered species are found in Hawaii.

MCBH Kaneohe Bay/Mokapu Peninsula Context - 75% of Mokapu peninsula is flat and supporting the “built environment.” 20% is coastal sand dunes, wetlands, and beaches. There are three volcanic features: Ku’au (Pyramid Rock), Pu’u Hawai’i’loa, and Ulupa’u Crater, whose 683-foot head is the highest point on Base. Weather is semitropical with 40 inches annual average rainfall. MCBH is bordered on the east by Kailua Bay, north by the Pacific, and southwest by Kāne’ohe Bay and the Nu’upia Ponds. Adjacent Kailua and Kāne’ohe



communities contain a combined population of 82,749 residents (U.S. Census Bureau, 2022). We enforce a 500-yard Naval Defensive Sea Area (also known as the security buffer zone) around our 11-mile peninsular coastline. MCTAB is sandwiched between Waimanalo Bay and the town of Waimanalo. Visiting and Base units utilize MCTAB’s critical beach for landing maneuvers, the only cost-effective Hawaii training location. MCTAB supports non-live fire ground maneuvers, helicopter insertion/parachute and heavy equipment operators training, hosts visiting Marine Expeditionary Units, civil defense exercises, law enforcement agencies, and a 48-acre tenant training facility run by Hawaii Army National

Guard. Military trainers use MCTAB’s south shoreline on weekdays. Weekend public beach access is licensed by the City & County of Honolulu. Adjacent Bellows Air Force Station supports military recreation. Many stunning and significant landscapes; seascapes, and shorelines are under this jurisdiction with valuable natural resources throughout. All are rich in Hawaiian culture, military history, and biological diversity.

Wetlands, Wildlife Management Areas, and Ulupa’u’s Natural History - Together, MCBH’s Kāne’ohe Bay and MCTAB properties support 133 acres of jurisdictional wetlands. About 112 of these acres are a component of the 517-acre Nu'upia Ponds Wildlife Management Area (WMA) in Kāne’ohe Bay. MCBH hosts an estimated 5% of the State’s endangered Hawaiian Stilt population along with two other endangered waterbirds (Hawaiian Gallinule and Hawaiian Coot). Over 50 species of native and migratory birds have been recorded here and/or at several other smaller coastal and inland freshwater base wetlands. Kāne’ohe Bay hosts about 12 acres of coastal wetlands along our Kāne’ohe Bay-facing shoreline, and about 6 acres of inland, freshwater wetlands. They all perform valuable stormwater retention and biofiltration roles as well as provide bird,



fish, and sea turtle habitat. MCTAB has 2.2 wetland acres located along Waimanalo stream, where waterbirds and native aquatic fish are found. The Nu'upia Ponds supports 16 native fish species. Wedge-tailed shearwater seabirds have colonized the eastern shoreline of Nu'upia Ponds WMA, with over 1200 active burrows identified (2022 count).

Our 25-acre Ulupa'u Head bird sanctuary located in the heart of the Kaneohe Bay Range Training Facility, an active weapons firing range, hosts one of only three Red-footed Booby seabird colonies in the main Hawaiian Islands, supporting the residence and nesting of over 2,000 birds. Pleistocene lake deposits in Ulupa'u Crater contain the oldest fossil bird remains known from the Hawaiian Islands, approximately 400,000 years old. These fossils are important for documenting evolutionary history of a variety of land and water birds from the islands. Specimens collected from these deposits were curated and made accessible for public display at Hawaii's Bernice Pauahi Bishop Museum and the Smithsonian Institution (Washington, DC).

Diverse Coastal and Marine Flora & Fauna - Sea cliffs and coastal sand dunes at Kāne'ohe Bay support native strand vegetation treasured in Hawaiian folklore and gathering traditions. MCBH is the only Marine Corps installation with coral reef resources. Mokapu's 500-yard Naval Defensive Sea Area, contains a dozen native coral species, native algae, reef fish, limpets, cowries, culturally important seaweeds, and native seagrass beds that support rare sea horses and various endangered and threatened sea turtles. Coastal waters support transiting spinner dolphins, federally protected humpback whales, and critically endangered Hawaiian monk seals.

Organization and Staffing - The base Environmental Compliance and Protection Division (ECPD) exists to enhance overall mission readiness. ECPD is comprised of a Marine Corps Major (O-4) as Director, a GS-13 civilian Deputy Director, and over 40 military, civilian, and contracted environmental professionals dedicated to the mission. ECPD Natural Resources (NR) staff within the Conservation section consists of a GS-12 program manager/senior natural resources manager; GS-11 natural resource manager; and GS-9 biological science (wildlife) technician. The NR team works closely with other ECPD staff in overlapping program areas (conservation law enforcement, NEPA, clean air/water, solid/hazardous waste management, cultural resources, environmental management, spill response, recycling, pollution prevention, and geographic information system applications). Off-base assistance comes from US Fish & Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA)-Fisheries, US Geological Survey (USGS), Hawaii Department of Land and Natural Resources (DLNR), US Department of Agriculture (USDA) Wildlife Services, O'ahu Invasive Species Committee, University of Hawaii (UH), Malama na Honu, contractors, scientists, and volunteers.

MCBH's Integrated Natural Resources Management Plan (INRMP) - Since MCBH completed the first INRMP, it has guided our ecosystem-based approach to natural resource management that supports quality of life and "no net loss" in military training options. There have been four succeeding 5-year updates since 2001. The current iteration of the INRMP was updated in June 2023. During the past two years (2022-2023) of INRMP implementation, MCBH completed over \$3,000,000 worth of discrete management actions. Types of INRMP management actions covered are grouped under specific goals and objectives, within seven "courses of action" categories: wildlife, wetlands, watershed, coastal and marine resources, landscape maintenance and vegetation management, outdoor recreation/outreach/public access, and resource information management. Per federal and military directives, MCBH follows criteria for developing INRMP actions, measuring INRMP implementation progress, and completing required regulatory reviews since 2001. MCBH uses the web-based Natural Resources Conservation Metrics to report annual INRMP implementation.

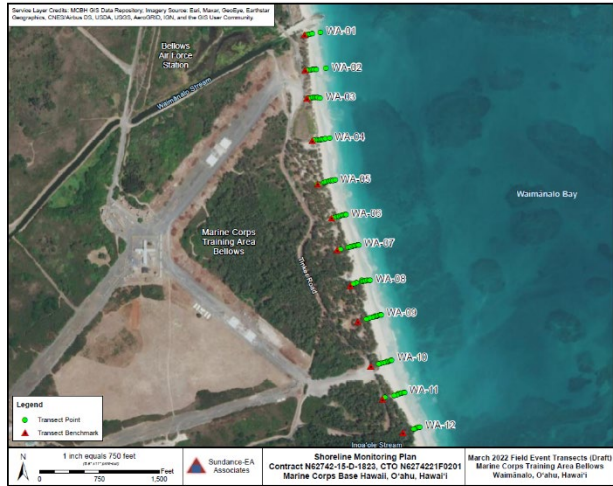
PROGRAM SUMMARY/OUTSTANDING ACCOMPLISHMENTS (FY22-FY23)

Our INRMP is a "living" document, continuously improving through adaptive management after completion of each action, stakeholder input, and environmental project evaluation. Highlighted below are key management actions and events that were completed, are on-going, or initiated during FY22 – FY23 and support INRMP course of action components. They are described in a broad array of areas to detail effective program management,

technical merit, orientation to the mission, transferability, stakeholder interaction, and outcome impacts. All actions were achieved through effective partnering with State agencies, cooperating agencies, non-government organizations, contractors, community volunteers and the public. Actions included expanding resource inventories, enforcing natural resources laws, enhancing wildlife habitats, and controlling invasive species while supporting “no net loss” in military training and quality of life.

Coastal Resources and Marine Life Management

- The geology of most coastlines in Hawaii is characterized by outcropping volcanic bedrock, lithified tephra (ash), and carbonate deposits. Beach erosion is a foreboding trend of shoreline change in Hawaii and it is the result of heavy recreational use and intense residential and commercial development that has hardened shorelines and caused a significant loss of protective shoreline vegetation. The combined shoreline length of all MCBH properties is approximately 20 kilometers, and 7.5 kilometers of that shoreline consists of sandy beach in various locations, including Mokapu Peninsula, Marine Corps Training Area Bellows, and the Pu’uloa Range Training Facility. These beaches directly and indirectly support military training that is crucial for MCBH to carry out its mission by providing programs and services in direct support of units to enhance and sustain combat readiness for all visiting and home-based operational units and tenant organizations aboard MCBH. Our beaches also support nesting by the threatened Hawaiian green turtle, provide a safe area for the highly endangered Hawaiian monk seal to rest, birth, and molt, and provides habitat necessary for breeding for over 1200 Migratory Bird Treaty Act-protected ground burrowing native Wedge-tailed shearwaters. Because of the importance of our beaches and to prepare for sea level rise, MCBH initiated a shoreline erosion monitoring program that will characterize



existing beach dynamics and establish methods for monitoring beaches to identify new trends or changes in sand movement patterns that can inform adaptive management practices.

When the H-3 highway was constructed from Pearl Harbor to MCBH from 1989-1997, the highway construction cut off the connection of the Nu’upia Ponds complex from Kāne’ohe Bay. The Pond complex consists of eight interconnected historical fishponds collectively called the Nu’upia Ponds extending from Kāne’ohe Bay to Kailua Bay. To restore some connection between the Bay and the Ponds, culverts were installed on the north and south end of the Nu’upia ‘Ekahi pond during the H-3 construction to allow for some water exchange. The Nu’upia Ponds serve as an essential habitat for a wide array of biodiversity, making it a vital breeding ground for several endangered waterbird species and native aquatic flora and fauna. When the Ponds were cut off from Kāne’ohe Bay, it changed the water circulation patterns and the biological dynamics of the Ponds. Invasive plants trapped in the Pond complex overwhelmed the area, eventually covering 30 acres of the ponds (removed 1994-2000). Sediments accumulated, and water exchanged was significantly reduced. Currently, there is uncertainty regarding the ecological status and condition of the Ponds. The University of Hawaii was contracted to conduct a circulation study to examine the circulation dynamics at Nu’upia Ponds using current meters, pressure sensors, and a bathymetric survey, and characterize water exchange, pond volume, and residence time across the full tidal spectrum of the Nu’upia Ponds. This is the first time the circulation dynamics at Nu’upia Ponds has been examined. The Study results found that the total water volume exchange varied as much as 12 hour difference from the western most ponds to the eastern ponds. The Study recommended larger and more culverts throughout



the pond system to provide greater water volume exchange throughout the ponds, potentially flushing sediments and increasing the biodiversity.

MCBH is currently the only Marine Corps base with extensive coral resources. Coastal and marine resource



surveys of the Mokapu peninsula offshore waters completed in 2004 and 2008 were resurveyed again in 2023. The surveys involved quantitative/qualitative investigations of the waters surrounding MCBH Kaneohe Bay's Mokapu Peninsula. The surveys were carried out by a USFWS-led interagency team that included top Hawaii marine biologists from the USGS and DLNR's Division of Aquatic Resources. All surveys characterize the benthic conditions, and photo-documented the underwater features and associated marine life. Detailed maps will be developed for incorporation into the base Geographic Information System. The project involved conducting marine resources assessment survey work within the 500 yard security buffer zone that exists seaward of the coastline of MCBH Kaneohe Bay. This

project documented the condition of the fish and marinelife resources within the base boundaries and documented the expansion of invasive species. The survey results will help MCBH with management strategies based on the updated survey data and observations. The maps developed from this project support military waterborne training to prevent damage to sensitive coral resources. The completion of the surveys in May 2023 was fortuitous as they helped with initial identification of coral resources and seagrass beds damaged when a Navy P-8A Poseidon aircraft overshot MCBH's runway ditching the aircraft in Kaneohe Bay on 20 November 2023. There were no crew injuries nor fuel spillage.



Because MCBH is a peninsula, it has a higher proportion of nearshore environments to manage than other parts of the island. MCBH is highly responsive to all sea life detected and works closely with Hawaii's Marine Animal Response organization to identify, assess, and protect marine life reported. Natural Resources staff respond to species in distress such as seabirds who fallout due to artificial lighting on base. From 2022-2023, the natural resources staff rescued or retrieved 395 federally protected birds. The staff monitors the shorelines for the highly endangered Hawaiian monk seal. The natural resources staff recorded 63 monk seals hauled out aboard MCBH. Being the second most endangered pinniped in the world, with only ~1,400 Hawaiian Monk Seals remaining, it is very important that every individual monk seal aboard MCBH is identified and their health assessed. When a monk seal comes ashore, MCBH often responds first to set up temporary barriers and signs to inform beach goers of a seal presence. Working with the non-profit Hawaii Marine Animal Response program, MCBH notifies the organization who will assist with monitoring the monk seal while it is ashore. Efforts to educate the base community on safe standoff distances from marine life and the protection status of the species occurs in person, in classes, and on social media platforms.

When Humpback Whales come to the Hawaiian Islands every spring to calve, MCBH collaborates with NOAA's Hawaiian Islands Humpback Whale National Marine Sanctuary by hosting two observation sites to collect data during the annual whale counts. Whale counts play an important role in estimating populations and calving success. During the whale migration period, MCBH facilitated six counting events between FY22-23.

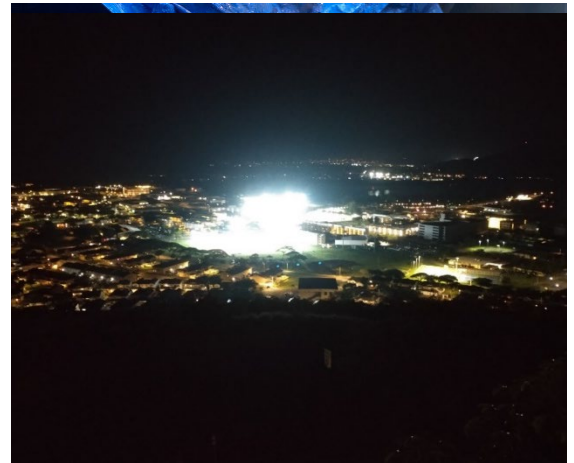
MCBH's beaches have become a regular nesting habitat for Hawaiian green turtles. In FY2022 a total of 13 nests were confirmed with an average hatching success of 93%, greater than any other year since 2019. In 2023, MCBH had four confirmed nests with a hatching success rate of 91%. The Natural Resources Office continues to nurture a collaborative relationship with Malama i na honu, a sea turtle conservation non-profit group based on O'ahu. Malama i na honu volunteers monitor sea turtle nests aboard MCBH and give us high resolution data on where

nests are and when nests were laid. The volunteers collectively logged over 600 hours surveying MCBH beaches. Volunteers also played a crucial role when it came time to excavate the nests and collect data on success.



Protecting Hawaiian sea turtle species is an interagency mission, and the MCBH Natural Resources Office worked closely with biologists from USFWS and NOAA by assisting them in collecting valuable scientific data. MCBH is seeking to fund a study on sea turtle nest detection methods such as detection dogs and Ground Penetrating Radar in hopes it can increase nest detection rates and minimize conflict with training operations by reducing uncertainty when designating a nest.

Wildlife Management - A contract with USDA Wildlife Services is a vital component to our predator management program. Feral swine and invasive predators such as rats, cats and mongoose, are a top threat to native wildlife biodiversity, human health/safety, and environmental quality. These species not only depredate protected species but also harbor zoonotic diseases that could potentially pass to people and contaminate water systems. Introduced wildlife also act as vectors for invasive weed dispersal. Controlling predators such as domesticated and feral cats and other invasive predators supports mission readiness by reducing predation and offering opportunities for surveilling zoonotic diseases. Controlling feral pigs limits human-wildlife interaction and conflict, allowing for a safer training environment. During the award period, 138 cats, 344 mongoose, 523 rats, and 35 feral pigs were removed from the two WMAs, wetlands, training areas, and administrative facility locations.



MCBH beaches provide nesting habitat for Hawaiian sea turtles and a colony of ~800 Wedge-tailed Shearwaters. Much of the artificial light on the installation has and will have direct impacts on nesting sea turtles, hatchlings, and fledging Shearwaters. Artificial light such as streetlights, porch lights, and headlights that are present on shorelines have the potential to draw hatchlings away from the open water and discourage mothers from nesting at all. Furthermore, bright lights on base, such as ballfield lights, have a high probability of disorienting nocturnal seabirds navigating at night in a phenomenon known as “seabird fallout.” Lessons learned from previous years helped Natural Resources staff collaboratively develop

multiple lighting plans of action and milestones (POAMs) with our partners, which include Base Facilities, Marine Corps Air Station, Private Public Venture Housing, Operations and Training, Military Police Physical Security, base residents and the USFWS Portland Migratory Birds & Habitat Program office to address specific light sources that were documented to impact sea turtles and seabirds. Natural Resources staff acquired funding and helped facilitate the replacement of 19 Amber LED light fixtures of coastal streetlights in Base housing. The POAMs guided partners in mitigating specific lighting sources, such as turning off athletic field lighting, shielding bollard walking path lights, and working with military units to shut off all unnecessary non-compliant wall-pack and area lighting. This was especially key around MCBH’s hangars where aircraft maintenance can occur around the clock. Natural Resources staff carefully crafted MCBH’s exterior lighting standards to guide Base projects during their design phases to mitigate future light pollution before a shovel ever strikes the earth. Main components of the standards urge designers to assess what is necessary lighting and to keep what lighting is truly needed long (>560nm), low (to the ground), pointed downward, and shielded. The standards have been communicated and incorporated in numerous projects during FY22-23. Lastly, with enormous investment in education and outreach many military units, residents, and base employees voluntarily reduced their lighting

signature. The outreach also doubled as training for what to do and who to call should disoriented sea turtles or seabirds be encountered. Although difficult to measure exactly, we have already seen the payoff of that work.

Wetland Management - MCBH Kane‘ohe Bay has nine wetlands in the Nu‘upia Ponds complex and eight smaller coastal wetlands. The smaller wetlands were either created for storm water retention or are located in low-lying fill areas along the Mokapu shoreline where wetland conditions have evolved. Due to Hawaii’s year-round growing season and the introduction of non-native invasive plant species, many of the wetlands are degraded to a point they no longer adequately support endangered species habitat and their flood control capabilities have been compromised. We have embarked on a multi-year plan to reinvigorate and restore these wetlands. MCBH is currently completing an Environmental Assessment to restore two degraded wetlands. We recently completed a project to sample the soils of all the wetlands to identify contamination and subsequently determine how contaminated soil must be handled or reused during restoration efforts.

Vegetation Management - From 1994-2000, the Marine Corps spent over \$2,500,000 clearing 30 acres of mangrove from the Nu‘upia Ponds wetlands. However, due to substantial acreages of mangrove growing along the shores of Kāne‘ohe Bay, the Nu‘upia Ponds are constantly besieged by mangrove propagules that arrive from Kāne‘ohe Bay. A half mile of mangrove-covered shoreline, approximately 15 acres, has established an extremely dense forest on the Kāne‘ohe Bay shoreline bordering the Nu‘upia Ponds, separated only by the H-3 highway. The mangrove propagules arrive through the culverts under the H-3 that allows water exchange between the Ponds and the Bay. Through a series of connecting channels and culverts, mangrove propagules drift throughout the ponds, rapidly colonizing the shorelines of all eight ponds comprising the Nu‘upia Ponds complex. Two times a year, a cadre of 10-15 volunteers and natural resources staff slog through the knee-deep mud of the wetlands to manually remove seedlings, juvenile and mature mangrove trees. A project was funded in FY22 to remove 10 of the 15 acres of mangrove and other invasive trees growing along the H-3 / Kāne‘ohe Bay shoreline. Removal of the mangrove forest benefits the ponds by allowing unobstructed flow of water through the culverts, benefits our native fish that are not adapted to the low oxygen conditions created by mangrove, will stop the accumulation of leaf and seed litter deposited by mangrove which cause a build-up of sediment in the Bay, and removes an obstacle to observation of our shoreline for security and illegal fishing practices.



MCBH suffers from many of the same highly invasive weeds that plagues the rest of O‘ahu. However, one note of success is the eradication of a vile plant known as devil weed from the forest above Camp H. M. Smith and a popular adjoining State Park hiking trail. Devil weed is highly invasive, toxic to livestock, and contains flammable resins making it a fire risk that threatens native habitats, lives, and livelihoods. If left unchecked, this plant would overwhelm training areas. During the award period, in collaboration with Conservation Dogs Hawaii, State of Hawaii O‘ahu Invasive Species Committee, and many volunteers, two full truckloads of mature devil weed were uprooted, bagged, and transported off site for incineration. In September 2023, after eight years of effort, no devil weed plants were detected by volunteers or by canines trained to locate this plant.

Natural Resources Access/Educational Outreach/Outdoor Recreation Management/Volunteers - Access/Outreach: Providing public access to and outreach about Base natural resources is a Sikes Act requirement to be accomplished without compromising security, military training, or resource conservation. During the performance period, 16 Weed Warrior volunteer events to remove invasive plants were executed. In addition, three outreach events were executed in 2022 alongside sea turtle nest excavations to give an up-close look at sea turtle conservation in real time. Over 30 participants across all age classes witnessed and learned about sea turtle conservation. MCBH has hosted the Hawaii chapter Audubon Society bird counts for over six decades. Furthermore, collaborative bi-annual state waterbird counts have been conducted each year for over 25 years. Data from these different counts feed into large datasets that inform us on the condition and trend of our protected

birds. For over a decade, we have partnered with UH on projects involving wildlife and marine surveys. These enduring partnerships testify to sustained program bonds with the community.

Volunteers: Volunteers are one of the most cost-effective staff supplementation solutions. During the 2022 sea turtle nesting season, volunteers from Malama i na honu logged over 592 hours while assisting with monitoring shorelines, collecting data, documenting changes, and excavating presumed nests. During the 2023 season, over 600 hours were logged between 14 volunteers. The time and effort given by volunteers ensured sea turtle success aboard our military installation. MCBH takes pride in sustaining these partnerships and helping volunteers reach their professional goals all while benefiting from the valuable work done and insightful data collected.



MCBH initiated a reserved access fishing program in 2020. This program allowed qualified personnel - military, DoD civilian employees, and community members to fish in restricted reserved access areas after performing a requisite number of volunteer hours for the Natural Resources Office. These volunteers implement restoration and invasive plant removal. During the award period, approximately 352 hours of hard work was accomplished by prospective anglers, with 2023 being a record year logging 240 hours by 16 volunteers; many were repeat volunteers. These 352 hours of vegetation management equate to nine full work weeks with no breaks! This program gives us the edge we need to maintain, and in some instances beat back, the continuous and overwhelming onslaught of invasive plants.