



Pacific Island Network Quarterly



Newsletter of the Pacific Island Network
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If Corals Could Talk... pgs. 4 - 5



Field
Schedule &
Contacts ...2
Staffing Update ...3

Inv. Plant Cards ...3
Ocean Acidification
& Coral
Disease...4-5

Park-centric
Web Sites
& Maps ...6-7
Birds Wayside ...7

The
Extraordinary
World of
Pu'u Ali'i ...8



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The National Park Service (NPS) 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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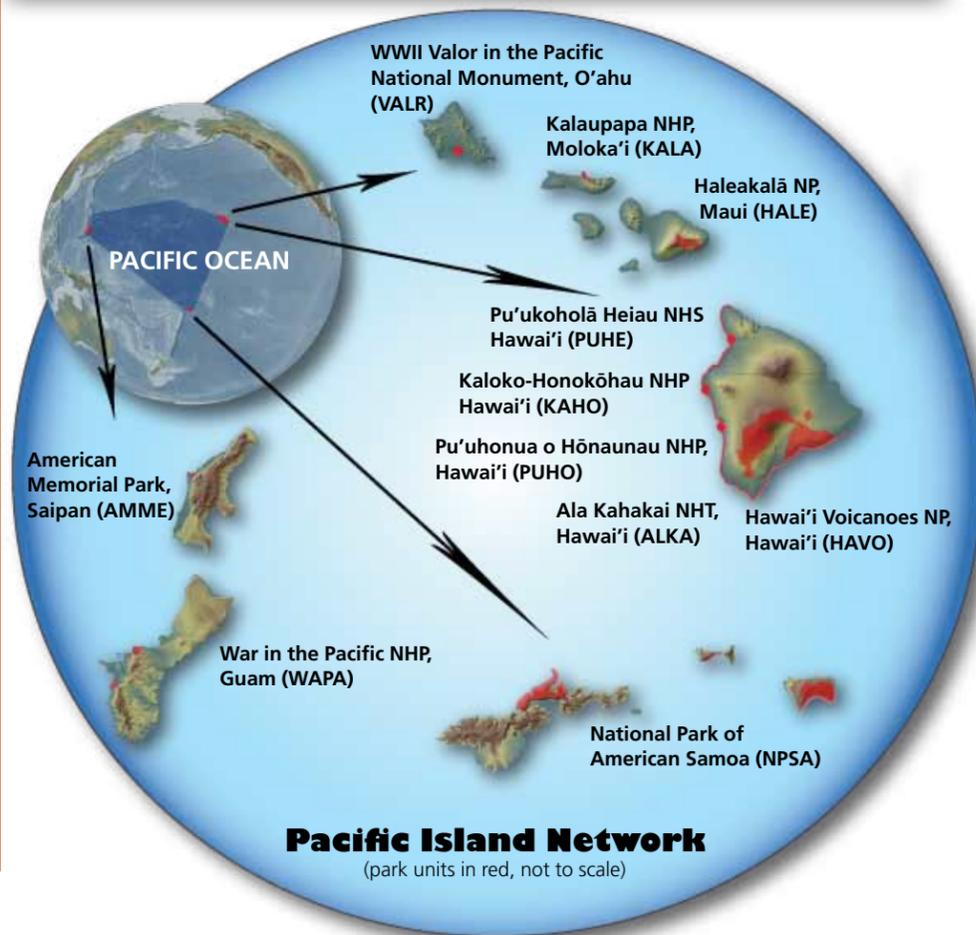
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NOTE: Unless indicated all photos and articles are NPS.

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Field Schedule

	April	May	June
Landbird monitoring			
Invasive plants	HALE		NPSA
Vegetation communities	HALE	NPSA	NPSA
Water quality	HALE	W. Hawaii, KALA, WAPA, AMME	NPSA
Stream animals			
Ground water		KAHO, AMME	
Benthic marine	KALA		
Marine fish			
Vegetation mapping	HAVO, KALA	HAVO, KALA	HAVO, KALA, HALE
Anchialine pools		KAHO, PUHO, HAVO	
Climate (on-going)	All Parks -----		



Know Your Plants to Protect Your Park

You are part of the frontline defense against new plant invaders

The Pacific Island Network just released *Invasive Plant Field Guides* as part of the Early Detection monitoring protocol. Each Pacific island NPS unit is now armed with sets of these useful cards to increase awareness and detection of aggressive park invaders before they spread and become a devastating nuisance for the parks.



To download your set or a 2013 calendar visit :
<http://science.nature.nps.gov/im/units/pacn/multimedia.cfm?tab=1>

NPS Botanist Alison Ainsworth and her vegetation team worked closely with Natural Resources Management at each park to develop a list of likely invasive species. "We focused on plants not yet in the parks, but ones that may cause park-wide damage," said Ainsworth. "If we find them before they become established in the parks, there is a good shot at controlling them."

The cards are designed to be used by any NPS staff in the field – the eyes and ears of the parks.

Each card features photos of the target species, including its flowers, fruits, seeds, and lifeform, along with basic information on the plant's impact, origins, and distribution. To limit false alarms, the cards include one or two look-a-like species that might otherwise be confused with the target species. Contact information for each park's invasive species eradication team is also indicated.

The cards are waterproof, durable, UV-resistant, and ready for duty in the field!

–C. Phifer, NPS Biological Technician

Featured Staff & Cooperator

Roxanne Zirkle (NPS Administrative Technician) was born and raised in San Jose, CA to a very large extended family. After college (W. Oregon Univ.) she worked for the State of Oregon before finding herself smitten with the Nevada desert. She worked in Death Valley NP as YCC Coordinator, Administrative Support, and Fee Collector before landing a position as a Human Resources Assistant. Curiosity got the best of her, and she headed further west, working for Yosemite NP as an HR Specialist.

She hopes to soon be reunited with the love of her life, her beloved sewing machine of 9 years, Bernina Artista 730. Roxanne has sewn clothing since she was very young.



Gov't job process."

"For me, life is to be lived full of adventure and service. I love to help others, including helping others decipher the

Kathy Akamine (CESU Vegetation Mapping Asst.) graduated in the spring of 2012 from UH Hilo where she received a BS in Environmental Science and a BA in Geography. 2012 was a busy year for Kathy. She worked as a team leader with Break Thru Adventures in Koke'e State Park on the island of Kaua'i. She participated on a geologic team that explored Grand Canyon and Zion National Parks. Over the summer, Kathy interned with Pacific Internship Programs for Exploring Science where she analyzed plant restoration efforts within Kanaka leo nui Bird Corridor. She then finished her year working as a field assistant with the Mauna Kea Watershed Alliance. It has been an exciting



boyfriend, Evan Ida.

year for Kathy; however, her favorite moment took place at the end of August when she married her longtime



Ocean Acidification: What Corals Can Tell Us

Many people are familiar with sea level rise and ocean warming, but ocean acidification?

Just as carbon dioxide from the burning of fossil fuels ends up in our atmosphere, it also ends up in our oceans, resulting in a process called ocean acidification. The carbon dioxide (CO₂) dissolving in our ocean combines with seawater (H₂O) to make carbonic acid (H₂CO₃) (see illustration).

Ocean chemistry is changing fast. The measure of the acid-alkaline balance is pH, from 0, extremely acidic, to 14, extremely alkaline (7 is neutral). On this scale, an increase or decrease of 1 unit is a tenfold change. The current ocean pH is around 8.0 but surface pH has decreased by 0.1 since 1750, and a

further decrease of 0.3-0.4 units is projected to occur by 2100. While these may seem like small changes, the reality is that ocean pH normally changes extremely slowly over vast periods of time, giving organisms time to evolve. This rate of change means that by 2050, the ocean could be more acidic than at any point over the last 20 million years.

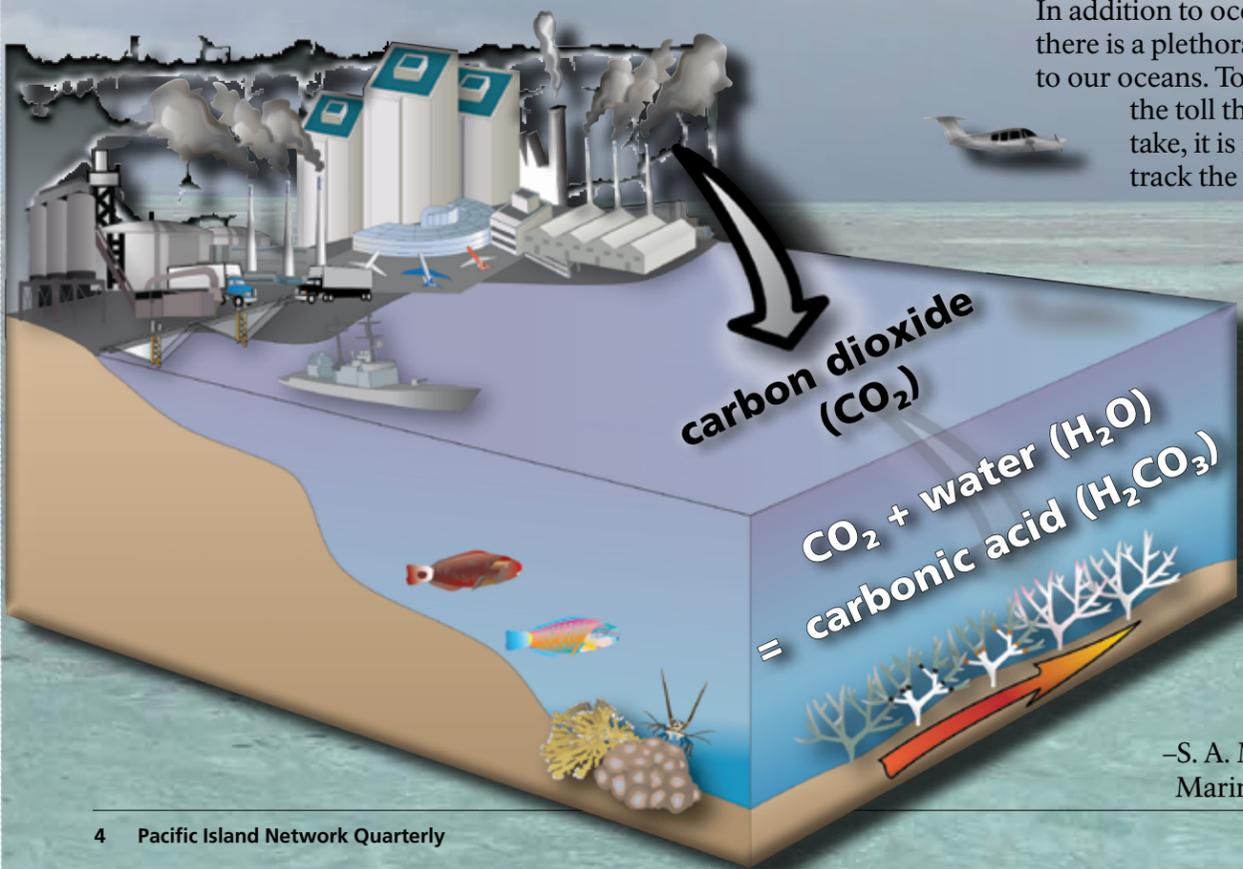
So why care? Have you ever seen what acid rain does to buildings and sculptures? It gradually dissolves the limestone resulting in blemished pillars and melted faces. The corrosive effects of acid rain on these limestone/calcium carbonate structures is similar to the effects on marine life which also uses calcium carbonate (e.g. seashells, urchins, and corals), with a scary exception... Sculptures can be restored. In nature, that is not possible. The chemical process of

acidification reduces the building material (carbonate ions) needed by marine organisms to construct their skeletons and shells, while simultaneously dissolving their already existing shells and skeletons. Furthermore, the energy that corals and other organisms expend to build and maintain shells or skeletons is increased, making the conditions even more difficult to endure. It is no wonder that ocean acidification has been referred to as the “osteoporosis of the sea”.

The effects of ocean acidification are not limited to just calcium carbonate utilizing organisms, but to all marine life. The changes in ocean chemistry result in other problems such as reduced metabolism and poor reproductive abilities for many species. As a consequence, fewer species in our oceans will survive.

In addition to ocean acidification, there is a plethora of other stressors to our oceans. To better understand the toll that these stressors take, it is important that we track the condition of our coral reefs to document how they change. The PACN Benthic Marine and Marine Fish programs monitor certain indicators of the health of coral reefs to see what corals and other organisms can tell us about threats like acidification.

–S. A. McKenna, NPS Marine Biologist



Coral Disease: What Corals Can Tell Us

Large numbers of corals are dying along Kaua'i's north shore (from Mākua to 'Anini and south as far as Ahukini Landing in Līhu'e) due to a coral disease outbreak that has been characterized as an epidemic by the U.S. Geological Survey (USGS) in a [2012 report](#). Researchers from the USGS and University of Hawai'i Institute of Marine Biology are studying the outbreak and point to a mysterious cyanobacteria and fungi as the culprit. Cyanobacteria and fungi were detected on samples taken from the lesions or diseased areas of the coral (top photo on right). What triggered these cyanobacteria and fungi to cause a disease outbreak is unknown, however a large amount of sediment is present on the reefs afflicted by the disease.

Sediments from land and other pollutants are known to stress coral reefs (bottom photo). A link between this outbreak and the high levels of sediment is under investigation. Dr. Thierry Work, head of Infectious Disease for USGS, reported that this is the first known large scale outbreak of cyanobacteria/fungal coral disease in the state of Hawaii.

Coral disease was first observed in the wider Caribbean in the 1970s. It has since been documented across the Hawaiian archipelago and throughout the Indo Pacific including: American Samoa, Guam, and the US Remote Pacific Islands. The frequency and severity of coral diseases has increased globally in the last few decades. Many researchers point to warming sea surface temperatures and increasing human-related impacts as factors exacerbating coral disease. The consequences of coral disease

on a reef can be catastrophic and result in a shift from a healthy coral dominated reef to an unhealthy algal dominated reef. For example in the Florida Keys, staghorn coral (*Acropora palmata*) was reduced up to 70%, with the dead corals being colonized by turf and fleshy algae. As corals are essential to the nearshore ecosystem, ensuring their long term health is critical.

Just think what would happen if coral reefs disappeared. Habitat would be severely degraded for the many marine creatures that depend on coral reefs. Our shorelines and coasts would also lose important protection from high wave energy.

The frequency and severity of diseases affecting coral reefs is truly alarming. To track outbreaks on a global scale, a Global Disease Database (<http://coraldisease.org>) was set up in 2000 by the National Oceanic and Atmospheric Administration and the United Nations Environment Program's World Conservation Monitoring Center. Based on studies from 1950 – 2013, there have been around 5,000 recorded outbreaks worldwide. A total of 16 genera of corals have been documented with one of at least 27 different coral diseases, with

many other abnormalities still under investigation.

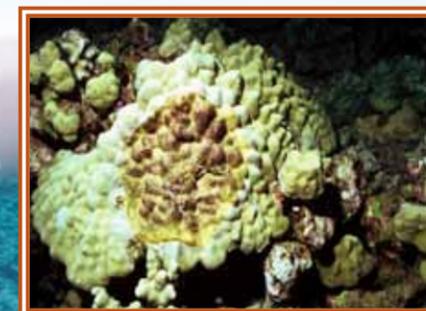
Pacific island national parks are not immune. Off of Hawai'i Volcanoes National Park, signs of disease have been observed. The PACN Benthic Marine monitoring program checks for signs of disease each year in War in the Pacific NHP, NP of American Samoa, Kaloko-Honokōhau NHP, and Kalaupapa NHP. Knowing about an outbreak is the first step in reducing its negative impacts.

–S. A. McKenna, NPS Marine Biologist

Corals with lesions



Corals with signs of disease near a national park



Sedimentation on the coral reef





A New Perspective of Your Park

FOR THE PUBLIC,
STUDENTS, & PARK STAFF

Since the infancy of the Inventory & Monitoring Program, and more specifically the Pacific Island Network (PACN), we have framed natural resources information by grouping similar resources together. For the PACN, this network perspective spans the thousands of nautical miles that string together the national parks of the tropical Pacific.

A geographical grouping of information about a resource, birds for example, is a logical way to present the information and data we collect. We devote whole web pages and database search categories to sharing what we know about birds in the CNMI, Hawaii, and American Samoa.

But it's more likely that you want to know about birds specifically in your park. Of course, you can sort through a database to target information on your park's birds. Although effective, this process

can be off-putting for some. Most likely, you didn't bother to search a database unless you really needed the information.

The NPS Inventory & Monitoring Program has heard you.

In addition to the traditional ways to access natural resources information, the new I&M network web site now features park-centric web pages devoted to I&M Program information in each individual park. All I&M natural resources information on the park you care about the most is grouped together in one easy-to-find location, complete with links to the powerful [IRMA database](#).

Now you can go to your park's PACN page and get direct links to just about everything we know about your park... inventories, monitoring results, briefs, videos, data, and more. All in one place.

The PACN has taken this new perspective a step further. Within our park-focused web pages, we have included special interactive park maps of generally where I&M conducts which monitoring protocols. We've included brief notes on when, why, and how we monitor. We also list a few highlights of what we've found. This information is updated as new monitoring reports are completed.



Kalaupapa NHP

These maps provide a simple overview of vital signs monitoring in specific parks. They offer a sense of place to the work we do with photos and brief descriptions of the surroundings. Finally, sprinkled throughout the text are little reminders of why these resources are important in the first place.

We hope you'll find this new perspective refreshing.

"Easily find out about the condition of the birds, plants, invasive plants, fish, corals, water... or whatever we monitor in the park you work in, live near, or just love."

-C. Nash, NPS Science Communications

Your turn.

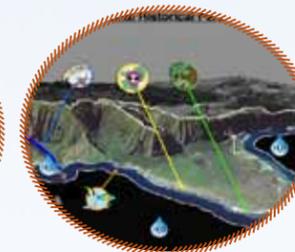
EXPLORE A MONITORING MAP OF A PARK YOU CARE ABOUT NOW.

Ala Kahakai NHT



American Memorial Park

Haleakalā National Park



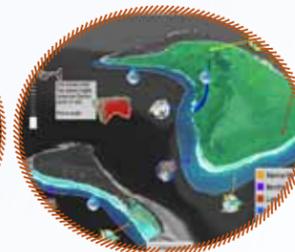
Kalaupapa NHP

Hawai'i Volcanoes NP (Main)



Hawai'i Volcanoes NP (Kahuku)

NP of American Samoa (Tutuila)



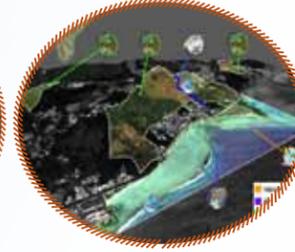
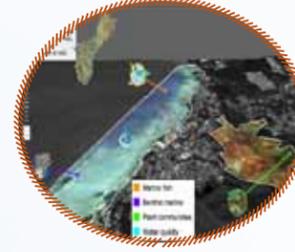
NP of American Samoa (Ta'u)

Pu'ukoholā Heiau NHS



Pu'uhonua o Hōnaunau NHP

War in the Pacific NHP (South)



War in the Pacific NHP (North)

Down by the Wayside

I&M partnered with Hawai'i Volcanoes National Park to enhance a wayside sign at the widely visited Nāhuku site (Thurston Lava Tube).

Now any park visitor reading this wayside and listening to the natural birdsong of the area ('ōma'o frequently call there) can supplement their understanding of Pacific island national park birds. Smartphone users simply scan a QR code at the top of the wayside that directs visitors to an NPS video about Landbirds monitoring in the parks.



QR codes are popping up in interpretive media throughout national parks, opening up a whole new avenue for resources exploration. Usage of this feature is easily trackable, giving parks a good idea of the popularity of the product. Hopefully, this is a good "sign" of things to come.



Visit our new web site:
<http://science.nature.nps.gov/im/units/pacn/>

Select "Network Parks" from the left-hand navigation bar

Choose your park

*Please note that accent marks are not available in this map building software



NOTES FROM
THE FIELD

The Extraordinary World of Pu'u Ali'i

Our commute to work that day started early in the morning, when we left for the Kahului Airport on Maui. We got on a small plane and soon flew alongside towering and majestic sea cliffs. Directly below us was our destination of Pu'u Ali'i Forest in Kalaupapa National Historical Park, Moloka'i Island. Our charge was to conduct the first regular monitoring survey of the plant communities in this area. The crew will gather comprehensive data on the species present; tree, fern, and shrub density, woody debris, and canopy height. As I pondered this, it quickly became apparent to me that this is an extraordinary place that very few have the opportunity to explore.

The dramatic landscape of Moloka'i is complemented by the hospitable people. It is known as the "Friendly Isle," and I felt immediately welcomed in such a generous culture. Albert Espaniola of Kalaupapa NHP, played an integral role in our work at Pu'u Ali'i. Not only was he familiar with the trails and topography, but being from Moloka'i, he gave us a unique perspective of the island's history and an account of what it was like growing up there. His local knowledge of the area made it a safe, efficient, and enjoyable trip for

the I&M crew from Haleakalā and Hawai'i Volcanoes National Parks.

Although "Kalaupapa" is translated to mean "Flat Leaf," Pu'u Ali'i is anything BUT flat! The crew walked for miles along narrow ridges that dropped on either side with breathtaking views of East Moloka'i and the ocean. Deep valleys and overpowering mountains made the work day sometimes long and demanding, and we were forced to

ocean of uluhe (false staghorn ferns) and mud. With careful observations and deliberate steps, the crew established thirty vegetation monitoring plots.

Daily field work involved hiking great distances to given GPS locations where we set up the monitoring plots. The effort culminated in a description of the overall vegetation community. The resulting baseline data will be

used to guide management strategies, and assist in the preservation of this rare ecosystem.

I feel fortunate to have had the opportunity to work in such a unique environment, and I look forward to returning to Kalaupapa National Historical Park soon. For now, deciphering the data from those plots while sitting

in my office brings back memories of vibrant sunsets, delicate 'awapuhiakanaloa (Hawaiian orchid), humbling skies, infinite shades of green, and impressive canopies of hāpu'u (tree ferns). The florescent lights in my office at Haleakalā National Park make me miss the extraordinary world of Pu'u Ali'i and the culture of Moloka'i.

—L. Moore, NPS
Biological Technician



adapt to changing environmental conditions and unexpected obstacles. But the dramatic beauty and wonderful crew made the work enjoyable and achievable.

The diversity of vegetation that we surveyed in the wet forest environment at Pu'u Ali'i sometimes resembled a mystical world of native moss, ferns, and trees. At other times it felt like a claustrophobic