THE CORAL REEFS
OF THE
MANU'A ISLANDS, AMERICAN SAMOA

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David Itano, Chief Fishery Biologist
and
Troy Buckley, Fishery Biologist

Department of Marine and Wildlife Resources
American Samoa Government
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INTRODUCTION

The coral reefs and reef fish communities of the Manu'a Islands (Ofu, Olosega and Ta'u Islands) were surveyed by a team of biologists in 1978. Information gathered during these surveys is recorded in the American Samoa Coral Reef Inventory (AECOS 1980) and the associated atlas. The AECRI contains a great deal of information concerning the coral, fish, algae and marine invertebrate reef communities of American Samoa. The study produced charts of the significant reef features and substrate types surrounding Tutuila, Aunu'u, Ofu, Olosega and Ta'u Islands and also provides information on shoreline subsistence fishing, recreational activities, special management areas and general shoreline observations. However, reef descriptions of the Manu'a Islands provided by the AECRI are primarily limited to the fringing reef flats of Ofu and Olosega Islands and only the reef flat areas adjacent to the villages on Ta'u Island. These reef flat areas are generally low in reef fish and coral diversity.

The observations reported in this paper are a result of surveys conducted by Department of Marine and Wildlife Resources (DMWR) biologists from 1986 to May 1990 and are intended to supplement information provided by the AECRI. Most of the reef descriptions are of the productive outer reef slope between 50 and 200 meters in depth and should be of value to recreational divers, resource managers and researchers. In Samoan coral reefs, this zone usually begins at the base of the outer reef flat margin and ends where the base of spur and groove or outer reef terrace formations meet relatively flat sand or pavement areas. This zone is high in biotic diversity and productivity and important for recreational, subsistence and commercial fisheries. Observations of this zone were made by biologists by diving behind small craft, snorkeling and scuba diving.

The DMWR Fisheries Research Division has permanent reef fish and coral monitoring stations on all three Islands of the Manu'a Group located near the villages of Ofu, Olosega, Sili and Ta'u (Figures 1 and 6). Hard and soft corals and reef fish are periodically monitored at these stations using scuba gear and standardized methods. The results of these surveys will also be reported in this document.

Additional observations and necessary corrections will be added to this document as they become available.
REEF DESCRIPTIONS

OFU AND OLOSEGA ISLANDS

The Islands of Ofu and Olosega were formed by the same group of volcanic cones but have undergone extensive erosion and subsidence. A fringing reef continues to join Ofu and Olosega but the islands are now separated by the narrow Asaga Strait. The following reef descriptions will regard both islands as having a single, continuous fringing reef (Figure 1). Descriptions of the outer reef slope will begin in the southeast at Maga Point (Figure 2), Olosega and proceed around Ofu in a clockwise direction (Figure 3) and end at Leaumasili Point, northern Olosega (Figure 4). The reef areas of eastern Olosega Island from Leaumasili Point south to Maga Point have not yet been surveyed. The following descriptions are numbered according to the areas labelled in Figures 2, 3 and 4.

OLOSEGA ISLAND - SOUTH SHORE

Maga Point to Vaisaili Point. (Figure 2).

1. The area west of Maga Point has a spur and groove topography that slopes gently outward but has very little live coral. Small encrusting coral colonies are evident in the crevices. There is no defined reef flat in the area surrounding Maga Point, the coastline consists of basalt boulders and cliffs.

2. Near the area where a reef flat has developed there is a gradual increase in the percentage of live coral cover. Small encrusting and massive colonies cover about 40 to 50 percent of the bottom. Species diversity is fairly high.

3. The spur and groove formations and the coral cover decrease to a broad flat shelf with little relief. Almost no live coral cover exists and the few colonies are very small.

Vaisaili Point to Pouno Point.

4. In the area of Vaisaili Point there is a 100 meter stretch of approximately 50 percent coral cover. The coral cover is dominated by corymbose and tabular Acropora colonies from 30 to 40 cm in diameter of several species. The topography is quite flat.

5. A spur and groove area with live Acropora irregularis (= A. danae) patches gradually appears then disappears. A broad shelf with small Acropora colonies resumes.
6. The reef becomes steeper and has greater than 50 percent coral cover dominated by a high diversity of circular corallobases, digitate or thick plate-like Acropora colonies about 40 cm in diameter. On the outer shelf, some tabular Acropora colonies are conspicuous.

7. The shelf broadens and has some branching Acropora colonies.

8. The reef cover diminishes to a broad, flat shelf with little reef.

Poughui Point to South Asaga Strait.

9. The low coral cover on the broad shelf is interrupted at this point by a 200 meter long section of small Acropora colonies about 30 cm in diameter. Abruptly, the low coral cover resumes.

10. The bottom begins to slope more steeply and some large colonies of Acropora irregularis appear separated by areas with about 50 percent coral cover of encrusting and massive, 30 to 40 cm diameter colonies of several species.

11. Ridges covered with live and dead Acropora irregularis colonies are separated by sand and boulder-strewn channels.

12. Offshore from Oiosega Elementary School the topography becomes very irregular with many large, distinctive coral formations. The bottom slopes gradually to 15 meters where large sand pockets and channels are evident. Coral diversity is high from 2 to 12 meters although the area is visually dominated by massive colonies of Porites rus measuring 2 to 3 meters in length and 2 meters in height. Below 12 meters, several large conical "bommes" of Porites lutea are evident. Many coral genera are present in the area and include Acropora, Montipora, Galaxea, Pavia, Pavites, Leptastrea, Turbinaria, Stylophora, Pocillopora, Goniatrea, Pavona, Coscinaraea, Fungia, soft corals and others. Sand channels are also numerous and increase with depth. A large ledge anchor is embedded in the coral at a depth of 16 meters offshore from the Oiosega Elementary School. There are three areas (reef channels) immediately north of this area and the surface water can become murky from water exiting the reef flat.

Reef Fish Observations - Oiosega Village.

The reef slope in this area is very different from adjacent areas and is characterized by large coral formations on a gentle slope. Large reef fish and schooling snappers seem to prefer this habitat over adjacent reef areas. Large scarids are relatively common and include Scarus gibbus, S. harid, S. frenatus, S. tricolor and S. schlegeli. Large individuals of Cheilinus undulatus and Balistoides...
viridescens were observed and a large school of Macolor ciger were present. Siganus montosum, L. fulvus, Prionurus grandis, G. olivaceus, A. clarkii, T. rufa, Melichthys niger and Epibulus insidiator were conspicuous.

The reef off Olosega Village offers excellent opportunities for recreational diving, snorkeling and underwater photography due to the high diversity of large reef fish, corals and varied underwater topography.

13. The reef drops more steeply to 20 meters. Large Porites formations and soft corals are the dominant bottom cover until a large deep sand channel forms near the western end of the village. After the steep walled channel the coral diversity increases with some Acropora irregularis and large colonies of Lobophyllia. Most of the live A. irregularis is growing on top of large dead colonies of the same species. The sand bottom at about 20 meters becomes more prominent with increasing distance from the village.

14. The reef begins to slope less steeply and the coral cover decreases to a gradually sloping reef front south of the Olosega bridge. This area has many small sand pockets and channels gradually sloping to meet a flat sand bed offshore. Soft coral colonies and small hermatypic corals dominate the area.

Asaga Strait.

15. A large ava bisects the reef south of Asaga Strait and leads to the channel through Asaga Strait. Large thickets of dead branching Acropora are evident south of the Olosega bridge. A significant current generally flows northward through the strait and can become very strong during periods of high swell and tide. Large colonies of Porites lutea and P. cylindrica dominate the channel north of the bridge.

OFU ISLAND - SOUTH SHORE

South Asaga Strait to Fatuua Point.

16. The reef front west of the Asaga Strait channel begins to slope more quickly and the sand pockets disappear. Spur and groove reef formations meet a sandy base at 20 to 30 meter depths. Most ridges are covered with large colonies of dead Acropora irregularis encrusted with thick growths of coralline algae. Live A. irregularis branches are growing among the dead coral beds and the area is re-populating with soft corals, Favids, Acropora Galaxea, and many other corals. This area resembles coral reefs on Tutuila that were depopulated by the crown-of-thorns starfish, Acanthaster planci, in 1977 - 1978.
Fatuaga Point to Toaga.  (Figures 2 and 3).

17. The spur and groove formations with large colonies of dead, coralline algae encrusted *A. irregularis* continue.  This type of substrate is typical past Fatuaga Point to Toaga with fluctuations in the diversity and the amount of live coral repopulating the reef.  There are three or four small, inconspicuous avas along this stretch of coastline where water exits the wide reef flat of southern Ofu Island.  Coral recolonization seems to be greater offshore from these avas.

Toaga to Papalola Point.  (Figure 3).

18. At Toaga the bottom changes to flat, hard pavement with very little coral cover or relief.  Several *Tridacna maxima* were observed.

19. The dead patches of *A. irregularis* begin again with the same patterns described above (refer to number 17).

20. The bottom returns to a flat, hard pavement with very little coral cover or relief.

21. At Fatuana Point the dead *A. irregularis* colonies take over with the same patterns as described above (refer to number 17).

22. There is an ava offshore from the runway breakwater at the eastern end of the Ofu Airport.  This area is characterized by large live thickets of *A. irregularis* with a high diversity and abundance of *Acropora* colonies (30 to 50 cm in diameter) recolonizing the area.

23. The live coral disappears and an area of flat, hard pavement with little coral cover extends to the west end of the airport runway.

Papalola Point to Nu'usilaelae Island.

24. At the western end of the Ofu Airport there is a gradual increase in the number of coral colonies and the coral cover reaches about 70 percent.  *A. irregularis* and *A. hyacinthus* are the most conspicuous species.

25. At a point west of the runway, offshore from a pile of large basalt rocks on the beach, the amount of live coral gradually decreases.  The substrate returns to flat pavement with little coral cover or relief.
26. Offshore from the next pile of basalt rocks on the beach, there is a sudden increase in live coral cover. Large colonies of Porites, Lobophyllia, Faviids, A. hyacinthus, D. cytherea, A. irregularis, and other species contribute to nearly 100 percent live coral cover.

27. The live coral cover remains high, but the composition of the coral cover changes closer to Ofu Village. The diversity decreases although tabular Acropora disappears with branching A. irregularis dominating the shallower areas of the reef.

28. Species of Acropora dominate the coral cover. Acropora (humilis group) *, A. irregularis, and A. cratiformis are abundant on the outer reef terraces to 10 meters. Encrusting colonies of many coral species are present and are often found under the branches and overhangs of the larger coral colonies. Generally, coral diversity is high, and many Faviids have been recorded from the area including Favia, Favites, Goniastrea, Platygrya, Leotia, Oulophyllia, Montastrea and Echinopora, as well as Turbinaria, Fungiia, Porites, Alveopora, Montipora, Galaxea, Pavona, Mucedium, Lobophyllia, Pocillopora, Stylophora, Millepora, and soft coral. Acropora palifera is common below 12 meters and is one of the dominant coral species below 15 meters. At 18 meters, the reef levels out to a broad shelf with numerous sand patches separating large Porites lutea bommies. I. maxima are common and many are growing within Porites colonies. A small Hawkbill turtle (Eretmochelys imbricata) was observed here.

* A. humilis, A. gemmifera, A. menticulosa, A. diadifera.

Reef Fish Observations - Ofu Village.

This area has very high coral cover with Acropora species dominating the shallow reef terrace. Reef fish diversity and abundance is correspondingly high with numerous corallivorous species present. Plectrophyllum diviti is very common among Acropora irregularis colonies and Chaetodon reticulatus was observed in schools of hundreds of individuals. The live coral indicator species of Chaetodon trifascialis, C. trifasciatus, C. ornatissimus, and Ocyurus chrysurus, longirostris were also observed. Damselfishes are abundant on the outer reef slope from 6 to 15 meters. Chromis sordida, C. margaritifer, C. kantcura, C. lorygus, Plectrophyllum lacrymatus, Pomacentrus brachialis, and Ophidiodon eleutherus cyanus are abundant. The surgeonfishes Ctenocephalus striatus, Acanthurus lineatus, and A. clarkii are common along with a variety of wrasses, juvenile and adult parrotfish, butterflyfish, goatfish and triggerfish. Pomacentrus urodenis, Myripristis sp., Flumenn sp. and Sarcasticenon spinifer are common in crevices and under ledges. The groupers Cephalopholis argus and C. urodena are conspicuous in the area and Acanthus
furca, Lutjanus bohar and Carangus melampygus often cruise the
color reef slope edge. A juvenile L. bohar mimic of Chromis
focalis was observed mixing with damselfish at this station.

The reef off Ofu Village is an excellent area for
recreational diving due to the high percentage of live coral
cover and the abundance and high diversity of large and colorful
reef fish.

29. Between Nu’upule Rock and the ava, large monospecific beds
of Echinopora are very conspicuous below the shallow reef
terrace.

30. At the southern edge of the ava, Echinopora abruptly
disappears and is replaced by large beds of A. crateriformis.
Many of these colonies are tabular or plate-like instead of the
encrusting form typical of the species.

31. A deep canyon extends into the reef to the ava. Coral cover
decreases with proximity to the ava and the bottom of the canyon
becomes very silty. Soft corals, Milipora platyphyla and M.
dichotoma mark the head of the ava that drains the reef flat
between Nu’utele Island and Ofu Village. From the ava to
Nu’usilaelae Island the coral cover remains high.

32. Immediately to the north of the Ofu ava is a conspicuous
area of dead branching Acropora encrusted by coralline algae.

34. North of this area a broad shallow shelf 4 to 8 meters deep
extends seaward.

OFU ISLAND — NORTH SHORE
North Nu’utele Island to Ofu Harbor.

35. From the north side of Nu’utele Island to the entrance to
Ofu Harbor there is a broad flat shelf 4 to 6 meters deep.
Seaward, this shelf ends in a more steeply sloping reef face.
The coral cover on the shelf is minimal and there is little
relief except for a few deep channels.

Ofu Harbor to Feia Point.

36. The channel entrance to Ofu Harbor was created by dredging
what was an existing natural channel that probably extended from
the ava draining the reef flat on the north side. The eastern
side of the channel outside the breakwater has some coral cover
and there are some large colonies of Diploria heliopora on the
near vertical reef face. Goniastrea tassicularis, Acropora
crateriformis and Porites spp are common. The reef wall meets a
sand bottom at 18 meters where large colonies of Mycedium
elephantopus and soft coral colonies are common. Large colonies
of Porites rugosa form conspicuous mounds on the sandy substrate at 12 to 20 meters outside the channel entrance. The channel entrance contains very few live coral colonies and the bottom is covered with coral rubble and sand. Inside the breakwater there is little live coral growth and the harbor bottom is covered with fine silt.

37. From the harbor channel to Feia Point there is a variety of topography but little live coral. A wide reef flat north of the harbor with spur and groove formations gives way to basalt cliffs that continue to Feia Point.

Feia Point to Sinapoto Point.

38. A broad flat shelf with little coral cover and little relief extends from Feia Point to Sinapoto Point. The bottom is periodically cut by small channels and there are some Tridacna maxima present.

Sinapoto Point to North Asaga Strait. (Figures 3 and 4).

39. A short distance east of Sinapoto Point, large bright yellow beds of Turbinaria reniformis are conspicuous. Eastward, the reef is typically a flat shelf of varying width with little live coral cover. On the outer edge of the shelf there are beds of dead, coralline algae encrusted 6. irregularis with small live patches. Nearly all the live coral colonies are encrusting or massive forms, providing very little relief and little coral cover.

40. Near Tuakanus the shelf widens extensively. There is very little coral cover and the only relief is provided by shallow channels extending seaward. One juvenile Acanthaster planci, the crown-of-thorns starfish, was found in about 6 meters of water on the side of one of the channels.

41. The shelf narrows near Mafafe, where the road crosses the island, and spur and groove formations dominate. As the shelf widens, the spurs become larger and the grooves become smaller and there are large blocks in deeper water. Coral cover is fairly high including soft corals.

42. Offshore from Sunuitao Peak the shelf widens again and is flat with little relief and little coral cover. Spur and groove formations become more prominent closer to the a'a in North Asaga Strait. This channel drains Asaga Strait and nearby reef flats. It is possible to navigate this channel during high tide in small craft.
43. A large zone of spur and groove formations extend from the Asaga ava to Tumatol Point. Large colonies of dead branching Acropora are evident on the spurs and ridges. The area is being successfully recolonized by a variety of coral species.

44. In front of the Lalomoana houses the reef widens and the coral cover remains low. On the widest part of the gently sloping reef there are a few dead tables of A. hyacinthus and many colonies of massive favids on the steeper portion further from shore. As the reef narrows north of the houses, there is an area of several patches of A. irregularis growing on top of large dead colonies of the same species. There are also several Tridacna maxima in this area.

45. After the large ava just north of the Lalomoana houses, the coral cover increases to about 50 percent. The reef slopes down gently from the edge of the reef flat to about six meters then drops steeply to the sand shelf at about 10 meters.

46. The reef front narrows severely, and separated from the reef by sand are several large Porites rus formations. As the reef widens, the slope is covered by nearly 100 percent live coral of the genus Pachyseris that suddenly returns to the 50 percent live coral cover on a gently then steeply sloping reef front.

47. Offshore from the line up of the yellow and red house with the red roof in Faiala and the largest basalt block on the reef flat is an DMAR monitoring station. The reef in front of Faiala is composed of spur and groove formations with a shallow shelf at 2 to 5 meters extending from the reef flat margin to a vertical wall that drops to 20 meters.

48. The live coral cover is 50 to 60 percent on most of the reef slope here. Acropora is the dominant genus in the upper 9 meters and Goniatrea, Pocillopora, Montipora, Leptoria, Stylophora, Leptastrea, Salsaka, Favia, Millepora, Pavona, soft corals and others are common.

Reef Fish Observations - Sili Village.

A fairly high diversity of common reef fish were observed on the shallow, 3 meter deep shelf. Surgeonfishes dominated and Ctenochaetus striatus, Acanthurus, gleucopareus and A. lineatus were the most common. Electroglyphidodon dickyi and P. johnstonianus were abundant on Acropora colonies. Glypheidontops cyanus are common in shallow surge channels with Chromis acares and P. jemelas schools common in deeper water near the reef slope.
Offshore from this shelf at the base of the reef slope (18 meters) is an area of large coral boulders and massive Porites colonies. Several large fish were observed in this area including sharks, jacks, large snappers, parrotfish and surgeonfish. Species observed included Triacodon obesus, Carcharhinus melanopterus, C. australicus, Caranx melampygus, Lutjanus bohar, L. monostigma, Monotaxis grandoculus, Macolor niger, Scarus gibbus, S. rubroviolaceus, S. bicolor, S. japonensis, Acanthurus mata and the uncommon Naso tuberosus.

The reef off Sili Village provides good opportunities for recreational diving and underwater photography. Underwater visibilities are generally excellent and this area is sheltered from the southeast Trade Winds.
FRINGING REEF FLAT - SOUTHERN OFU ISLAND

The wide fringing reef from Papaloloa Point northeast to Fatuana Point (Figure 5) supports a high diversity and abundance of reef fish and corals. This portion of the Ofu reef flat contains a nearshore trench area of relatively deep water between the outer reef platform and the shore. This reef area is carefully described in the ASCRI and apparently little has changed in the past ten years. The area is characterized by limestone blocks and coral heads 2 to 4 meters in diameter extending nearly to the surface with sand and rubble channels between. Water depths between the coral heads average 1 to 2 meters and provides protective habitat for delicate branching corals and juvenile reef fish. This natural lagoon like environment is unique in American Samoa where no barrier reefs exist and most reef flats are relatively flat and exposed at extremely low tides. The area provides a sheltered environment with excellent opportunities for snorkeling, underwater photography and recreational fishing. Presently, this portion of the Ofu reef is very important to the local subsistence fishery as spearfishermen can operate without concern for rough seas or sharks. This reef flat area has been proposed for designation as a National Marine Sanctuary and also for inclusion in the future U.S National Park of American Samoa. The outer reef flat area is mostly devoid of living corals and forms a flat reef platform that is exposed at low tides.

An isolated, adult population of crown of thorns starfish (Acanthaster planci) exists in this lagoon like environment from Area B to Area F (Figure 5). Another isolated population of Acanthaster has been located in the Pago Pago International Airport lagoon on Tutuila which has environmental conditions very similar to the southern Ofu reef flat. Adult Acanthaster have not been observed outside these two areas by Divers since the major outbreak of the late 1970s.

Area A

The substrate in this area is composed mostly of coral rubble and sand with small blocks of limestone and coral. The area is shallow, approximately 0.5 meters deep, and shelves seaward to the shallow outer reef platform described above. A moderate current flows to the north toward Ofu Village. Coral diversity and abundance is fairly low with some small colonies of branching Acropora present. Small colonies of Heliozoa coerules grow near Porites encrusted limestone blocks. The holothurian Stichopus chloronotus is common in sandy areas and under rocks. Holothuria nobilis and Bohadschia argus were noted. Trechus pyramis was also observed.
Area B.

The nearshore reef area deepens slightly and channels form between isolated outcroppings of outer reef platform. The current switches direction near Papalolokia Point and the longshore current flows northeastly toward Olohe'ea. Large, massive colonies of Porites lutea become more common with sandy rubble areas between. Larger thickets of branching Acropora are common in the outer reef areas shoreward of the shallow outer reef platform. Some destruction of Acropora and Porites by Acanthaster planci was noted. Lagastrea transversa, Porites porites and Millepora platyphylla colonize nearshore rocks and rubble. The damselfishes Glyptcephalops cyanus, G. leucogonus and G. albus are common nearshore and Acanthurus triostegus, A. lineatus. Juvenile parrotfishes and wrasses are common in outer reef areas.

Area C.

Extensive beds of branching Acropora are common in this area closer to the end of the airport runway. Large circular colonies of Porites lutea and limestone blocks two to four meters in diameter are common and are often deeply undercut providing excellent shelter for reef fish. Many of these blocks are completely ringed with colonies of Heliopora coerulea and/or Millepora dichotoma. Heliopora is very common in this area but is not common or not found in the rest of American Samoa. Common corals also found in this area include Millepora platyphylla, Porites sp., Pavona decussata, Lettixia phrygia, Galaxea fascicularis, Turbinaria reniformis, Montipora and Favia. Recent Acanthaster activity was noted and adult specimens were located and removed.

Reef fish diversity is very high in this area and is an ideal spot for recreational snorkelling. The large damselfish Abudefduf sordidus is conspicuous on limestone outcroppings nearshore and the more colorful Pomacentrus vauglii and Glyptcephalops cyanus are common on the outer reef. Stegastes albifasciatus, S. nigricans and S. lividus are abundant in live and dead Acropora beds and are highly territorial. Colorful adult and juvenile wrasses are particularly abundant and include Halichoeres trispilus, H. margaritaceus, H. notulatus, Thalassoma sp., Stethojulis lindsayi, Compairus varius, Coris gaimardi and C. aya. The surgeonfishes Acanthurus nigrofuscus, A. mata, Chlorurus strigatus and Zebrasoma scopas are common in the sand channels between limestone blocks as well as the parrotfish Scarus oviceros, S. fontalis, G. japonensis and G. sordidus. Many species of chaetodontids can be observed here with Chaetodon tricinctus, C. trimaculatus and C. citrinellus are particularly common. Other conspicuous reef fish observed in this area include Rhinecanthus aculeatus, Dymonocanthus.
Area D.

This area is very shallow with depths ranging from 0.5 to 1 meter. Extensive thickets of branching Acropora cover much of the mid reef area. A significant percentage of these coral beds have apparently been destroyed by Acanthaster. These dead coral areas support a lush growth of filamentous algae under the protection of the farmerfish, Stegastes lividus and S. nigricans. Large colonies of yellow Turbinaria reniformis form conspicuous layered formations on the edges of limestone outcroppings.

Area E.

Coral and reef fish diversity is high in the area near large basalt boulders in the mid reef area northeast of Fatuana Point. This is also an excellent snorkelling area with many sand channels between interesting coral and limestone formations. In addition to the corals mentioned above, Acropora hyacinthus, A. crateriformia, Hydrophora epesia, H. micrconos, Astreopora, Lobophyllia, Favites, Favia and Stylophora mordax were noted. Turbinaria reniformis also forms the conspicuous layered colonies around limestone blocks mentioned above. The reef fish in this area are similar to those noted for Area C with the addition of the anemonefishes, Amphiprion melanopus and A. chrysopterus. Tridacna maxima was also noted in the area. The endangered hawksbill turtle (Eretmochelys imbricata) has been observed in this area and is known to nest on the long white sand beach of Toaga.

Area F.

Coral diversity decreases north of Area E as sand channels and rubble areas increase and the water depth increases. Larger predatory fishes are more common here including Caranx melampygus, needlefish and emperors. Holothurians are particularly common in the sandy areas and include Bohadschia argus, Holothuria nobilis, H. atrata, Astropopogea mauritiana, Thelenota enanuna and Stichopus chloronotus.
TA'U ISLAND

Ta'u Island is the largest of the Manu'a Islands (44 square km) located southeast of Ofu and Olosega. Mount Latā represents the volcano that formed Ta'u and is the highest point of land in American Samoa at 966 meters. Much of the shoreline consists of a narrow beach or basalt cliffs and outcroppings. The coral reefs of Ta'u are generally lower in diversity and percent live coral cover as compared to the coral reefs of Ofu and Olosega.

The information reported here results from surveys conducted by DMAR biologists from 1986 to May 1988. The areas surveyed include the west and northern coasts from Siauta'aile Point, north to Faleasao and east to Fititua (Figures 5, 6 and 7). The reefs adjacent to the unpopulated eastern and southern coasts of Ta'u island remain unsurveyed.

A reef survey was conducted in May 1987 to assess the impact of Hurricane Tusi on the coral reef communities of Ta'u. The survey found little damage to coral reefs or live coral as a result of the storm. However, some reef areas of northern Ta'u were experiencing heavy siltation due to hurricane inflicted erosion and some coral mortality was noted.

TA'U ISLAND - WEST COAST

Vaita Point to Ma'afe'e Rock. (Figure 6).

1. The outer reef (6 to 20 meter depth) from Vaita Point north to the Ta'u Boat Harbor consists of a broad shelf with low spur and groove formation. Live coral is relatively sparse but increases on top of the ridges and spurs. Most of the live coral present consists of sturdy corymbose or digitate Acropora colonies (humilis and nasuta group §), Pocillopora, and some colonies of branching Acropora.

§ A. nasuta, A. coreal, A. valida.

2. From Ta'u Harbor to Ma'afee Rock a very broad gently sloping basaltic shelf extends seaward. The shelf is very flat with little relief, but is punctuated in places by a series of parallel channels that provide a low spur and groove type topography. This is particularly evident closer to shore where grooves form deep channels that cut into the outer reef flat. The channels are lined with boulders, rubble and sand pockets and have almost no live coral growth. Coral cover is sparse on the sides and top of the basalt spurs but increases to about 30 percent live coral cover below 10 meters. The coral cover is uniformly low and is dominated by encrusting and small, massive colonies.

On the long stretches of broad shelf, the 30 percent coral cover...
cover is dominated by encrusting, low corymbose and massive colonies. *Acropora* colonies are very abundant. *Montipora, Porites, Acropora, Pocillopora, G. fascicularis* and the faviids, *Favia, Favia*, *Dionastrea, Leptoria pygmaea* and *Montastrea* are recorded from the area. Most colonies are relatively small except for massive *Porites* colonies. Most *Acropora* colonies are low, sturdy species such as *A. crassiuscula* and corymbose or digitate colonies of the *A. humilis* and *A. nasuta* groups. Branching or tabular colonies are not present in this area.

**Reef Fish Observations - Ta'u Village**

Though the habitat is not complex, there is a fair diversity of fishes. The nearly flat bottom is riddled with holes and cracks, providing some cover for smaller species. Damselfishes are common, but not numerous, with some of the more abundant species being *Glyphidodonps cyanus*, *Chrysiptera leucopomum*, and *Pomacanthus richardsoni*. Small wrasses are very common, especially *Thalassoma hardwickei*, and the large wrass *Cheilinus undulatus* was seen. Several surgeonfishes and triggerfishes frequent the area including *Acanthurus glaucogranus*, *A. nigricans*, *A. nigricans*, *Naso literratus*, the uncommon *N. tuberosa*, *Balistapus undulatus*, *Balistoides viridescens*, *Melichthys vidua*, *M. nigra*, *B. chrysops*, *B. chrysops*, and *Rhinecanthus rectangulus*. *Tridacna maxima* under 10 cm are common.

3. A broad, shallow shelf extends out from the fringing reef at Luma to encompass *Maleo'ae* Rock. This shelf has relatively high live coral cover dominated by *Acropora* (*humilis* group), *Pocillopora* spp and other sturdy coral species.

**Ta'u Island - North Shore**

**Utanua Point to Siulegi Point**

4. Spur and groove type formations similar to those described above and gently sloping pavement are prevalent. The low coral cover is dominated by encrusting and low growing colonies that may reach 30 percent live coral cover below nine meters.

5. Live coral cover increases in the deeper water off Faleasao Village with flat plates of *Acropora* (*humilis* group) and branching *A. irregularis* being the most prominent. The bottom slopes upward toward the fringing reef in large spur and 10 meter deep groove formations. Rugged *Pocillopora, Acropora*, and encrusting faviids provide very little coral cover and relief. On the reef flat, species of *Pavona, Porites, Montipora* and *Acropora* provide varying live coral cover that generally seems to increase with proximity to the ovu exiting near the center of the reef front.
Reef Fish Observations - Faleasao.

The reef fish community near Faleasao is dominated by surgeonfishes, particularly Acanthurus lineatus and A. quollatus. The damselfishes, Chromisera leucopomus and Stegastes fasciatus, and the wrasse, Thalassoma hardwickii, are also very numerous.

6. The spur and groove formations with very little coral cover dominate the topography. Large basalt blocks occur near areas where cliffs drop down into the water.

Siulagi Point to Avatele Cove. (Figures 6 and 7).

7. Midway between Siulagi Point and Loto Point there is an area with approximately 50 percent live coral cover on basalt ridges. Tridacna maxima are numerous along this shoreline. Acropora palifera is common below 12 meters.

8. Avauii Cove is commonly turbid and appears to be the sight of periodic heavy siltation. The typical spur and groove formations exist here with the long channels filled by sand and light silt that is stirred up with each swell. Most of the coral colonies have dead edges, but several colonies of Acropora (humilis group) are completely dead and further from shore the ridge tops are covered by coralline algae encrusted A. irregularis. Common corals are rugged Acropora, Porites rus, Turbinaria and massive Faviids. Common fishes include surgeonfishes, especially Acanthurus mata and Naso spp (unicornfishes), triggerfishes and parrotfishes.

9. Avatele Cove has less relief than Avauii Cove but it is similarly turbid and appears to be the sight of periodic siltation. Near shore, deep ravines and channels cut into the pavement and there is very little live coral cover shallower than five meters. Seaward from the five meter contour, there is very little relief and the channels blend into flat pavement at eight meters. Live coral cover is limited to encrusting and massive colonies. A majority of the few fish in the area are in the deep ravines near shore and Acanthurus lineatus is the most numerous species. Tridacna maxima are common.

Faga to Temula.

10. This coastline has a narrow reef flat that extends offshore in definite spur and groove formations. The spurs and ridges extend 60 to 80 meters offshore before gradually sloping to meet basalt pavement areas beyond 20 meter depths. The grooves and channels are lined with basalt boulders, sand and rubble and are devoid of live coral. Live coral cover is low in this area but increases to around 30 percent on the tops of ridges below 10 meters in depth.
Most of the coral in this area consists of encrusting, massive or low growing forms that are capable of withstanding high wave energies. Thick, encrusting or digitate Acropora species are especially common. The coral community is dominated by Acropora (humilis group), Massive Porites, encrusting Millepora and small colonies of Pavilids (Favia, Favites, Gonastrea, Leptastrea, Leptoria). Pocillopora, corymbose Acropora, Acropora irregularis, Galaxea fascicularis, Lobophyllia and Montipora are also common.

Reef Fish Observations - Lepula (near Fitiuta)

The reef fish community in this spur and groove area is dominated by the surgeonfishes, Acanthurus glaucopareius, A. lineatus, A. nigrofuscus and Ctenochaetus striatus. The butterflyfishes, Chaetodon auriga and C. reticulatus are conspicuous and a variety of wrasses are abundant including Thalassoma quinquivittata, T. fuscum and Gonatus varius. Very few large fish were seen, but small groupers (Cephalopholis urodeta, Epinephelus merra), damselfishes and triggerfishes are common near the tops and edges of the spur formations.
SUMMARY

The coral reefs and reef fish communities of the Manu’u Islands appear to be in excellent condition and offer many opportunities to the recreational diver or fisherman. Coral diversity and live coral cover is particularly high around Tutu and Olosega Islands. Pristine live coral beds were located around these islands dominated by beautiful Acropora species. Illegal dynamite fishing has often been reported from the Manu’u islands where legal enforcement and monitoring is very difficult. However, this activity seems to be restricted to reef flat areas as no evidence of blast fishing was observed during these surveys.

Apparently, large areas of coral were killed in recent years on the southern and northern outer reef slopes of Tutu and Olosega, but these areas are recovering. Most of the dead coral is branching Acropora species and the colonies are covered with encrusting coralline algae. The preference for Acropora by Acantheras, thickness of the coralline algae, size of re-colonizing coral colonies and the intact condition of the dead colonies indicate that these coral beds were probably destroyed by a minor Acantheras infestation 10 to 20 years ago. There is some evidence that dead coral areas near reef avas are re-populating at a faster rate and show a higher coral diversity than other areas. This could be a result of higher concentrations of settling coral planula larvae exiting the avas or increased survivorship of the young coral colonies due to increased nutrient levels near avas.

The discovery of a small, isolated adult population of Acantheras on the southern Tutu reef flat is particularly interesting. Large scale Acantheras infestations may be spawned from these stable, isolated populations when optimum conditions for larval survival exist. Removal efforts in these areas seem to be effective and may avert future infestations. However, Acantheras infestations may serve a beneficial purpose to reef communities and a disruption of this phenomenon may adversely effect the coral communities in the long term.

The presence of large, relatively unwary reef fish on the outer reef slope and relatively high densities of Tridacna maxima is evidence that these areas are seldom fished or visited by divers. Large snappers (Lutjanidae), groupers (Serranidae), jacks (Carangidae) and barracuda (Sphyraenidae) are relatively abundant in the Manu’u Islands when compared to Tutu Island indicating lower fishing pressure. This assumption is supported by the fact that the Manu’u Islands are sparsely populated and DMWR fishery data collection efforts indicate that there are few commercial fishing vessels and most of the subsistence fishing takes place on the fringing reef flats. Also, Samoan divers do not fish outside the breakers with large spearguns in the day and seldom venture outside the reef flats at night.
The combination of pristine coral reefs and large, diverse reef fish populations supports the possibility of developing a small scale recreational diving industry in Manu‘a. The lagoon-like inner reef area of southern Ofu described in this paper is particularly suited to tourism development. Inexperienced snorkelers can enjoy a high diversity of reef fish and corals in a protected environment inside the breaker line. This area has the longest, most scenic white sand beach in American Samoa and the endangered hawksbill turtle is known to nest on this beach. Sea turtles are also known to nest on the unpopulated eastern beaches of Olosega (Figure 1). This area also has high concentrations of the beautiful blue coral *Heliopora coerulea* that is not found on Tutuila or Anu‘u Islands. This population of *Heliopora* apparently represents the extreme eastern range of the species, for the Indo-Pacific region. The recreational and educational value of this area supports the need for regular Acanthaster removal efforts by the DMPAR. Every effort should be made to have this special area included in the proposed National Park of American Samoa.
Figure 1. Ofu and Olosega Islands. DMWR permanent transect locations marked by (D), known turtle nesting areas marked by (T), and Acanthaster planci observations marked by (A).
Figure 5. Reference points for text descriptions of reef flat, Southern Ofu Island.