

NATIONAL PARK OF AMERICAN SAMOA

RESOURCE MANAGEMENT PLAN

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INTRODUCTION

The National Park of American Samoa is newly authorized (1988), and the land leases necessary for it to be fully established are only now completed (1994). Resource management will be complicated because of the traditional and subsistence uses that are authorized for this park. The park staff is still small (2 people) and the base budget scarcely supports those two. Even general knowledge of the park is not widely known. Hence, this RMP gives a brief conceptual overview of the cultural and natural resources of the new park.

This is the first resource management plan in the Pacific to attempt incorporating the Western Region's R-MAP and CR-MAP analyses in defining base needs for resource management. We propose that R-MAP and CR-MAP analyses be incorporated into plans at all other Pacific parks.

Legislation

Public Law 100-571 of October 31, 1988 which established the National Park of American Samoa has these special provisions:

- The purpose of the park is "...to preserve and protect the tropical forest and archaeological and cultural resources of American Samoa, and of associated reefs, to maintain the habitat of flying foxes, preserve the ecological balance of the Samoan tropical forest, and, consistent with the preservation of these resources, to provide for the enjoyment of the unique resources of the Samoan tropical forest by visitors from around the world."
- The law permits "...agricultural, cultural and gathering uses...in the park for subsistence purposes. . . if such uses are conducted in the traditional manner and by traditional methods."
- The law also requires "... the Secretary, in cooperation with the Governor . . . prepare a general management plan for the park . . . that shall contain specific measures for the protection and preservation of tropical forest resources and archaeological and cultural resources within the park, including, but not limited to, protection of flying foxes and measures to enhance visitation . . ."
- "The Secretary (of Interior) shall establish the National Park of American Samoa only when the Governor of American Samoa has entered into a lease with the Secretary under which the Secretary will lease for a period of 50 years the lands and waters generally referred to in subsection (b) for use solely for purposes of the park."
[The lease has been completed.]

Otherwise the law requires that the park be administered "... in accordance . . . with the provisions of law generally applicable to units of the National Park System. Most obvious of those applicable laws include:

- *National Park Act of August 25, 1916.* "The . . . service . . . thus established . . . shall . . . promote and regulate the use of the Federal areas known as national parks, monuments, and reservations . . . as provided by law, by such means and measures as conform to the fundamental purpose of the said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historical objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."
- *National Trust Act of March 27, 1978.* (P.L. 96-250). "Congress declares that . . . the protection, management, and administration of . . . (the National Parks) . . . shall

be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as . . . directly and specifically provided by Congress."

- *The Historic Sites Act of 1935*. Congress declared that ". . . it is a national policy to preserve for public use historic sites, buildings, and objects of national significance for the inspiration and benefit of the people . . ."

Additionally, the deeds of cession that the U.S. signed when establishing American Samoa a U.S. territory in 1900 provided the Samoan people guarantees of many of their cultural traditions. Perhaps for that reason alone the Samoan people still maintain a strong grasp on their past, which in many ways, still guides the present.

Location

The Samoa archipelago lies in the South Pacific at latitude 13° - 15° south and longitude 168° - 173° west. Its nine inhabited islands are divided into Western Samoa (an independent country) and American Samoa (a U.S. unincorporated territory). American Samoa comprises the east end of the archipelago and consists of five main volcanic islands (Tutuila, Aunuu, Ofu, Olosega, and Tau) and two atolls (Rose and Swains). The national park is in three units-- on the islands of Tutuila, Ofu, and Tau.

Pre-Polynesian Times

Remote islands of isolated oceanic origin typically had a more diverse animal species composition before they were settled by the first humans. The literature records that Tikopia and Hawaii lost many bird species after settlement by the first Polynesian peoples. Little is known of this aspect of Samoa's pre-Polynesian times. But the recent To'aga study on Ofu suggests that in pre-Polynesian times the lands within the park had a much more diverse and abundant seabird fauna than when humans first arrived. In the case of Ofu, not a single species of *procellariid* has survived the 3000 years of human occupation. Among indigenous resident species at the To'aga study site on Ofu, a megapode, five of ten seabirds, and one of three landbirds which were there in pre-Polynesian times are now gone from Ofu. Two of the survivors (*Steminae* sp., *Gallicolumba stairii*) are now on Ofu in only very small, threatened populations. This loss of endemic biodiversity with the arrival of first human settlers is characteristic of isolated island systems throughout Polynesia.

Polynesian Times

The Pacific Ocean covers one-third of the earth's surface but this region has only 7/10ths of one percent of the earth's land. Human colonization of this vast Oceania occurred first during the Pleistocene when Australia and New Guinea were a single continental land mass and had only short water separation from Southeast Asia. People colonized closely adjacent and inter-visible islands during the Pleistocene as well. Remote Pacific islands with large water gaps were not populated until later. This second colonization phase began about 3,500 years ago by peoples known generally as the "Lapida" cultures (from their distinctive ceramics). The Lapida people are ancestor to native island populations in Melanesia, Polynesia, and Micronesia. The earliest horizons at the To'aga study site on Ofu were of Lapita age.

The Lapita ceramics are not found east of Samoa and Tonga. Some speculate that this was the limit of this early Lapita people immigration. Others think the Pacific crustal plate subduction of the ocean floor east of Samoa is carrying downward remnants of the Lapita, and archaeological deposits of this early period can only be found buried below sea level.

Based upon the To'aga site studies, Ofu and the Manua group were colonized between about 1200 - 900 B.C. These dates are similar with earliest human occupancy C¹⁴ dates throughout Samoa. Chickens are represented in the earliest human midden strata at Ofu, but not pigs or dogs. Other early adventive species introduced as stowaways with the first Polynesians included the Polynesian rat, *Rattus exulans*, and five terrestrial molluscs. These species are closely associated with humans. The molluscs are all very small--visible only on close inspection--and were transported inadvertently with plants or foodstuffs brought by the human immigrants. From the studies at Ofu, it seems the pig and dog arrived with later immigrants.

The To'aga site has characteristics similar to other prehistory sites throughout Polynesia which indicate human modifications to the lowland landscape and ecology. Clearing for agriculture, including use of fire, accelerated erosion. (The earliest strata of the site at Ofu has not been fully sampled because it is so heavily covered by later erosion).

From about 500 B.C. gradually expanding populations began to extend inland, and by 350 A.D. there were large inland communities. Expanded settlements across much of Samoa's habitable land suggests continued population growth. The population pattern was dispersed rather than nucleated, and seems associated with agricultural activities. The seacoast was settled as well, with a similar dispersed pattern.

In the late prehistoric period there were large settlements often dominated by large mound complexes. One of these complexes near Mt. Olo in Western Samoa had a dense distribution of house platforms, raised pathways, star mounds, large earth-ovens and possible cook house structures.

Historic Times

First contact with Europeans occurred in 1722, but visits for the next 100 years were mostly unrecorded. In 1787 La Perouse visited Tutuila and made detailed observations, but a misunderstanding with local people led to a fight in which a dozen French sailors died. Samoa gained a bad reputation from this incident and for decades few explorers or other sailors landed. By the time of missionary arrivals in 1832 substantial changes had occurred in Samoa. The pre-European religion had been disrupted. Populations had been decimated by European diseases. Many places, once largely populated, had very reduced numbers. There were deserted villages and remains of plantation walls. By the late 1800's mainly the seacoast was inhabited. Ancient villages in the interior area had become covered with forest. Changes in the settlement pattern were probably caused by population loss from epidemics of European diseases.

Today populations are expanding. In American Samoa most people reside on south side of Tutuila. Most farming is of a subsistence nature. Crops are produced for immediate needs of family or for use as gifts. Main crops are taro, bananas, breadfruit, and coconuts. Other common crops are cassava, lime, papaya, pineapple, and yam. Usually the crops are grown intermixed. A few small commercial farms (none near the park) specialize in vegetables--cucumbers, cabbage, green peas, green peppers, tomatoes, and eggplant.

Many Samoan cultural traits, evolved over time, still exist today. Of concern to the modern concept of national park management are significant cultural traits such as; the communal ownership of land, oral tradition of boundaries rather than written or surveyed, a fierce protection of land and the status land provides a family, and a continued traditional tie to the natural resources the land and sea provide.

Geography and Site Description

The islands of American Samoa are mountainous and covered with jungle. Geographically and biologically American Samoa is at the end of an extension of islands beginning in New Guinea through the Solomons, Fiji, Tonga and Western Samoa. The impact of this geographic position is significant. Beyond American Samoa many terrestrial and marine species and genera disappear.

Geology

Samoa has steep shorelines, rather narrow fringing reefs, and thick sediment aprons. The Samoa islands are formed from volcanoes that are "oceanic" in origin. That is,

they were formed from basalt rising from a "hot spot" on the ocean floor and are well beyond the continental islands farther to the west. The archipelago was born in isolation and has never had connection to any other land area. The islands are Pliocene in origin (over two million years ago) and formed in a westerly direction. Savaii (in Western Samoa) is the youngest and Rose Atoll is the oldest. Pago Pago harbor, which lies just beyond the southern edge of the Tutuila portion of the park, is an ancient collapsed caldera. The Tutuila portion of the park is the exposed northern rim of this volcano. Erosion and land subsidence have formed steep canyons and rugged coastlines.

Tau island is formed from a main shield volcano. The summit of the original volcanic shield collapsed to form a caldera. Explosive cinder cone eruptions in the caldera and northern flanks of the volcano have continued.

Ofu, and nearby Olosega, are a complex of volcanic cones buried by lavas from two merging shield volcanoes. One is a shield volcano centered on the northern coast of Ofu. The high cliffs along the southern shore of Ofu are from faulting and landslides with subsequent debris removed by wave action.

Climate

Samoa, as small islands lying between the Equator and Tropic of Capricorn, has a tropical maritime climate. It has monthly temperatures of more than 18° C (65° F), no winter season, and abundant annual rainfall that exceeds annual evaporation. The park areas have abundant rain and warm, humid days and nights. Rainfall at Pago Pago averages about 125 inches annually, but rain varies greatly over small distances because of topography. Higher elevation portions of the park facing the trade winds have a much higher precipitation-- well over 300 inches annually. The driest time is June through September (winter) and the wettest is December through March (summer), but seasonal rainfall varies widely from year to year. Prevailing winds throughout the year are easterly trades. They tend to be directly from the east in summer and are predominantly from east-southeast and southeast the rest of the year. Tropical storms and hurricanes are common. The most recent hurricanes were Tusi (1987), Ofa (1990), and Val (1991)-- but probability of three strong hurricanes in such close proximity is unusual.

Soils

The soils of American Samoa, including those within the park, were described and mapped by the Soil Conservation Service. Except for local sandy soils near the sea of coral origin, all soils within the park are of volcanic origin. Most are steep, well drained, with shallow profiles and low fertility. They vary from rock outcrop to

moderately deep clay loams. Most soils in Samoa are classified as latosols. The combination of weathering and leaching character of latosols results in soils with little silica, high iron and aluminum, and relatively low fertility. The best soils in the park are suitable for such subsistence crops as bananas, coconut, breadfruit, and taro. All soils support tropical rain forest. The soils near the sea and of coral origin are cobbly sands or mucky sands that are fairly level.

The tropical soils and climate lend themselves to a destructive cycle of "slash and burn" agriculture. Undisturbed forest is cleared of heavy vegetation and planted in taro. Full sunlight is required for taro, but the clearing practice also causes leaching of the already poor soil. In the absence of supplemental fertilizer taro growers, therefore, abandon nutrient exhausted areas and clear new ones-- leaving a trail of disturbed areas to grow in vines and eventually into secondary forests.

Tsunami and Flood Zones

There are no areas within the park that are mapped as flood zone by the Corps of Engineers. There is no area in the park listed as in a tsunami zone, nor is there local knowledge or lore of such an event on the lands within the park.

Land Ownership

All lands within the park are locally owned by the nine villages in the vicinity of the park. The National Park Service has a fifty year lease from the American Samoan Government to use these lands for park purposes. Ocean waters within the park are owned by the territory and the lease with ASG allows waters within the park boundary to be used for park purposes. Land boundaries, titles, specific ownerships, etc., in rural areas are mostly "recorded" in oral tradition. Thus, some aspects of the park's lease ownership and authorities are a bit vague.

In part, there is some sense of "ownership" in individual parcels (or even individual trees) based upon "use" of that parcel. (This is somewhat like the U.S. custom of ownership of water in the American Southwest; if you don't put the water into productive "use"-- someone else can appropriate it). We don't know how the National Park "use" of land by not using it will play out.

MANAGEMENT OBJECTIVES (related to resource management)

Administer the park in accordance P.L. 100-571 (which established the park) and provisions of law generally applicable to units of the National Park System including Acts approved August 25, 1916 and August 21, 1935.

Natural Resources

Manage native terrestrial ecosystems generally in accord with those conditions found prior to European contact in the 1700s.

Control recently introduced (within the last 100 years) alien species found to threaten native ecosystems. Try to prevent introduction and/or establishment of additional alien species in the park.

Identify and give priority protection to keystone or strong interactor species. If their populations are low due to modern anthropogenic reasons, find ways to enhance their numbers.

Undertake cooperative research and resources management activities with Western Samoa (and other countries or territories in the region) to benefit from shared ecosystems and cultures.

Do not use extraordinary means to enhance populations of naturally rare species, or make efforts to re-introduce naturally extirpated species unless found to be strong interactors. The park may manage to enhance populations of traditionally used native or alien species (introduced by early Samoans) that are becoming rare.

The park protects a small island of the Samoan ecosystem within an already small island ecosystem. It is axiomatic that the park does not contain sufficient habitat for wide ranging species like flying foxes or fruit doves - presumed strong interactors in the ecosystem. Park management will place high priority on cooperating with local government and village landowners to assure long-term viability of these species.

Conduct research and management to protect flying fox populations and habitat.

Marine and coral reef ecosystems will be managed to maintain species diversity, existing population structure and unusual growth forms, and to maintain high scientific and conservation value and high aesthetic appeal.

The crown-of-thorns starfish, *Acanthaster planci*, presents a unique management challenge. Although a native species, manage and control the starfish according to a pre-approved management plan when numbers exceed a certain threshold level and threaten the integrity of the park coral reef on Ofu island.

Cultural resources

Identify archaeological and culture sites and protect, manage and interpret them in accordance with the desires of the Samoan people (and in particular, with the desires of the owners of the land on which they are found).

Subsistence Uses

Manage subsistence uses, in scope and extent, as generally found upon park authorization in October 1988.

Pending a more thorough understanding of the impacts of subsistence uses, manage park resources to assure a healthy balance between resource protection and permitted extractive uses. Espouse a "no net loss" philosophy for primary or old growth secondary forest near subsistence use areas in the park. Until the NPS more fully understands population health and habitat requirements for flying foxes and fruit doves, keep ASG's island-wide hunting ban in effect inside the park.

Conduct research to determine historic and contemporary subsistence uses of park terrestrial and marine resources and formulate sustained use strategies to minimize unacceptable impact on those resources.

Successful implementation of the park's resources management plan depends upon informed and cooperative landowners. Park management will place high priority on educational activities directed toward park villages and individual landowners.

PRESENT CULTURAL RESOURCE STATUS

Cultural Resource Baseline Information

Cultural resources of the park are unknown. No cultural resource inventories for any areas of the park have been conducted. There are neither any LCS listed sites nor places on the National Register within the park. Still, we speculate that the park is rich in archaeological sites.

The "To'aga Site" adjoins the park at Ofu. To'aga spans 3000 years of human occupation based upon a radiocarbon sequence that is the largest suite of dates from any single archaeological site in the Samoan archipelago. The site is highly significant and spans virtually the entire prehistory sequence of the Samoan archipelago. Initial occupation of the site began about 3500 b.p., contemporaneous with the Mulifanua Lapita site on Upolu Island. To'aga has a single stratigraphic record from about 1500 B.C. to A.D. 800. No other single site locality in American Samoa has yet produced such a continuous occupation sequence spanning the whole of regional prehistory. To'aga has been nominated to be placed on the National Register.

Currently Dr. Terry Hunter of the University of Hawaii is on contract to "Prepare an Archaeological Overview and Assessment" of the park (project C001). He is behind schedule preparing this overview, mostly because it is a big task. We have a draft and a good bit of material. His assessment more and more indicates that the park contains very significant archeology (notwithstanding that this is a 'natural area' park).

Current Ethnographic Situation

The park is entirely composed of lands leased from nine native villages. To our knowledge no one resides permanently on the park lease lands, but substantial areas are subsistence farmed. The waters and land are subject to subsistence gathering, and fishing that is permitted by American Samoa law. There is a first cut of a GIS map of existing subsistence farmlands in the park.

Jocelyn Linnekin and Terry Hunt of the University of Hawaii are contracted to "Prepare an Ethnographic Overview and Assessment" of the park (project C003). This study has just begun.

Major Issues

First speculative inventories of the park's resources indicate that conflict does exist

between some subsistence farming practices and preservation of the rainforest ecosystem, and between subsistence use of the reef and preservation of some vulnerable reef species. Resolution of this conflict will be long, and will entail careful and defensible inventory of both subsistence uses and the impacted resources; explaining and convincing village councils of the data validity; developing objectives and strategies to harmoniously manage both subsistence uses and resource preservation.

Cultural Context/Themes

The park land itself is uninhabited-- but these lands are owned by nine traditional Samoan villages. Lands and waters of the park are used by village residents for subsistence agriculture and fishing, gathering traditional and medicinal materials, and as sacred or traditional sites.

The Park represents the "Native Cultures of the Pacific" subtheme of the National Park System.

PRESENT NATURAL RESOURCE STATUS

Most biota in Samoa have an Indo-Malaysian affinity, and for many forms southeastern Polynesia represents the easternmost extension of their distribution. Nearly 93 percent of the plant species from undisturbed habitats are native species (and most are also found in Fiji).

All island ecosystems are particularly fragile. Because of their small size and geographical isolation most islands of the tropical Pacific have low species diversity. Life forms with limited powers of dispersal over salt water, including amphibians and non-flying mammals, are virtually absent from these islands. Yet despite low species numbers, Pacific islands are home to many endemic species and subspecies as result of long periods of evolution in isolation. Pacific islands are home to some of the world's most spectacular adaptive radiations, including the Hawaiian honeycreepers, the partulid land snails, and fruit-doves of the genus *Ptilinopus* and fruitbats of the genus *Pteropus*.

The limited species diversity of Pacific islands may have far-reaching ecological consequences. Some important ecological functions, such as pollination and seed dispersal, may be performed by only a single species. As a result, the consequences of extinctions may be severe and widespread. Species on islands are highly vulnerable to extinction. For example, one-third of all known threatened plants are island endemics, and 90% of the bird species that have gone extinct in the past 400 years lived on oceanic islands. The reasons for this are: high vulnerability to introduced predators, competitors, diseases, habitat loss, lack of protected areas to escape over hunting and natural disasters such as tropical cyclones.

Little untouched primary rainforest habitat exists in the Samoan archipelago, although in American Samoa some old secondary growth forests are nearly indistinguishable from primary forest. Prior to European contact the inland areas of Samoa were extensively cultivated.

The arrival of the first Europeans dramatically accelerated the process of human modification of the Samoan ecosystem. Far more plant and animal species have been introduced in the past 200 hundred years than in the preceding 3000 years. These introductions have been both accidental and deliberate and have caused major ecological disruptions. Some of the most harmful recent introductions include: Koster's curse, *Clidemia hirta*, mile-a-minute weed, *Mikania micrantha*, the cannibal snail, *Euglandina rosea*, the Jungle and Common Mynas, *Acridotheres fusca*, and *A. tristis*, and the black rat, *Rattus rattus*). Fortunately, some potentially catastrophic introductions, including the mongoose and the brown tree snake have not yet occurred.

Still-- for small Pacific island ecosystems at this point in time, the biodiversity of the park's lands and waters is surprisingly complete. No species have been lost and there remains opportunity to protect the whole of these natural environments.

In American Samoa, a rapidly growing population (with a doubling time of only 19 years), growing affluence, and a strong desire for economic development ensure increasing pressure on the remaining native forests and coral reefs. There is a curious phenomenon occurring today in American Samoa. Subsistence uses and their concomitant impacts on resources are on the decline. However, the increasing affluence of contemporary Samoans encourages and permits perhaps more insidious impacts, such as road building and homesite development into heretofore inaccessible areas. Although traditional subsistence uses are declining, while they occur they will be encouraged and are permitted by law. At this time the full range of subsistence uses such as agriculture, hunting, medicinal plant collecting, fishing, etc., is not extensively known nor its impact on the native ecosystem. Archaeological, historic and ethnographic surveys will further define the extent and impact of these uses. Many contemporary Samoans possess an impressive amount of knowledge about nature based on direct observation and folk wisdom passed down through the ages. Park management will find that folk wisdom and modern biology may differ in many aspects in defining and understanding the Samoa ecosystem. However, resource managers stand to gain important insights into the ecosystem by devoting time to understanding and listening to knowledgeable Samoans.

For a new area, the National park of American Samoa is blessed with a good beginning base of information about the terrestrial ecosystem from which to base resources management guidelines, goals and objectives. Marine resources and cultural resources are less clearly defined at this time but no less important to understand or manage. The following guidelines reflect this weighting toward terrestrial resources while needed research is being done for marine and cultural resources.

Natural Resource Baseline Information

At this writing-- Samoa has an impressive accumulation baseline information for a new park. Whistler completed botanical inventories for the entire park. The land base, topography, and lease details are recorded on GIS. Engbring has completed excellent bird and fruit bat inventories. A recent check list of marine fishes of Samoa is in hand, and detailed inventory and monitoring protocol is established at Ofu Reef. The Ofu Reef is mapped in detail on very large scale GIS. We have let a contract to fly detailed stereo, false color photo coverage of the Tutuila and Tau units of the park. Amerson, et al., *Wildlife and Wildlife Habitat of American Samoa* in 2 volumes is an excellent inventory of the national park habitats, and the *Atlas of American Samoa* by U.H. and the Government of American Samoa is an excellent baseline database. (The park's GIS topography was derived by scanning the original topography mylars used in making the Atlas).

The current materials digitized on the park's GIS are listed in the appendix.

Natural Resources

The National Park of American Samoa is in itself a highly significant representation of the natural park system natural themes *Coral Islands, Reefs, Atolls; Tropical Ecosystems; and Marine Environments*.

Animals

Typical of isolated island tropical ecosystems, Samoa has a depauperate mammalian community. The only terrestrial mammals native to Samoa are three species of bats. The two species of flying foxes (fruit bats) are essential to maintaining the tropical rainforest. Bats function as vital pollinators and seed dispersers in the ecosystem. One species is diurnal. That, along with its three foot wing span and graceful soaring, makes it particularly popular and accessible for viewing and research. The importance of flying foxes in the ecosystem is specifically mentioned in the authorizing legislation. Only two individuals of the diminutive sheath-tailed bat have been seen since Hurricane Ofa in 1990. It is likely that they will soon be extirpated from American Samoa.

For a small isolated island, American Samoa has a diverse avifauna, although not nearly as rich as on larger land masses. More species of birds are found than all reptiles, amphibians and mammals combined. There are 42 resident breeders, 19 of which are land and water birds, 20 are sea birds and 3 are alien introductions. There are a total of 18 migrant bird species. Of the resident and migrant bird species, seven are considered to be vulnerable and potentially endangered species candidates.

Thirteen species of amphibians and reptiles are thought to be found within the park. Two species are introductions, the marine toad and house gecko. The threatened green sea turtle and the endangered hawksbill turtle are known to have nested on park beaches. The Pacific boa, found only on the island of Ta'u, is the only snake occurring in American Samoa. Ten species of skinks and geckos make up the most readily visible herpetological fauna in Samoa. Of the invertebrate fauna, preliminary findings suggest that the native partulid snails are rapidly disappearing in face of the onslaught of a predator snail brought into Samoa to control the introduced African tree snail.

Marine Resources

Samoa's marine environment is a complex and highly diverse ecosystem that is only

now being studied. The coral reef on Ofu island has about 150 species of corals - three times the number of species in the Caribbean national parks. One species, the blue coral, *Heliopora coerulea*, is a CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) species. The reef is of great interest to science. It has highly unusual 300 year old *Porites* micro atolls and many species are at the easternmost extension of their range. As a fringing reef this area is also easily accessible to visitors and subsistence fisherman. Over 900 species of fish reside in the waters of the Samoan archipelago.

Freshwater resources

There are only a few very small freshwater streams, and no lakes or ponds, within the park. Fifteen short small perennial streams are on the steep, north shore rainforest of Tutuila. All are less than a half mile long and are unnamed. Three streams (Gaoa, Lausa, and Mulivai Streams) enter Vatia Bay from the park. None of these are more than a few miles long. Two intermittent streams (Laufuti and Saua Streams) drain part of the crater on Tau. To our knowledge there are no studies or inventories of these freshwater environments.

Terrestrial plants

American Samoa is the only US territory south of the equator and its most remote. By virtue of its location at 14 degree south latitude and 179 degrees west longitude, Samoa is considered a paleo-tropical ecosystem in the humid tropics of the South Pacific. The 5 main islands of American Samoa are volcanic in origin. Rugged coastline, steep mountains, deep valleys, white sand beaches and large tracts of verdant green rainforest provide Samoa scenic status nearly unparalleled in the South Pacific. Western Samoa is an independent nation less than 50 miles from American Samoa. This is a political division only, the culture and the natural resources are shared.

Samoa is a volcanic archipelago formed from basalt rising from a hot spot on the ocean floor. The archipelago is isolated and never had connection to other land areas. These are old islands that were formed in the Pliocene. Erosion and land subsidence have formed steep canyons and rugged coastlines.

The Samoan archipelago has been inhabited for 3,000 years and is extensively modified by human activity. Probably two thirds of the native vegetation of the archipelago has been severely altered by human activity and natural disasters. The park, especially on the island of Ta'u, contains the best remaining areas of native

vegetation in Samoa. There are approximately 380 species of native plants and about 120 naturalized species in American Samoa, the majority of which are found within the park boundaries.

Although there is only a 1% endemism rate in the flora of American Samoa, there is a 30% endemism rate in the archipelago. Considering it is estimated that Western Samoa has less than an estimated 10 years of native forest left at current rate of exploitation, the flora of the park takes on a very great significance. NASA will be home to nearly 50% of the native vascular flora in the entire archipelago. Also, because of its sub-equatorial location, the park flora represents the easternmost extension of the Indo-Malay tropical ecosystem.

Typical of isolated island tropical ecosystems, Samoa has a depauperate mammalian community. The only terrestrial mammals native to Samoa are 3 species of bats. The two species of flying foxes (fruit bats) are considered essential to maintaining the tropical rainforest. Bats function as vital pollinators and seed dispersers in the ecosystem. One species is diurnal, that along with its three foot wing span and graceful soaring, make it particularly popular and accessible for viewing and research. The importance of flying foxes in the ecosystem is specifically mentioned in the authorizing legislation. Only two individuals of the diminutive sheath-tailed bat have been seen since Hurricane Ofa in 1989. It is likely that they will soon be extirpated from American Samoa.

For a small isolated island, American Samoa has a diverse avifauna, although not nearly as rich as on larger land masses. More species of birds are found than all reptiles, amphibians and mammals combined. There are 42 resident breeders, 19 of which are land and water birds, 20 are sea birds and 3 are alien introductions. There are a total of 18 migrant bird species. Of the resident and migrant bird species, seven are considered to be vulnerable and potentially endangered species candidates.

Thirteen species of amphibians and reptiles are thought to be found within the park. Two species are introductions, the marine toad and house gecko. The threatened green sea turtle and the endangered hawksbill turtle are known to have nested on park beaches. The Pacific boa is the only snake occurring in American Samoa and is found only on the island of Ta'u. Ten species of skinks and geckos make up the most readily visible herpetological fauna in Samoa. Of the invertebrate fauna, preliminary findings suggest that the native partulid snails are rapidly disappearing in face of the onslaught of a predator snail brought into Samoa to control the introduced African tree snail.

The marine environment is another complex and highly diverse ecosystem, that is only now being studied. The coral reef on Ofu island has about 150 species of corals - three times the number of species in the Caribbean national parks. One species, the

blue coral, *Heliopora coerulea*, is a CITES species. The reef is of great interest to science. It has highly unusual 300 year old *Porites* micro atolls and many species are at the easternmost extension of their range. As a fringing reef this area is also easily accessible to visitors and subsistence fisherman. Over 900 species of fish reside in the waters of the Samoan archipelago.

Geographically and biologically American Samoa is at the end of an extension of islands beginning in New Guinea through the Solomons, Fiji, Tonga and Western Samoa. The impact of this geographic position is significant. Beyond American Samoa many terrestrial and marine species and genera disappear. In this context the National Park of American Samoa is not only important in the U.S. because of its unique paleotropical ecosystem but it is equally important regionally as an end point in the process of ecological filtering beginning in Southeast Asia.

Superimposed on this diverse natural history is a ancient culture that first plied these waters and planted the soil around 3,000 years ago. They brought with them pigs, fowl, dogs, bananas, taro, coconut, breadfruit, pandanus, paper mulberry and other accoutrements to form a new culture. The islands contain many archaeological sites, remnants of these ancient pre-Polynesians and their offspring. They also left behind many sites of legendary importance, which are still prominent in today's more contemporary culture. Knowledge of pre-Euro-American contact history of American Samoa is quite limited due to the lack of archaeological research. But the little that has been done suggests a considerably richer archeological resource than previously suspected. Recent finds include pottery-bearing sites, star mounds, ridge-top villages, and additional basalt quarry\adze manufacturing sites.

Many cultural traits, evolved in a crucible of millennia, still are manifested today. Of concern to the modern concept of management of a national park are significant cultural traits such as; the communal ownership of land, oral tradition of boundaries rather than written or surveyed, a fierce protection of land and the status land provides a family, and a continued traditional tie to the natural resources the land and sea provide.

The deeds of cession that the U.S. signed when making American Samoa a U.S. territory in 1900 provided the Samoa people guarantees of many of their cultural traditions. And probably for that reason alone the Samoan people still maintain a strong grasp of their past, which, to a large degree, still guides the present.

A national park for American Samoa will attempt to protect outstanding natural and cultural resources while also permitting traditional subsistence uses. A resources management plan is particularly important at this time because the natural and cultural resources of Samoa are threatened by human and natural causes. The park's resources management strategy must be based on a thorough understanding of

natural processes. The goal is to protect native ecosystems and neutralize harmful human influences. There are several characteristics unique to island ecosystems in general and some specifically to Samoa that will guide resources management goals and objectives.

Major Issues

- a Inventory existing agricultural subsistence use with the people engaged in this farming. Contract aerial photo coverage in 1994 or '95 as baseline evidence of subsistence use.
- b Inventory existing Ofu reef subsistence use with people engaged in it, and devising monitoring protocol of critical species involved (in part using subsistence people).
- c Develop a emergency action plan (with Environmental Assessment) for *Acanthaster* outbreak potential at Ofu Reef.
- d Monitor and evaluate flying fox and dove populations.

R-MAP & CR-MAP ANALYSES

R-MAP (Resource Management Assessment Program), and its cultural component CR-MAP, is a process designed to identify a park's base funding needs to reasonably protect and preserve its natural and cultural resources. It is particularly valuable for a new park such as this since it develops a rationale for staffing based upon parks of comparable resource complexity. The following table contains the first inventory for those R-MAP/CR-MAP for which we have enough knowledge to make entries.

Table 1. R-MAP/CR-MAP Profile 10/7/93 (for only non-0 entries)

GEOGRAPHICAL COMPONENTS		
1	Total Acres	9,000
2	Miles of Boundary	ca. 25
3	Number of 7.5' USGS Quadrangles	3
4	Elevation Range	0-3123'
5	Miles from Pk Hqt to Center of Park	70
6	Primary Access to the Park	air
VISITATION, over previous 3 years		
7	Park Visitation	12000
ROADS, TRAILS AND DISTRUBED AREAS		
11	Total Road Network	15
12	Miles of Abandoned Road	4
13	Number of Trailheads	3
14	Miles of Trails in Backcountry	—
TERRESTRIAL		
18	Forest Acres	6000
19	Scrubland Acres	1000
WETLANDS AND DEEPWATER HABITATS		
22	Estuarine acres	?
23	Deep Marine Acres	?
24	Shallow Marine Acres	2720
25	Intertidal Unconsolidated Acres	?
26	Intertidal Other Acres	
27	Surface Riverine Miles	10
37	Palustrine Acres	5
SHORELINE PROCESSES		

43	Miles of Ocean Shoreline	17
GEOPHYSICAL PROCESSES		
53	# Rockslides/Landslides	3
NATIVE SPECIES -- GENERAL		
55	Native Terrestrial Vascular Plant Species	415
56	Native Aquatic Plant Species	<100
57	Native Resident Terrestrial Vertebrates	58
58	Native Aquatic Animal Species	1090
ALIEN SPECIES		
59	Number of exotic Plants	<150
60	Area Impacted	12
61	Area to Treat	100
62	Number of Exotic Animals	7
63	Area Impacted by Exotic Animals	11100
64	Extic Animals to Control	0
THREATENED AND ENDANGERED SPECIES		
72	Candidate Category Animal Species	3
AIR QUALITY		
89	Park Air Classification	I
	Air Quality Condition	1
FISHING, HUNTING AND TRAPPING		
117	Aquatic Species Harvested	50
118	Angeler Use Days	?
SUBSISTENCE AND AGRICULTURAL USE		
121	Subsistence/Cultural Plant Species Used	5
122	Number of Users of Such Plants	500
123	Subsistence/Cultural Animal Species Used	100
124	Number of Users of Such Animals	500
125	Agricultural Uses Acres	200
CONTIGUOUS OR OVERLAPPING AUTHORITIES		
127	Overlap State (Territory)	1
128	Overlap County (Islands)	3
129	Overlap Cities (Villages)	9
PLANS COMPLETED OR IDENTIFIED IN THE RMP AS NEEDED		
130	Full Resource Management Plan	Y
133	Land Protection Plan	N
# COMPLIANCE DOCUMENTS IN PREVIOUS 5 YRS		
162	Rights of Way or Easements	1
	Acreage of easements	10
	Total research	20

CULTURAL COMPONENT

301	Forest & Scrub	6000
314	Publications Needed	1
327	Needed Historic Report	1
330	Needed Park Admin Hist	1
329	Needed Historic R	
345	Needed Cultural L	3
346	Needed Doc, Eval	1
347	Needed Cultural reports	3

CULTURAL RESOURCES

366	Needed Ethno Overview	1
367	Needed Oral/Life	3
368	Trad Use S	3
369	Cultural Affil	3
370	Needed REAP #	1
371	Subsistence Use Acres	400
372	Trad Use #	20
373	Ethnic Groups	9
374	Critical Issue In	2
378	S 106 # 3yr	1

Table 2. Total Natural FTE Derivations from the Tables

Related to Native Vegetation and animals	11.67
Related to fishing and hunting patrol	2.12
Related to Natural Resource Research	4.05

Access Factor -- 1.325

Total Natural w/ access	17.87
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Table 3. Total Cultural FTE Derivations from the Tables

Archaeological survey	9.94
Cultural Studies	1.06
Total Archaeological and ccultural studies	11.00
Subsistence Uses	0.40
Traditional Uses	0.27
Cultural Reports	0.13
Library and Curatorial	0.13
Total Subsistence, traditional and curatorial	0.93
Access Factor -- 1.325	
Grand Total Cultural with Access Factor	_____

Table 4. Related Workload Generated

GIS Data Management	3.60
Interpret Resources	4.49
Management	5.50
Administration	4.55

CURRENT FUNDING AND PERSONNEL

Table 5. NPS Resources Personnel current year

Chief Ranger position ½ of time

Table 6. NPS Resources Funding, natural and cultural, current year

Ethnographic Overview and Assessment - Jocelyn Linniken

Archaeological Overview - Terry Hunter

Ofu Reef Inventory and Monitoring - Corial

Aerial photo coverage -

Fruit Bat Study - Sandra Banack

Locate Whistler and Ofu transects with GPS - Lane-Hamasaki & Fake

RESOURCE MANAGEMENT ORGANIZATION CHART and PERSONNEL

Natural and Cultural Resources Projects Programming Sheets

Program Sheet 1, Current Year Funded Cultural Resource Activities

Program Sheet 1, Current Year Funded Natural Resource Activities

Program Sheet 2, Unfunded Cultural Resource Activities

Program Sheet 2, Unfunded Natural Resource Activities

Project List By Priority.

Natural Resources Project Statements Funded Program Statements

Natural Resources Project Statements Unfunded Program Statements

Cultural Resources Project Statements: Funded Program Statements

Cultural Resources Project Statements, Unfunded Program Statements

APPENDICES

Appendix A. List of Related Action Plans.

National Park Feasibility Study, American Samoa. July 1988.

Statement for Management. 1994

Appendix B. Annual Project Status and Accomplishments.

The following are accomplishments during the past year (FY94):

C-001 Prepare Archaeological Overview and Assessment.

Dr. Terry Hunter is behind schedule preparing this overview, mostly because it is a big task. We have a draft and a good bit of material. His assessment more and more indicates that the park contains some very significant archeology (notwithstanding that NASA is a 'natural area' park). For example, the To'aga Site at the Ofu unit of the park is highly significant and spans virtually the entire prehistory sequence of the Samoan archipelago. Initial occupation of the site began around the close of the second millennium B.C., contemporaneous with the Mulifanua Lapita site on 'Upolu Island. To'aga has a stratigraphic record from ca. 3000 B.C. to A.D. 800. No other single site locality in American Samoa has yet produced such a continuous occupation sequence spanning the whole of regional prehistory.

Hunt, T. L. and K. Stark. 1992. An Archaeological Overview of Samoa, DRAFT. Cooperative National Park Resources Study Unit, University of Hawaii at Manoa.

C-003 Complete Ethnographic Overview and Assessment

We are attempting to negotiate a contract with Jocelyn Linnekin and Terry Hunt, through the CPSU, but as yet, this is not complete.

Conduct Botanical Survey of Tau

Dr. W. A. Whistler has furnished a *Draft of Botanical Inventory of Proposed*

T'au National Park, American Samoa in July 1991. We do not have the final publication yet. This summer Pacific Area Office personnel plans to accompany Whistler to Ta`u with Global Positioning System (GPS) equipment to pinpoint locate his permanent transects.

Whistler, W. A. 1991. Botanical Inventory of Proposed Ta'u National Park, American Samoa, DRAFT. Cooperative National Park Resources Study Unit, University of Hawaii at Manoa.

N-003 Monitor, Manage Flying Foxes

The park funded John Engbring's (U.S. Fish and Wildlife Service) travel to American Samoa to re-run his old flying fox transects run prior to the recent typhoons which have devastated the flying fox populations. Engbring re-ran these with Dr. Pepper Trail, biologist from American Samoa Department of Land and Natural Resources. The bat populations are significantly down, and *samoensis* is being considered as a candidate endangered species.

Wilson, D. E. and J. Engbring. 1993. Status of the Fruit Bat, *Pteropus samoensis*, in Samoa. Report to the National Park of American Samoa. 47 pp, mimeo.

Currently Sandra Banack is continuing her studies of flying fox food habits and behavior. She is operating out of the park office (even though we currently have no staff at all).

N-002 Control Acanthaster (Crown-of-Thorns Starfish)

Dr. Leon Zann of Australia made a careful on-site review of the Ofu Reef and offered insights on management and policy related to subsistence use, visitor snorkling use, and management strategies for possible future crown-or-thorns outbreaks. The draft report present excellent strategies based upon Australian and other South Pacific coral reef natural history and management practices.

Zann, Leon. 1992. Crown-of-Thorns Starfish, *Acanthaster planci* In the Proposed Ofu Marine Park, American Samoa. Recommendations on Policy and Strategies, DRAFT. Cooperative National Park Resources Study Unit, University of Hawaii at Manoa.

N-006 Monitor Coral Reefs, Particularly Ofu.

Work to date has produced an excellent GIS base map of the reef (down to the individual coral head). Hunter's survey gives individual checklists for fauna and underscores the dramatic biodiversity of this tiny reef. They recorded some 64 coral species, 13 of which represent their easternmost distribution in the Pacific; and 289 fish species of 47 families. Their lists include macro invertebrates, green seaweeds, brown seaweeds, red seaweeds and fishes.

Hunter, C. L., et al. 1993. Ofu Reef Survey, Baseline Assessment and Recommendations for Long-Term Monitoring of the Proposed National Park, Ofu, American Samoa. Report to the National Park Service, Pago Pago, American Samoa.

Appendix C. Resource Inventory Atlas

The following materials digitized on the park's GIS include the following:

- topography (contour maps)
- boundaries of park and lands
 - Congressionally authorized boundaries
 - Land Lease boundaries
 - Managed lands
 - Road Corridors
 - Native forests
 - Inholdings
- Vegetation type maps, Tutuila and Tau
- Soils-- part of Tutuila
- Management Zoning
- Ofu road and detailed location of electric poles
- Ofu Reef bottom, corals,

Bibliography