

Standard Operation Procedure (SOP) #2

Before the Field Season

Version 2.0 (June 28, 2021)

Change History

New Version #	Revision Date	Author	Changes Made	Reasons for Change	Previous Version #
2.0	6/28/2021	Kim Weisenborn, Amanda McCutcheon, Anne Farahi	Updates to SOP reference. Added content on logistics and field schedule originally in appendices.	SOP references were outdated, and appendices were removed.	1.0

Only changes in this specific SOP will be logged here. Version numbers increase incrementally by hundredths (e.g., version 1.01, version 1.02) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0). Record the previous version number, date of revision, author of the revision, changes made, and reason for the change along with the new version number.

Purpose

This SOP describes pre-field season procedures for monitoring stream animals in PACN parks. The procedures described here are primarily the responsibility of the PACN Field Lead (this role is filled by the PACN Lead Aquatic Biological Science Technician) who may be assisted in some tasks by the PACN Aquatic Ecologist. Included in this SOP are a description of general preparations, field season scheduling considerations, and a list of necessary supplies and equipment for sampling. The procedures described here should begin no later than three months prior to a sampling trip.

Procedures

General Preparations and Review

1. Review the protocol (monitoring narrative and all SOPs). The PACN Aquatic Ecologist and the PACN Field Lead should both be thoroughly familiar with the objectives of PACN stream protocol. They should also have a solid working knowledge of all field sampling methods and techniques.
2. Season specific plans. The PACN Aquatic Ecologist and PACN Field Lead should review sampling goals, including scheduling and crew member responsibilities. A timeline of tasks and actual field sampling should be established (see Table SOP 2.1). The PACN Field Lead should also review the previous season's field notes.

Table SOP 2.1 Identification of each task by project stage, indicates who is responsible, and establishes the timing for each task. Note that the PACN Aquatic Ecologist will serve as the PACN Aquatic Ecologist, and the PACN Lead Aquatic Biological Technician will serve as the PACN Field Lead. Protocol sections and SOPs are referred to as appropriate.

Project Stage	Task Description	Responsibility	Timing
Preparation	Initiate announcements for seasonal technician positions, begin hiring	PACN Aquatic Ecologist	
	Notify PACN Data Manager and PACN GIS Specialist of needs for the coming season (field maps, GPS support, training)	PACN Field Lead	
	Meet (or conference call) to recap past field season, discuss the upcoming field season, and document any needed changes to field sampling protocols or the working database	PACN Aquatic Ecologist, PACN Aquatic Biotech (PACN Field Lead), park staff, PACN Data Manager, PACN GIS Specialist	
	Ensure all project compliance needs and permitting are completed for the coming season	PACN Field Lead, PACN Aquatic Ecologist, park staff	
	Provide names of field crew to park staff	PACN Aquatic Ecologist	
	Plan schedule and logistics, including ordering any needed equipment and supplies (SOP #2 Before the Field Season)	PACN Field Lead, assisted by PACN Aquatic Ecologist	
	Inform PACN GIS Specialist and PACN Data Manager of specific needs for upcoming field season	PACN Field Lead	
	Generate field navigation reports, roster of sample points and coordinates from the database (SOP #5 Downloading and Uploading Data from/to a Garmin® GPS)	PACN GIS Specialist, assisted by PACN Field Lead	
	Prepare and print field maps (SOP #3 Locating Sampling Stations)	PACN Field Lead	
	Update and load data dictionary, background maps, and target coordinates into GPS units (SOP #5 Downloading and Uploading Data from/to a Garmin® GPS)	PACN GIS Specialist	
	Ensure that project workspace is ready for use and GPS download software is loaded at each park (SOP #25 Workspace Setup and Project Records Management)	PACN Data Manager, PACN GIS Specialist	
	Implement working database copy	PACN Data Manager	
	Initiate computer access and key requests (may need park-specific dates)	PACN Field Lead	
	Provide field crew email addresses and user logins to PACN Data Manager	PACN Data Manager assisted by PACN Field Lead	
	Provide database/GPS training as needed	PACN Field Lead assisted by PACN Data Manager and PACN GIS Specialist	
	Train field crew in species identification, habitat characterization, and safety (SOP #7 Training Observers)	PACN Field Lead	
Data Acquisition	Notify park staff and PACN Aquatic Ecologist of field sampling schedule	PACN Field Lead	

Project Stage	Task Description	Responsibility	Timing
	Collect field observations and position data during field trips	PACN Field Lead	
	Review data forms after each day	PACN Field Lead	
	Check in with park staff	PACN Field Lead	
	Debrief crew on operations, field methods, gear needs	PACN Field Lead	
Data Entry & Processing	Download GPS data and email files to PACN GIS Specialist for correction if necessary (SOP #5 Downloading and Uploading Data from/to a Garmin® GPS)	PACN Field Lead	
	Download and process digital images (SOP #27 Managing Photographic Images)	PACN Field Lead	
	Enter data into working copy of the database (SOP #28 Data Entry and Verification)	PACN Field Lead	
	Verification of accurate transcription as data are entered	PACN Field Lead	
	Correct GPS data and send map to PACN Field Lead and for review if necessary	PACN GIS Specialist	
	Periodic review of GPS location data and database entries for completeness and accuracy	PACN Field Lead	
	Merge, correct, and export GPS data. Upload processed and verified coordinates to database	PACN GIS Specialist	
Product Development	Complete field season report (SOP #34 Data Analysis and Reporting)	PACN Field Lead	
Product Delivery	Send field season report to Program Manager, park managers, PACN Data Manager, and PACN GIS Specialist (SOP #32 Product Delivery Specifications)	PACN Aquatic Ecologist	
Quality Review	Quality review and data validation using database tools (SOP #29 Post-season Data Quality Review and Certification)	PACN Aquatic Ecologist	
	Prepare coordinate summaries and/or GIS layers and data sets as needed for spatial data review	PACN GIS Specialist	
	Joint quality review of GIS data, determine best coordinates for subsequent mapping and fieldwork	PACN Aquatic Ecologist and PACN GIS Specialist	
Metadata	Identify any sensitive information contained in the data set (SOP #31 Sensitive Information Procedures)	PACN Aquatic Ecologist and park staff	
	Update project metadata records (SOP #30 Metadata Development)	PACN Field Lead and park staff	
Data Certification & Delivery	Certify the season's data and complete the certification report (SOP #29 Post-season Data Quality Review and Certification)	PACN Aquatic Ecologist	

Project Stage	Task Description	Responsibility	Timing
	Deliver certification report, certified data, digital photographs, and updated metadata to PACN Data Manager (SOP #32 Product Delivery Specifications)	PACN Aquatic Ecologist	
	Upload certified data into master project database, store data files in PACN Digital Library ¹ (SOP #33 Product Posting and Distribution)	PACN Data Manager	
	Notify PACN PACN Aquatic Ecologist of uploaded data ready for analysis and reporting	PACN Data Manager	
	Update project GIS data sets, layers and associated metadata records	PACN GIS Specialist	
	Finalize and parse metadata records, store in PACN Digital Library ¹ (SOP #30 Metadata Development)	PACN Data Manager and PACN GIS Specialist	
Data Analysis	Check station and stream level data for normality (see SOP #34 Data Analysis and Reporting).	PACN PACN Aquatic Ecologist assisted by PACN Aquatic Biotech	
	Create bar graphs of data (see SOP #34 Data Analysis and Reporting).	PACN PACN Aquatic Ecologist assisted by PACN Aquatic Biotech	
	Analyze data for trends over time using yet to be determined statistical methods (see SOP #34 Data Analysis and Reporting).	PACN PACN Aquatic Ecologist assisted by PACN Aquatic Biotech	
	Integrate biotic data with habitat data using a multivariate approach (see SOP #34 Data Analysis and Reporting).	PACN PACN Aquatic Ecologist assisted by PACN Aquatic Biotech	
Reporting & Product Development	Export automated summary queries and reports from database	PACN Aquatic Biotech	
	Produce park-wide and transect-specific map output for archives	PACN GIS Specialist	
	Generate report-quality map output for reports	PACN GIS Specialist	
	Acquire the proper report template from the NPS website , create annual report	Data analyst and PACN PACN Aquatic Ecologist	
	Screen all reports and data products for sensitive information (SOP #31 Sensitive Information Procedures)	PACN Aquatic Ecologist	
	Prepare draft report and distribute to park biologists for preliminary review	PACN Aquatic Ecologist assisted by PACN Aquatic Biotech	
Product Delivery	Submit draft I&M report to program manager for review	PACN Aquatic Ecologist	
	Review report for formatting and completeness, notify PACN Aquatic Ecologist of approval or need for changes	Program manager	

Project Stage	Task Description	Responsibility	Timing
	Upload completed report to PACN Digital Library ¹ submissions folder, notify PACN Data Manager (SOP #32 Product Delivery Specifications)	PACN Aquatic Ecologist	
	Deliver other products according to the delivery schedule and instructions (SOP #32 Product Delivery Specifications)	PACN Aquatic Ecologist	
	Product check-in	PACN Data Manager	
Posting & Distribution	Submit metadata to IRMA Portal ²	PACN Data Manager	
	Create IRMA Portal ² record, post reports to the IRMA Portal ²	PACN Data Manager	
	Update IRMA Portal ² records according to data observations	PACN Data Manager	
	Submit certified data and GIS data sets to IRMA Portal ²	PACN Data Manager	
Archival & Records Management	Store finished products in PACN Digital Library ¹	PACN Data Manager	
	Review, clean up and store and/or dispose of project files according to NPS Director's Order #19 ³	PACN Data Manager assisted by PACN Field Lead	
Season Close-out	Inventory equipment and supplies	PACN Field Lead	
	Conference call to discuss recent field season (close out); discuss who needs to do what to get data ready for analysis	PACN Aquatic Ecologist, PACN Aquatic Biotech, PACN Field Lead, park staff, PACN Data Manager and PACN GIS Specialist	
	Discuss and document needed changes to analysis and reporting procedures	PACN Aquatic Ecologist, assisted by PACN Aquatic Biotech, park staff, and PACN Data Manager	

¹ The PACN Digital Library is a hierarchical digital filing system stored on the PACN file server. Network users have read-only access to these files, except where information sensitivity may preclude general access.

² The IRMA Portal is a clearinghouse for natural resource data, metadata, bibliographic records, and park species information (<http://irma.nps.gov/App/Portal/Home>). Only non-sensitive information is posted to the IRMA Portal. Refer to the protocol section on sensitive information for details.

³ NPS Director's Order 19 provides a schedule indicating the amount of time that the various kinds of records should be retained. Available at: <http://data2.itc.nps.gov/npspolicy/DOrders.cfm>

1. Permits. Obtaining all necessary permits is the responsibility of the PACN Aquatic Ecologist. Permits can be especially time-consuming to obtain and therefore, applications for these permits should be submitted well before the season begins. A minimum of 90 days is typically required. Scientific collecting permits need to be obtained from the appropriate state or territory agency, and each individual park where sampling will occur (Note: contact

information regarding permits will be provided). For the National Park Service, there is a Research Permit and Reporting System (RPRS) website (<https://irma.nps.gov/RPRS/>, last accessed 5 May 2020) where permit applications are filed

2. Park contacts. At least two months prior to starting fieldwork, appropriate persons in the park should be contacted (Chief of Resource Management, Chief Ranger, other applicable staff that may be required to assist). Details are provided in the [Logistics](#) section below.
3. Travel arrangements. Airline flights, boats (NPSA, KALA), possible helicopter (to Waikolu), ground transportation, and lodging (hotel, park accommodations, or camping) should all be arranged well in advance. Details are provided in the [Logistics](#) section below.
4. Supplies and equipment. All of the necessary supplies for the season should be located and inspected to ensure that they are in adequate condition. This includes, for example, field guides, data forms, GPS (Global Positioning System) units, maps, preservative, and all sampling equipment. For additional details see the list of supplies and equipment (Table SOP 2.1) and associated data collection SOPs (SOPs #8-24). Supplies should be grouped together in containers according to sampling activity, and each container should have an attached checklist of all of the necessary supplies. Each field season a new set of data forms will need to be photocopied onto waterproof paper.

All field equipment should be available and organized at least one month before fieldwork is scheduled to begin. All equipment should also be examined for functionality and completeness before fieldwork begins. For example, sampling traps should be clean and free of holes, and a sufficient supply of replacement batteries and pencils should be available. Wetsuits and waders should be inspected to ensure that they are clean and free of tears.

It is very important that all gear (including personal items such as boots or tabs) be thoroughly cleaned to avoid inadvertently transporting introduced species to a new location. It is recommended that the field crew should have a different set of gear (including personal items such as boots) for each island group (Hawaii, Guam, and American Samoa). Details on preventing the transport on introduced species (aquatic hitchhikers) are provided in the [Logistics](#) section below.

5. Location of sites. Prior to the field season, the PACN Field Lead should check all GPS units to ensure that the location coordinates of sampling sites have been uploaded to each unit. Any unnecessary coordinates from the previous year should be deleted. A printout of all sampling location coordinates should accompany each unit as a backup reference for crew members. Laminated topographic maps with sampling locations marked on them should also accompany each GPS unit. Access points of difficult to reach areas should be marked on the maps and if possible, the coordinates of these points should be saved in the GPS units. Road or trail logs, in addition to site descriptions and contact information for landowners, park managers, or others should be maintained in a notebook.

Scheduling Fieldwork

1. Sampling schedule outline. A sampling timeframe has been established for each park (see Table SOP 2.3 Recommended Field Sampling Schedule). This is coordinated with water quality monitoring and has been selected to avoid the times of likely stream flooding.
2. Create a tentative schedule. A tentative schedule should be constructed for the entire field season, taking into account all logistical considerations. Ultimately, the sampling scheduling should provide a plan for the entire season, but flexibility for unforeseen circumstances should be built into the schedule.

Table SOP 2.2 Field supplies.

Personal Gear

Felt-soled boots	Backpacks
Wetsuit	Drinking water
Hood	Food
Dive gloves	Flashlight
Rain jacket	Batteries
Sun hat	Field notebook

Snorkeling Survey

Mask	Clipboards
Snorkel	Pencils
Fish quadrat wire	Flagging tape
Snail quadrat wire	Waterproof pens
Calipers	Identification keys
SOPs	Fingerless gloves
Data sheets	Ziploc bags for datasheets
Random coordinates for quadrats	Transect tape

Crustacean Net surveys

Transect tape	Data sheets
Buckets	Clipboards
Sampling nets (Kick net for Guam)	Pencils
Dip nets	Sample jars (WAPA only or voucher specimens) with labels
Flagging tape	Identification keys
Rugged gloves	Ziploc bags for datasheets
Ruler	Ethanol (WAPA only or voucher specimens)

Reach Layout

Flagging tape	Transect tape
Waterproof pens	

Habitat Measurements (rapid assessment)**

Flow meter**	Data sheets**
Wading rod**	Clipboards**
Transect tape**	Pencils**
Ruler**	Flagging tape**
Densimeter	Waterproof pens**

Habitat Measurements (rapid assessment)**

	Ziploc bags for datasheets**
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General Gear

Site information folder	Laminated site map
Ricoh Camera	Permits
Underwater camera	Equipment list
Sample jars	Park/emergency contacts
GPS	Field notebook
Small multi-tool	

Safety Gear

First-aid kit	Radio/satellite phone/satellite communicator
Sunscreen	Drinking water
Ear drops	Spare snacks
Insect repellent	Alcohol-based hand wash
Cell phone	

Other

Charger for camera batteries	Laptop with charger
	Waterproof paper data sheets

SOP 2.3 Recommended Field Sampling Schedule.

	Water Quality	Streams	Groundwater	Benthic Marine	Marine Fish	Anchialine Pools
January	KAHO, HALE					
February	KALA, PUHO, PUHE, ALKA		KAHO			
March	WAPA, AMME, NPSA	WAPA		NPSA	NPSA	
April	KAHO, HALE		KAHO			
May	KALA, PUHO, PUHE, ALKA					
June	NPSA, WAPA, AMME		KAHO	WAPA	WAPA	
July	KAHO, HALE	HALE		KALA	KALA	
August	PUHO, PUHE, ALKA, KALA	KALA	KAHO			
September	HALE, NPSA, WAPA, AMME	NPSA				
October	KAHO, HALE		KAHO	KAHO	KAHO	
November	KALA, PUHO, PUHE, ALKA					PUHO, KAHO
December	HALE, NPSA, WAPA, AMME		KAHO			

Logistics

American Samoa (NPSA)

Travel to American Samoa

The initial point of entry to American Samoa is Pago Pago on the main island of Tutuila. Flights are only 2-3 times a week from Honolulu (HNL) to Pago Pago (PPG) exclusively on Hawaiian Airlines. A current passport is required for travel to American Samoa. American Samoa is -11:00 Greenwich Mean Time (GMT) or 1 hour earlier than Hawaiian Standard Time (HST). A water filter is highly recommended to filter drinking water especially on outer islands or during periods of heavy rainfall. Hotels and smaller lodges are available on Tutuila.

Transportation on Tutuila

Rental cars are available on Tutuila through Friendly rental car, Avis, and certain hotels. Park vehicles may be available to staff depending on availability and timing. Contact park staff to arrange. Sadie's by the Sea hotel is walking distance to the park office, which can be a convenient option.

Directions to Tutuila Field Sites

Leafu stream is accessed by traveling the main road to Pago Pago and the road over the mountain to the village of Vatia. Note there are no official road names in American Samoa. Roads are distinguished by the villages they connect. Village chiefs and the mayor must be notified prior to arrival in the village. This should take place several days to preferably at least a week in advance. Contact park staff for more information. FTUT01 is accessed through a villager's backyard. Consult homeowners before sampling. It is helpful to have employees that speak Samoan assist in communication efforts. FTUT02 and FTUT03 are accessed by a trail that follows on the banks of the stream. Trail is marked with blue flagging tape.

Fagatutui Stream (FTUT04-FTUT06) is accessed by traveling the road from Pago Pago towards the village of Fagasa. Park at the Mount Alava trailhead, proceed up trail 2 miles until specified GPS point. Local staff know how to access these sites. It is helpful to have local knowledge. Trail is a very steep slope down and marked with pink flagging tape though there may be other trails in the area that can cause confusion. There are many streams in the area that look quite similar. It is extremely important to have accurate GPS coordinates when accessing the stream via trail. This stream can also be accessed via boat on days with calm sea conditions. The boat can be launched from the Fagasa boat ramp and driven 3 bays over to Fagatutui Bay. Fagatutui Bay is a distinctive looking bay with two streams that pour into the Bay. The sampled stream is the one on the right coming in from the ocean. Depending on sea conditions, crew capabilities, and boat specifications it may be possible to get relatively close to shore. However, it will be necessary to swim some distance to shore with all sampling gear. A float for the equipment will be required.

Amalau stream is accessed via the road from Pago Pago towards Vatia to the village of Amalau. Visitors must ask local villagers for permission to sample in Amalau stream. Permission should be obtained the day of, as well as several days in advance so they know to expect you. Site FTUT07 is at the mouth of the stream near the village fales. The site is accessed through private land. Remember to obtain permission. FTUT08 is easily accessed by walking upstream crossing highway and following stream until specified GPS point is reached.

In all travels to sites on Tutuila where village access is required, it is vitally important to recognize that you are traversing private land. When specific dates and times are established for sampling, these need to be honored. Local villagers get extremely upset when expected intrusions do not happen as planned. Also, following local customs is required. While sampling in village areas, dress must necessarily be modest, and no work is to be conducted in village areas on Sundays. Contact park staff for any questions regarding local customs.

Travel to Tau

Flights to Tau are available on Inter Island Air based in Pago Pago Airport. It is advisable to contact local staff for assistance with booking flights to Tau. Flights can then be paid for, in person, at the local airport office at least one day prior to departure. Flights generally fly daily, however, they are extremely weather dependent and changeable at any moment. Call the Inter Island Air office the day before to determine exact flight time (varies depending on the day) and arrive at airport 2-3 hours ahead of scheduled flight time. It is not uncommon for the flight to leave early to try and beat the weather, or to leave several hours late. Be prepared to spend the entire day at the airport waiting for flights to happen. When flying with extra baggage, it is advisable (almost required) to arrive very early and secure a spot in the check in line. Luggage is taken on a first come first serve basis and no guarantees are made that excess luggage will make it on the flight. Additionally, if there is a village chief, talking chief, mayor, or local dignitary, their luggage will take priority over your luggage, regardless of order in line. Another option is to package gear ahead of time and ship it over beforehand via plane or boat (M/V Sili). Contact local staff for assistance.

Housing on Tau

Homestays can be arranged through local NPSA staff. Generally, there are two options, Mele's Place and Mauga's Place. Mele's place is set up more like a traditional hotel. Rooms are separate from the family's living quarters. They offer basic, shared cooking facilities. Food should be brought over from Tutuila, though there is a small store on Tau, it has a very limited supply of options and is not regularly restocked. Mauga's Place has 4 rooms and a kitchen/dining area that is shared by the family and guests. The family will prepare local style meals for an additional fee.

Camping is possible only in the lower portion of the Laufuti Stream or at the end of the access road at the beginning of the trail to Laufuti. Solid tents are essential as the mosquitoes in the area are vicious. Extra rope/parachute cord is necessary to tie down tents as stakes do not work well in sand. The best camping is on the sandy beach 15 minutes before you reach the stream. Camping hammocks are unsuitable due to the mosquitoes. It is also possible to camp at the end of the road to Saua to minimize carrying camping gear. Camping in the upper portion of the stream is not possible due to the steep and heavily forested terrain. All camping gear (tents, water filter, sleeping bags, cooking gear) must be brought over from Tutuila; there are no supplies available on Tau. There is no camp fuel available on Tutuila. Fuel is not allowed on airplanes; therefore, fuel must be shipped over via boat well in advance. The M/V Sili is a cargo ship that makes sporadic trips to the outer islands. Contact local staff for boat schedule and to arrange cargo transport.

Directions to Tau field sites

All fixed field sites (FTAU01-FTAU04) are accessed via the beach trail at the end of the 4WD road. The trail leads over a short sandy beach, a boulder beach, and a relatively smooth forested trail. The trail then splits to access lower Laufuti and middle/upper Laufuti. Allow 30 minutes to trail junction. The trail down to lower Laufuti (FTAU01-FTAU02) is a steep, slippery slope that ends at a rocky beach. The trail was improved, and a ladder installed in 2010 to assist hikers. Follow the coast along sandy and boulder beaches until the mouth of Laufuti stream. This takes approximately 2 hours from the split due to the rough terrain and heavy gear. To access the middle and upper sections of Laufuti (FTAU03-FTAU04), the trail follows the ridgeline up a steep climb. This trail can be extremely overgrown and may take extra time to cut through the vegetation with machetes. It is helpful to ask NPSA staff to cut the trail in advance. This saves hours of hacking through the jungle. Notify staff of intended arrival at least 2 months prior to facilitate trail clearing. The trail is flagged with blue and pink flagging tape though they may not be entirely visible if overgrown. The trail climbs through mostly fern forest. Many large boulders, exposed roots, moss covered lava rocks, and thick vegetation present hazards. Pants, long sleeve shirts, and mosquito repellent are essential.

NPSA Park Contacts

Phone: 684-633-7082

- Eric Brown, Marine Ecologist
- Bert Fuiavia, Manua District Ranger (Tau & Ofu)
- Ian Moffit, Marine Technician
- Tama Sagapolutele, I&M Biological Science Technician

Guam (WAPA)

Travel to Guam

Daily flights are available on United Airlines to A.B. Wonpat International Airport (GUM). A passport is necessary. Guam is +10 hours GMT. It is over the International Dateline; therefore, Guam is 1 day ahead and 4 hours behind Hawaii Standard Time. Rental cars are easily available in Guam from most major American companies. Park staff may be able to make a vehicle available if enough advanced notice is given (preferably 1-2 months). Most hotels are located in the Tumon and Tamuning areas of Guam, roughly a 20-30 minute drive from WAPA's main office in Hagatna. It is also possible to rent an apartment in Guam for extended stays.

Directions to field sites

All field sites are located on Asan stream in the Asan Unit of War in the Pacific National Park. From the Airport or Tumon take highway 10A to Marine Corps Drive (Guam Route 1). Turn left and go approximately 6 miles. Turn left onto Jose Leon Guerrero Street. Park on street near bridge over Asan stream. Access the lower sites by heading upstream in the river. The first fixed site is approximately 70 meters upstream from the parking location, just immediately past the overhanging vegetation on the stream. Heading upstream, there is a trail on the left stream bank (right side when facing upstream) just past the second banana plantation where there are several limestone rocks in the

bend of the stream. This trail can be used to facilitate quicker access to central river sites up to the dam. All sites can be accessed by hiking upstream in the stream.

Please note that access is constantly changing due to development in the area, fires, and erosion. Always check with local staff on current conditions. Middle and upper stream sites can be accessed by turning left onto Guam Route 6 from Marine Corps Drive toward the Asan Unit Overlook. Turn left onto Mama Sandy Road toward a residential area. Turn onto the small dirt road labeled J Street. Follow this road over the hill and then take the first dirt road to the right (it is unmarked as of January 2011). Follow this dirt road downhill until you reach the end of the passable road. Park at the end of the road. Continue to walk the overgrown access road through some formerly cleared lots and bear left toward the ridgeline. Follow the road along the ridge until it turns to the left. Don't turn left (This is an extremely important direction note). Continue hiking over the ridge in front of you (the main ridge). All middle and upper stream sites can be accessed from points along the main ridge. If luck is on your side, you will find a hash/pig trail that runs along the top of the main ridge. Follow this trail along the main ridge and use your GPS to access all sites in the middle portion of the stream. The uppermost middle site, FWAPA07, can be accessed by crossing this main ridge from the access road and continuing to head down the side ridge to the stream. You will enter the stream about 100 meters downstream of the site (this is not the current preferred route as it is presently overgrown with sword-grass, but it is an access route, and the frequent fires may change the vegetation making it an excellent access point in the future). As you access the middle trail sites, remember to keep the main valley to your right. There are several side ridges, which, if taken, will lead you into sword-grass fields and wasp lairs, which are better avoided. All sites in the middle stream can be access by heading upstream from the previous location.

There may be the possibility of accessing FWAPA03 (dam site) through private property and a private access trail. This requires permission from landowners facilitated by local staff.

Sites on the Calacq River are accessed from (FWAPA10-12) are accessed from the next bridge over from Asan River (toward Hagatna). Access is by walking though stream.

WAPA Park Contacts

Phone: 671-477-7278

- Barbara Alberti, Park Superintendent
- Tim Clark, Chief of Resources
- Maria Lynn Cruz, WAPA/PACN Biological Science Technician

Maui (HALE)

Travel to Maui

Flights are available on multiple airlines to Kahului International Airport (OGG). Rental cars are available from most major American companies at the airport.

Directions to Field Sites

All field sites are located in the Kīpahulu area of Haleakalā National Park. From OGG follow the Hāna Hwy/HI-360 (Hāna way or north route) to Kīpahulu or follow Haleakalā Hwy/HI-37 to Pi‘ilani Hwy/HI-31 (south route) to Kīpahulu. It takes approximately 2.5-3 hours each way from the airport to Kīpahulu.

FHALE01 is located near the mouth of the stream and is accessed via the Kūloa Point Trail from the Kīpahulu visitor’s center. FHALE07 is accessed by walking to the stream from the Living Farm access road. Permission is required since it is a shared road between Kīpahulu ‘OHāna and NPS. Contact local staff. Cross the stream to the right bank and follow the stream to appointed GPS point. FHALE02, FHALE08, and FHALE11 are located just off the Pīpīwai trail. FHALE02 is at the lower USGS gauging station. FHALE08 is accessed by hiking upstream in Pīpīwai Stream just after the confluence of Palikea and Pīpīwai. FHALE11 is near the base of Waimoku falls just upstream of where the trail crosses the stream. FHALE09 is accessed by hiking in the stream up Palikea just after the confluence of Palikea and Pīpīwai. Temporary sites on Palikea or Pīpīwai streams can be accessed via the Pīpīwai trail.

FHALE05, FHALE06, and all temporary sites on Alelele are accessed by following highway 31 south from Kīpahulu to the Alelele bridge. Park in the pullout near the mouth of the stream. Follow the trail on the left bank of the stream to access all sites. FHALE10 and all upper Alelele stream sites are accessed by a trail from the Kalepa bridge that hikes up the adjacent hill and down to Alelele.

Housing

Camping is available in the Kīpahulu maintenance yard by prior arrangement. There is a small communal cabin that is used for cooking. There is a propane stove, refrigerator, tables, and chairs. Bring all food, cookware, and dishes from Kahului. There is a small store in Hāna if additional supplies are necessary (40 minutes north of Kīpahulu). Bring adequate drinking water or a filter as no potable water is available in Kīpahulu. There is catchment water that can be boiled for cooking, filtered, and used to wash dishes. This cabin is shared by all employees camping in Kīpahulu. Ample tent space is available just outside the cabin. Bring all camping gear. It rains regularly in Kīpahulu. It is also possible to rent houses in Hāna, but advance reservations 2-3 months ahead of time are necessary to ensure availability. There are very few affordable options.

HALE Park Contacts

- Paul Hosten, Natural Resource Chief, 808-567-6802, ext. 1501
- Lindsay Moore, PACN/HALE Biological Science Technician
- James Herbaugh, Kīpahulu District Ranger, 808-357-2160

Moloka'i (KALA)

Travel to Kalaupapa

There are two options for travel to Kalaupapa. There are regular flights to Ho'olehua Airport (MKK) located topside Moloka'i. It is then possible to take a cab to the trailhead down to Kalaupapa and hike 3 miles down the Pali Trail to the settlement. The trail is very steep with numerous switchbacks. The hike down is about 45 minutes while the hike up is 1-1 ½ hours. This requires preplanning by shipping gear 2 weeks in advance (FedEx 2 day takes 5-7 working days to reach Kalaupapa). The other option is to fly directly to Kalaupapa airport (LUP) on Mokulele Airlines. This is significantly more expensive, but less hassle as you can carry equipment as baggage. Bookings must be done over the phone for this leg. In either case, at least 2 weeks advance notice is required to enter Kalaupapa. Contact local staff for more information. All guests must be sponsored by local staff and escorted from the airport or the trailhead. Lodging in the settlement must also be prearranged with local staff.

Travel to Field Sites

All field sites are located on Waikolu Stream. There are 3 access options. The first is to hike from Kalawao (20 minute drive from main Kalaupapa settlement) down to the boulder beach and across to Waikolu. The trail follows the coast alongside steep sea cliffs. Hardhats are required. The hike is not advised during periods of heavy rain as this can cause loose rocks to fall from cliffs. The hike is approximately 1.5 miles over a boulder beach with loose and slippery rocks. The hike takes 1-1 ½ hours depending on pack weight and weather conditions. Equipment/gear can be transported via helicopter to field sites. The 2nd option is boat from the settlement around the point to Waikolu. This requires extensive planning with local staff and calm sea conditions. The drive is approximately 45 minutes. Launching and loading the boat takes approximately 1 hour. The boat can be anchored in the bay for near shore gear unloading. Gear unloading takes approximately 1 hour. Camping is possible at the mouth of the stream with proper permission. The 3rd option is to drive through the water diversion tunnel from topside. This allows easier access to sites above the pumphouse. Prior permission must be obtained through the Moloka'i Irrigation System part of the Department of Agriculture. A 4WD vehicle that meets the tunnels specifications must be obtained. Jeep Wranglers that meet these specifications are available for rent through Island Kine Rental Car (808-553-5242) located in Kaunakakai. Arrangements with workers must be made for directions to the tunnel and to borrow keys to access the tunnel. Contact Oscar Ignacio at 808-336-0587 for tunnel access. The drive takes approximately 2 ½ hours from Kaunakakai.

Once in Waikolu Valley, all sites below the tunnel can be accessed by hiking up the stream or from the trail. The trail goes from the mouth of the river to the pumphouse and continues as a road to the tunnel. All sights above the tunnel must be accessed by taking the catwalk that goes from the tunnel to the diversion dam, and then hiking up stream. Sites near the tunnel and waterfalls can be accessed by taking the catwalk that crosses the valley to the collection pool at the base of the waterfalls, and then scrambling down to the stream below. The main trail along Waikolu stream starts on the left Bank of the left most branch of the stream (the extreme right of the valley facing upstream). Hike to the rocks that form the valley wall and begin walking upstream. This trail is unmarked in this location so some faith must be taken the trail is there. You will be touching the cliff as you hike the initial several meters of the trail. The trail then becomes somewhat more distinct and travels along

both sides of the stream crossing in several places. GPS is useful in locating sites, but not always accurate or dependable as the signal gets degraded the further upstream you travel. Navigation by topographic maps is advisable, and at times required to locate the sites.

Housing in Kalaupapa

Housing in settlement is available by prearrangement with local staff. Camping is possible in Waikolu Valley with prior permission from the patient's council. Camping is also possible near the pumphouse about halfway up the stream. All camping gear including water filter, stoves, tents, sleeping bags must be brought in. All travel to this stream must be arranged in advance (preferable 1-2 months) to allow time for all proper permissions to be obtained.

KALA Park Contacts

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