

FINAL REPORT: SOUTHWEST PALAU ISLANDS EXPEDITION, June 1-19, 1992
TERRESTRIAL SURVEYS

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PRELIMINARY INFORMATION (PERSONNEL, ITINERARY, SPONSORS, OBJECTIVES)

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Total participation was 15 persons, including marine scientists, skipper, crew, dive-master/photographer, Palauan and Tobi State Government representatives, and Greenpeace campaigner. The Chief Scientist was Dr. James Maragos, The Nature Conservancy, Hawaii.

Vessel: M.V. *Pegasus II*, 16.4 m, 33 gross tons, Whangarei, New Zealand.

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Itinerary:

June 1	Depart Koror, Palau by M.V. <i>Pegasus II</i>
3	Arrive Tobi
4	Depart Tobi
5	Arrive Helen Reef (Atoll)
9	Depart Helen Atoll, brief stopover at Tobi depart for Merir
11	Arrive Merir
13	Depart Merir, arrive Pulo Anna
15	Depart Pulo Anna, arrive Sonsorol
16	Depart Sonsorol, arrive Fanna
18	Depart Fanna for Koror
19	Arrive Koror

Sponsors and Contributors: The Nature Conservancy (TNC), South Pacific Regional Environment Program (SPREP), Greenpeace, Republic of Palau (ROP), U.S. Fish and Wildlife Service (USFWS), University of Guam (UOG), University of Hawaii (UH), National Marine Fisheries Service (NMFS).

Objectives: The ultimate aim of the 1992 SW Palau Islands Expedition was to conduct detailed surveys of the marine, terrestrial and cultural resources of the southernmost islands of Palau: Tobi, Helen Reef, Merir, Pulo Anna, Sonsorol, and Fanna (Fig. 1). This was the first full-scale survey of these islands, located approximately 200-400 miles (320-640 km) southwest of the

main Palau Islands. The information, supplemented by aerial color photographs, color slides and videos, revised maps, and comparative data from previous trips, will be used for conservation and education purposes, as well as adding to scientific knowledge of the Pacific. In addition, it will provide documentation for the Republic of Palau in its political dealings with foreign countries relating to marine economic zonation.

BACKGROUND INFORMATION, SW PALAU ISLANDS

These 6 small islands, totalling 374.2 ha, lie between 3° and 6° N latitude and 131° to 133° E longitude. Five are surrounded by fringing reefs from 200-600 m wide, exposed at low tide. The sixth, Helen Reef, is a large, 13-mile (21 km) atoll with an enclosed, navigable lagoon and single tiny islet. All are low coral islands, only a few meters above sea level and ringed with coral sand. Loose coral gravel, boulders, and consolidated limestone debris may be present. Three (Tobi, Merir, Pulo Anna) contain interior fresh or brackish water.

For those readers familiar with Palau proper, it may be of interest that the SW Islands show no evidence of volcanic origin or affinities with the upraised limestone features typical of the southwest portion of the main archipelago, i.e. there is no resemblance to the "Rock Islands."

The islands harbor from 5 to 27 people, with the exception of Fanna, which may or may not be uninhabited. There is a notable lack of anthropogenic pollutants and debris, the forests and beaches are generally healthy, and all waters surrounding the islands are exceptionally clear. The climate is hot, wet, and humid.

Collectively the islands support a varied assemblage of marine and terrestrial resources of national and international importance: outstanding coral reef ecosystems, tall indigenous forests, large seabird colonies, a rich variety of small lizards (including an unknown number of new species to science), and notable populations of green turtles and coconut crabs.

Relating to their strategic geographic position (the closest island is Morotai, Indonesia, 240 km west), the fauna and flora of the SW Palau Islands is unique, containing Pacific, Asian, Australo-Papuan, and Indonesian elements. Their remoteness has, in the past, enabled species such as turtles, seabirds, giant clams and sea cucumbers to establish large, relatively untouched populations. However, recent excessive utilization of terrestrial and marine resources, both by foreigners and Palauans, requires immediate conservation and legal action.

Previous Scientific Visits (terrestrial surveys): John Engbring (U.S. Peace Corps), November 1977 and May 1979 (birds, all islands); Warren King, Dennis Puleston and Thomas Ritchie, October 1979 (birds, Helen and Merir). Some plant collecting was done during World War II by Peace Corps Volunteers during the 70s, and by anthropologist Peter Black. All records prior to 1979 are incorporated into Fosberg et al. (1979). Visits varied from a few hours to one or 2 days per island.

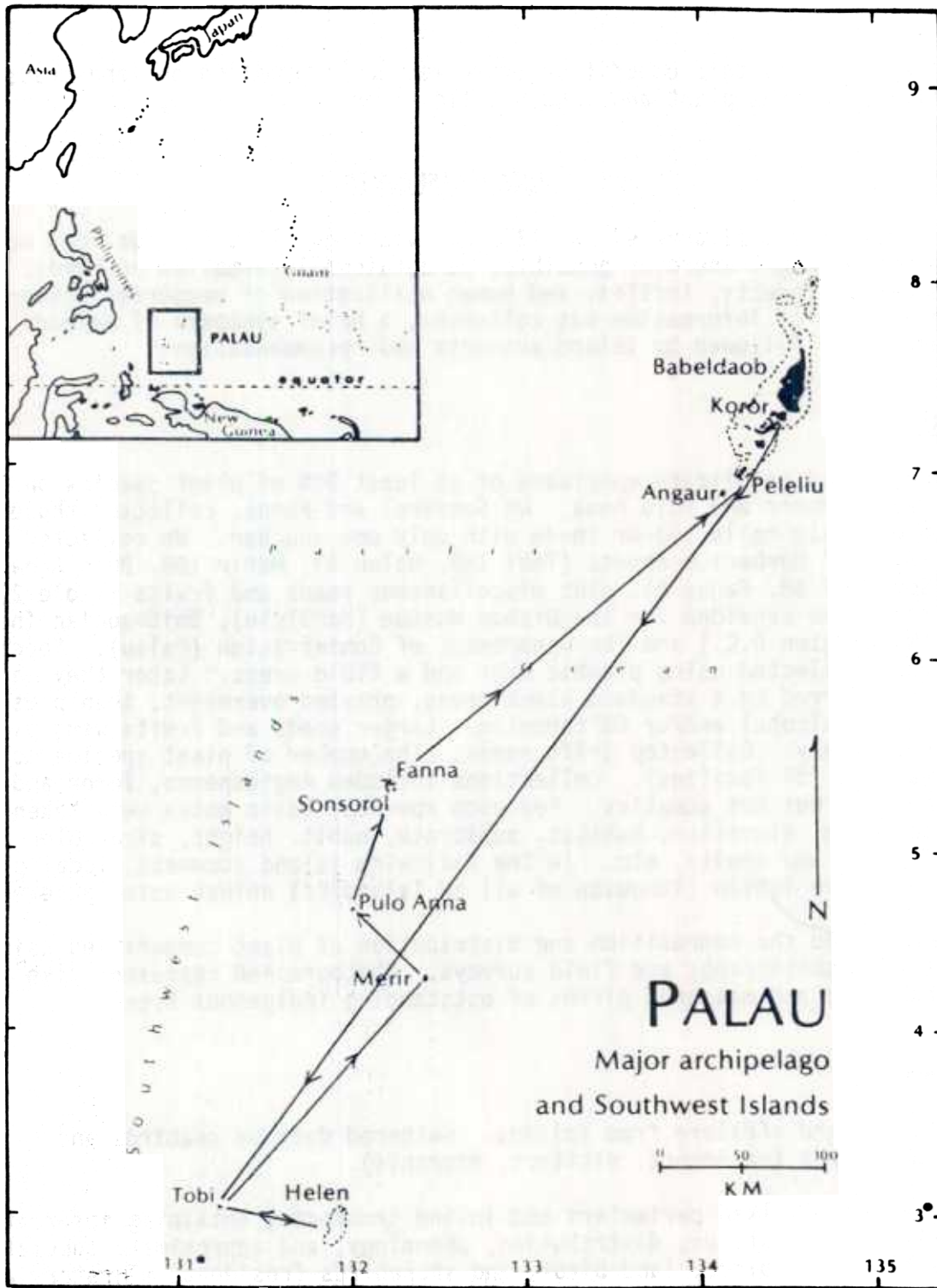


Fig 1 SW Palau Islands Expedition, June 1-19, 1992: approximate cruise track (plotted from at-sea observations of birds and marine mammals). Source: Engbring (1983)

Previous to this expedition there was no information on land crabs or reptiles, and few plant and insect collections.

ACCOMPLISHMENTS

The *Pegasus II* covered ca. 1370 km, visiting all 6 islands in 3 weeks. Camping overnight wherever possible, we obtained information on birds, plants, land crabs, insects, turtles, and human utilization of resources. Since a wide variety of information was collected, a brief synopsis of methods is given below, followed by island accounts and recommendations.

FLORA

1. Collected triplicate specimens of at least 90% of plant species on Tobi, Helen, Merir and Pulo Anna. On Sonsorol and Fanna, collected those not previously collected or those with only one voucher. We collected 545 12 x 17" herbarium sheets (Tobi 186, Helen 33, Merir 168, Pulo Anna 91, Sonsorol 58, Fanna 8), plus miscellaneous seeds and fruits (Table 2). Sets were provided for the Bishop Museum (Honolulu), Smithsonian Institute (Washington D.C.) and the Department of Conservation (Palau). Specimens were collected using plastic bags and a field press. Later they were transferred to a standard plant press, pressed overnight, then preserved in 70% alcohol and/or 5% formalin. Larger seeds and fruits were pickled separately. Collected drift seeds. The number of plant species collected was 112 (57 families). Collections included Angiosperms, ferns and mosses, but not aquatics. For each species, basic notes were taken on location, elevation, habitat, substrate, habit, height, size/color of flowers and fruits, etc. In the following island accounts, local plant names are Tobian (language of all SW Islanders) unless noted otherwise.
2. Described the composition and distribution of plant communities using aerial photographs and field surveys. Photographed representative habitats and measured girths of outstanding indigenous trees.

AVIFAUNA

- 1 *At-sea and offshore from islands.* Gathered data on seabirds and shorebirds (residents, visitors, migrants).
2. *Islands.* Walked perimeters and inland transects, obtaining information on the current status, distribution, phenology, and approximate population sizes of seabirds, land birds, and shorebirds (resident, migratory and vagrant). Checked for banded and nocturnal species.

Showed pictures of birds known to occur in Palau, Micronesia and Southeast Asia to chiefs and other islanders in order to obtain a broader knowledge of species occurrence and match unusual sightings by residents. Looked for evidence of predation by humans, land crabs, and rodents.

Collected one vagrant species, the Dollarbird (*Eurystomus orientalis*) on Tobi.

We saw a total of 43 species of birds (Table 4):

seabirds (breeding): 11
 (non-breeding): 15
 (local information only): 2
shorebirds: 7
water birds: 5
 (local information only): 5
land birds: 5
 (local information only): 9

MAMMALS

1. Gathered information on introduced mammals (rodents, dogs, cats, pigs). Collected 2 black rats for the Bishop Museum.
2. Confirmed presence or absence of fruit bats, counting roosts or individuals. Collected 2 fruit bats on Sonsorol for the U.S. National Museum.
3. Incidental at-sea observations of marine mammals (Appendix IV).

REPTILES

1. Collected skinks and geckos on each island (at times assisted by local kids) for the U.S. National Museum. The 35 specimens represent at least 13 species, at least one (probably several) new to science. Possible island endemics. Not one specimen could be positively identified by Pacific reptile specialists (Table 9, Appendix III).
2. Talked to islanders about turtle nesting, poaching, methods, seasons when captured, consumption, bartering with visiting boats, etc. Photographed illegal harvesting on Helen and Merir. Asked about Guam tree snakes and crocodiles.

LAND CRABS

A. COCONUT CRABS

1. Collected data on primary habitats, size distribution, and sex ratios. Measured all crabs seen (Merir, Pulo Anna, Fanna). Attempted a crude population estimate using a mark-and-recapture method on Merir.
2. Discussed local consumption, population status, export/gifts, etc. with islanders. This included sharing information on growth rates, legal sizes

in other countries, population recruitment, current commercial prices, and local views on future management.

B. OTHER LAND CRABS

Collected, preserved, and photographed *Cardisoma*, *Coenobita* and *Geograpsus* for the Bishop Museum, including rare non-molluscan "shells" carried by hermit crabs. Photodocumented the preparation of cooked land crabs for export to Koror. The known distribution of land crabs in the Western Pacific is very incomplete.

ARTHROPODS

Collected several dozen specimens of insects, spiders, scorpions, etc. with brief habitat notes, as time permitted, for the Bishop Museum. Searched for coconut beetle (*Oryctes rhinoceros*), an agricultural pest and accidental introduction to Palau from Southeast Asia during World War II, and scolia wasp (*Scolia ruficornis*), a biological control measure introduced to Sonsorol in 1984. Collected one coconut beetle.

CONSERVATION

Gathered information on local consumption/poaching/bartering of seabirds, turtles, land crabs and fruit bats. Discussed the concepts of sustainable resources, traditional and contemporary usage of wildlife, possible future conservation measures, illegal harvesting, and law enforcement.

MAPPING

The only available charts of the SW Palau Islands prior to this expedition were Japanese sketch surveys made in 1918 (U.S. Defense Mapping Agency 81133 and HO 5425, 1:72,560 for all except Helen Reef; Helen Reef Defense Mapping Agency 81127, 1:72,900). Island areas in the literature were calculated from these.

During this expedition The Nature Conservancy made available aerial color photographs, providing the basis for the revised measurements, areas, and vegetation analyses in this report. Areas were calculated on an IBM computer using a magnetic digitizer.

SYNOPSIS OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST
AND RECOMMENDATIONS TO THE PALAU GOVERNMENT

The Southwest Palau Islands are the westernmost islands in the tropical Pacific. Their remoteness and small human populations have resulted in fairly traditional cultures and rich natural resources. Collectively they support a varied assemblage of marine and terrestrial resources of national and international importance: outstanding coral reef ecosystems, tall indigenous forests, large seabird colonies, a rich variety of small lizards (including new species to science), and notable populations of green turtles and coconut crabs.

In order to preserve and manage these natural resources--both for their own sake and to maintain or enhance the traditional lifestyles of their native people--conservation measures, formulated by islanders, biologists, international conservation agencies, Palauan government employees and legal advisors, are necessary. The recommendations respectfully offered in this report are summarized as follows:

A. Recommendations for All Islands

1. That the killing of seabirds or turtles for commercial profit, non-subsistence use, or transport back to Koror for friends and relatives be illegal and subject to heavy fines.
2. That all boats visiting the SW Islands carry food and fuel supplies.
3. That laws concerning coconut crabs be formulated and enforced.
4. That residents of the SW Islands, as well as Palauans, be educated concerning the slow growth rates, difficulty of farming, and reticence of coconut crabs to return to traditional areas once cleared out.
5. That the private and commercial sale of coconut crabs be illegal.
6. That the Palauan government enforce the current laws which state that all bird species are fully protected in Palau.
7. That no large native trees be felled on any island without a permit.
8. That regular visits by wildlife biologists be made to all islands (particularly Helen, Merir and Fanna) to monitor seabird and turtle populations.
9. That rat control be begun on all islands where rats are numerous (especially Tobi and Merir).
10. That terrestrial wildlife (turtles, coconut crabs, seabirds) be utilized far less by islanders than in the past.

11. That school- and adult education promote the principle that living "traditionally" does not involve taking what you want, when you want, and as many as you want.

B. Recommendations for Individual Islands

SUMMARY OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST

75 ha

Vegetation: (5 plant communities, 75 species, 59% indigenous) Tobi is lush and well-wooded. Although much of the island was converted to coconut plantations in the past, today 40% of the land area is covered with indigenous forests, which continue to expand. Although these forests are less diverse than on some of the other SW Palau Islands, they contain notable virgin or veteran trees: *Ficus prolixa* (Eng. banyan, Tob. *hiriyo*, Pal. *lulk*), *Calophyllum inophyllum* (Eng. portia tree, Tob. *safang*, Pal. *btaches*), *Mammea odorata* (Pal. *ongolbeosakel* ?). There are small stands of tall *Neisosperma oppositifolia* forest (Pal. *uaoch*).

Birds: (12 species: 2 spp. breeding seabirds, several spp. non-breeding seabirds, 3 spp. migrant shorebirds, several spp. water birds) Tobi harbors abundant breeding White Terns (Pal. *sechosech*) and Brown Noddies (Pal. *mechadelbedaoch*). Other birds include migrants and vagrants from as far afield as the Arctic, Southeast Asia, and Australia, as well as the main Palau archipelago and other areas of the Pacific. Residents were astute observers, describing 21 bird species which they have seen at different times of year or on rare occasions, illustrating Tobi's unique geographical location.

Mammals: Fruit bats formerly occurred and could perhaps be reintroduced. Black rats abundant.

Reptiles: Green turtles are declining. At least 6 species of geckos and skinks, including probable new species to science, inhabit all habitats.

Land Crabs: Coconut crab populations are depleted; other land crabs uncommon.

Recommendations:

- A larger human population is not desirable.
- Reintroduce green turtles.
- Abandon the idea of an airstrip (in the interests of preserving culture).
- Formulate laws to assist coconut crab conservation.

HELEN: SUMMARY OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST

Area: Island: 3.1 ha; Atoll: reefs 5871 ha, lagoon 103 km²

Vegetation: (2 plant communities, 8 species, 88% indigenous) Helen is little more than a tiny curved sandspit, of variable shape and size, supporting a swath of *Tournefortia* scrub forest (to 8 m tall), flanked on the ends by a meadow of native grass (*Lepturus*). With the exception of a few coconut palms and a tiny garden plot, all plants are native. Helen is a haven for drift seeds and seedlings, washed ashore from near and far. A major problem with the vegetation is that many trees have been felled for firewood.

Birds: (seabirds: formerly 9 breeding species, presently 3) The most serious wildlife depredation (shooting, beating, egging) in the SW Islands occurs at Helen. Formerly an impressive Micronesian and international seabird colony, excessive human molestation, peaking in spring 1992, has decimated Helen's seabird populations from an estimated 91,000 to 95,000 (9 species) in 1979 to 5700-7100 (2 species) today. Sooty Tern (Pal. *bedebedechake1*) egging, primarily for commercial profit, was responsible for the majority of losses, but breeding and non-breeding populations of 5 species have dropped drastically, including all the large seabirds: Red-footed and Brown Boobies (Pal. *kuel*), Great Frigatebird (Pal. *kadam*), Black-naped Tern (Pal. *kerkirs*), and Sooty Terns. Several of these seabirds breed in Palauan waters only in the SW Islands, at Helen and/or Fanna. Helen's Crested Tern (Pal. *roall*) colony, the largest in the Pacific, was disturbed daily by residents for fresh eggs; over 600 eggs were already abandoned. Strict conservation measures and education are critical to the survival of Helen Atoll as a seabird refuge.

Mammals: One major reason that Helen, although tiny, is heavily utilized by breeding seabirds (especially ground-nesters) is that it is rat-free. Every effort must be made to keep this island free of rodents and other mammalian predators such as dogs. A dog was present on the island, which should be removed immediately.

Reptiles: Helen was a major turtle nesting ground (see S. Geermans' report). One undetermined species of skink, related to a species from Palau's northernmost atoll, Kayangel, was present.

Recommendations:

1. That Helen Reef and Island (Helen Atoll) be declared an international wildlife reserve, dedicated to preserving and rejuvenating its rich marine and terrestrial resources.
2. The sole residents of Helen be no more than one or 2 chosen wardens, preferably trustworthy Tobians.
3. Rat traps be provided to the wardens
4. No pets (dogs, cats, caged birds) be permitted.

5. No further tree-felling for house sites, gardens or cooking fuel, and that the Palauan government supply a stove and fuel for Helen's wardens.
6. No turtles be killed, either on land or in the water.
7. Reports of wildlife poaching by Palauans be treated with respect and offenders fined heavily.
8. Erection of a multilingual noticeboard at the landing, forbidding unauthorized entry and explaining Helen's status as a protected area for marine and terrestrial animals and plants. Suggested languages: English, Palauan, Indonesian, Japanese(?)

MERIR: SUMMARY OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST

Area: 99 ha

Vegetation: (5 plant communities, 63 species, 68% indigenous) Merir is densely clothed with lush forests (94% indigenous), including an extensive interior mangrove swamp. There is little coconut forest (6% of the total area).

Although the forests succumbed to a typhoon in the mid-1960s, uprooting most of the largest trees, much of the interior forests now average 20 m tall. Species diversity is fairly high, including tall *Barringtonia speciosa* (Tob. *hur*, Pal. *bduul*), *Calophyllum inophyllum* (Tob. *safang*, Pal. *btaches*, Haw. *kamani*), *Terminalia samoensis* (Tob. *haisas*, Pal. *esemiich*), *Crateva speciosa* (Pal. *edebsungel*). Significant stands of *Neisosperma oppositifolia* (Pal. *uaoch*) and *Heritiera littoralis* (Pal. *ebibeck*) are notable. The rich understory of vines, shrubs and ferns (including bird's nest fern, *Asplenium nidus*), is totally impenetrable in certain areas.

Birds: (10 species: 6 seabirds, 1 shorebird, 1 water bird, 2 land birds) All bird populations very low: estimated total population 500-700. In 1979, 3100-5350 birds were estimated. Most common were Brown Noddies and White Terns. Birds, and their eggs and young are eaten by the resident family.

Mammals: Tree-climbing black rats were superabundant and may be partly responsible for the low bird populations.

Reptiles: An outstanding turtle nesting area (see S. Geermans' report), of national and international importance. Three species of small reptiles collected, all of uncertain identity. One gecko (*Nactus* sp.) appears to be a new species, possibly endemic to Merir.

Land Crabs: A minimum of 2 species of terrestrial hermit crabs as well as non-hermit land crabs. Coconut crabs were formerly widespread and abundant, but are dwindling rapidly, evidently confined to the east-

central forests and mangrove depression. Some very large males still present.

Recommendations:

1. Merir be declared a sanctuary for turtles (green, hawksbill) and coconut crabs.
2. The family be relocated as soon as possible.
3. Until relocation is possible, the family should obey Palau's laws relating to turtles and obey suggested guidelines for coconut crab conservation.

PULO ANNA: SUMMARY OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST

Area: 37.9 ha

Vegetation: (4 plant communities, 50 species, 76% endemic) Pulo Anna is also lushly vegetated, although overall less thickly than the other SW Islands (except Helen). Indigenous forests comprise 55% of the land area. The Coastal Forest is virtually intact around the entire perimeter, mingling with Mixed (indigenous) Forest along its inner edges.

The Mixed Forest, although fragmented and often lacking a substantial understory, is extensive. The prime northern groves (Pl. 8) harbor some majestic, probably virgin, trees to 21 m tall, including *Calophyllum inophyllum* (Tob. *safang*, Pal. *btaches*, Haw. *kamani*), *Neisosperma oppositifolia* (Pal. *uaoch*), *Syzygium malaccense* (Tob. *fariap*, Pal. *kidel*, Eng. mountain apple), and *Artocarpus mariannensis* (Tob. *bukeriau*, Pal. *ebiei*, Eng. wild breadfruit). We recommend that this grove be protected, since it also harbors nesting seabirds and a rich diversity of small lizards (see below).

The Mangrove Forest, although partly destroyed, contains a good diversity of indigenous trees, including the nipa palm, *Nypa fruticans* (Pal. *toechel*), its only known remaining location in the SW Islands.

Birds: (12 species: 7 seabirds, 2 shorebirds, 1 water bird, 2 land birds) Although not high, populations appear stable. Estimated total population 1050-1600. Most common were Brown Noddies and White Terns. A quality nesting seabird was the Red-tailed Tropicbird (Pal. *dudek*), estimated population 50-75 birds. The swamp is utilized by shorebirds in the fall. We observed an unknown vagrant cormorant, most likely from Southeast Asia.

Mammals: Black rats common, no fruit bats.

Reptiles: No turtles seen. The island is exceedingly rich in small reptiles, having the highest species diversity and density in the SW Islands. Of 9 specimens collected, 8 appear to be different species of

uncertain identity. At least one skink (*Mabuya sp. nov.*) is a new species, possibly a Pulo Anna endemic. Another skink *Lipinia cf. noctua* was not found elsewhere.

Land Crabs: Pulo Anna has literally millions of land crabs (*Cardisoma/Geograpsus*) and dwindling populations of coconut crabs

Recommendations: Preservation of the prime northern groves of indigenous trees (approx. 2.5 ha), outlined in Plate 8.

SONSOROL: SUMMARY OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST

Area: 120.5 ha

→ Vegetation: (4 plant communities, 75 species, 65% indigenous) Sonsorol, second largest of the SW Islands, is lushly vegetated with large tracts of quality indigenous forest extending from shore to shore. Much is intermingled with long-abandoned coconut plantations, such that less than 10% of the land area consists of relatively pure plantations. Approximately 85% of the forests harbor >60% indigenous trees. Dozens (hundreds?) of virgin (or near virgin) trees dot these forests (*Calophyllum*, *Ficus*, *Neisosperma*), all with canopies over 16 m and wide-spreading canopies. The majestic *Pisonia grandis* (Pal. *mesbesibech*) trees were restricted to Sonsorol and Fanna, as were native orchids (Sonsorol species: *Calanthe*, *Nervilia*, *Taeniophyllum*). Understory shrubs and ferns were abundant. Of particular interest was an enormous *Pandanus* (Tob. *vats*, *pohu*; Pal. *ongor*), as yet unidentified, bearing leaves 3-5 m long twisting in giant spirals.

Birds: (20 species: 15 seabirds, 3 shorebirds, 3 water birds, 3 land birds) Estimated total population: 1700-3050. Birds were conspicuous at Sonsorol, in part because of its proximity to Fanna, but also because of the extensive interior forests. Most common were White Terns, Brown and Black Noddies, and White-tailed Tropicbirds (pop. 150-200).

Mammals: Fruit bats (*Pteropus sp.*) were present, but in relatively small colonies.

Land Crabs: Coconut crabs, if still extant, are rare. Villagers now harvest them from Fanna for domestic consumption, give to visiting boats from Koror, and sell them commercially.

Recommendations:

1. That the Sonsorolese particularly heed the general recommendations for all islands, especially regarding non-traditional exploitation of coconut crabs and seabirds.
2. That entomologists visit Sonsorol and Fanna to study the coconut beetle (*Oryctes rhinoceros*), a pest in coconut plantations, and the

scolia wasp (*Scolia ruficornis*), its introduced biological control agent.

3. That restrictions be set on the taking of fruit bats to allow the populations to increase.

FANNA: SUMMARY OF TERRESTRIAL FEATURES WITH CONSERVATION INTEREST

Area: 39.8 ha (uninhabited?)

Vegetation: (4 plant communities, 26 spp. plants, 73% indigenous) Fanna is clothed with tall (to 22 m) lush, closed-canopy forests. Indigenous forests cover 90% of its area. Fanna's forests, seabirds and coconut crab resources are of national and international importance. The coastal and interior forests are replete with stands of *Neisosperma oppositifolia* (Pal. *uaoch*), *Ficus* spp. (Tob. *hiriyo*, Pal. *lulk*), *Cordia subcordata* (Pal. *badrirs*), and *Scaevola sericea* (Tob. *not*, Pal. *korrai*). A 10-ha stand of *Pisonia grandis* (Pal. *mesbesibech*), 14-22 m tall, is notable. This is one of the finest representatives of this ecosystem in the Pacific, even though it is not all virgin.

Birds: (10 species: 7 seabirds, 2 shorebirds, 1 water bird) Total population estimate 23,000-29,000. Fanna supports spectacular seabird colonies; *along with Helen Atoll it is one of the prime seabird islands in Micronesia and the Western Pacific*. Three species were present in colonies of 6000-10,000: Black Noddies (Pal. *bedaoch*), White Terns (Pal. *sechosech*), and Red-footed Boobies (Pal. *kuel*). Since the latter species were driven away from Helen, Fanna constitutes Palau's only colony at present. Similarly with Brown Boobies (Pal. *kuel*) and Great Frigatebirds (Pal. *kedam*). The island has traditionally been a reserve; however, with recent increased access (new motor boat), it is no longer guaranteed protection.

Mammals: Fruit bats (*Pteropus* sp.) are present in unknown numbers.

Reptiles: Of the 3 species of geckos and skinks collected, all are of uncertain identity and could possibly be new species to science.

Land Crabs: Fanna was, until very recently, a coconut crab haven. Commercial sale has depleted their populations considerably. The large ones have been overharvested. Since coconut crabs have been nominated for the Threatened Species list, Fanna's populations should be strictly controlled from now on.

Recommendations:

1. That Fanna be declared a seabird, coconut crab, native forest, and lizard reserve. Future managers could include The Nature Conservancy and U.S. Fish and Wildlife Service, in cooperation with the chiefs and elders of Sonsorol.

2. That 2 or 3 terrestrial biologists return to Fanna to further inventory the plants and birds, and study the reasons for dying tree canopies.
3. That entomologists study the coconut beetle situation (see Sonsorol).
4. That no more ornamentals or food plants be planted on Fanna.
5. That no further land clearing take place.
6. That strict quotas be placed on the taking of coconut crabs to allow populations to recover.
7. That fruit bat populations be allowed to increase, involving restrictions on the numbers killed for human consumption.
8. No dogs, cats, or pet birds be permitted on Fanna, even for visits.
9. No eating of ground-nesting boobies or terns.