

BEST MANAGEMENT PRACTICES (BMPS) FOR TERRESTRIAL BIOSECURITY

Papahānaumokuākea Marine National Monument

The following conditions and rules aim to conserve and protect biologically unique terrestrial environments in Papahānaumokuākea Marine National Monument (Monument or PMNM). These unique uplands, shorelines, and shallow reef habitats provide refuge for many rare and endemic wildlife found nowhere else on Earth. Many of these species are formally listed as endangered or threatened under the Endangered Species Act. Endemic and listed plants, animals and arthropods are especially vulnerable to competition or habitat degradation from invasive or non-native species. These potential introductions may cause the extinction of endemic wildlife species and the destruction of entire terrestrial ecosystems or coral reef communities. Notable local examples include: the introduction of rabbits to Laysan Island (Kamole) in 1902, which caused the extinction of numerous plant and arthropod species, and three endemic land bird species; the introduction of the annual grass, common sandbur to Laysan Island (Kamole) where it has crowded out native bunch grass (kawelu) thus, eliminating nesting habitat for the endangered 'Ekupu'u (Laysan finch, *Telespiza cantans*) the introduction of rats to many Pacific Islands causing the extirpation of many burrowing seabird colonies as well as native plant communities; and, the introduction and proliferation of numerous ant species throughout the Pacific Islands to the widespread detriment of endemic plant and arthropod species.

Several of the islands within the Monument are pristine, and as a result are rich in rare and endemic plants and animals. Nihoa Island has at least 17 endemic and rare insect species, 5 endangered plants and 2 endangered birds. Mokumanamana has endangered plants and 11 endemic insects. Laysan Island (Kamole) has endangered plants, 9 endemic arthropods and 3 endangered birds. Kure Atoll (Hōlanikū) has endangered plants and 2 endangered birds. Other islands in the Monument such as Lisianski (Kapou), and islets in Atolls such as Pearl and Hermes Atoll (Manawai) and French Frigate Shoals (Lalo) provide homes for a variety of endemic and endangered species that require special protection from alien species.

Other Pacific Islands such as the “high islands” (O`ahu, Hawai`i, Maui, Kaua`i, etc.) as well as, certain islands within Midway Atoll (Kuaihelani), Pearl and Hermes Atoll (Manawai), French Frigate Shoals (Lalo) and Kure Atoll (Hōlanikū) have plants and animals that are of high risk for introduction to the relatively pristine islands discussed above. Of special concern are snakes, rats, mice, invasive marine algae, cats, dogs, amphibians, ants and a variety of other arthropods, plant species (and associated diseases) and microorganism and virus diseases such as Newcastle disease. Harmful plant species of highest concern that we know of are *Verbesina encelioides*, *Cenchrus echinatus*, *Pluchea indica*, and *Setaria verticillata*.

The Co-trustees are responsible for the management and protection of the islands, reefs and wildlife of the Monument. No one is permitted to set foot within the Monument without the express permission of the Co-trustees through the permitting process. The following restrictions on the movement of personnel and materials throughout the Monument exist because of the above concerns.

Definitions:

new: off-the-shelf and never-used-anywhere but the island in question.

clean: the item has been closely inspected for plant material, seeds and arthropods, paying close attention to seams and laces. All footwear must be 100% free of encrusted mud, dirt, or sand.

disinfect: the item has been (1) rinsed and is 100% free of encrusted mud, dirt, and sand, (2) closely inspected for seeds and insects, (3) soaked or wiped with an appropriate disinfecting solution as outlined in BMP011, and (4) rinsed if directed.

disinfect solution: When directed to use disinfect solution there are three acceptable solutions to choose from: 1- a 1:32 dilution of commercial bleach in freshwater (1/2 cup bleach per gallon of freshwater), 2-yielding a 1000 ppm dilution of sodium hypochlorite, or 3- 3% free chlorine solution.

clothing: is all apparel, shoes, socks, gaiters, hats, gloves, over and under garments.

soft gear: is all gear such as books, office supplies, daypacks, fanny packs, packing foam or similar material, camera bags, camera/binocular straps, microphone covers, nets, holding or weighing bags, bedding, tents, luggage, or any fabric, fiber, paper or material capable of harboring seeds or insects.

footwear: is anything worn on the foot that makes contact with the substrate. Once you stand up, a dive bootie is considered footwear (footwear with spikes are prohibited). Examples: shoes, slippers, socks, tabis, etc.

island specific gear: dedicated gear are items that are purchased new, and have ONLY ever been used on a specific island, and nowhere else. When it is not being used on the specific island, gear should be quarantined and stored separated from all other gear.

hard gear: is ... both “sensitive gear” and “non-sensitive” such as:

sensitive gear: computers, optical equipment, and other sensitive equipment.

non-sensitive equipment and construction materials: building materials, power and hand tools, generators, and other machinery.

Intertidal Zone: the area of substrate emergent during low tide and fully submerged during high tide, extending upwards from the mean low low-tide mark to the top of the splash zone during winter months (areas that are impacted by wave action, not including tsunamis)

Suitable Plastic Packing Container: Packing containers must be constructed of smooth, durable plastic which can be easily cleaned and will not harbor seeds or insects.

- Suitable: 5-gallon plastic buckets and plastic totes constructed with a single layer and having a smooth surface. All appropriate packing containers must have tight fitting plastic lids (with gaskets preferred).
- Not-suitable: Mail totes, cardboard boxes, untreated wooden boxes. These containers are porous and may provide a multi-layered surface allowing seeds and arthropods to be unintentionally transported.

The Following Conditions and Rules apply to the all islands within the Monument with the exception of those at Midway Atoll (Kuaihelani):

1. Any personnel who will be landing boats, and staying within the boats, on quarantine enforced islands (Nihoa, Mokumanamana (Necker), French Frigate Shoals (Lalo), Laysan (Kamole), Gardner Pinnacles (Nā ‘Ōnū), Lisianski (Kapou), Pearl and Hermes Atoll (Manawai), and Kure Atoll (Hōlanikū)) must have clean clothes and shoes.
2. Any personnel going ashore, including the intertidal area must have new footwear, new or island specific clothes and new or island specific soft gear. All must be frozen for at least 48 hours prior to landing. To avoid transport of seeds from within small boats, the following protocol must be followed when landing ashore: hose out small boat and inspect for vegetative matter including seeds, amphibians and insects before departing the main vessel. Quarantine shoes may be worn in small boats that have been cleaned and inspected. Make sure that non-quarantine shoes are put in a sealed container if taken ashore.
4. Non-island specific Personal Protective Equipment (PPE) that is worn while landing on an island (such as helmets or life jackets) must be inspected and cleaned prior to accessing land. After landing, PPE must either be immediately put back in the small boat, or placed into a clean/sealed container or bag after landing. The sealed container, if clean on the outside, may go ashore, but should not be opened ashore. PPE should at no time touch the ground.
5. Soft gear may not be moved between islands. Hard gear, both sensitive and non-sensitive, must be thoroughly disinfected, inspected, and if applicable for non-sensitive hard gear, frozen for at least 48 hours between islands.
6. During transit, clothing and gear coming off the Main Hawaiian Islands, or Midway Atoll (Kuaihelani) must be carefully sequestered to avoid contamination of gear bound for cleaner islands. Special care must be taken to avoid contaminating gear storage areas and quarters aboard transporting vessels with seeds or arthropods from these islands.
7. Regardless of origin or destination, all equipment and supplies must be cleaned just prior to any trip to quarantine enforced islands. Carefully clean all clothing, footwear and soft gear following use to minimize risk of cross contamination of materials between islands.
8. Pack supplies in suitable plastic packing containers such as, 5-gallon buckets with fitted lids or other sealable metal or plastic containers, such as Rubbermaid type totes or pallet tubs, since they can be thoroughly disinfected inside and out.

Non-wooden pallets, plastic boxes and cases, and plastic buckets may be reused for multiple deployments, however, before transporting these items to the quarantine islands, they must be thoroughly cleaned. Disinfect all exterior and interior parts of the container with a disinfect solution (bleach, hypochlorite or active chlorine). Follow this up with a comprehensive high-pressure rinse to ensure that no arthropods or seeds are stuck in small crevices of the cargo transport containers.

Non-suitable containers are not permitted at any of the quarantine islands, such as cardboard boxes, because these disintegrate in a short time and harbor seeds, animals, etc., which cannot be easily found or removed. Wood is not permitted unless sealed (painted or varnished) on all surfaces and frozen for 48 hours. Wooden boxes can also harbor arthropods and seeds and therefore are only allowed if well-constructed (tight fitting seams, no rotten or termite-damaged sections). All wood must be treated, and inside and outside surfaces must be painted or varnished to provide a smooth, cleanable finish that seals all holes. **Wooden pallets are not permitted** due to the high amount of crevices and cracks that could harbor insects, seeds, and microbes. Acceptable alternatives include plastic, galvanized steel, or aluminum pallets.

During pre-deployment logistics and packing, purchased items (once removed from any cardboard packaging) shall be transferred directly into sealed pallet tubs or other containers. Clean all transport vessels before loading. Minimize, as much as possible, the amount of time that items are left sitting in a warehouse yard or in the back of a truck. Leave the lids of packing containers tightly sealed when they are not in use.

9. Just prior to departure, non-sensitive equipment and supplies (books, tents, generators, pumps, hoists, everything) must be frozen or tarped and fumigated. Food and cooking items need not be fumigated but should be cleaned and frozen, if freezable. Sensitive gear, such as cameras, binoculars, radios, and other electronic equipment that cannot be frozen or fumigated must be thoroughly cleaned and inspected, including internal inspection whenever possible, just prior to departure. All suitable containers must contain new, clean packing materials and be frozen or fumigated.

10. For larger mechanical or motorized equipment such as generators, outboard engines, and mechanical hoists which are periodically returned to Honolulu for servicing, remove the outer housings and engine covers to visually inspect for seeds and insects. Use compressed air with a fine-tipped air-gun attachment to air clean all crevices and enclosed spaces within. Full tear down of the motors and pumps for biosecurity is not feasible, however best efforts to remove outer covers and casings and inspect and clean underneath is a minimum precaution.

Replace all air filters, including outer foam pre-filter elements on any relevant piece of equipment shortly before being returned to the quarantine islands.

11. Remove, inspect and clean all lines on small boats between islands that have different island specific biosecurity. Pressure-wash the exterior and interior of the vessel, including the inside of bilge wells, anchor wells, and any other enclosed compartments. Carefully inspect the inside of consoles to ensure that they are clean and free of plant and animal material. Tarp and fumigate the entire boat shortly before departure, ensuring the inside of the console unit is also treated.

Additional Special Conditions for Food:

Fresh foods such as fruits, vegetables, leafy vegetables and tubers are not permitted on quarantine enforced islands (Nihoa, Mokumanamana, French Frigate Shoals (Lalo), Laysan (Kamole), Garner Pinnacles (Nā 'Ōnū), Lisianski (Manawai), Pearl and Hermes Atoll

(Manawai), and Kure Atoll (Hōlanikū)). Fresh foods may be consumed on vessels operating within the atoll, provided that materials are properly contained and disposed of with other shipboard organic waste. Concern is that certain species, such as tomatoes, could easily become established and decomposing organic waste can harbor microbes and arthropods and act as an introduction vector. Fresh foods such as tomatoes and berries should not be eaten 48 hours before going ashore during transit. Soil can contain seeds, eggs, larvae, etc., and cannot be transported to or between islands.

All other food that can be safely frozen (this does not apply to food in cans or glass jars) must be packaged in airtight containers just as all other gear and frozen for 48 hours.

Additional Special Conditions for Travel to Nihoa and Mokumanamana Islands:

Nihoa and Mokumanamana are the most pristine terrestrial locations in the Monument, with Nihoa being home to the largest number of federally listed endangered species.

Please read and follow **BMP# 16** when accessing Nihoa and **BMP # 19** when accessing Mokumanamana.

Additional Special Conditions for Travel within Pearl and Hermes Atoll (Manawai):

Recently *Verbesina encelioides* has been introduced to Southeast and North Islands/islets within Pearl and Hermes Atoll (Manawai). This noxious weed has taken over a large portion of Southeast island. To prevent the further spread of this weed to the other islets within this atoll the following precaution must be taken:

1. **Every person should have one set of separate quarantine gear and clothing for Southeast Island, North Islands (islets when separated), and for all the other islets in the atoll (3 total sets of quarantine clothing).** For instance the same clothing, and if needed camping gear, may be used at Grass and Seal-Kittery islands, but anything used at Southeast needs to stay off all the other islets in the atoll. Do not use the North Island clothing and gear on the other islets (Grass, Seal-Kittery and Bird Islands).

2. Carefully inspect small boats and their associated equipment when traveling between islets at Pearl and Hermes Atoll (Manawai). Since one anchor is placed ashore and one anchor is placed in the water there is potential for seed dispersal on anchor lines as well as from within the small boats.

In 2019, *Chondria tumulosa* (red alga) was discovered within Pearl and Hermes Atoll causing extensive damage to coral reefs. Extreme caution is being taken to prevent the spread of this alga to other areas within Hawaii.

Please reference the current *Chondria tumulosa* BMP for Pearl and Hermes and BMP#11 Marine Biosecurity for any activities planned at Pearl and Hermes Atoll.

Additional Special Conditions for Travel within French Frigate Shoals Atoll (Lalo):

French Frigate Shoals (Lalo) supports one of the most diverse and dense assemblages of tropical seabirds and marine life in the North Pacific Ocean boasting the nesting habitat to over 90% of the Hawaiian green sea turtle population, one of the largest subpopulation of Hawaiian monk seals, and over a half million breeding seabirds of 18 different species. Although not “pristine”, Tern Island’s 26 acres support approximately 97% of the atoll’s 500,000 breeding seabirds, many of which depend on a specific assemblage of plant species to raise their young each year. The island’s plant community and habitat conditions are very fragile. One new species introduction, such as mice, yellow crazy ants, or *Verbesina*, could devastate the entire community.

In 2018, Hurricane Walaka hit French Frigate Shoals (Lalo) as a category 4-5 storm that washed most of East Island away. Since 2018, East Island has reformed naturally with no invasive species present. **Every person should have one set of separate island specific quarantine gear and clothing for Tern Island and for the other islets in the atoll including East Island (2 total sets of quarantine clothing/gear).** For instance the same clothing, and if needed camping gear, may be used at Gin, Trig and East islands, but anything used at Tern Island needs to remain separate from the other islets in the atoll. Tern Island has introduced weeds and insects that the other islands in the atoll do not have. Do not use Tern Island gear/clothing on East Island.

When anchoring on East Island, ensure the rope of the anchor is free of vegetation, seeds or insects by providing a good saltwater rinse before anchoring on island.