



Dear Team Member,

Attached is your copy of the "Participant's Handbook" for the Kosrae Reef Survey and Monitoring Project. We hope that you will find it useful and that you will bring it with you when you come.

We have made a few suggestions in your handbook concerning some items that you may want to bring with you. Please be aware that the island has very limited sources for any items which you might forget. Please double check your list before you leave.

For those of you who have not already done so, we would appreciate it if you would prepare a brief dive biography and description of your primary interests and skills in regard to the project. These will be put together in a common format and will become part of the project record. This information may also be supplied to Kosrae State Marine Resources for their reference. You may wish to consider the following: last certification level (with agency), any special certifications or training like CPR, O2, fish identification classes, etc., general areas dived (CA, Caribbean, Mexico, etc.), special interests (photographer, videographer, gourmet), other projects in which you have participated, if any, your equipment (in particular - cameras, lights and video, etc.) anything else you might think would be of interest. Just a few notes will be sufficient, please supply this information directly to your team leader.

Also, please be reminded that each team member participating in diving must provide proof of both certification and diver insurance and must provide a signed liability release to the team leader. You should also ensure that you possess a valid Passport from your country of origin. Visas are not required of U.S. citizens to visit the F.S.M. Visas and travel documents may be required of non-U.S. citizens. If you are traveling by way of Guam, you will be subject to U.S. Immigration and T.S.A. requirements.

Thank you in advance for your participation in this worthwhile project. We look forward to working with you and to a rewarding and productive trip to Kosrae.

Sincerely yours,

Dr. Stephen E. Smith  
U. S. Project Coordinator

Katrina Adams  
F.S.M. Project Coordinator

**The Coral Reef Survey and Monitoring Project  
Kosrae, Federated States of Micronesia**

**Participant Handbook 2013**



U. S. PROJECT COORDINATION

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ON-ISLAND DIVING SUPPORT AND ACCOMMODATIONS

**Kosrae Village Resort**

**Kosrae, Federated States of Micronesia**

[www.kosraevillage.com](http://www.kosraevillage.com)

IN COOPERATION WITH

**The Department of Fisheries and Marine Resources**

**Kosrae Island Resource Management Authority**

**Kosrae State Government**

**Tofol, Kosrae State FSM**

(v.121912)

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## GREETINGS

Welcome to the Kosrae Coral Reef Survey and Monitoring Project. First, let us express our appreciation for your decision to take part in this valuable endeavor. The participation of dedicated individuals such as you plays a pivotal role in the protection and preservation of this unique natural resource.

This handbook has been prepared as an overview of information for project volunteers. It is intended to both help you prepare for and enhance your participation in the project. The handbook will contribute to your understanding of project goals and will help you understand your responsibilities. Further, the information in this document will assist us to coordinate efforts, avoid difficulties and, of course, maximize results. Please take some time to familiarize yourself with its content and have it available for your use during your visit to Kosrae. Important topics discussed in the following pages include:

- An Introduction to Kosrae
  - History, Customs, Behavior
- Project Accommodations
  - Information on Kosrae Village Resort
  - Food and Infrastructure Considerations
  - Optional Activities
  - Medical Information
- Project Overview
  - General Reef Project History and Methodology
  - Typical Schedule and Expected Participation
- Dive Safety
  - General Considerations
  - Local Conditions
  - Some Suggested Supplies
- Post-Project Responsibilities of the Participants, Implied Releases
- Appendices
  - Project Contact List
  - Consular Information Sheet
  - References and Suggested Reading
  - Link to Participant Liability Releases

If you have questions that are not answered by this handbook, please feel free to contact a project representative. A list of contacts is included in the Appendices. In particular, for questions dealing with team issues and transportation, contact your team leader or project coordinator. For questions on accommodations and diving facilities while on Kosrae contact Kosrae Village Resort (KVR).

### **A Note on Releases and Agreements**

Please note that each participant will be required to sign three standard general releases of liability and one general affirmation. These documents acknowledge your awareness of the risks of diving and release all participants and organizers from liability. The documents also affirm that you have read the information in this manual and have agreed to abide by and have met the requirements for participation. If you have any questions regarding either the releases or the requirements to participate, please contact your project coordinator immediately. Without these releases, you may not participate in the diving activities of the project. Please keep a copy of each release for yourself and return a copy to the project coordinator. You will find a link to the required forms included in the Appendix to this document.

## An Introduction to Kosrae

Kosrae (pronounced variously as Ku-shy or Ko-shry) is the easternmost and second largest of the islands of Micronesia which includes the more common recreational dive destinations of Truk, Palau, and Yap. Kosrae is volcanic in origin, centered by Mt. Finkol (2064 ft), and is covered with a lush rain forest. Being the geologically youngest of the major islands, it exhibits the characteristic fringing reef system as opposed to barrier or atoll. Kosrae has numerous rivers and waterfalls and the island's mangrove forests are some of the most impressive in the Pacific. There are three primary harbors: Lelu (pronounced Lay'La), Utwe (U as in 'Hoot' Way), and Okat (Ohh'Cat) (next to the airport).



The temperature on Kosrae averages 80 F. year round. Kosrae is at the extreme southern part of the typhoon track, so although major storms are uncommon, the rainfall average of 200 plus inches per year should give you an idea of how often it rains.

Kosrae's reef system is relatively pristine and populated by a tremendous variety of fish and invertebrates. At least 400 types of fish have been identified. Mantas, rays, eels, grouper, and barracuda inhabit the reef. White Tip and Black Tip reef sharks can also be found at the margins of the reef. The island has a large population of Green turtles which visit periodically and schools of bottle-nosed and spinner dolphin which cruise the outside of the reef. Kosrae is roughly triangular in shape, with good dive sites on all sides. As a result, diving is not typically prevented by wind or current. Visibility averages 100+ft. Past project teams have measured visibility approaching 200 ft. The fringing reef completely surrounds the island.

Kosrae's history includes whaling, piracy, and warfare, and the remnants of these activities can be found both on the island and underwater. The Lelu harbor contains the remains of two Japanese ships and at least two military planes. Utwe harbor contains remains of the pirate ship Leonora sunk in 1874. Other shipwrecks may lie in coastal waters. Japanese military hardware left from WW2 can still be found on some of the island's beaches.

The Lelu Ruins, located on Lelu Island, rank as one of the most significant historic sites in the Pacific. Lelu was the capital of a complex feudal society and ruins of many of the dwelling and burial compounds remain and are in the process of being preserved. For those who wish to explore, there are numerous hiking trails, caves, waterfalls with bathing pools, and mangrove channels that can be reached by canoe. Excursions off the beaten track may be dangerous and should always be made with a guide.

## **Customs and Behavior**

Religion plays an important role in the lives of Kosraeans. This gives rise to a number of social mores, which can affect the visitor. During your stay on Kosrae please be sensitive to the expectations and customs of Kosrae. One of our primary goals is to foster a mutually rewarding relationship that will facilitate the continuation of this project into the future. Please help us preserve and build that friendship.

Sunday is taken very seriously on Kosrae. It is illegal to fish or gather shellfish on Sunday. It is illegal to purchase or consume alcohol on Sunday or Christmas Day. In general Sunday is acknowledged as a day of rest; no project work or diving activities can be performed at this time. Snorkeling and swimming in front of the resort are acceptable but should not be engaged in elsewhere. Should you wish to attend the local church activities, please let us know.

It is considered immodest to reveal your upper leg on Kosrae (and in most of the Pacific). This applies to both men and women. (This is not a concern on the resort grounds except in the restaurant.) In general, men should wear shirts and women should dress modestly. We suggest that women participants bring sarongs or wraps, for those times when they are appropriate. Men should have longer legged shorts. Dress expectations apply when preparing for dives. Generally, we refrain from changing clothes at the dock or when we are still in obvious view of the shore.

Most of the land on Kosrae is privately owned. If you are 'wandering' and sight seeing, always ask permission to enter or traverse land.

## **Project Accommodations**

Project participants will be staying at the Kosrae Village Resort (KVR). Please visit the KVR website for information describing the general accommodations. KVR is located on the eastern side of Kosrae on a five-acre site located in groves of coconut, banana, citrus and pandanus trees. The traditional thatched bungalows are open air and reflect the style of original native construction. Each bungalow has a private bath, hot water and two queen beds. Project costs assume, and participants should plan on, double occupancy – i.e. a shared bungalow. KVR will attempt to accommodate team member needs to the greatest extent possible. Laundry service is available. Additional information can be found at the KVR web site, <http://kosraevillage.com>

Although they were urged to vacation in Florida, the mosquitoes on the island decided to stay. Therefore, expect some in residence. Each bed is equipped with a mosquito net and each room comes supplied with mosquito coils and repellent. If this is of special concern and you have a preference as to the type of repellent you use, you may wish to bring your own.

Keep in mind that we are visiting a rain forest. If you have equipment that absolutely must remain dry, please take appropriate precautions. There is a chance that items could

get wet (even inside), splashed on, etc. Use dry boxes and/or Ziploc bags to protect possessions. On-island shopping is extremely limited, please plan ahead. A rain poncho is recommended as well and comes in handy on the boat during squalls. If you have questions, don't hesitate to ask us.

KVR is a PADI (Professional Association of Diving Instructors) Resort facility, with a PADI 5 Star dive center on premise and, as such, follows PADI guidelines for diving, equipment, breathing air, etc. The owners are PADI, NIADD and SSI Instructors. Except by special request, all project dives will be performed using Nitrox. Please contact us for additional information if you are not Nitrox certified.



## **Food**

Meals at the Kosrae Village Resort are not included in your project cost. The Inum Restaurant is open from 8 am to 9 pm seven days a week. Guests may charge meals and beverages to their rooms. A sample menu for the Inum Restaurant is available on the KVR website. The in-room refrigerator typically contains complimentary drinking water, coconuts, and fruit. The room usually also comes equipped with a coffee maker and supply of tea and coffee. Alternative food is available throughout the island at your option. If you have special dietary needs, please inform KVR or your team leader as soon as possible so that you can be accommodated.

Please note that alcohol is not served on Sundays.

Tipping is not expected but is welcome. At Kosrae Village Resort, tips are shared equally by all members of the resort and restaurant staff.

Fruit trees are found throughout the island. However, since most land is privately owned, it would be wise to ask before helping yourself. Use common sense when consuming foods outside of the restaurant. The drinking water at KVR is filtered, but you may want to drink bottled water while on the island if you are sensitive to foreign water sources.



## Infrastructure

- Electricity: Same plug configuration and voltage as U. S.
- Communications: Kosrae uses U.S. postage rates but FSM stamps are required. Standard phone service is available. Rates are expensive. Use country code 1 for calls to the U. S.
- Kosrae Village Resort from U.S.:  
011-691-370-3483 (voice)  
011-691-370-5839 (fax)
- Email: Wifi is available at Kosrae Village Resort. Internet access requires the purchase of a Kosrae Telecom card. Cards are available in denominations of \$5.00 up. As of 2012, usage charge is 8 cents per megabyte transferred. Email: [info@kosraevillage.com](mailto:info@kosraevillage.com)  
Web Site: <http://kosraevillage.com>
- Currency: The FSM uses U.S. currency. ATMs are available at banks. Credit cards can be used at the resort. Cash is acceptable everywhere. You should bring sufficient cash to cover tour tips, purchases of souvenirs, etc. Traveler's checks are can be used but may not be readily accepted outside the resort.

## Optional Activities

Outside tours are available with prices ranging from \$5 to \$75. Since the tour operators usually have other jobs, arrangements must be made in advance. Many of these activities are weather-dependent. Possible adventures include kayak paddling in the mangrove channels, climbing Mt. Oma or Mt. Finkol, exploring the Japanese caves, a jungle hike to the Menke ruins, a visit to the Lelu ruins, and guided car tours.

## General Medical Information

There is a staffed hospital on Kosrae, but its resources are limited. If you have need of any special medications, you should bring them with you. Some over the counter supplies you may wish to consider include sunscreen (essential), insect repellent (highly recommended) especially for hikes, anti-fungal medications if you are susceptible. Make sure your immunizations are current e.g. tetanus. There is no malaria reported. Please refer to the list of suggested items to bring with you for additional ideas.

## A Brief Project History

During the early 1990's Bruce Brandt and Katrina Adams began examining the possibility of founding a diving resort which closely integrated respect for indigenous natural resources, history and culture of the Pacific Islands. Their research led them to the island of Kosrae, the easternmost and least visited of the major islands of the Federated States of Micronesia. When exploring the waters surrounding Kosrae, Bruce and Katrina were amazed to discover that an easily accessible pristine reef system still existed.

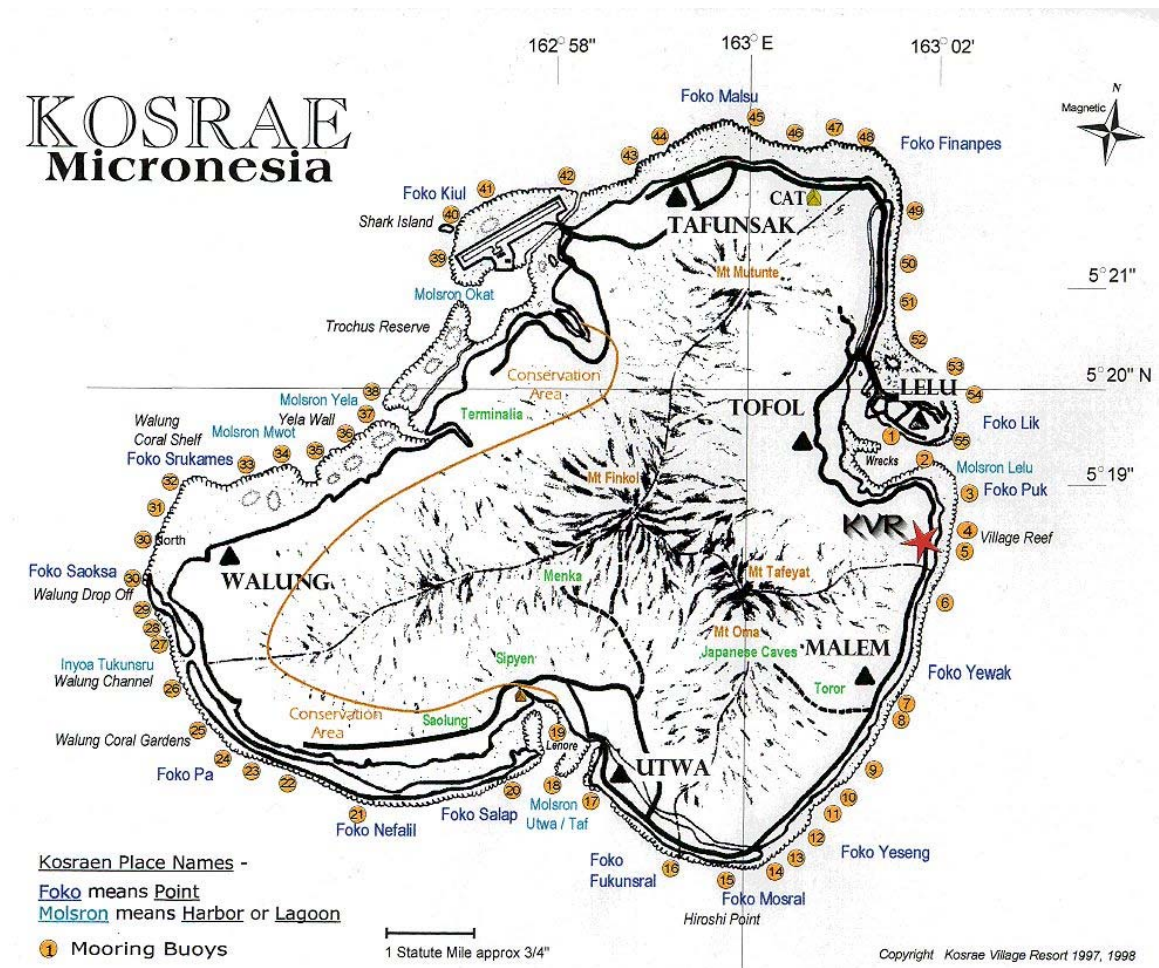
Upon committing to the creation Kosrae Village Resort, Katrina and Bruce recognized that one of their major goals would be the continued preservation of this critical coral resource. To that end, they began developing various monitoring and management plans. A variety of approaches have been pursued, from diver and community education to control and recycling of the resort wastes.



Critical to establishing any long-term reef management plan is the development of baseline data documenting its starting condition. The Kosrae State Department of Marine Resources did an excellent job of monitoring and documenting selected sections of the reef in the early 1990's and, as a result, was able to identify and halt a sudden outbreak of crown of thorns starfish, which occurred in 1994 and 1995. However, personnel limitations and budgetary cuts have constrained their ability to carry on larger scale projects.

In 1995, informal discussions began concerning the possibility of establishing a mooring buoy system surrounding Kosrae. Such systems have since become an accepted method of reducing the impact of reef area anchorage by fisherman and recreational boats and have been successfully implemented in a number of heavily visited diving sites around the world. These discussions initiated the first phase of the Reef Protection and Coral Monitoring Project in 1996. In that year a group of volunteer divers from California, lead by Dr. Stephen E. Smith, helped select mooring buoy sites and performed fish counts and coral surveys using a preliminary survey methodology. Visibility was measured and photographic and video records were compiled.

During 1997, Phase 2 of the project was completed with the installation of 56 mooring buoys; 53 on the reef and 3 marking historic wrecks in the harbors. The installation of these buoys was a community project designed to aid the fishermen, diving community and others using the ocean, as well as protecting the reef from anchor damage.



Presently, the project is in its third phase - ongoing data collection and long term monitoring. It is at this point that a larger group of interested volunteers becomes critical to successfully building on the groundwork which has already taken place.

## **Project Methodology Development – An Overview**

Over the course of the reef monitoring project the data collection methodology has been continuously modified and refined. As more experience has been gained in methods applied to reef monitoring in general, the Kosrae Project has adopted revised procedures to maximize both the value of the data collected and the efficiency with which it is compiled. Early project protocols depended primarily on the use of underwater slates to record the observations of the monitors (volunteers) and employed quadrats (squares of known size) or transects (lines of known length) to provide baseline areas over which the incidence and frequency of indicators or targets (fish, coral, invertebrates, etc) could be assessed. After gaining experience with both areal methods, the Kosrae project adopted the latter approach and installed permanent linear transects at selected buoy sites around the island. These locations have been used for many years for data collection and have provided substantial information about the on-going condition of the reef system.

Along with the selection of a method to define the area to be sampled (in this case the transect), a monitoring project must define the targets of the sampling. Obviously, the success of a monitoring protocol depends to a great extent on the ability of the monitor to identify the targets of interest. This, in turn, depends both on the complexity of the target universe and the extent of the training afforded to the monitor tasked with the data collection. Traditionally, marine monitoring projects have depended upon trained observers, most typically having a marine sciences educational background, to perform the data collection. However, the availability of such resources is generally limited and this imposes a constraint on the ability of monitoring programs to expand beyond those supportable by the academic or professional community.

In the early 1990's numerous organizations, including OceanEarth, recognized that in order to sustain long-term biological monitoring efforts, it would be necessary to access the substantial resource of motivated individuals willing to invest their time in environmentally related projects. At the same time, it was apparent that the traditional sampling methodologies could be difficult to apply by a group of lay volunteer researchers. A variety of organizations proceeded to develop approaches to address this issue. Some of these involved morphological approaches which ultimately proved insufficient to resolve differences in benthos populations in sufficient detail. One organization, Reef Check (California) designed a protocol which employed volunteers to assess the state of the cold water reef system of California. At the same time, the data collected by the Reef Check volunteer groups was used to begin building a database of sites throughout California, and later was extended to include warm water locations for which the original protocols were modified. For a variety of reasons Reef Check became one of the primary drivers of the movement to involve local lay volunteers in the collection of marine data – a process which was becoming known at the time as “citizen science”. OceanEarth employed the Reef Check methodology for a number of years and, during that time, supplied the resultant data to Reef Check for inclusion in its international database. In an attempt to broaden its scope, Reef Check also developed monitoring protocols which attempted to address the needs of warmer water climates, e.g. Hawaii and the Indo-Pacific.

In 2009, Dr. Peter Houk of the Pacific Marine Resources Institute performed a study comparing and assessing the results accumulated to that time of a variety of reef and fish monitoring studies on-going in the Marshall Islands and the F.S.M. One of the conclusions reached in that study was that “the majority of benthic datasets, that serve to estimate the abundance of coral, algae, and other sessile invertebrates, were collected at lower taxonomic resolution than required by the pressing management questions being asked”. At the same time, the report re-iterated the commonly held ideas for a good data collection effort, i.e.

“...there is a strong need to ensure that scientific monitoring is addressing pertinent management questions; specifically that the survey design match the questions

Monitoring needs to be quantifiable and repeatable for future investigation to compare change over time

There is a need to develop criteria for acceptable levels of statistical power (the probability of accurately detecting change should it occur) based upon human and financial resources available to conduct monitoring.”

With regard to the Kosrae Monitoring Project in particular, Dr. Houk concluded:

“Regardless of the cause, the long-term dataset here is notable for its ability to detect changes in coral cover at individual sites with relatively high statistical power. However, the benthos classification scheme does not provide sufficient characterization of the coral and algae assemblages to examine yearly difference further and approach an understanding of the causes of change over time, a desired result for monitoring to eventually be able to accomplish.”

As a result of this study and other considerations, in particular, the difficulty of making Reef Check’s overall methodology and data requirements consistent with the informational needs of local and government organizations, in 2010 a new methodology was adopted to address these concerns, while preserving and enhancing the value of the volunteer monitor in the development of the survey data.

## **Current Methodology and Procedures**

The Coral Monitoring Project continues to use the “environmental” mooring buoys (4, 8, 13, 16, 18, 21, 27, 29, 31, 34, 39, 42, 43, 47, 50, 53) as monitoring site markers. Because of the limited time available during a standard two week monitoring session, not all buoy sites can be examined in any one year. Site selection can be further constrained by the weather and sea conditions experienced during a particular monitoring session. In general, the site selection process for any particular session incorporates a site rotation, such that the same site is generally not monitored in the immediately following year. However, the rotation may be overridden by unusual events occurring in the intervening time since the previous session and/or by special request of on-island partners.

For each site selected for monitoring, four general areas of study are conducted. These are 1) environmental observations, including underwater visibility 2) a fish population inventory, 2) a point photo-quadrat survey, 3) an invertebrate inventory, 4) disease and damage survey. In practice, study areas 3 and 4 are combined. This protocol approach embodies many of the recommendations of the 2009 Houk study.

The execution of a monitoring session may be most easily exemplified by a representative description of the typical monitoring session. It should be realized that the actual procedure may require modification due to weather, personnel available and their capabilities, and/or the availability of sufficient bottom time to complete certain aspects of the procedures.

Ideally, each boat supports a single survey team comprised of at least three two-person dive teams. The teams would have the following assignments: Team 1: Environmental Observations and Coral Damage and Invertebrate Photo Survey; Team 2: Fish Inventory; Team 3: Photo Quadrat Survey.

### **Environmental Observations**

Team 1 begins the environmental observations by recording the following information:

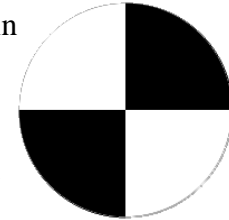
Cloud Cover - Cloud cover is recorded in terms of ‘oktas’. The sky is divided into 8 quadrants, like a pie, with the center of the sky oriented overhead. The total percentage of the sky obscured by clouds is estimated by counting the number of individual slices obscured. Values range from 0 oktas (a completely clear sky) through to 8 oktas (a completely overcast sky). If the sky itself was obscured, i.e hidden from view by fog, the value recorded would be 9 oktas (diving would be suspended in this unlikely case). Although measuring mirrors are available to facilitate this estimate, our procedure is simply to have the members of the team and any other available personnel on-board make individual estimates, with the recorded value being the group average. It should be recognized that the okta measurement is only a general indication of solar irradiance, since the albedo or cloud layer transmissivity is not reflected in the okta approach.

Surface Air Temperature – Surface air temperature is measured using an Onset “Hobo” probe which is stored in a light-tight container prior to use. The probe is removed from the container and exposed to ambient air for 5-10 minutes. The probe records light intensity and the light signal marks the start of the temperature measurement. The probe is returned to its container between each measurement.

Surface Water Temperature – Surface water temperature is measured by submerging the Onset “Hobo” probe under 12 inches of the oceans surface. The probe is allowed to remain in the water until the temperature reading has stabilized (5–10 min.).

Surface Water Sample – A surface water sample is taken using a container marked for the purpose. This sample will be returned to shore for later evaluation of salinity and pH.

Underwater Visibility – Underwater visibility is measured using a Secchi disk. This is a disk which is divided into four quadrants colored alternating black and white (see figure at right). The disk which we use is 12 inches in diameter. The Secchi disk is most commonly used to measure vertical light penetration by lowering the disk in the water until the disk’s pattern is no longer observable. This enables computation of the extinction coefficient, a representation of the rate at which illumination decreases with depth or distance.



Measuring vertical visibility is generally difficult due to the effect of currents on the suspended disk. The Kosrae monitoring protocol employs the Secchi disk to estimate horizontal visibility as a measure of the general clarity of the water.

To measure the horizontal visibility, one member of the dive team grasps the handle of the Secchi disk (located on the back of the disk) and uses the other hand to grasp the buoy downline at a depth somewhat above the reef surface, maintaining a fixed position in the water. The second member of the team reels out the measuring tape while swimming with the current. Swimming with the current allows the diver to maintain some tension on the measuring line and minimizes the amount of ‘bough’ in the line, which will introduce error into the distance measurement. The diver continues reeling out the measuring tape until the disk disappears from view. (The diver holding the disk should orient the marked surface of the disk toward the observer). The observer then slowly reels the tape back in until the disk becomes just observable. At the limits of visibility, the disk will generally fade in and out of view. The diver should record the measured visibility on a slate.

When the visibility measurement is complete, the diver reels up the tape, taking care to prevent the tape from twisting as it re-enters the reel. During take-up, the diver will be swimming into the current, which tends to keep the tape taut and helps prevent tangling.

Two additional considerations should be kept in mind. If the direction of the current will take the diver performing the measurement into blue water (water in which no bottom is visible), then an alternate direction should be selected. Also, if the direction of the deployment will place the diver near the team performing the fish count, the measurement team should wait until the fish counters clear that area. When the tape has been reeled up, it is either placed in a pre-positioned bag which is attached to the buoy

downline or it is returned to the boat. When ready, the same dive team proceeds to the starting point of the linear transect to begin the invertebrate and coral damage survey.

Underwater Temperature and Water Sample – Prior to beginning the visibility measurement, one diver should deploy the Onset Hobo probe near the reef surface and secure a second water sample for later assessment. The probe should be collected after the visibility measurement has been completed and the line retrieved.

### **Fish Count**

While the first team is performing the environmental survey, the dive team responsible for the fish count proceeds to install the transect line. The starting point of the first transect is a predetermined location near the buoy pin. The line is laid in a direction that maintains a depth profile of approximately 30 feet.

Reefs are both topographically and bathymetrically complex, so deploying the transect in a straight line direction will seldom result in the line describing a constant depth contour (isobath). Because the composition of the coral community can be strongly influenced by depth (primarily due to its relationship to light levels), changes in transect depth introduce variability in the data that is difficult to control for statistically. As a result, the need to maintain a constant depth tends to result in the transect following a somewhat random path even as it proceeds in a desired general direction of deployment. Though the attempt to maintain a constant depth may result in a convoluted path, which is acceptable, the diver should avoid having the line cross over itself. This minimizes the potential for re-sampling of the same area.

As the line is being laid out, the fish counter is recording the fish present along the transect path by taking photos of all fish observed within an imaginary, vertically oriented ‘virtual cylinder’ having a 5 meter diameter and a 5 meter height. The axis of the cylinder is perpendicular to the transect line with the fish counter at its center. Starting at the 20m position of the first transect, the fish observer spends 3 minutes taking photos in all directions to encompass the volume of the cylinder and all fish it contains. The observer then moves forward 20 meters and pauses for 3 minutes before taking the next photo. The 3 minute stop time allows the return of fish that may have been disturbed by the approach of the dive team. The total volume assessed is approximately 1,200 cu. meters. The photos are later reviewed and the fish recorded are identified. The primary targets for the count are fish used for food, whether for subsistence or commercial sale. They include:

Grouper/coral trout over 30 cm (any species)	Serranidae
Barramundi cod	<i>Cromileptes altivelis</i>
Grunts/Sweetlips/Margates	Haemulidae (e.g. <i>Plectorhincus spp.</i> )
Snapper	Lutjanidae
Butterfly fish (any species)	Chaetodontidae
Humphead (Napolean) wrasse	<i>Cheilinus undulatus</i>
Parrotfish over 20 cm.	Scarridae
Bumphead parrotfish	<i>Bolbometopon muricatum</i>
Moray eel (any species)	Muraenidae



## **Invertebrate Inventory and Coral Disease and Damage Assessment**

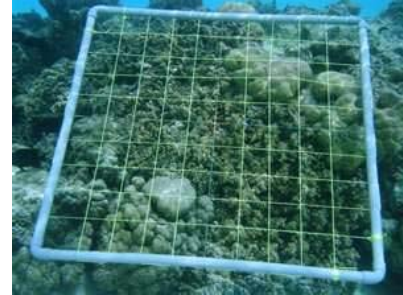
The invertebrate and disease / coral damage inventory is normally performed by the same team of divers that completes the environmental assessment. The objective of the invertebrate inventory is to record the occurrence of all target invertebrates observed within 2.5 meters on either side of the transect centerline. Each member of the dive team selects one side of the transect on which to perform the inventory. In the past, divers were asked to record the observation of the inverts on a slate which provided a column for each of the target categories and the transect on which it was observed. For divers who were unfamiliar with the target species, this introduced some uncertainty into the data collected.

In order to minimize this uncertainty, the current protocol calls for the diver to photographically record every observation made. The diver begins by taking a photo at the start of the transect by capturing either a tag which indicates the transect number, or holding the appropriate number of fingers in front of the camera to identify the transect. The diver then proceeds along the transect recording all observations of invertebrates, disease, or damage within the 2.5 meter belt. Simultaneously, the second diver performs the same task on the opposite side of the line. At the end of a transect, each diver photographs the final line marking and takes a photo of the beginning of the next transect. The total area surveyed is 1,250 square meters. The photographs are reviewed at the end of the day and invertebrates, damage, and suspected disease identified and recorded in the database. Some of the invertebrates that are of interest include:

Giant clams	<i>Tridacna spp.</i>
Lobster (all edible species)	Malacostraca (Decapod)
Banded coral shrimp	<i>Stenopus hispidus</i>
Pencil urchin	<i>Heterocentrotus mammilatus</i>
Long-spined black sea urchin	<i>Diadema spp.</i>
Edible Sea Cucumber - Prickly redfish	<i>Thelenota ananas</i>
Edible Sea Cucumber - Greenfish	<i>Stichopus chloronotus</i>
Seastars (Various)	<i>Linckia, etc.</i>
Pincushion Stars	<i>Culcita schmideliana</i>
Crown of thorns starfish	<i>Acanthaster planci</i>
Triton	<i>Charonia tritonis</i>

## **Photo Based Point-Quadrat Inventory**

A quadrat is a square of known dimension which defines a sampling area. Most commonly, the quadrat is further divided into smaller squares using sets of intersecting parallel lines. A sample is taken by either noting the presence of the target of interest at the intersecting points of the smaller squares (point quadrat method) or by estimating the percentage coverage in each of a subset of squares (grid quadrat method). See figure at right. Quadrats are commonly used to assess the frequency or density of a species within an ecological community. When taking a sample using a quadrat it is important that the points selected to determine the presence of the target be random. Since the sampling points within the quadrat are fixed (i.e. the intersections of the fixed lines) randomness is usually achieved by placing the whole quadrat in a non-biased way, for example, by throwing the quadrat at random into the sampling space of interest. The frequency of a target is calculated as the number of times it occurs at the defined points out of the total points. The density of a target is the mean number of occurrences per unit of area. For example, if a certain species of coral was identified at 8 out of the 81 intersecting points in the quadrat shown in the figure, its frequency for that quadrat would be approximately 10%.



For the coral inventory, the Kosrae project employs a quadrat measuring 0.5 meters per side that is affixed to a stand that incorporates a camera. The camera is mounted in the stand such that the frame of its photo encompasses the outer frame of the quadrat. In use, the quadrat is placed next to the transect centerline such that the lower side (the bottom of the photo) aligns with a meter mark on the transect line. See figure at right. A photo is then taken, after which the quadrat is moved forward along the line until the bottom of the quadrat aligns with the next meter mark. This process continues until a photo has been taken for each of the 50 meters of the line. As a result, 250 photos will be recorded over the length of the 5 transects. This process defines what is referred to as an interrupted-belt transect and in total provides a sampling space of 62.5 square meters (0.25 sq. meters per photo x 250 photos).



On return to shore, the transect photos are downloaded and processed by software which randomly assigns 5 points to each photo. The analyst then visually makes a determination of the type of substrate which occurs under each assigned point. This data is recorded in a database for later further analysis.

## **A Note on Dive Safety**

Although divers may find themselves acting somewhat independently during the inventory process, they must always be cognizant of the location and status of their dive buddy and be prepared to render any assistance required during the survey. Divers must always be aware of their bottom time and air supply and terminate the dive with sufficient air to return to the buoy downline and perform a 3 to 5 minute safety stop. The standard expected ending tank pressure is 500 psi or greater. Since the end of the transect may be a considerable distance from the buoy downline and the diver may find it necessary to swim against a current during the return, it is very important to have adequate air reserves at the end of the survey. **Diver safety takes precedence over all other considerations, and the decision to terminate the dive is always the sole responsibility of the individual diver. Divers who have insufficient air reserves to complete a survey should terminate the dive and return to the downline with adequate reserves to perform their safety stop .**

At the end of the day, team members should remember to clear the camera's memory once the photos have been downloaded in order to create sufficient space for the next monitoring session.

## **Typical Project Schedule**

Upon arrival on Kosrae, divers will be given the option of a weight check and orientation dive with Sleeping Lady Divers (KVR). The first evening or following morning will be used to provide a project orientation, training overview, and discussion of diving assignments.

Following the initial project briefing, divers will gather for a practice dive. This dive will give participants a chance to gain familiarity with the survey procedures and techniques.

Daily working dives will include area surveys at one or two buoys (estimated 60 - 90 minutes each). When survey work has been completed, divers may use the balance of their permitted dive time to explore and observe the surrounding area. Interesting or unusual observations made during this time should be recorded for discussion following the end of the dive.

The team's project goal is to complete up to 8 sites per week. In cases of bad weather or unsafe diving conditions it may be necessary to postpone survey dives. During such times, alternative activities will be scheduled, possibly including trips into the island interior to familiarize team members with the local rain forest environment. Make-up dives may be scheduled in an attempt to achieve the team goal, subject to standard dive-safety protocols. Evenings will be used for dinner, a debriefing of the days work, and review the photos and any available un-edited video.

Please note that due to societal customs there will be no diving performed on Sundays, and no diving will occur within 24 hours of the time of departure. The day of departure may include an optional tour of the Lelu archeological site and a visit to local craftsmen, time permitting.

### **Expected Participation**

Volunteers for the Kosrae Reef Monitoring Project are participating in a research project. It is expected that all divers will assist in the collection of data. All contributions are important. However, divers are expected to participate and contribute only within the limits of their abilities and individual sense of safety. Of equal importance is to have a good time and a rewarding experience. Each individual has internal goals. All best efforts will be made to integrate these goals to achieve an overall successful result.

## DIVING AND DIVE SAFETY

### General

Above all else, our primary consideration is for the safety and well being of all the divers and participants in this project. No participant will be asked nor expected to perform any task, nor participate in any project undertaking for which they do not feel they are properly prepared. Any individual may decline to participate in any aspect of the project without need of stated reason. Your participation is of your own volition and as such is a statement of your personal preparedness and readiness.

You are expected to provide your own personal equipment for diving, with the exception of tanks and weight belts. Your equipment must be in a serviceable and safe condition and appropriate for the type of diving anticipated to be encountered. This would include diving in warm water (80 + degrees) within the accepted recreational depth limits of less than 130 feet. You are encouraged to have your equipment inspected and/or serviced by a certified technician prior to your arrival; there are limited resources on the island for equipment repair. You are also encouraged to bring a personal 'save-a-dive' kit containing backup equipment that may be needed during your stay. This kit would include, but not be limited to, items such as spare mask straps, fin straps, snorkel keepers, etc. Divers using computers should bring a spare battery. Please refer to any standard dive text or contact the project coordinator for additional ideas concerning save-a-dive kits.



All diver profiles will be expected to conform to currently accepted standards for no-decompression diving. If you will be using a computer during your dives, it will be your responsibility to follow the appropriate procedures for its use. A diver relying on standard Tables (such as the Recreational Dive Planner or modified Navy Tables) should use the procedures appropriate to those tables and for which the diver has been trained. In all cases, buddy team profiles will be governed by the most conservative profile and table in the team.

Decompression diving is not sanctioned during this project. There are limited medical resources available for any diver who places himself at risk of decompression related illness. There is a staffed hospital on the island and there will be oxygen available on the dive boats. However, evacuation could be necessary for any required treatment, including recompression therapy. This emphasizes the need for all divers to perform conservative profiles, to carefully track and record dive profile information properly and to utilize appropriate safety stops and surface intervals. **You are responsible for monitoring your own dive profiles.** All of these considerations are basic to normal accepted practices in recreational diving.

Because of the substantial expense involved in the unlikely situation requiring an air evacuation, **all participants are required to obtain diver insurance.** Divers Alert Network, PADI, SOS and others provide such insurance at reasonable cost. Otherwise, you must have sufficient personal resources available to cover such an eventuality. In many cases, personal medical insurance will not cover such costs.

### **Telephone Numbers for Obtaining Diver Insurance**

<b>Divers Alert Network (DAN Insurance)</b>	<b>(800) 446-2671</b>
<b>Vincencia &amp; Buckley (PADI Insurance)</b>	<b>(800) 223-9998</b>
<b>PADI Information</b>	<b>(800) 729-7234</b>

### **Local Considerations**

The diving around Kosrae is typical of indo-pacific diving. Kosrae is surrounded by a fringing reef with the characteristic reef inhabitants. Divers should be familiar with the fish and coral, which deserve respect. Reef sharks may be sighted but are typically uninterested in divers. Reportedly, there have been no negative encounters with reef sharks on Kosrae for three generations, even for spear fisherman with catch. This may be due to the tremendous abundance of natural resources. Physical contact with scorpionfish (lion, zebra, stone), rays, eels, and certain types of coral should, of course, be avoided. Coneshells such as textile cones should not be collected, they are extremely toxic and may inflict a serious and even fatal injury. None of these animals are aggressive and generally cause problems only when harassed or a diver is not paying attention and blunders into one. Practice good environmental awareness. Remember the old rule, if you don't know what it is, don't touch it.

Visibility averages well over 100 ft. depending on local site conditions. Harbor visibility can be significantly less, especially during and after rains. The same reduced visibility should be expected at river outfalls. Strong currents may develop at certain times but the triangular configuration of the island results in one side generally being relatively calm at almost all times. Currents at the mouth of Lelu Harbor can be swift. Tidal changes generally influence currents at cuts in the reef. Divers should simply be aware of the possibility of currents at dive sites and dive appropriately.

## **Suggestions for Items to Bring**

(Just because it is not on the list, doesn't mean someone else is bringing it)

### **Dive Related**

All personal dive gear except tanks and weight belts.

Save-a-dive kit.

Thermal protection to suit your physiology.

Dive skin and warm water gloves, to provide protection from sun, scrapes, scratches, etc.

Dive tables, slates, pencils.

Dive lights and spare batteries, whistle, dive sausage, compass.

Support materials for u/w photo and video gear.

C-card, Diver Insurance Card

### **Other**

Light breathable clothes suitable for the tropics.

Hat, Teva type sandals, reef walkers and shoes for hiking.

A light, rain resistant poncho can be useful.

Insect repellent, personal medications, cortisone and/or anti-itch creams.

Sunscreen is essential, Kosrae is 5 deg. N, the sun is brutal, even when it doesn't feel hot.

Antihistamines such as Benadryl can have multiple uses.

Motion sickness remedies if susceptible, e.g. Bonine, etc. Some people report good results with ginger tablets or capsules. Use what works for you.

Small personal first aid kit. Spare glasses, sunglasses, it's very bright!

All batteries required to support electronics.

Dive logs and personal logs.

Small gifts for the island friends that you may discover.

### **Post-Project Responsibilities**

A documentation package will be prepared for the work accomplished by the team while on Kosrae. This will include the data or descriptive results of any reef observations, fish counts, photographic, video, dive logs and journals, etc. This material will be compiled, duplicated as appropriate, and furnished to the Department of Fisheries and Marine Resources as archival reference data concerning the state of the reef sites examined at the time of this project, as well as documentation of the actual work accomplished.

You may be asked to provide copies of personal dive logs, originals of project logs, stills and video records or other materials supporting the scientific objectives of the project. In addition, this material may be used to publicize and support future extensions of this project and prepare scientific and/or popular reports of the work or accomplishments of the team. Any and all materials produced during the project remain the property of the creator who will retain any copyright. The project sponsor(s) and coordinator are granted a royalty free right to use such materials in promotional activities to support future work of this nature. In such cases, appropriate attribution of the source material will always be made. The project will not distribute any such materials to third parties without the written consent of the copyright holder.

## **APPENDICES**

- I. Project Contact List**
- II. References and Suggested Reading**
- III. U. S. Dept. of State Dept. Information for F. S. M.**
- IV. Participant Liability Releases (to be returned to project)**



## Appendix I.

### KOSRAE REEF PROTECTION PROJECT CONTACT LIST FOR FURTHER INFORMATION AND SUPPORT

#### Additional Information for Participants

**Katrina Adams**  
**Bruce Brandt**  
Project Coordinators, FSM  
Owners/Operators  
**Kosrae Village Resort**  
**Sleeping Lady Divers**  
P. O. Box 399  
Kosrae, FSM 96944  
[www.kosraevillage.com](http://www.kosraevillage.com)  
[info@kosraevillage.com](mailto:info@kosraevillage.com)  
691.370.3483  
691.370.5839 fax

Information regarding project accommodations can be found at the following internet address :

[www.kosraevillage.com](http://www.kosraevillage.com)

**Dr. Stephen E. Smith**  
Project Coordinator, U.S.A.  
**OceanEarth, Inc.**  
402 Via Royal,  
Walnut Creek, CA 94596  
[kosrae@oceanearth.org](mailto:kosrae@oceanearth.org)  
925.934.1051 voice

Information regarding project goals, procedures, sponsors, and history (including photographs of dive teams at work) can be found at the following internet address :

[www.oceanearth.org](http://www.oceanearth.org)

## **Appendix II.**

### **REFERENCES AND SUGGESTED READINGS**

#### **General**

Bendure, Glenda, and Ned Friary. *Micronesia - A Lonely Planet Travel Survival Kit*. Lonely Planet Publications. P.O. Box 617, Hawthorn, Vic 3122, Australia

Booth, Tom and Virginia. *The Adventure Guide to Micronesia*. Hunter Publishing, Inc. 300 Raritan Center Parkway, Edison NY 08818. 201.225.1900

Campbell, I. C. *A History of the Pacific Islands*. University of California Press, Berkeley.1989.

Kluge, P. F. *The Edge of Paradise, America in Micronesia*. University of Hawaii Press. 1993.

Price, A. Grenfell, ed. *The Explorations of Captain James Cook in the Pacific - As Told by Selections of His Own Journals 1768 - 1779*.

Segal, Harvey Gordon. *Kosrae - The Sleeping Lady Awakes*. Kosrae State Tourist Division, Dept. of Conservation and Development. Kosrae State Government, Federated States of Micronesia, FM 96944. The definitive (and probably only) work on Kosrae in a single volume.

Stanley, David. *Micronesia Handbook - Guide to the Caroline, Gilbert, Mariana, and Marshall Islands*. Moon Publications, Inc.722 Wall Street, Chico, CA 95928.

#### **Corals and Reef Biology**

Allen, Dr. Gerald R. *Indo-Pacific Coral Reef Field Guide*. Tropical Reef Research. 5055 Ang Mo Kio Industrial Park 2 #01-1155, Singapore 2056.

Auerbach, Paul S., M.D. *A Medical Guide to Hazardous Marine Life*. Progressive Printing Co., Inc.4505 Lexington Avenue, Jacksonville, Florida 32210. 904.388.0746

Kaplan, Eugene H. *Coral Reefs*. Peterson Field Guides Caribbean and Florida. Houghton Mifflin Company, Boston. 1982. Not oriented to the Indo Pacific but includes background on the biology of reef inhabitants.

Rohwer, Forest. *Coral Reefs in the Microbial Sea*. Plaid Press. 2010.

Sheppard, Charles R. C., et. al. *The Biology of Coral Reefs*. Oxford University Press, Great Clarendon Street, Oxford. 2009.

Veron, Jen. Corals of the World. Australian Institute of Marine Science, PMB 3, Townsville MC, Qld 4810, Australia. 2000.

### **Reef Survey Protocol Documents Employed**

Crosby, Michael P and Ernst S. Reese., A Manual for Monitoring Coral Reefs with Indicator Species: Butterflyfishes as Indications of Change on Indo-Pacific Reefs, Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, Silver Spring, MD. 1996

Dahl, Arthur Lyon. Coral Reef Monitoring Handbook. South Pacific Commission. Noumea, New Caledonia. 1978.

English, S., Wilkinson, and C., Baker, V., Survey Manual for Tropical Marine Resources, 2<sup>nd</sup> Edition, Australian Institute of Marine Sciences, 1997

Houk, Peter. Assessment of Ecological Datasets and Recommendations for Monitoring Programs to Assess the Effectiveness of the Micronesian Challenge. Pacific Marine Resources Institute. August 2009.

Rogers, Caroline S., Ph.D, et al. Coral Reef Monitoring Manual for the Caribbean and Western Atlantic. National Park Service, Virgin Islands National Parl. June 1994.

### **Other Publications of Interest**

Conrad, Cathy C. and Krista G. Hilchey. A Review of Citizen Science and Community-Based Environmental Monitoring: Issues and Opportunities. Environmental Monitoring Assessment (2011) 176:273-291.

Downs, Anthony, et.al. Defending Our Pacific – Summary of Findings from the Esperanza’s Expedition, September – December 2011. Greenpeace International. March 2012.

Hodgson, G. 2000. Coral Reef Monitoring and Management Using Reef Check. Integrated Coastal Zone Management. 1(1): 169-176.

Hodgson, G. 1999. What is the Purpose of Monitoring Coral Reefs in Hawaii? p 15-26. In: Maragos JE, Grober-Dunsmore R (eds). Proceedings of the Hawaii Coral Reef Monitoring Workshop, June 8-11, 1998. Department of Land and Natural Resources and East-West Center for Development, Honolulu, HI, USA. 334 pages.

Hodgson, G. and C.M. Stepath. 1999. Using Reef Check for long-term coral reef monitoring in Hawaii. p. 173-184. In: Maragos JE, Grober-Dunsmore R (eds). Proceedings of the Hawaii Coral Reef Monitoring Workshop, June 8-11, 1998. Department of Land and Natural Resources and East-West Center for Development, Honolulu, HI, USA.

Hodgson, G. 1999. Reef Check Global Survey Program: The first step in community-based management. In: I. Dight, R. Kenchington, J. Baldwin (eds). Proc. International Tropical Marine Ecosystems Symposium, Townsville, Australia, November 1999. pp 321-326

Hodgson, G. 1998. Reef Check and sustainable management of coral reefs. Pp. 165-68. In: C. Wilkinson (ed) Status of Coral Reefs of the World: 1998. Australian Institute of Marine Science, Townsville, Australia 184 p.

Wilkinson, C. and G. Hodgson 1999. Coral reefs and the 1997-1998 mass bleaching and mortality. Nature and Resources. 35(2):17-25.

Wilkinson, C., O. Linden, H. Cesar, G. Hodgson, J. Rubens, and A. E. Stong. 1999. Ecological and socioeconomic impacts of 1998 coral bleaching in the Indian Ocean: an ENSO impact and a warning of future change? Ambio 28:188-196.

See also : <http://www.oceanearth.org/newsmain.html>

In particular, the 2012 Greenpeace Report on the State of the Oceans.

And <http://www.oceanearth.org/coralinfo.html>

For additional information on Coral.

## **Appendix III.**

### **BACKGROUND ON THE FEDERATED STATES OF MICRONESIA**

The following information was extracted from U. S. State Department publications and was considered valid as of November 03, 2011. It is provided to give volunteers additional background on the Federated States of Micronesia. OceanEarth, Inc. assumes no responsibility for inaccuracies in the information provided.

#### **COUNTRY DESCRIPTION:**

The Federated States of Micronesia (FSM) has four states, each including a main island as well as dozens of smaller islands, spread out over a million square miles of the north central Pacific. The four states are Pohnpei (formerly Ponape), Kosrae (formerly Kusaie), Chuuk (formerly Truk) and Yap. The federal capital is located at Palikir, on the island of Pohnpei, close to Pohnpei's largest town, Kolonia. The FSM is a constitutional democracy and part of the Compact of Free Association with the United States. Read the Department of State's [Background Notes on Micronesia](#) for additional information.

#### **U.S. Embassy in Kolonia**

1286 U.S. Embassy Place, Pohnpei (near the movie theater)  
P.O. Box 1286, Pohnpei, Federated States of Micronesia 96941  
Telephone: (691) 320-2187  
Duty Officer's telephone: (691) 920-2369  
Facsimile: (691) 320-2186

#### **ENTRY / EXIT REQUIREMENTS FOR U.S. CITIZENS:**

You will need a U.S. passport, a completed FSM Immigration Arrival and Departure Record (FSM Form 5004), and a completed FSM Customs Form in order to enter the FSM. Your passport must be valid for at least 120 days after you enter into the FSM. Your air carrier will distribute the FSM Immigration Arrival and Departure Record and Customs Form before you arrive into FSM. There is no limit to the length of time U.S. citizens can remain in the FSM. All states except Yap have a departure fee that you must pay when you are leaving. The fees are \$15 for Pohnpei and Kosrae and \$20 for Chuuk. Please make sure you have cash available as credit cards are not accepted and ATM machines are not available at any of the airports.

Also note that a health certificate may be required if you are arriving from an area experiencing an epidemic.

The U.S. Embassy in Kolonia accepts passport applications if you are living or traveling in the FSM; however the applications are processed and printed remotely. The time between submitting an application and receiving a new passport is approximately four to six weeks. The Embassy can print limited validity passports in emergency situations only. Visit the [Embassy of Micronesia](#) website for the most current visa information.

For more information about FSM entry requirements, travelers may consult the Embassy of the Federated States of Micronesia at 1725 N Street NW, Washington, D.C., 20038, Tel: (202) 223-4383. The FSM also has Consulates in Honolulu and Guam.

The U.S. Department of State is unaware of any HIV/AIDS entry restrictions for visitors to or foreign residents of the FSM.

### **THREATS TO SAFETY AND SECURITY:**

If you are in the FSM, always maintain a high level of security, be alert to any unusual activity around your home or business, and report any suspicious incidents to local police authorities.

In the state of Yap, if you are diving or traveling, you should be aware that there are approximately a dozen World War II era aerial bombs in shallow depths located in the channels of Yap harbor. These devices have been around for many decades but are still considered live and dangerous and could possibly detonate if a diver or other object collides with them. There is also other unexploded ordnance left from the heavy fighting and bombardment that happened in and around the islands of Micronesia during World War II. Be careful when you travel or dive in the region, especially in the waters around Yap harbor and the adjacent channels.

### **CRIME:**

Crime is higher in Chuuk than in the other states; you should stay off the streets after dark on Weno (the main island). On occasion, foreigners are subject to and possibly singled out for theft and verbal and physical abuse, sometimes violent. Do not attempt to intervene in disputes between local citizens. Alcohol-related attacks as well as alcohol driving accidents are a concern during weekend evening hours. Dress conservatively, as it is considered impolite for females to wear clothing that exposes anything above the knee. Modern Western swimwear may be considered immodest by local standards, and people wearing such clothing outside of hotels that cater to tourists could be harassed. Additionally, we suggest women travel in groups and walk in well-lit areas.

### **CRIMINAL PENALTIES:**

While you are traveling in FSM, you are subject to its laws even if you are a U.S. citizen. Foreign laws and legal systems can be vastly different than our own. It's very important to know what's legal and what's not where you are going. In Micronesia, for example, driving under the influence could land you immediately in jail. If you violate Micronesian laws, even unknowingly, you may be expelled, arrested, or imprisoned. Penalties for possessing, using, or trafficking in illegal drugs in Micronesia are severe, and convicted offenders can expect long jail sentences and heavy fines. These criminal penalties will vary from country to country. If you break local laws in FSM, your U.S. passport won't help you avoid arrest or prosecution.

## **SPECIAL CIRCUMSTANCES:**

Micronesian customs authorities charge import taxes on cigarettes, tobacco, alcohol, gasoline, and other personal items that are more than the amounts allowed. All imports can be physically inspected by customs officials. There are strict quarantine regulations restricting entry of plant and animal products. You should contact the [Embassy of Micronesia](#) in Washington, D.C., or one of [Micronesia's consulates in Honolulu or Guam](#) for specific information regarding customs requirements.

## **ACCESSIBILITY:**

While in FSM, individuals with disabilities may find accessibility and accommodation very different from what you find in the United States. Neither laws nor regulations mandate accessibility to public buildings or services for persons with disabilities. The national Health Services Department is responsible for protecting the rights of persons with disabilities; however, action is rarely taken by the government. Logistically speaking, there are almost no sidewalks available in the FSM. There is no public transportation, and taxis are run by independent operators that make no provision for people with disabilities.

## **MEDICAL FACILITIES AND HEALTH INFORMATION:**

Health care facilities in the FSM consist of hospitals on each of the four major islands and a few scattered clinics. These facilities sometimes lack basic supplies and medicines, and the quality of health care varies. Doctors and hospitals may expect immediate cash payment for health services. U.S. medical insurance is not always valid outside the United States. Supplemental medical insurance with specific coverage for overseas treatment and medical evacuation may be useful to have before you travel. Medical evacuation for non-ambulatory patients may not be immediately available and can be very expensive. Scuba divers should note that although there are decompression chambers in Yap, Chuuk, and Pohnpei their availability and staff experience in treating diving injuries vary.

You can find detailed information on vaccinations and other health precautions on the [CDC website](#). For information about outbreaks of infectious diseases abroad, consult the [World Health Organization \(WHO\) website](#). The WHO website also contains additional health information for travelers, including [detailed country-specific health information](#).

## **MEDICAL INSURANCE:**

You can't assume your insurance will go with you when you travel. It's very important to find out BEFORE you leave whether or not your medical insurance will cover you overseas. You need to ask your insurance company two questions:

- Does my policy apply when I'm out of the United States?
- Will it cover emergencies like a trip to a foreign hospital or a medical evacuation?

In many places, doctors and hospitals still expect payment in cash at the time of service. Your regular U.S. health insurance may not cover doctor and hospital visits in other countries. If your policy doesn't go with you when you travel, it's a very good idea to take out another one for your trip.

### **TRAFFIC SAFETY AND ROAD CONDITIONS:**

While in FSM, you may encounter road conditions that differ significantly from those in the United States. The information below concerning Micronesia is provided for general reference only, and may not be totally accurate in a particular location or circumstance.

In the FSM, driving is on the right-hand side of the road, as in the United States. However, unlike most cars in the United States, the majority of vehicles in FSM have the driver's seat built on the right side. Traffic, particularly in the state capitals, is increasing. Congestion may be a problem at the beginning and end of the workday. Most roads are narrow and without sidewalks, creating a hazard for both drivers and pedestrians. Many roads are in poor condition, with potholes and little or no shoulder to pull to the side of the road. Road conditions can worsen after heavy rains; coral surfaces are particularly likely to be slippery. There is no formal training in road safety so many drivers are unaware of road safety rules. Drivers' skills vary and drivers often make turns or stop to pick up pedestrians without warning. Roads outside the towns are often unpaved and are used by pedestrians, children playing, animals, and drivers. Streetlights are rare. Taxis are available in state capitals, but you should always be careful since some taxi drivers are reckless. Drunk drivers can create serious hazards, particularly on weekend evenings and holidays. Motorcyclists are required by law to wear helmets.

### **AVIATION:**

Continental/United Airlines is the only commercial carrier serving the FSM. Flight schedules and routes are limited and subject to change. There may be few alternatives if flights are canceled or missed. Flights are usually 100% booked, and aircraft weight is an issue due to short runways and the type of aircraft used. Because of these limitations and the numerous transit stops made (the typical routing to get to Kolonia would be via Honolulu with intermediate stops in Majuro, Kwajalein, and Kosrae or via Guam with a stop in Chuuk), with exiting and arriving passengers at each location, baggage sometimes may not be loaded at the departure point or maybe off-loaded by mistake and left behind at an intermediate stop. You should keep these logistical challenges in mind when traveling in the region. Missing baggage should be reported immediately to the airline ground personnel before onward flight departure.

### **THE FEDERATED STATES OF MICRONESIA**

Nine ethnic Micronesian and Polynesian groups.

Religion: Roman Catholic 50%, Protestant 47%, others 3%.

Language: English and nine ethnic languages.

Education: Literacy--89%.

Health: Life expectancy--male 67.6 yrs; female 69.1 yrs. Infant mortality rate--13/1,000.

Work force: More than 50% of workers are government employees.



## **GOVERNMENT**

Type: Constitutional confederation in free association with the United States.

The first Compact of Free Association entered into force in 1986, and an Amended Compact entered into force June 30, 2004. Independence from U.S.-administered UN trusteeship: November 3, 1986.

Constitution: May 10, 1979.

### **Branches:**

Executive: President (chief of state and head of government), cabinet.

Legislative: Unicameral Congress with 14 seats.

Judicial: Supreme Court.

Major political parties: No formal parties.

### **ECONOMY (FY 2010 figures)**

GDP: \$297.5 million.

GDP per capita (current): \$2,898.

National income (GDP + foreign assistance): \$419.4 million.

National income per capita: \$4,086.

### **GDP Composition by Sector:**

Agriculture 14.1%, fisheries 10.1%, manufacturing 0.5%, construction 5.6%, wholesale and retail trade 12.6%, government 10.6%, education 11.6%, health 4.6%.

Industry: Types--fishing, agriculture, tourism, construction, craft items.

Trade: Exports of goods (\$30.1 million)--fish, kava, betel nut.

Export markets: Japan, United States, others.

Imports of goods (\$157.6 million): food, manufactured goods, fuel.

Import sources: United States, Japan, others.

External debt: \$81.4 million.

Currency: U.S. dollar.

## **GEOGRAPHY AND PEOPLE**

The Federated States of Micronesia (FSM) consists of 607 islands extending 1,800 miles across the archipelago of the Caroline Islands east of the Philippines. Approximately 100 islands are inhabited. The four states are the island groups of Pohnpei, Chuuk, and Yap, and the island of Kosrae. The federal capital is Palikir, on Pohnpei.

The indigenous population consists of various ethno-linguistic groups. English has become the common language. The birth rate remains high at more than 3%, but the population of the four states remains almost constant due to emigration.

## **HISTORY**

Ancestors of the Micronesians settled the Caroline Islands over 4,000 years ago. A decentralized chieftain-based system eventually evolved into a more centralized economic and religious empire based principally in Yap and Pohnpei. European explorers, first the Portuguese in search of the Spice Islands and then the Spanish--reached the Carolines in the 16th century, with the Spanish establishing sovereignty. The current FSM passed to German control in 1899, and then through the Treaty of Versailles to the Japanese in 1919. Following World War II, these islands became part of the United Nations Trust Territory of the Pacific Islands, administered by the United States.

On May 10, 1979, four of the Trust Territory districts ratified a new constitution to become the Federated States of Micronesia. The neighboring trust districts of Palau, the Marshall Islands, and the Northern Mariana Islands chose not to participate. The FSM signed a Compact of Free Association with the United States in 1986. An Amended Compact entered into force in June 2004.

## **GOVERNMENT AND POLITICAL CONDITIONS**

The FSM is governed under a 1979 constitution, which guarantees fundamental human rights and establishes a separation of governmental powers. The unicameral Congress has 14 members elected by popular vote. Ten senators represent single-member districts based on population and serve 2-year terms. Four senators at large--one from each state--are elected to serve 4-year terms. The President and Vice President are elected by Congress from among the 4 at large senators. Once elected, the President and Vice President serve for 4 years. Their congressional seats are then filled by special elections. An appointed cabinet supports the President and Vice President. There are no formal political parties.

The FSM is a confederation with a weak central government. Each of the FSM's four states has its own constitution and its own elected legislature and governor. The state governments maintain considerable power, particularly regarding the implementation of budgetary policies.

The FSM's highest court is the Supreme Court, which is divided into trial and appellate divisions. The President appoints judges with the advice and consent of the Congress.

The FSM maintains an Embassy at 1725 N Street NW, Washington, DC 20036.  
Telephone: 202-223-4383. Fax: 202-223-4391.

## **ECONOMY**

Under the terms of the Compact of Free Association, the United States provided the FSM with about \$2 billion in grants and services between 1986 and 2001. The Compact's financial terms were renegotiated for the 20-year period 2004 through 2023, with the aim of encouraging sustainable development. The United States will provide almost \$100 million in direct assistance every year until 2023, which includes the systematic reallocation of a portion of the direct aid to a jointly managed Trust Fund. Additional

federal grants and services to the FSM are estimated to be as much as another \$100 million annually. Assistance under the Amended Compact is distributed by grants in response to a transparent FSM budget process, focusing on the following six sectors: education, health, infrastructure, public sector capacity building, private sector development, and the environment. The U.S. Department of the Interior is responsible for monitoring and implementing the Amended Compact.

The FSM government sector plays a central role in the economy as recipient and domestic administrator of Compact funds. The national and state-level governments employ over half of the country's workers. Government services and public enterprises account for 38% of GDP. Real wages nationwide have been flat and the number of jobs in the economy has generally been in decline since 1995. However, data does show an increase from 15,485 jobs in 2009 to 16,179 in 2010. Private sector jobs pay about half as much as public sector jobs.

The fishing industry is very important. Foreign commercial fishing fleets pay \$15 million to \$20 million annually for the right to operate in FSM territorial waters. These licensing fees accounted for 26% of the national government revenues in 2010. Exports of fish accounted for nearly 64% of export revenues in 2010.

Visitor attractions include scuba diving, surfing, World War II battle sites, eco-tourism, and the ancient ruined city of Nan Madol on Pohnpei. The islands have more than 24,000 tourists and visitors each year. However, the tourist industry has been hampered by a lack of infrastructure, limited commercial air connections, and a severely restrictive foreign investment climate. The Asian Development Bank (ADB) has identified tourism as one of FSM's highest potential growth industries.

Agriculture is mainly subsistence farming. The principal crops are breadfruit, coconuts, bananas, betel nuts, cassava, taro, and kava. Betel nut is becoming an increasingly important export with a yearly value estimated at \$2 million to \$4 million.

The large inflow of official assistance to the FSM allows it to run a substantial trade deficit--imports outstrip exports by a five-to-one ratio--and to have a much lighter tax burden than other states in the region (12% of GDP in FSM compared to 18%-25% elsewhere). In 2004, the FSM Government and Congress started steps toward establishing a nationwide tax system to improve collections and more fairly distribute the tax burden with assistance from the ADB, the Pacific Finance Technical Assistance Center (PFTAC), and the Australian Government, but the tax system remains unchanged. In 2011 and 2012 the FSM Congress approved the first and second of five laws required to implement the new system, but as of early 2012 only two of the four states had passed the necessary legislation, making the future of the reforms unclear.

## **FOREIGN RELATIONS**

The Government of the Federated States of Micronesia conducts its own foreign relations. Since independence, the FSM has established diplomatic relations with a number of nations, including most of its Pacific neighbors, Japan, Australia, and the People's Republic of China. Regional cooperation through various multilateral

organizations is a key element of its foreign policy. The FSM became a member of the United Nations in 1991.

## **U.S.-MICRONESIAN RELATIONS**

The Governments of the FSM and the United States maintain deep ties and a cooperative relationship. Reflecting a strong legacy of Trusteeship cooperation, over 25 U.S. federal agencies maintain programs in the FSM. Under the Compact, the United States has full authority and responsibility for the defense and security of the FSM. This security relationship can be changed or terminated by mutual agreement. Also under the Compact, Micronesians can live, work, and study in the United States without a visa. Micronesians volunteer to serve in the U.S. Armed Forces at approximately double the per capita rate as Americans; they are also eligible for admission to U.S. Service Academies. Americans can live and work freely in the FSM without the need for a visa.

The United States will provide about \$100 million annually in assistance to the FSM until 2023. A Joint Economic Management Committee (JEMCO), consisting of representatives of both nations, is responsible for ensuring that assistance funds are spent effectively, with the aim of fostering good governance and economic self-reliance. The basic relationship of free association continues indefinitely. The United States is the FSM's largest trade partner.

## **Appendix IV**

### **Required Volunteer Liability Releases**

(Go to: [www.oceanearth.org/v\\_oex\\_volpage.html](http://www.oceanearth.org/v_oex_volpage.html) for Currently Required Releases)