Pacific Island Network
Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

PACN QUARTERLY

Newsletter of the Pacific Island Network, April – June 2015, issue no. 40

10th Anniversary Edition

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10 Years of the PACN Quarterly

-And the Program Manager declared, "Let there be a newsletter!"
....and it was ok.

After 40 issues, 110 feature stories, scores of other articles, and countless contributions from every corner of every park in the network... things are only getting more interesting.

When I started working with the Pacific Island Network (PACN) in March of 2005, there was no science communications program. There weren't any established Inventory & Monitoring (I&M) communications programs anywhere in the country. Each network had to come up with their own approach. Even now, ten years later, the national I&M Division is just beginning to develop its first nationwide strategy for communicating the incredible wealth of science data and discovery that we help the NPS collect. I don't look at this situation as a communications afterthought to a science program, but more of a natural evolution of the program. Science communication has become a progressively important part of I&M as we grow, collect data, and observe trends. After a decade of work, we are now in better position to actually discuss interesting findings, data, and innovations. It was from these modest origins that the PACN Quarterly was born.

Both the quality of the articles and the selection of the subjects has matured through the years. Almost all of the PACN staff (NPS and cooperators) since 2005 have contributed. Since the first newsletter, we've had three program managers, five administrative assistants, three data managers, two GIS specialists, two aquatic ecologists, two marine ecologists, a botanist, a climate scientist, a dozen biotechs, and scores more cooperators and volunteers working in some of the most remote areas of all 11 of the Pacific island national park units. These sciencey people joined with dozens of parks' staff and even outside scientists to write articles for the PACN Quarterly. We've covered topics such as fruit bats, koa moths, blind snakes, mapping techniques, invasive species, rare birds, ʻōhiʻa rust, turtles, rising sea levels, sea cucumbers, tamaligi slaying, children's games, hand grenade safety, monitoring in mangrove swamps, new educational websites, petrels, coral disease, caves, databases, tsunami, ʻoʻopu, radio dead zones, a lake that changes colors, and the list goes on and on.

The first edition PACN newsletter from the Summer of 2005.

To access over 110 feature articles and back issues visit:
http://science.nature.nps.gov/im/units/pacn/multimedia.cfm

We look forward to sharing more science with you over the next decade. These coming years will allow us to report on the longer-term trends of some of the resources we monitor as we return to survey each of them for a second, third, or even 20th time. Through the repetition of monitoring surveys over time, we begin to really understand how a resource is changing. That's when things get really interesting.

–C. Nash, NPS Science Communications
& PACN Quarterly Editor

Stomatopods

Photos by S. Lee

CREATURES FROM THE REEF

The meanest, coolest, and fanciest.

Throughout 2015, this newsletter has been featuring an up-close-and-personal profile of some of the lesser known, but equally cool and compelling invertebrates that make up the marine benthic community on our coral reefs. This quarter we are taking on stomatopods. Arguably, one of the meanest, coolest, and fanciest critters on the planet! Why? Read on and decide for yourself.

Stomatopods, commonly called mantis shrimp, are crustaceans just like lobsters, shrimps, and crabs. There are over 400 species living hidden within burrows of subtropical and tropical shallow marine habitats. Resembling shrimp with flattened and more elongated bodies, stomatopods are characterized by having massive, conspicuous, praying mantis-like "raptorial" claws. The claws are folded under the sides of a hard upper shell or carapace. And as predatory crustaceans, these claws come in handy.

Their claws are morphologically modified for spearing, stunning, crushing, or dismembering prey. Stomatopods adapted for crushing, sport claws shaped like blunt clubs which they use to attack snails, crabs, molluscs, and rock oysters. Spearers have claws with sharp barbed teeth-like structures to snag and slice the meat of softer animals, like fish. Some of the larger species in captivity have been known to strike with such force that they actually break the glass of aquaria after eating everything in the tank.

So stomatopods are mean. But what makes them cool? Check out their T-shaped moveable eyes (see bottom). Their vision is extraordinary as they can see colors that no other species can even imagine. Humans, for example, only have three types of color receptive cones, while stomatopods have 16 types. Mantis shrimp can even see ultraviolet light!

Maybe we've convinced you that stomatopods are both mean and cool... but fancy? Many species are adorned with amazing coloration. For example, one species is so vibrant, its common name is the peacock mantis shrimp (*Odontodactylus scyllarus*, left). Some species even use fluorescent patterns on their bodies to actually send signals to others.

Alright, so you're thinking that "fancy" and "mean" are subjective and anthropomorphic. Fair enough, but you've got to admit... Stomatopods are pretty cool.

–S. A. McKenna, NPS
PACN Marine Ecologist

Maui Unknown

High-Altitude Stream Sampling at Haleakalā NP

At the request of the park, the PACN recently sampled streams at high altitude in Haleakalā National Park on Maui. The team implemented the stream monitoring protocol at Palikea Stream, which is normally only sampled downstream near sea-level. The park was interested in what fish, snails, and shrimp might live in reaches far upstream.

This sampling trip was a true expedition into the wilderness, and required a lot of preparation. The team had to get trained on helicopter operations and safety. We prepared our normal stream sampling equipment, including a water quality sonde, flow meter, water sampling filter tower, and snorkeling gear.

A four-person, five-day trip to sample streams required two "sling-loads" of supplies. After arriving at the landing zone near the Kīpahulu Visitor center, we spread out two giant nets made of heavy rope. We arranged all our coolers, backpacks, and other supplies into the centers of the nets. Then the nets were closed around the supplies and fastened with heavy gauge steel cables.

The helicopter, bright orange with stripes, with a small bubble for a passenger and high skids, swooped in overhead and landed in the middle of the field. I was escorted to the door. I climbed in, put my harness on, and plugged my headset in. Or rather, I had help doing all these things, since it was my first heli-op. It was so noisy I couldn't speak to anyone. Once my escort climbed in and got settled, up we went.

We soared over the rainforest climbing high into Kīpahulu Valley. There are no roads, no trails, and no real landmarks besides the streams and topography of the land itself. The flight only took about five minutes. We landed in a small patch of high grass among ʻōhiʻa trees. My partner led me away from under the spinning rotors to the tree line. Once the rest of the team joined me, we made our way through the dense forest, climbing over roots and branches to our home for the next five days... Delta Camp. It's a shack (photo on right) built in the forest with a single small room and a tank for catching rainwater.

Twenty minutes later, we heard the helicopter approaching, and it hovered directly over the camp. The rotor wash drowned out all other sounds and everything shook in the artificial wind. A sling load was lowered out of the sky onto the ground right next to the camp. The cable separated, and the ship flew away. We move all the supplies out of the way, and a second sling load arrived. As the ship left it toggled its siren to say farewell. The sound of rotors fades away.

We were there to survey Palikea Stream at an altitude of 4,000 feet. Between our location and the famous pools at ʻOheʻo several miles away are literally dozens of waterfalls; some several hundred feet high. But it was possible that fish were there, as some can configure their ventral fins to form a kind of suction cup, and literally scale vertical rock walls under waterfalls. We scouted the stream nearby, and decided it was suitable to sample. The next day we would scout another location downstream.

This place is cold and wet. The dense forest surrounded us with ʻōhiʻa trees, hāpuʻu, shrubs with wide succulent leaves, and stands of small climbing ferns. Bird songs abound, but it was difficult to spot them.

Our first survey revealed no fish in the stream. In fact there were no snails, no shrimp, and almost no algae growing on the rocks. It appeared as if the gravel and rocks in this area are repeatedly scoured, preventing biofilm from developing. We did find rare ferns along the bank, and a small aquatic beetle. This stretch of the stream ends in a tall waterfall. Perhaps the geomorphology of the stream is such that the water is concentrated in a small area, creating high turbulence that rolls the rocks and scours them clean.

The next day we moved downstream through the forest. It was slow going. We frequently had to crawl under brush and take detours around thick vegetation. We were headed for a spot on the map that looked to be safe access to the stream. When we arrived we looked down on the stream from the tops of cliffs. There was no safe place to access the stream, let alone sample, so we had to abandon this area. Another slog through the rainforest and we arrived back at camp. Fog rolled in, obscuring the surrounding mountains. We discussed our options and decided to try a different stream that runs parallel to Palikea, nicknamed ʻŌpae Stream. Judging by the name we thought there ought to be shrimp. To get there we'd have to cross Palikea. It was a concern because if the water rose, we could be trapped on the other side. Had there been heavy rain overnight, and the Palikea was high, we wouldn't have attempted it. By morning the weather stayed clear, and Palikea was flowing normally. We crossed and found ʻŌpae Stream.

This stream is remarkably different. It flows through a flatter, more open area with trees. Moss covers rocks. There is algae growing on most surfaces. We did find shrimp, but no fish. Is there one particular waterfall that they can't overcome somewhere downstream?

We explored upstream until we got to another several hundred foot waterfall. One biologist, who has worked in the area many times over the past twenty years removing invasive plants, had never been to the end of this particular stream. I wonder if the ancient Hawaiians pushed this far into the forest. We might be the first people to see this particular place in 500 years, or ever.

The information we gathered will help to characterize water quality, the physical habitat, and spatial distributions of animals populations in Kīpahulu Valley in areas never before surveyed. In future trips we will survey downstream to try and determine how far upstream stream animal populations extend.

The next day we broke camp, packed up, and carried every cooler and bag through the forest to the landing zone. It was time to head back. We were thoroughly tired, and thoroughly inspired.

–D. Raikow, NPS
PACN Aquatic Ecologist

Don't Bemoan the Drone

Yes, DOI can fly! But it takes training.

Unmanned Aircraft Systems (UAS) are remotely piloted aircraft, broadly referred to in the popular press as drones. They can be useful for resource management activities, search and rescue, and law enforcement operations, and have been successfully used in national parks. However, up to now no park has actually completed the official procedures for a fully approved National Park Service mission. Official UAS missions require a two-person crew and an observer to pass a two-week flight training and receive a medical certification. Otherwise, employees who use UAS in the parks are operating outside the scope of their positions.

If approved by a superintendent, there is a "file and fly" Memorandum of Agreement (MOA) in place with the Department of Interior (DOI) and Federal Aviation Administration (FAA). This MOA establishes a framework under which DOI Bureaus must operate to comply with FAA rules and procedures pertaining to small UAS use. The scope of small UAS operations under this MOA applies only to systems weighing 55 lbs or less, engaged in public aircraft operations below 400 ft, and limited to natural resource and scientific applications as well as Search and Rescue efforts. All other UAS operations, including wildland fire and law enforcement operations, must still comply with the FAA Certificate of Authorization application and approval process before flights can commence.

No. The public may not fly in America's national parks.

In August 2014, National Park Service Director Jonathan B. Jarvis signed a policy memorandum that directs superintendents nationwide to prohibit launching, landing, or operating unmanned aircraft on lands and waters administered by the National Park Service. "We embrace many activities in national parks because they enhance visitor experiences with the iconic natural, historic, and cultural landscapes in our care," Jarvis said. "However, we have serious concerns about the negative impact that flying unmanned aircraft is having in parks, so we are prohibiting their use until we can determine the most appropriate policy that will protect park resources and provide all visitors with a rich experience."

Amazing potential for good

With the rapid advancement of UAS technology, the interagency fire community appreciates the potential benefits of this technology for managing incidents and missions. If you are considering flight with a drone or have questions, please consult with your Unit Aviation Officer or the Regional/State aviation staff to assist in selecting the aircraft best suited for the mission, and information on the approval process.

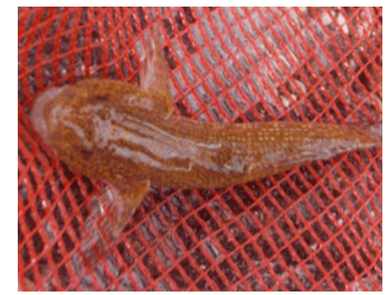
Flying a "Raven" at Haleakalā National Park

Drones can save labor and access areas too dangerous for people. They can deliver medical supplies to injured hikers and help find lost visitors quickly. Resource managers can utilize drones to photograph project areas at high resolution and easily perform 3D modeling of structures and landcover. They can be used to capture samples of biological resources, and so much more. As this technology advances, we realize many potential applications for its use. The DOI and others are actively working to ensure the safe integration of this technology into our resource and incident management operations... and the sky is the limit.

–S. Kichman, NPS
PACN GIS Specialist

Asan River Invaded by Tilapia

When most people hear the word tilapia they think dinner. I, on the other hand, immediately recognize them as a BIG problem. Tilapia are aggressive fish that are extremely adaptable and reproduce rapidly. They have been known to invade streams around the world usually in impaired watersheds that don't receive protection. Usually the introductions to streams are by accidental escapees from tilapia farms. Some may have been in ornamental ponds, and when the owners move, they release their beloved pets into the stream. The problem is tilapia do not belong in streams in Guam and most certainly not in a national park. The PACN Inventory & Monitoring Program has recently documented the first tilapia in the Asan River found during annual stream surveys in War in the Pacific National Historical Park. These fish reproduce rapidly and will compete with native fish for food resources and habitat. Additionally, there is a fear that farm-raised tilapia could introduce parasites or pathogens into the stream, which could spread to the native fish. The Asan River hosts five fish species native to Guam, and 4 of those are endemic; meaning they only live on Guam. These are not the only unique species in the streams of Guam. There is also an abundance of native shrimp and snail species. The introduction of tilapia could lead to degraded water quality and crowd streams due to their ability to reproduce so rapidly. We hope that by identifying this species early we will be able to provde the park the information they need to make an informed decsion on how to move forward. Early detection by I&M protocols is key to informing managers about critical resource management issues such as this one.



A tilapia captured at Pu'uhonua o Hōnaunau National Historical Park

–A. Farahi, NPS PACN Aquatic Biotech

I&M's Role in the HAVO Bioblitz

Phew. That was a big event. Pretty much all HAVO staff, partners, and hundreds of others were involved in one way or another. It only made sense for the I&M Program to pitch in and help with an all-park inventory like the bioblitz. Inventories are kind of our thing after all.

Five PACN staff led inventories, three worked at booths in the festival, two devoted their days to the data center (including weeks of preparation from our data manager), and one prepped students with a video and classroom visits. We even had help from I&M staff at our Fort Collins Office, including the I&M Division Chief, Kirsten Gallo.

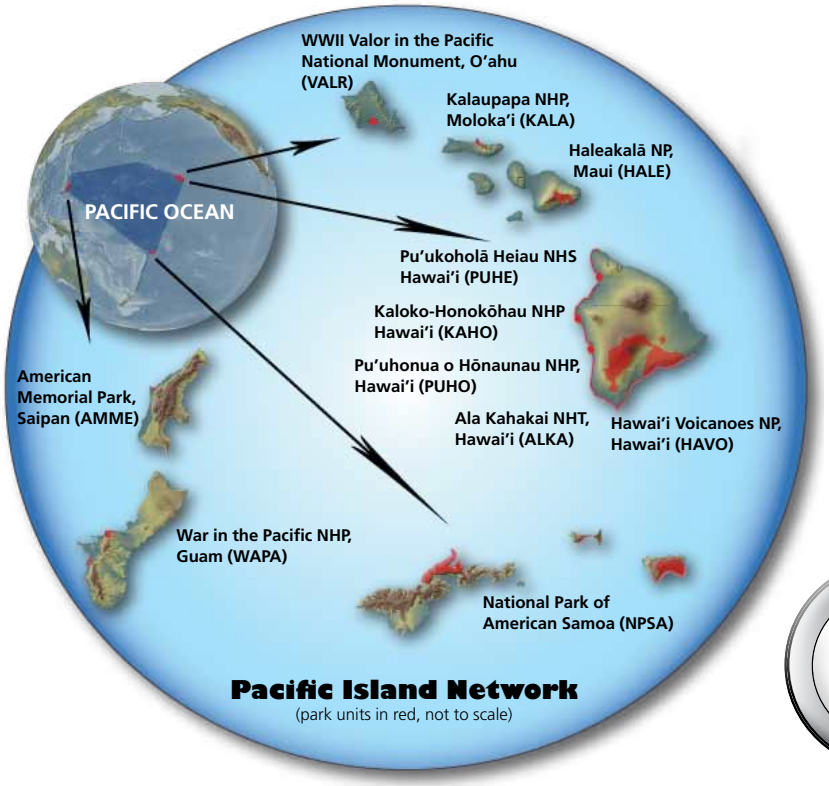
In all, over 20 new species to the park were recorded, hundreds of students and visitors engaged in citizen science inventories, and thousands made cultural and conservation connections at the festival.

And by the time the evening came on the last day of the event, I think we realized that we had a little fun too.

Photo by C. Garrett

Field Schedule

	July	August	September
Landbirds monitoring	HAVO		
Invasive plants	HAVO	HAVO	HAVO
Vegetation communities	HAVO	HAVO	HAVO
Water quality	HALE, KALA	KALA, WAPA	NPSA, W. Hawaii, AMME
Stream animals	HALE	KALA	NPSA
Groundwater			KAHO, AMME
Benthic marine	KALA	WAPA	
Marine fish	KALA	WAPA	
Climate (on-going)	All Parks----------	----------	----------



Recent Reports

NPSA Vegetation Mapping Inventory Project

HALE Vegetation Mapping Inventory Project

National Park Service
U.S. Department of the Interior
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1 Crater Rim Drive - Qtrs 22
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The National Park Service (NPS) has implemented natural resource inventory and monitoring (I&M) 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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NOTE: Unless indicated all photos and articles are NPS.

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