



Pacific Island Network News

Newsletter of the
Pacific Island Network
Inventory & Monitoring Program
Apr.-Jun. 2006, Issue no. 04

Board of Directors Note - Aric Arakaki, pg. 2

Superintendent Aric Arakaki of Ala Kahakai National Historic Trail shares a few thoughts.

Notes from the Field - Seabirds at HAVO, pg. 4

Roberta Swift discusses the travails of conducting bird surveys in Hawaii's largest national park.

Featured Resource - Limestone forests, pg. 6

The limestone forests of WAPA hold a diverse and rich assortment of flora and fauna.

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Giant Taro (*Alocasia macrorrhiza*) at War in the Pacific National Historical Park (Guam). Photo by J. Yoshioka

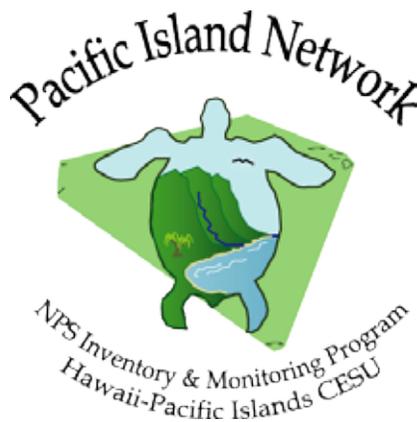
Aloha. Talofa. Hello. Tirow. Hafa adai.

A colorful consortium of peoples, cultures, and ecosystems co-exist within the vast Central Pacific Ocean's national parks called the Pacific Island Network (PACN). This network is unique in the National Park Service as it is exclusively comprised of tropical islands and archipelagoes including protected areas in Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands.

Trade in your SUV for a sailboat and join the PACN Inventory and Monitoring program (I&M) as we explore some of the issues and highlights in our parks. In this edition of our newsletter we discuss limestone forests, AT-MPs, and feature the American Memorial Park

in the Northern Mariana Islands. Also, don't miss the adventures of one of our field technicians, Roberta Swift, as she tells us what it is like to survey seabirds.

We hope you enjoy this edition !



"What in the world are these?" — Wolfie Thomas at Hawai'i Volcanoes National Park.



Photo by W. Thomas

Behind the visitor's center at Hawai'i Volcanoes National Park Wolfie discovered a Starfish Stinkhorn (*Aseroe rubra*). This striking red fungus is a native species that can be found throughout the inhabited islands of Hawaii. The casual fungus enthusiast may be just as easily bedazzled by its unique beauty as its strong pungent odor.



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The National Park Service has implemented natural resource inventory and monitoring on a servicewide basis to ensure all park units possess the resource information needed for effective, science-based management, decision-making, and resource protection.

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Mailing List:

Please pass this newsletter on to interested parties. To be added to or removed from mailing list, please contact Cory Nash.

Note from the Board of Directors — Aric Arakaki

"Not everything that can be counted counts, and not everything that counts can be counted."
—Albert Einstein (1879 - 1955)
Physicist & Nobel Laureate

The Ala Kahakai National Historic Trail (NHT) celebrates the culture and worldview of the Hawaiian. It tells the story of an ingenuity developed over millennia that mastered the creation of sustainable abundance for hundreds of communities inhabiting one of the most isolated groups of islands on the planet.

As we learn from the past, we look to the future. Management planning for each segment of the Ala Kahakai NHT strives to merge traditional knowledge with modern science to bring about the most respectful and effective approach to community-based trail and shoreline stewardship.

The I&M Program plays an important role in the development of tools for our communities to use in their shoreline trail management programs. Along with the I&M staff, Ala Kahakai NHT is working with NPS Honolulu staff, Redlands University, the University of Hawaii, The Kohala Center, West Hawai'i Explorations Academy, and community volunteers to devel-



Top: View of Kealakekua Bay from Pali o Keoua.

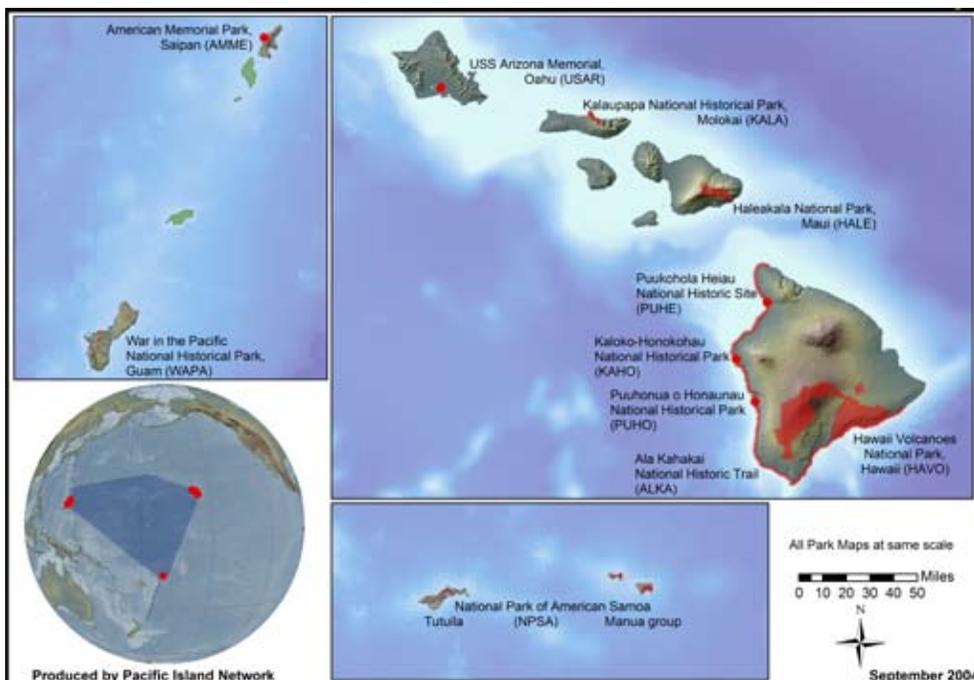


Right: Two young surfers eyeing the waves along the Ala Kahaki National Historic Trail. NPS photos

op a GIS framework for collecting and sharing natural and cultural resources monitoring.

An internet mapping site (IMS) has been created and a database is currently being structured to receive management information for the trail. When complete, the public will have access to unrestricted information at this site for trail visit planning, history, culture, the environment, and how to get involved.

Mahalo a nui to all of our partners for your assistance and support!



Map of the Pacific Island Network and its 11 park units.

Inventories – Alien Mammals in Hawaii

The Hawaiian Islands are known for their diverse environments and unique endemic species. Due to their geographic isolation, animal and plant species have evolved on these islands without many of the natural defenses found in similar species on the continents. As non-native species are accidentally or purposefully transported to Hawaii, the vulnerable native plant and animal communities often face predation, competition for food resources, and habitat degradation. The alien species invasion is a significant cause of biodiversity loss and ecosystem damage in Hawaii.

The loss or potential loss of some native species, has resulted in innovative approaches to invasive species management. The National Park Service (NPS) has taken a lead role in detecting new invasions in or near park lands, and identifying and carrying out prevention, control, and eradication programs. Because alien mammals pose a significant threat to park resources, the Inventory and Monitoring Program along with the U.S. Geological



Invasive mouflon sheep (*Ovis musimon*) in the Kahuku unit of HAVO. Photo by D. Boyle

Survey have collected baseline information on feral ungulates, rodents, cats, and mongooses. Inventories have been conducted in Kalaupapa National Historical Park (KALA), Haleakalā National Park (HALE), and Hawai'i Volcanoes National Park (HAVO) to document the occurrence of these destructive alien species.

In 2005, a presence-absence survey for small alien mammals was conducted in KALA along seven transects established in a variety of plant communities. Four mammalian species were detected in this park: mongoose (*Herpestes auro-punctatus*), feral cat (*Felis catus*), mouse

(*Mus musculus*) and black rat (*Rattus rattus*). Although no feral dogs (*Canis familiaris*) were observed in this survey, they were heard and tracks were found near one transect.

In the same year, a similar survey was conducted in the Ka'apahu area of HALE. A single transect extending from sea level to 3,880 feet was surveyed for mammals. Again, black rats and mongooses were observed. The presence of feral pigs (*Sus scrofa*) and goats (*Capra hircus*) was indicated by habitat disturbance, vegetation damage, fecal droppings, and direct audio or visual observations. No evidence of cats, dogs, axis deer (*Axis axis*), mice or other rat species was observed; however it is possible that these species exist in Ka'apahu.

The NPS continues to evaluate and monitor alien mammal species in Hawaii's national parks. Elimination of alien species and prevention of new species invasions is essential to the management and recovery of habitats and ecosystems in the PACN parks.

—Gail Ackerman

Data Management – Landscape Dynamics and Imagery

Determining which images will provide the best information.

The I&M landscape dynamics monitoring protocol will be using remote sensing products (e.g., satellite imagery, aerial photos) along with other data sets to monitor changes in land use and cover over time in PACN parks. Data currently available include Landsat, Ikonos imagery, and others. More satellite imagery files will be available in the future as partners such as the Hawaii GAP Analysis Program acquire and analyze imagery.

As yet, a database providing descriptions of available image data sets has not been developed for the PACN. This lack of information can make it difficult for park staff and collaborating partner agencies to select the most appropriate images for any individual project and application. Some images are best as mapping background, while other images provide information on vegetation or physical structures. GIS and remote sensing software

has metadata (data about the data) tools, but currently metadata are not fully developed.

The PACN landscape dynamics protocol team is currently testing standard operating procedures developed for the North Coast Cascades Network landscape dynamics protocol. To carry out their procedures, images from multiple dates are needed. This includes a baseline image as well as another image from a later date to analyze changes over time. Also needed are a digital elevation model (DEM) and a data set defining the boundaries of the study area. All of these image files must be in the same projection (the mathematical models used to portray the spherical earth onto a flat map). Tracking new files and documenting the processing steps they have undergone will be critical to maintaining the accuracy of our studies.

Thus, the PACN protocol team plans to develop a database that will help address these needs. The database will hold information including: region covered by the image, date of image

collection, projection, location on the server, security or access limitations, image quality, type of sensor, and processing steps applied to the image among other parameters.

The protocol team is researching the best method to track and store desired imagery attributes. We anticipate that this project will make it much easier for NPS staff to make use of remotely sensed imagery and aerial photos in PACN parks.

—Page Else



Ikonos satellite image of Kilauea Caldera at HAVO. Photo courtesy of Space Imaging

Monitoring – Conceptual Models for Vital Signs Development

Officer Obie, in Arlo Guthrie's verse "Alice's Restaurant Massacree", provides a keen example of why multiple types of conceptual models are so important. "With 27 eight-by-ten color glossy photographs with circles and arrows and a paragraph on the back of each one, and a judge with a seeing-eye dog"; Obie quickly realized that his well-prepared conceptual models were not the appropriate interpretive tool for a typical case of "American blind justice". In this case, a blind judge.

To help avoid such a conundrum in the Pacific Island Network, we are asking each of our Vital Sign monitoring protocol teams to consider including graphic and narrative conceptual models. Vital Sign conceptual models may range from: maps, diagrammatic profiles with illustrations of resources and processes, flowcharts with circles and arrows, control models

that conceptualize feedback systems, stressor models that articulate relationships between stressors and indicators, numerical models, and others. Monitoring objectives, management considerations, strata, and links to other Vital Signs are just a few potential considerations when preparing such conceptual models.

A conceptual model is a visual or narrative summary that describes ecosystem components and the interactions among them. It is a way to organize information. Development of conceptual models helps us understand how diverse ecosystem components interact, and promotes integration and communication among scientists and managers from different disciplines.

A well designed conceptual model will:

- Formalize understanding of system processes and dynamics;

- Identify linkages across disciplines;
- Identify the bounds and scope of the system of interest; and
- Enhance communication among scientists, program staff, managers, and the general public.

Once Vital Signs monitoring is underway, proper interpretation of indicators is greatly facilitated by models. These provide sound and defensible linkages between the indicator and the ecological function or critical resource it is intended to represent. These key linkages should be explicit in conceptual models and their articulation is essential to justify and interpret ecological measurements.

—Fritz Klasner

Notes from the Field

In 2005, Hawai'i Volcanoes National Park Inventory and Monitoring bird staff surveyed surf to turf from the rugged coastlines to the slopes of Mauna Loa. The season began with bird surveys along the entire length of the park's shoreline. Volunteer Mike Hughes hiked for four days in socks and sandals after developing huge blisters crossing rugged coastal lava flows. As if that wasn't enough excitement, the team ran out of water two miles from camp on day two, and watched our camp stove scorch our field notebook which we barely rescued from the small blaze. Luckily the conflagration boiled our water for the required time to kill microorganisms and we enjoyed a warm but much needed drink on the shores of beautiful Keauhou Bay.



Roberta Swift by the shoreline at HAVO
NPS Photo

In early spring, Kathryn Turner and I braved early mornings and hefted heavy packs to survey birds along the park trails. Countless gadgets to measure distance, direction, and weather hung from our necks and pockets and clanked with every step like wind chimes. Hours of hiking and miles of trails rewarded us with sightings of native 'apapane and 'amakihi, dramatic sunrises, and afternoons resting at remote park beaches.

In mid-Summer, our intrepid birders searched remote areas of HAVO for rare seabirds. Intern Evana Burt-Toland and I sighted rare band-rumped storm petrels, but Newell's shearwaters were harder to find. We were never able to confirm sightings of this elusive bird despite late nights watching, listening, and broadcasting taped calls at the edge of craters and beaches. Despite this small disappointment, the Inventory and Monitoring bird crew was paid in full, in the raw beauty and solitude of the park's backcountry.

—Roberta Swift

Featured Staff

R&R OF THE PACN (Risé Hart and Raychelle Daniel)

Risé is the Ecological Monitoring Database Facilitator for NPSA while Raychelle fills this role for WAPA and AMME, and assists with the marine Vital Signs.

—Risé, and husband Mitch, arrived in Pago harbor via their 37-foot



sailboat. For three years they sailed over 15,000 miles visiting the Americas and South Pacific Islands. American Samoa seemed the perfect place to drop anchor for a few years before continuing their voyage around the world. One of her most important I&M projects (a first for American Samoa) has been to collect literature from other agencies in the territory and then scan them to digital format; thereby making them available to any interested agencies. Currently, she is a landlubber living with her husband and two adopted Samoan dogs, Sally and Fred.

—"If the kōlea (Pacific Golden Plover) can do it, so can I", thought **Raychelle**. Like the

kōlea she was born in the marshlands of western Alaska. A naturalist at heart, her background is in behavioral ecology. After receiving a masters from the Univ. of British Columbia, Raychelle worked with the Alaska Dept. of Fish and Game and the Univ. of Alaska on marine mammal monitoring projects. She enjoys being near or in the water, writing, and drawing. However, unlike the kōlea, Raychelle has decided to make Hawaii her new home.



Risé Hart (above) wearing "puletasi", traditional Samoan clothing and Raychelle Daniel (below) enjoying a snorkel.

Program Update

Monitoring Plan: In June, several staffers will take part in an Adobe InDesign training course in an effort to bolster I&M's publishing skill base for the production of outreach materials. This new software will also equip I&M with much stronger publishing and creative tools for fine tuning the PACN Monitoring Plan. The most recent version of our monitoring plan is available online at: <http://science.nature.nps.gov/im/units/pacn/monitoring/>

Vital Signs: Conceptual models is the talk of the program these days as each protocol development team has been asked to develop models to visually explain the scheme for their Vital Sign protocols. A conceptual model workshop was held on May 22, 2006.

Several protocols are under full-on development this summer. They include: Benthic marine, Landbirds, Landscape dynamics, and Early detection of invasives protocols. Other protocols are also at various stages of development.

Cultural Resources: The PACN has been continuing its effort to integrate cultural resources, interpretation, and other staff at network parks with I&M. Recently, meetings were held at PUHE, KALA, NPSA, ALKA and KAHO with park staff and I&M. Some of these meetings were highlighted by the participation of local members of cultural/kupuna groups

associated with the parks. At these meetings, areas of collaboration were identified and Vital Signs reviewed for cultural significance and value. Future meetings are being scheduled for PUHO, HALE, AMME, WAPA, and USAR.

Staffing: Kelly Kozar transitioned from Inventory Coordinator to Data Management Assistant. Corbett Nash expanded his former position as Program Facilitator to include Science Communications and Outreach. Both of these changes have come about as the program's needs are ever evolving. Dr. David Schneider will extend his statistical services with I&M until autumn.

Kimber DeVerse has decided to explore new horizons outside of the I&M program. We wish her luck in new endeavors. We won't let her go too easily, however. She will continue to work for I&M in a part-time advisory role.

Finally, we welcome Tahzay Jones as our new Aquatic Ecologist! He arrived at HAVO on the first of May, and is in the process of settling in to his new surroundings. He is looking forward to meeting the vast array of I&M's colleagues and partners in the coming months.

THE NATIONAL PARK SERVICE CARES FOR THE SPECIAL PLACES SAVED BY THE AMERICAN PEOPLE SO THAT ALL MAY EXPERIENCE OUR HERITAGE.

Calendar • April - June, 2006

- Apr. 5 = During bat surveys at KALA, I&M and KALA staff discuss Vital Signs monitoring and cultural values
- Apr. 21 = I&M participates in an Earth Day exhibit at UH Hilo
- Apr. 22 = I&M participates in an Earth day exhibit at the Maui Nui Gardens
- Apr. = L. HaySmith and T. Jones attend agreements training at OLYM, WA
- May = Several staffers conduct research on landbirds, seabirds, bats, and conduct Vital Signs monitoring and cultural values meetings at NPSA
- May 22 = I&M conceptual models workshop for Vital Signs protocols at HAVO
- May 23 = Vital Signs monitoring and cultural values meeting at KAHO
- Jun. 1 = Vital Signs monitoring and cultural values meeting at ALKA
- Jun. 6 = I&M Adobe InDesign training at HAVO (newsletters, monitoring plan)
- Jun. 8 = Vital Signs monitoring and cultural values meeting at PUHO
- Jun. 27 = Staff presents Vital Signs monitoring to network cultural resource managers in Honolulu

Games Corner

Native or Non-native?

Island ecosystems are among the most unique and specialized in the world. Humans, since the beginning of overseas travel have changed island ecosystems by introducing flora and fauna from elsewhere. Some introductions are intentional and some are not. Can you identify the non-native species introduced to some of the PACN parks?

Answers are below:



1



2



3



4



5



6



7

Photos by W. Thomas, T. Fake, C. Nash, & NPS

ANSWERS:

- 1-Micronesia Honeyeater-Native
- 2-White rumped shama-Introduced
- 3-Portuguese Man-of-War-Native
- 4-Noni-Introduced
- 5-Chukkar-Introduced
- 6-Nene-Native
- 7-Starfish stinkhorn-Native



Limestone Forests – Botanical Gems (Guam)

Description: Limestone forests are a unique feature of Guam and occur primarily on the northern half of the island. In general, the southern half of the island is dominated by savanna grasslands on a volcanic clay substrate, although Mariana and Alifan Limestone outcrops support limestone forests. It is in this southern portion of the island that remnant limestone forests persist in portions of each of the War in the Pacific National Historical Park's (WAPA) seven separate management units. Most of these limestone forests are relatively intact and support myriad native shrubs, lianas, ferns, and trees including several species that are found only in the Mariana Islands.

Cultural Significance: The limestone forests found within the park are comprised of many native plant species that are still used by Chamorro people today. For example, pahong (*Pandanus dubius*), known for its waxy coated leaves, is useful for waterproof matting and its edible seeds. Lumot moss (pictured below) is a common moss that grows on limestone and is part of a unique local tradition of decorating nativity scenes during the Christmas season. Based on local legend, the jungles of Guam are occupied by taotaomona, (literally, "people before recorded time") or ancestral spirits. These taotaomona can take on many forms and are sometimes described as mischievous beings that pester or harm people who enter the forests. Therefore, those entering the jungle ask permission to both prevent the wrath of taotaomona and out of respect to ancestors.

Inventories: The vegetation of Guam has been extensively documented by various botanists and researchers, and is recorded in floral references and popular books. A botanical survey of WAPA completed in 2005 identified the plants encountered in the park, including its limestone forests. Although no endangered species were observed, a single plant of an endangered species, *Serianthes nelsonii*, was found on limestone substrates elsewhere on Guam. Through additional surveys it may also be found in the park.

Monitoring: Monitoring of the limestone



Limestone forest on Mt. Alifan.

forests of Guam will be addressed in I&M's focal terrestrial plant communities protocols to be developed in the near future. Other associated monitoring at WAPA will include the status and trends of established invasive plants, landscape dynamics, climate, and water quality, which may include the analysis of water in the park's perennial streams.

Data: At present, the vegetation inventory findings at WAPA are provided in the NPS database, NPSpecies. The images taken during the vegetation survey are archived in ThumbsPlus (photo database) and available by contacting I&M's Data Manager. The inventory report will soon be available on-line.

Status & Trends: WAPA's limestone forests did not escape the impact of World War II maneuvers, and as a result are highly disturbed. Tangentangen (*Leucaena leucocephala*), a small tree likely introduced to address extensive erosion after the war, has spread widely through-

out Guam, including into limestone forests. Other plant threats continue to plague this unique plant community. Another impact is the decimation of bird life by introduced brown tree snakes (*Boiga irregularis*) on Guam. Birds once served as important plant pollinators and seed dispersers. The impact of their demise is presumed to be significant to plant communities. Other impacts include erosion, encroachment from adjacent land use, and human-set wildfires that burn into limestone forests.

Management: Management of WAPA's limestone forests includes initial studies to understand the impacts of fire and erosion. The park is still in need of detailed vegetation maps to plan management projects. Once the vegetation maps are completed, the NPS will be poised to implement terrestrial natural resource management programs that protect, enhance, and interpret this unique resource.

—Joan Yoshioka

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Where to see limestone forest:

The most accessible place to see limestone forests in WAPA is the south-facing slope of Fonte Plateau Unit, down slope from the quarry. Another site is in the Asan Beach Unit, where a visitor trail accesses the top of the limestone ridge. Despite its degraded nature, many native species are still present on the ridge line.



From left to right: Lumot moss, fedange (*Cycas circinalis*), paipai (*Guamia mariannae*)

Photos by J. Yoshioka



Air Tour Management Plans

Issue: The term Air Tour Management Plan (ATMP) has potentially immense implications for a national park, its resources, visitors, park operations, and neighbors. The Federal Aviation Administration (FAA) and National Park Service (NPS) evaluate and determine under which conditions air tours may fly. The objective of an ATMP is to develop acceptable and effective measures to mitigate or prevent the significant adverse impacts, if any, of commercial air tour operations upon natural and cultural resources and visitor experiences.

The National Parks Air Tour Management Act of 2000 requires an ATMP for commercial air tours over any NPS park unit or abutting tribal lands and within ½ mile outside of park boundaries, excluding Alaska and the Grand Canyon.

Affected Resources & Communities:

Air tours have a visual impact, but their sound impact may be even greater and further reaching. The acoustic characteristics of aircraft (both helicopter and fixed wing) typically include sounds that resonate and are of frequencies that humans and wildlife can hear. One ATMP challenge is identifying the ecological relationship between soundscapes, wildlife, and humans. Any impacts that commercial air tours may have upon soundscapes and species must be identified, and mitigation measures might be needed to reduce the impact level.

A soundscape refers to the total acoustic environment of an area. Both natural and human sounds may be desirable and appropriate in a soundscape, depending on the purposes and values of the park. Soundscapes are valuable resources that can easily be degraded or destroyed by inappropriate sounds or sound levels. Soundscapes require careful management if they are to remain unimpaired for future generations.

Park visitors, nearby communi-

ties, native Hawaiian cultural practitioners, and others may also be affected by air tours. Ground-visitors to a national park may be seeking a different experience or have very different expectations than air tour visitors. Nearby communities are affected by the noise and visual impacts of routine and occasional flight traffic. In Hawaiian national parks, many Native Hawaiians, the Kalaupapa patient community, and others consider the land and airspace to be culturally significant.

Management Considerations: Each park's ATMP will be in the form of an environmental assessment or environmental impact statement. Each ATMP must address the affected environment, environmental impacts (including cumulative impacts and impairment), impact indicators or definitions, impact thresholds, mitigation, and provide for public and agency consultation.

ATMPs and Pacific Island Parks: Air Tour Management Plans are currently being developed for Haleakalā National Park and Hawai'i Volcanoes National Park. These two parks are among the first to go through the ATMP process, along with three other national parks: Mount Rushmore, Badlands, and Lake Mead. Other national park units in Hawaii started the ATMP process: Kalaupapa National Historical Park, Pu'ukoholā Heiau, Kaloko-

Honokōhau, and Pu'uhonua o Hōnaunau, but the process ended when the commercial air tour operators withdrew their requests to fly over or within ½ mile of these park units. Commercial air tours do not fly over or within ½ mile of the four other NPS Pacific Island Network park units so they do not need ATMPs. Hawaii parks are at the forefront of the ATMP process, and the results in Hawaii will be applied to other national parks throughout the U.S.

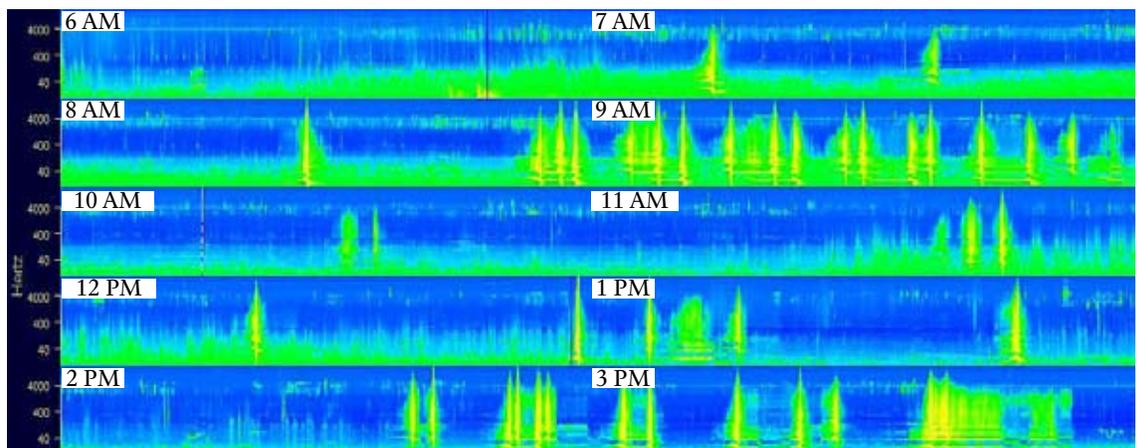
—Catherine Lentz

Further Information:

FAA & ATMP web page – www.atmp.faa.gov
NPS Natural Sounds Program web page – www.nature.nps.gov/naturalsounds
NPS Natural Sounds Program contact – Vicki McCusker, vicki_mccusker@nps.gov
Hawai'i Volcanoes ATMP contact – Catherine Lentz, catherine_lentz@nps.gov
Haleakalā ATMP contact – Liz Gordon, elizabeth_gordon@nps.gov

How you can be involved:

If you have information that might be useful for ATMPs please contact us at any time. The NPS maintains an ATMP mailing list and will send out notification of review and comment period for the draft ATMP. If you would like to be added to the mailing list for one or more of the three Hawaii parks please send us your name, address, and which park mailing list you would like to be on.



A picture of acoustic data collected southeast of Pu'u Huluhulu at Hawai'i Volcanoes National Park on January 25, 2003, from 6 a.m. to 4 p.m. The scale on the left of each row is the frequency of the sound (40 to 4000 hertz). Sound magnitude along the frequency spectrum is represented by color, increasing from blue (quiet) to yellow (louder). The yellow spikes are probably helicopter overflights since this site is located near a known helicopter tour route. The first yellow spike occurs about 7:15 a.m., with many spikes between 9 a.m. and 10 a.m. In contrast, the natural dawn bird chorus appears in the left-hand portion of the first row, starting before 7 a.m.

—Information adapted partially from the NPS Natural Sounds Program web pages.



American Memorial Park – Saipan

A covenant between the Commonwealth of the Northern Mariana Islands (CNMI) and the U.S. in 1976 included the lease of 133 acres for a park honoring the lives of Americans and Micronesians lost during the World War II (WWII) Marianas Campaign. American Memorial Park (AMME) was established in 1978 and is administered by the National Park Service in partnership with CNMI. AMME sits along the western shoreline of the island of Saipan. Today, AMME is regarded as a “living memorial” offering activities like baseball, bicycling, tennis, picnicking, and swimming.

Natural Resources: While much of the park is landscaped with ornamental, non-native plants, significant natural resources are contained in the 30-acre wetland and mangrove complex. Saipan’s entire distribution of the oriental mangrove, *Bruguiera gymnorrhiza*, is contained almost exclusively within the park boundary. The wetlands contain approximately 200 species of plants, trees, flowers, and birds. This includes two endangered bird species, the mariana moorhen and nightingale reed-warbler. Other types of vegetation found within the park include marshes, strand, coastal and weedy scrub. Wildlife species include collared kingfishers, Micronesian honeyeaters, bridled and golden white-eyes, rufous fantails, and island swiftlets. Some other threatened or endangered species found in the park are hawksbill, leatherback, loggerhead, and green sea turtles, and the Tinian monarch butterfly. Adjacent to the park are significant coral reef and nearshore marine resources enclosed in a lagoon with a well-developed barrier reef system.

Cultural History: The first inhabitants of the Northern Marianas were the Chamorros, who settled from Southeast Asia around 1500 BC. They are closely related to the Carolineans, who migrated to the Marianas during the early 1800s. Micro Beach, a fine white sand beach, was the site of the first Carolinean village. This beach served as a training site for celestial navigation. Another interesting archaeological site near the park entrance is a Chamorro Latte Stone which is composed of large limestone pillars with bowl-shaped caps of brain coral or

limestone, and it is believed to be a foundation for dwellings.

The decisive battle for Saipan represents the beginning of the end of the Pacific war. On June 15, 1944 U.S. forces landed on Saipan’s southwestern beaches, and the ensuing struggle resulted in over 25,000 casualties. Tragically, many Japanese and local Chamorro civilians evaded capture by throwing themselves off limestone cliffs, now known as the Suicide and Bonzai Cliffs, into the jungle and the sea. For more information, visit: <http://www.nps.gov/wapa/indepth/sections/pacificTheater.htm> and <http://www.worldwarII.info> The park contains many remnant structures from WWII such as Japanese pillboxes, bunkers, and a bathhouse complex.

Inventory and Monitoring Highlights:

Plant inventories from 1989 and 2001 may serve as a baseline for alien plant monitoring. A hydrological study of the wetland was recently completed (2005) by the US Geological Survey to improve understanding of groundwater dynamics in the park’s wetland habitat. The CNMI Division of Fisheries & Wildlife currently monitors birds in the wetlands. Since 1994, the Commonwealth’s Department of Environmental Quality monitors water quality parameters at six park sites.

Current Issues in Management: Micro beach is subject to erosion and the shoreline has shifted over time. Park staff are now assessing the rate of erosion in cooperation with CNMI Coastal Resource Management Office.

Wetlands must be conserved as natural areas to preserve endangered and indigenous species by controlling exotic species, especially the brown tree snake. Feral animals (e.g., cats and monitor lizards) also pose threats to native ecosystems and ground-nesting birds. Invasive plants such as vines, scarlet gourd, and chain-of-love are overgrowing the edge of the wetland, and introduced mosquito fish and tilapia are present in wetland pools. It is urgent that the park assess the distributions of alien and invasive species and formulate management strategies after initial inventories are completed. Future conservation efforts will involve improving water quality, maintaining the native wetlands including the existing flora and fauna, and protecting adjacent marine areas.

—Raychelle Daniel

Come visit us:

Saipan is the capitol of CNMI and is located 150 miles north of Guam and 3,200 miles west of Hawaii in the Indo-Pacific Ocean. Daily flights from Hawaii service Saipan, via Guam. On the Web at: <http://www.nps.gov/amme/>



From left to right:

Micronesian honeyeater, AMME flag circle, mangrove wetlands, Micro beach, and the Mariana 8-spot butterfly

Photos by T. Fake, S. Henrickson and D. Hoover