



# AMERICAN SAMOA MARINE CONSERVATION PLAN

*This Marine Conservation Plan is submitted to the Western Pacific Regional Fishery Management Council for possible funding from the Western Pacific Sustainable Fisheries Fund for the implementation of various projects to aid in fishery management.*

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## INTRODUCTION

American Samoa is an unincorporated U.S. territory and the only US territory in the south Pacific. It is approximately 4,200 km south of Hawai'i, in the central South Pacific Ocean. It is geologically part of the Samoa Archipelago, a remote chain of 13 islands of varying sizes and an atoll, located 14° south of the equator near the International Date Line. The archipelago is divided into two political entities: the Independent Samoa and American Samoa. The Independent Samoa has two relatively large islands (Upolu and Savaii) and eight islets. American Samoa is comprised of five volcanic islands (Tutuila, Aunu'u, Ofu, Olosega, and Ta'u), one low-island (Swains Island) and a coral atoll (Rose Atoll). The five volcanic islands that are part of the American Samoa territory are very steep with mountainous terrain and high sea cliffs and of various sizes. Tutuila Island, the largest (137 km<sup>2</sup>) and most populated island, is the most eroded with the most extensive shelf area and has banks and barrier reefs. Aunuu is a small island very close to Tutuila. Ofu and Olosega (together as 13 km<sup>2</sup>) are twin volcanic islands separated by a strait which is a shallow and narrow break in the reef flat. Tau is the easternmost island (45 km<sup>2</sup>) with a more steeply sloping bathymetry.

American Samoa has a population of 55,000 has a growth rate of 3.7%, one of the highest in the world. For approximately three thousand years, the Samoans have relied on the ocean for their sustenance with a culture that revolves around fishing. Fishing activities constitute an integral part of the 'fa'asamoa' or the Samoan culture and fisheries resources are used in cultural ceremonies. For instance, ceremonies on chiefly position entitlements use fish during these cultural events. 'Atule' fishing is a community activity tinged with legends and the distribution of the catch follow traditional protocols.

The fisheries in American Samoa can be broadly categorized in terms of habitat and target species as pelagic fisheries, bottomfishing in mesophotic reefs and the nearshore coral reef fisheries. Fisheries is either subsistence (fishing from shore and mostly for personal consumption) or commercial (may use a boat and catch mostly sold). Bottomfishing is actually a combination of mesophotic reef fishing and/or pelagic fishing (trolling). The coral reef fishery involve gleaning, spearfishing ( free dive from shore or boat based), rod and reel using nylon lines and metal hooks, bamboo pole, throw nets and gillnets.

Climate change, land-based pollution and fishing are the three main threats to the fisheries resources in the territory. Climate change is a global phenomenon predicted to lead to general adverse changes in productivity, coral reef habitat loss, and decline in fisheries. Sedimentation and debris are the major land-based pollution sources. Both are products of unsustainable land use brought about by an increasing population. Sedimentation is a serious threat because it impacts nearshore fish recruitment from degradation of these habitats. Fishing has been identified as a major factor that has led to the decline in the number of sharks and other big fish. Economically important nearshore invertebrates such as giant clams and sea urchins have also declined based on anecdotes.

Research and initiatives towards sustainable management of the fisheries in American Samoa derive funds from federal sources (e.g. the NOAA Coral Reef Conservation Program) and commercial fishing excise tax. However, the 1996 Magnuson-Stevens Fishery Conservation and Management Act also provides American Samoa with the ability to receive funds from foreign fishing agreements with distant-water fishing nations. Section 204(e) of the Act states that fees collected under a foreign fishing agreement (referred to in the Act as a Pacific Insular Area Fishery Agreement (PIAFA)) allowing foreign fishing in the EEZ around American Samoa will be deposited into the treasury of the American Samoa Government. In the case of fishing violations occurring within the EEZ, fines or penalties imposed under the Act, including sums collected from the sale of property seized, will also be deposited into the American Samoa's treasury. Furthermore, the Magnuson-Stevens Act declares that a PIAFA permitting foreign vessels to fish in the EEZ surrounding American Samoa can be negotiated only with the concurrence of, and in consultation with, the Governor of American Samoa. No PIAFA will be entered into if it is determined by the Governor that the agreement will adversely affect the fishing activities of the indigenous people of the islands.

The Magnuson-Stevens Act specifies that the amounts deposited in the treasury are available, without appropriation or fiscal year limitation, for the purpose of conducting marine conservation projects. Proposed marine conservation projects must be detailed in a 3-year marine conservation plan. This document is American Samoa's marine conservation plan (MCP) describing how the American Samoa Government proposes to allocate funds obtained under a PIAFA or collected from fisheries violations for the period 2012-2015. The MCP has been developed in accordance with guidelines provided by the Western Pacific Regional Fishery Management Council (WPRFMC) and National Marine Fisheries Service (NMFS) and is consistent with the requirements of the Magnuson-Stevens Act. The plan sets forth objectives that cover a broad range of fishery conservation and management issues and initiatives. The projects listed are designed to help achieve these objectives.

The American Samoa Department of Marine and Wildlife Resources (DMWR) is the lead agency for identifying projects for inclusion in the MCP. Copies of the final MCP approved by the US Secretary of Commerce will be made available to the public. Annual reviews will determine if adjustments are necessary to improve and update the MCP. The review panel will consist of representatives of the DMWR, NMFS and WPRFMC.

## **OBJECTIVE 1: PEOPLE OF AMERICAN SAMOA TO ENJOY THE HIGHEST LEVEL OF SOCIAL AND ECONOMIC BENEFITS THROUGH SUSTAINABLE FISHERIES DEVELOPMENT OF FISHERIES RESOURCES**

**Progress:** Statistics reveal that Pacific Island Countries and Territories are receiving approximately \$200 million in fees from foreign fishing access to their Exclusive Economic Zones (EEZ) annually while Distant Water Fishing Nations (DWFN) are generating several billion from fishing the same waters. This presents a massive difference and the only way for American Samoa to improve its social and economic benefits from its fisheries resources is to seriously engage the development of its domestic tuna industry, especially the development of a small-scale tuna industry. The development of the domestic fishing industry needs a number of issues to be addressed and resolved at various levels including that of Government, local and island community.

One of the fisheries issues in the territory is the lack of services in the Manua islands, there is a which makes fishing difficult to carry out. As a result, many Manua fishermen have moved over to fish and base in main island of Tutuila. In Tutuila, fishermen need development assistance from DMWR,. However DMWR's mandate of resource management overrides fisheries development and often there are not enough fiscal resources available to do both. Without improvement of the fisheries development environment, private sector's interest in investing in the domestic tuna industry development will be hard to encourage.

There are areas related to improving fisheries development environment that need proper consideration and implementation. . This will encourage the private sector to promote various development initiatives to derive more social and economic benefits from fisheries resources of American Samoa waters. A number of projects suggested in this section of the MCP are aimed at promoting the fisheries development environment at various levels including that of Government, local, and island communities.

### **Activity 1.1 Domestic Fisheries Development**

<b>Project Title:</b> Development of multiplatform fishing vessel for American Samoa.
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**Purpose:** The purpose of this project is to develop a new generation of fishing vessel for American Samoa that will improve safety at sea, promote catch quality, facilitate efficient fishing operations, support longer fishing trips, provide low operational costs affordable to local fishermen.

**Description:** The most commonly used and preferred fishing vessel by local artisanal fishermen is the 28ft '*alia*' type boat (catamaran). These *alia* fishing boats were all bought from Samoa either as new or secondhand. While the *alia* is a preferred type of boat by most local artisanal fishermen, history dictates the need for modifications to acquire a better boat for fishermen. There is a need to improve the design primarily to enhance sea safety of fishermen, to facilitate fishing operations, and to meet needed

quality of fish for local and overseas markets. The new vessel design must take into account the following factors: 1) sea safety of fishermen, 2) type of fishing to undertake, 3) hold capacity, 4) duration of fishing, 5) quality of fish, 6) boat maintenance, 7) economics of boat operation, and 8) affordability by local fishermen. This project involves:

- i. Hiring of Marine Architect to design and build the prototype which will be the new generation of fishing boats for American Samoa;
- ii. Undertaking survey to obtain opinions of fishermen;
- iii. Developing a design and plan for fishing;
- iv. Construction of new fishing boat, and
- v. Conducting trial fishing using the new fishing boat.

**Evaluative criteria:**

Construction of new fishing boat that improves sea safety, fishing operation, and low operation costs based on necessities which are lacking with current fishing boats operated by fishermen at artisanal level.

**Budget Estimate:** \$150,000

**Executive Agency:** DMWR

**Duration:** 3 years

**Priority:** High

<b>Project Title:</b> Increasing local boat building capacity for fishing vessel construction
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**Purpose:** This project will enhance the expertise of local boat builders with limited experience and knowledge in building boats, and create curiosities of interested individuals who may be keen to become future boat builders. The project also aims to use local personnel, local resources, and local services so that revenue generated remains in the territory thus boosting American Samoa’s economy in the long run.

**Description:** There is no fishing boat building yard in American Samoa, although there are few locals with knowledge in boat building, and with many fishermen that need boats. Locals with limited knowledge of boat building are only undertaking repairs on aluminum “*alia*” fishing boats. All “*alia*” fishing boats were bought from Samoa. The aim of the project is to train local boat builders and interested individuals with the construction of the suitable fishing boat for local fishermen, so that they acquire the knowledge and experience of building boats at the completion of their training. The strategy is to invite those interested to be part of the team that will build the newly designed fishing boat which will be the new generation of fishing boats in American

Samoa, under the leadership of the Naval Architect. During the course of this project , boat builders will learn new developments in fishing vessel design, and installation of mechanized equipment and electronics.

**Evaluative criteria:** Local boat builders successfully trained and be able to build new generation of fishing boats for American Samoa fishermen.

**Budget Estimate:** \$180,000

**Executive Agency:** DMWR

**Duration:** 2 years

**Priority:** High

<b>Project Title:</b> Fishermen Training Program (FTP)
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**Purpose:** The Fishermen Training Program (FTP) aims to enhance fishermen knowledge in all aspects of fishing and its safety, and to introduce fishermen to new and efficient equipment. This will lead to increasing fish catches and improved fish quality that attract high prices from overseas markets.. The (FTP) is also developed to qualify successful trainees with the opportunity to acquire a fishing vessel from the Fishermen Leading Scheme (FLS).

**Description:** The components of the FTP will be depending largely on the new type of fishing boat that would be chosen as the new generation of fishing boats for fishermen of American Samoa. It is anticipated that the new generation of fishing boats is designed to facilitate and improve fishing in all aspects compared to what the present *alia* fishing boats are capable of. There are various systems and equipment that includes electronic, mechanical, hydraulic and navigational which are currently not parts of existing *alia* fishing boats and are required to facilitate fishing activities. In light of this, a comprehensive training program will be established for fishermen and boat owners to learn the 1) use of the new equipment and their operations, 2) sea safety, 3) fishing gear and methods, 3) basic navigation, and 4) basic book keeping. The training scheme will be established and coordinated by DMWR and in partnership with the WPRFMC (Council), American Samoa Community College (ASCC) and the Secretariat of the Pacific Community (SPC). The training will consist of a theory component run at the ASCC and practical component run jointly by DMWR and SPC using the newly designed and built fishing boat. Depending on the need, the training will be conducted at certain intervals, where participants shall be awarded with Certificates of successful participation at the end of each course. This certification shall provide for one of the main prerequisites to qualify for the “Fishermen Lending Scheme”.

**Evaluative criteria:** Trained fishermen successfully completed their training course, are able to conduct fishing more effectively and safely with increased fish catches and better fish quality.

**Budget Estimate:** \$130,500

**Executive Agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

<b>Project Title:</b> Fishermen Lending Scheme (FLS)
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**Purpose:** Many fishermen around American Samoa wish to have fishing boats but could not afford initial capital investments to qualify them for loans established under bank lending policies. For that reason, the FLS is established to facilitate purchase of fishing boats, fishing gear and equipment for fishermen that have gone through and successfully pass the fishermen's training program (FTP). This project will assist to promote the fisheries development environment for American Samoa fishermen.

**Description:** The FLS will have two financial components. The first component is a major one and is to be provided by a funding agency which could be either the American Samoa Development Bank (ASDB) or other commercial banks in American Samoa. The second component is a minor one and is to be provided by the American Samoa Government on behalf of the qualified applicant. The earlier will be paid with interest as bank policies dictate, while the latter is paid with no interest to establish a fishermen revolving fund which rolls over for later fishermen applications. Fishermen who successfully pass the FTP may be granted with the government's financial assistance to qualify for funding agency loans to purchase fishing boats, fishing gear and equipment.

The FLS will be administered by DMWR in partnership with Department of Commerce (DOC) and a representative of funding agencies. In preparation for the scheme, the American Samoa Government needs to convince funding agencies that such a scheme works through established scheme process and procedures, and policies. DMWR will also establish data and resource management strategies to verify that the resource targeted will continue to sustain throughout the course of the scheme. Most importantly, a cash flow needed to be established to substantiate the success of the scheme in terms of its revenue earning and affordability to meet its loan obligations.

The FLS shall facilitate the infusion of capital financing needed by fishermen to participate in sustainable fishing in the territory.

**Evaluative criteria:** More fishermen to own new fishing boats that will increase fish catches of improved quality thus boosting the economy of American Samoa.

**Budget Estimate:** \$406,500

**Executive Agency:** DMWR

**Duration:** 3 years

**Priority:** High

<b>Project Title:</b> Fisheries Development in the Manua Islands
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**Purpose:** The project aims to assist the two newly established Fishermen Cooperatives (Co-Ops) in Manua acquire fishing boats that allow fishermen to participate actively in fishing operations to promote food security and livelihoods in the Manua islands.

**Description:** Manua has 3 small islands (Tau, Ofu and Olosega) of similar sizes with estimated population of 200-300 in Tau, and 150-200 in Ofu and Olosega. To promote fisheries development environment in Manua, the Western Pacific Regional Fisheries Management Council (Council) funded and established two fishermen facilities – one in Tau and another in Ofu. These facilities were established in partnership with the Department of Marine and Wildlife Resources (DMWR), Department of Public Works (DPW), and Department of Port and Administration (DPA). Each facility has two components - one to provide fuel for fishermen and the other to provide ice. The earlier contains four mobile 500 gallon fuel storage tanks, and the latter contains two ice makers and one refrigerated ice storage container. To formally operate these facilities, the Council also assisted with the setting up two Co-Ops- the *Tai Samasama Fishermen's Co-Op* for Tau island, and the *Faleluaanu'u Fishermen's Co-Op* for Ofu and Olosega islands. There are 24 members of the *Tai Samasama Fishermen Co-Op* of which 50% are without fishing boats. The *Faleluaanuu Fishermen Co-Op* has 15 members with 9 of them without boats. There are other fishermen that wish to join the Co-Ops but would not be able to acquire fishing boats. This project will assist each Co-Op for procurement of 3 fishing boats which will be leased out to its members. Depending on the performance of fishermen that operate the fishing boats, a strategy will be developed so that the most active fishermen will eventually buy and pay off the boats through installment of payments.

**Evaluative criteria:** Increased number of fishing boats with active fishermen that contribute to food security and livelihoods of Manua island people.

**Budget Estimate:** \$407,000

**Executive Agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

**Project Title:** Construction of new dock and landing space for American Samoa-based longline and other small commercial fishing vessels (*alia*) in Pago Pago Harbor

**Purpose:** Adequate docking space and landing areas are needed to support the American Samoa-based longline fishery and other fisheries such as the bottomfish fishery. Currently, American Samoa based longline vessels, which are generally between 60-85 ft, do not have dedicated docking space in Pago Pago Harbor, which results in operational challenges. For example, after landing their fish at the cannery, American Samoa-based longliners are often bumped off the loading dock to make room for other vessels such as purse seiners and cargo vessels offloading their fish to the canneries. The longline vessels then transit across the harbor and tie up at the fuel docks, where again they are often bumped off by other, often larger foreign vessels. For example, Cook Islands has 56 longline vessels that offload their catches in Pago Pago and will create more complication as far as berthing space is concerned. There is constant reshuffling of American Samoa-based longline vessels in Pago Pago Harbor and a dedicated pier for American Samoa-based fishing vessels would alleviate the need to move these fishing vessels around the harbor. Although fishing effort and participation by other small commercial fishing vessels such as *alia*, which fish longline for pelagic species as well as fish for bottomfish using handline-type gear, is currently at historically low levels, these vessels would also benefit from such docking and offloading space as participating increases in future years.

**Description:** DMWR will contract the services of an Engineer to prepare plans for the new dock followed by solicitation of a contractor to build the dock and landing space for American Samoa longline vessels and other American Samoa-based fishing vessels (e.g. bottomfish vessels).

**Evaluative criteria:** Construction of dock and landing space within 2 year of funds being distributed.

**Budget estimate:** \$ 450,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

**Project Title:** Construct cold storage and fish processing facilities

**Purpose:** To improve fish quality for local consumption and overseas markets. The limited availability of cold storage has been identified by several studies as one of the reasons why fishery development has been hampered.

**Description:** Availability of cold storage in American Samoa is one of the factors that will help improve good fish quality for local consumption and for overseas markets. Currently, there is limited cold storage available for local fishermen to store their fish during their local sale process or while awaiting shipment to overseas market. The absence of cold facility has forced immediate disposals of fishermen catches to local retailers with fishermen disadvantage of low prices. In addition, fisheries projects established in Manua (fuel and ice facilities) will promote fishing activities and the need for cold storage to maintain good quality of fish in Manua before they are transport to Pago Pago markets. These facilities are important for the success of Manua fisheries projects.

**Evaluative criteria:** Construction of cold storage facilities equipped to support fish processing at adequate levels

**Budget estimate:** \$ 500,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

**Project Title:** Purchase of ice making equipment that will support fresh fish fishery for local and export markets

**Purpose:** To promote fresh fishery development so that local fishing boats are able to carry ice during fishing operations. This will keep fish catches fresh from time of fishing until disposal at fish markets thus improving the quality of fish to attract better prices.

**Description:** American Samoa's largest fishery is the longline fishery targeting albacore, which is landed frozen for the local canneries. The diversion of longliners to use ice instead will increase the value of the albacore fishery over three times if albacore are sold fresh at fresh fish markets.

A contractor will be contracted to purchase and install icemakers at different sites close to fishermen landing grounds. Four icemakers and two ice storage containers have already been bought for two fisheries facilities at Tau and Ofu in Manua. The latter part of the project will require the same for Tutuila fishermen.

**Evaluative criteria:** Purchased and fully operable ice making equipment in Manua and Tutuila.

**Budget estimate:** \$ 300,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

**Project Title:** Development of a fish marketing plan that includes market identifications, means of transportation, fish products and market values, constraints in marketing, and other marketing related issues

**Purpose:** American Samoa has an established longline fishery that primarily targets albacore tuna but also catches a variety of palatable fish that could supply both domestic and export markets. In addition to longline fisheries, American Samoa once had a thriving bottomfish fishery that exported fish to Hawaii. Fisheries development in American Samoa requires a plan to appropriately identify markets as well as determine transportation needs or constraints, develop branding and ecolabeling options in addition to other marketing issues.

**Description:** DMWR in coordination with WPFMC will contract a consultant to develop American Samoa fisheries marketing plan who will investigate potential markets, identify transportation options and constraints, develop unique branding and ecolabeling options, and provide a strategic plan on marketing sustainable American Samoa fisheries.

**Evaluative criteria:** American Samoa Fisheries Marketing Plan developed and put into use

**Budget estimate:** \$ 80,000

**Executing agency:** DMWR in coordination with WPFMC

**Duration:** 1 year

**Priority:** High

**Project Title:** Training for fish handling procedures and the development of Hazard Analysis Critical Control Point (HACCP) plans

**Purpose:** Fish processors are accountable for assuring that fishery products sold in the U.S. meet government standards under the seafood safety system. This project aims to provide training for fish handling procedures and implement HACCP-based plans aimed at preventing specific seafood-related illnesses.

**Description:** Funds would be used for training American Samoa fishermen and fish processors in understanding potential hazards as well as devising effective control measures and monitoring protocols to ensure that seafood products are handled, processed, and stored properly so that these products are safe to eat.

**Evaluative criteria:** Participation by American Samoa fishermen and fish processors in HACCP training courses.

**Budget estimate:** \$ 60,000

**Executing agency:** DMWR

**Duration:** 3 year

**Priority:** medium

**Project Title:** Support the organization of American Samoa fishermen's cooperatives (Co-Ops)

**Purpose:** To assist with the formal establishment of American Samoa fishermen's Co-Ops through development of their respective Articles of Incorporations and By-laws, training and other aspects of fisheries development in order to promote fishermen to work together to reduce costs and maximize returns..

**Description:** Local small boat fishermen need assistance and training to participate in fisheries which will enable them to sell their fish to the canneries, local markets, and potentially export to U.S. markets. Fishermen's Co-Ops would provide assistance in administrative, business, and accounting services as well as reduced fuel prices, oversight and procurement of supplies, sale and delivery of fish to markets. Two Manua Fishermen's Co-Ops have already been established. A Tutuila fishermen's Co-Op needs development.

**Evaluative criteria:** Three fishermen Co-Ops for American Samoa, formally established and properly functioning.

**Budget estimate:** \$ 125,000

**Executing agency:** DMWR and WPRFMC

**Duration:** 2 years

**Priority:** Medium

**Project Title:** Technology and safety upgrades for the American Samoa bottomfish fleet

**Purpose:** Participation in American Samoa's bottomfish fishery was highest in the late-1980's and since that time has experienced significant attrition. It is reported that the fleet would benefit from technological upgrades such hydraulic or electric reels, GPS plotters, monofilament line, drop gear to increase bycatch survival, bait bags, safety equipment, and other related gear.

**Description:** DMWR will develop a gear upgrade program and will use funds to purchase equipment. The gear upgrade program will provide participating bottomfish

fishermen will gear that will allow them to increase their fishing efficiency as well as promote safety at sea.

**Evaluative criteria:** Revival of American Samoa bottomfish fleet with increased landings that are within MSY limits.

**Budget estimate:** \$ 50,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** Medium

<p><b>Project Title:</b> Promoting American Samoa as a premier sport fishing destination by holding annual sport fishing tournaments</p>
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**Purpose:** The local sportfishing club sponsors annual sportfishing competition. This promotes fishing and improves camaraderie among competitors. More publicity is needed to promote this sport to the neighboring island territories. The tourism revenue generated from this activity will contribute to the development of the American Samoa economy.

**Description:** While the formal definition of what a recreational fishery is still being debated, there is only a small sector in American Samoa can be considered as for recreation (given that subsistence is different from recreational). Sportfishing is locally considered as recreational and yearly tournaments are being conducted. The annual fishing has the potential to generate tourism revenue if be promoted to other island territories. This opens an opportunity to gather recreation data and gives an opportunity to establish a registry scheme to monitor the effort and catch since only a handful of fishermen are involved in this fishery. Expansion of the sportfishing tournament is needed to promote American Samoa as a premier sportfishing destination. A series of promotional events will be sponsored by DMWR and invitation will be submitted to other island territories.

**Evaluative criteria:** Establishment of annual sportfishing tournaments will be monitored and participants will be recorded. Catch monitoring and registry will also be established.

**Budget estimate:** \$80,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** High

**Project Title:** Enhance fishing opportunities by deploying fish aggregation devices (FADs) dedicated to small non-longline fishing vessels and/or the deployment of community FADs

**Purpose:** It has been reported in the past that there have been conflicts between small vessels and longline vessels fishing around the existing FADs deployed by DMWR. Dedicating new FADs only for use by small vessels will eliminate these conflicts while supporting enhanced fishing opportunities for participants that operate small fishing vessels. Furthermore, DMWR will consider placing these FADs in areas offshore of villages/communities around American Samoa that are isolated or that have lost fishing access to their nearshore fishing areas from regulatory or other factors.

**Description:** DMWR will deploy an array of FADs dedicated solely for small non-longline vessels. These FADs or other separately dedicated FADs will be deployed for use by certain villages or communities, which for example have lost fishing access to their nearshore areas from regulatory or other factors. Funds may also be used to purchase a vessel that will be used to deploy and monitor FADs around American Samoa.

**Evaluative criteria:** The deployment of FADs in various locations and the reduction in conflicts between small vessels and longline vessels when fishing on FADs around American Samoa.

**Budget estimate:** \$ 150,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** High

**Project Title:** Deep-water bathymetric survey for current and potential FAD sites in Tutuila and Manu'a

**Purpose:** Fish Aggregating Device (FAD) is a popular fishery tool to increase catch rates for offshore as well as coastal pelagics. Pelagic fish are attracted to FADs structure in the open ocean environment for shelter and protection from ocean predators. This behavior is being taken advantage of by fishermen to increase their catch rates. Skipjacks, mahi mahi and wahoo are frequently caught around these FADs. Near shore FADs and deepwater FADs are needed to boost catch rates and to decrease costs by having fishermen to operate around FADs instead of the usual trolling that uses more fuel.

Site location is an important factor in FAD success. Accurate bathymetric data is critical since depth is an important parameter in FAD design. The purpose of this project is to

conduct focused bathymetric surveys in potential sites for FAD deployment. The project aims to collect bathymetric data on selected sites in Tutuila and Manua.

**Description:** Bathymetric data will be collected using an sonar that is suitable for deepwater surveys (> 4000 m). The survey sites will be initially chosen based on other criteria such as relative exposure, depth and ease of monitoring.

**Evaluative criteria:** Availability of boat, staff and echo sounder.

**Budget estimate:** \$ 100,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** High

**Project Title:** Development of broodstocks of giant clams and sea urchins for population restoration and enhanced fisheries

**Purpose:** Giant clams and sea urchins used to be important fisheries in the territory. Giant clams or *faisua* is a local delicacy but its numbers have declined. The establishment of size limits for giant clams is a recognition of the precarious health of its population. The fate of the sea urchins *Tripneustes* is much worse. Anecdotes from old people indicate that they used to have high numbers of this sea urchin and it was highly harvested owing to their accessibility. Today, it is very rare to see a *Tripneustes* sea urchin in the reef flats in American Samoa. The purpose of this project is to develop a broodstock of giant clams and sea urchins in American Samoa.

**Description:** Broodstocks of giant clams and sea urchins will be purchased from nearby Samoa and other Pacific countries. These stocks will be maintained in a no-take marine protected area in Fagamalo, Tutuila Island and and other villages under the Community-Based Fisheries Management Programs. Growth rate and survivorship will be monitored for 1 year.

**Evaluation criteria:** Maintenance of the no-take marine protected area status in Fagamalo and other villages under the Community-Based Fisheries Management Program.

**Budget estimate:** \$100,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** High

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**OBJECTIVE 2: SUPPORT QUALITY RESEARCH AND OBTAIN THE MOST COMPLETE SCIENTIFIC INFORMATION AVAILABLE TO ASSESS AND MANAGE FISHERIES**

**Activity 2.1 Data collection and monitoring**

**Objective:** Ensure that evaluations of the current status of fishery resources and the impacts of proposed management measures are based upon the best scientific information possible.

**Progress:** Assistance from the Western Pacific Fishery Information Network (WPacFIN) from 1985 continues up to present. DMWR data collectors sample catch and conduct interviews from commercial small boat fishermen and collect store receipts to monitor importations and local catch. The inshore subsistence fishery was monitored using roving creel survey from 1991 to 1995. The area coverage was expanded in 2000 and funding comes from the Sportfish Restoration Grant of Federal Assistance US Fish and Wildlife Service. All data are forwarded, stored and analyzed by WPacFIN.

**Project Title: Understanding movement patterns of target species in no-take MPAs**

**Purpose:** Understanding ecological connectivity is important when planning and establishing an effective network of no-take marine protected areas. A variety of studies including oceanographic characterization of small-scale current patterns around Tutuila and circulation modeling using GPS drifters are used by DMWR to investigate ecological connectivity. Movement patterns of target species inside no-take areas would complement the on-going efforts to understand ecological connectivity and assist in the design of marine protected areas.

**Description:** An estimate of the movement patterns of target fish species inside no-take areas could be attained by the use of visual tracking and passive acoustic telemetry. Target fish species will be tagged using floy tags and transmitters. Passive acoustic receivers will be deployed at the no-take area. The National Park of American Samoa has been conducting fish tracking work inside the park areas and has extensive experience with this type of study. DMWR staffs will be trained on the techniques and usage of the equipments.

**Evaluative criteria:** Data collected will provide baseline information on movement patterns inside the no- take area and will aid in understanding ecological connectivity in American Samoa. GIS maps showing movement patterns from data collected will be used for outreach purposes. A strong working relationship between DMWR and NPS

will be achieved. The capacity of staff within the DMWR will be increased by training and practical experience received during this project. Equipments purchased during this project can be used again for future projects.

**Budget estimate:** \$120,000

**Executing agency:** DMWR and NPS

**Duration:** 3 years

**Priority:** High

<b>Project Title: Understanding local-scale current patterns around Tutuila</b>
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**Purpose:** An acoustic doppler current profiler (ADCP) was purchased by DMWR with funding from WPRFMC in 2010, to map local small scale currents around Tutuila. A limited amount of surveys have been completed. Conducting additional surveys using the ADCP device will have numerous outputs for the territory.

**Description:** DMWR has the capacity to organize and carry out surveys using the ADCP. With assistance from a consultant, survey sites will be identified and surveys will be carried out. The consultant will also provide training on analysis of data from ADCP surveys.

Another DMWR project has been funded by NOAA (internal grants) to validate and set-up a circulation model (ADCIRC) in Tutuila. The model will be validated through the deployment and collection of GPS drifters. However, the ADCP data will also be used to validate the model and the model will be made more accurate by the amount of data that can be attained to validate it.

**Evaluative criteria:** Data from additional surveys with the ADCP will provide information on local scale currents and specific sites at Tutuila (and therefore potential larval pathways) and used to validate a model that will have numerous outputs for the territory (e.g. simulation of: larval pathways and sediment, fresh water and other pollutants from watersheds around the island). DMWR staff capacity on analysis of data from ADCP surveys will be improved.

**Budget estimate:** \$100,000

**Executing agency:** DMWR and Consultant

**Duration:** 3 years

**Priority:** Medium

**Project Title:** Improving data collection and delivery in Ofu, Olosega, and Tau

**Purpose:** The isolated nature of the Manua islands poses problem with supervision of data collectors and data delivery. Despite developments in the office facility and equipment, there has been no improvement in the data delivery. This is obviously a recurring problem and the lack supervision seems to be the root. This could be resolved by increasing on-site supervision and through the utilization of internet service to the Manua islands.

**Description:** This project aims to increase supervisor presence in Manua to ensure proper conduct of the survey and to secure internet service to provide ~~ensure~~ data delivery to the WPacFIN. Supervisor will travel to Manua once a month and conduct data collection with the on-site technician for 1 or 2 weeks. After a year, data will be compared to period without supervision and with supervision to determine if increased supervision and access to technology enhances data output. If there was significant increase in data delivery, then a cost analysis will be performed to determine if traveling to Manua every month would be cost effective compared to maintaining a regular staff in the area.

**Evaluative criteria:** Evaluation result of the study will enable DMWR to make effective use of funds. This can provide timely information on the status of the fishery in the remote islands of American Samoa from which management decision will be based on.

**Budget estimate:** \$30,000 per year

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

**Project Title:** Determining genetic connectivity of coral reef ecosystems in the Samoa archipelago

**Purpose:** A majority of coral reef fish populations have been postulated as a series of spatially discrete units that are interconnected by different degrees of larval exchange. This phenomenon is a consequence of the bipartite life cycle of many coral reef fishes: an early planktonic, free-floating larval phase (especially by the early development stages since late stages may have strong behavioral qualities already) followed by a reef-associated benthic adult phase. Because of the possibility of wide larval exchange, there is a need to determine the degrees of connectivity among fish populations for management purposes. Highly interconnected fish populations necessitate coordinated management strategies. Moreover, larval sources and sinks are critical information on

marine protected area network design. The purpose of this project is to determine the genetic connectivity of key reef fish species in American Samoa.

**Description:** . We propose to determine the genetic relatedness among populations of representative fish species. We propose the development of population genetic markers (e.g. mitochondrial DNA segments) using the bristletooth surgeonfish *Ctenochaetus striatus*, the bullethead parrotfish *Chlorurus sordidus*, the orangespot surgeonfish *Naso lituratus*, the peacock grouper *Cephalopholis argus*, the skipjack *Katsuwonus pelamis* and the Tahitian squirrelfish *Sargocentron tiere* as model fish species. These are the most abundant fish targeted by the fishermen in the territory and need information on population connectivities. We propose to sequence the mitochondrial DNA control region and other relevant population genetic markers of fish collected from various reef sites and marine protected areas in Tutuila and other reefs in Ofu-Olosega, Tau, Swains and more importantly the reefs in Rose Atoll and the independent Samoa. Tissues will be sent to an adequate molecular laboratory off-island. Data analyses will be conducted by the primary project manager in consultation with population geneticists.

**Evaluative criteria:** A collaborating scientist who has a molecular laboratory.

**Budget estimate:** \$150,000

**Executing agency:** DMWR and collaborating molecular laboratory (e.g. Hawaii Institute of Marine Biology)

**Duration:** 3 years

**Priority:** Medium

<b>Project Title:</b> Survey of fish spawning aggregations in American Samoa
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**Purpose:** Many reef fishes have been observed to navigate great distances and form spawning aggregations in specific and traditional sites. It has been hypothesized that these sites provide advantages in maximizing gamete dispersal from predators. However, these sites have also been used as fishing sites that may lead to significant decline of fish populations. The purpose of this project is to survey spawning aggregations and identify spawning aggregation sites for protection towards sustainable fisheries management.

**Description:** Interviews of fishermen and underwater surveys will be conducted to survey spawning aggregations. There are already standard protocols in fishermen interviews and catch surveys in identifying potential sites and timing in spawning aggregations. Reproductive cycles will also be determined from collection of gonads and calculating gonadosomatic indices. Field surveys will be conducted based on initial interviews with fishermen and on reproductive cycles.

**Evaluative criteria:** Collaborating scientists who have worked on spawning aggregations

**Budget estimate:** \$150,000

**Executing agency:** DMWR and collaborating scientists

**Duration:** 3 years

**Priority:** High

## **Activity 2.2 Resource assessments and monitoring**

**Objective:** Assess the present and probable future condition of, and the optimum sustainable yield from, the fisheries within the EEZ

**Progress:** Several resource assessments has been conducted in American Samoa since late 1970 (Wass 1982, Birkeland et al 1987, Green 1996, Green 2002, Brainard et al. 2007, Sabater and Tofaeono 2006, Whaylen and Fenner 2005). Monitoring activities are currently being conducted by DMWR through the various programs under the American Samoa Sportfish Investigation and Conservation Projects and the American Samoa Coral Reef Monitoring Program. Other agencies conduct research and monitoring in the designated sites. Almost all of these projects are geared towards providing spatial and temporal comparisons on biomass and abundance of various marine resources. Proper stock assessments are far from the goals of these projects.

<b>Project Title:</b> Developing size limits to manage fish stocks in American Samoa
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**Purpose:** Fishing has long been recognized to be a major factor of the decline of coral reef fish populations. However, fishing continues to be a major source of livelihood of many south Pacific countries and territories. To ameliorate the impact of fishing and in recognition of its economic and cultural significance, various management measures have been formulated. The establishment of marine protected areas has been a popular management strategy. However, it has been recognized that MPAs should be supplemented by other strategies to sustain exploitation of fisheries resources. For instance, there are size limits for lobsters and crabs in American Samoa. However, numerous other fish species don't have size limits. The purpose of this project is to develop guidelines in establishing size limits in the territory. Size limits will be established for the top 10 fish species caught by spearfishing, the major fishery.

**Description:** The size limits will be based on the patterns of sexual maturity of selected species. A range of sizes will be collected for each species. Sex will be identified and gonads will be examined and categorized according to established maturity stages in the literature. Gonads will also be preserved in formalin for later sectioning and more

detailed analyses of reproductive stage. The length at first maturity will be an initial guideline in establishing size limits. Local staff will be trained in determining the maturity stage of gonads based on gross ocular inspection and microscopic details of gonad sections.

**Evaluative criteria:** A collaborating laboratory for gonad sectioning

**Budget estimate:** \$200,000

**Executing agency:** DMWR, WPacFIN, WPRFMC

**Duration:** 3 years

**Priority:** High

<p><b>Project Title:</b> Estimating spawning period by juvenile abundance survey in the Pala lagoon</p>
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**Purpose:** Tutuila has been shown to have limited shallow water habitats relative to the total reef area compared to the other islands (Brainard et al. 2007). This limited juvenile rearing habitat is presently being degraded by urban development posing threat to the fish population by creating a recruitment bottleneck thereby affecting replenishment of fish stocks. This area has to be protected in order to ensure that the habitat would perform its function as a juvenile nursery area. More data, however, is needed to facilitate the protection of this habitat.

**Description:** The Pala Lagoon is one of the few large-enough shallow water habitats for nurturing juvenile marine organisms (Ponwith 1992; Iose and McConnaughey 1993). It is one of the Special Management Areas (SMA) declared by the American Samoa Coastal Management Program (ASCMP). This project aims to establish seasonal periodicity of juvenile in-flux to the Pala lagoon and determine habitat utilization as juvenile rearing areas. A larger video fish transect survey will be conducted to supplement the monitoring transect work. The data gathered could be used for establishing seasonal closures for the area and warrant additional protection through the Project Notification and Review System (PNRS) that no further development should occur that will degrade this limited habitat.

**Evaluative criteria:** The data that will be generated from this study will be used to formulate a management plan for the Pala lagoon and a fishery management regulation for the lagoon fishery.

**Budget estimate:** \$100,000

**Executing agency:** DMWR, ASEPA, ASCMP

**Duration:** 2 years

**Priority:** Medium (There are some data collected by light traps that need to be analyzed already. Some of the funds will be used in using collection methods, e.g. beach seine).

**Project Title:** Health and Quality of Juvenile Reef Fish Habitats

**Purpose:** The aim of this project is to assess the health and quality of juvenile reef fish habitat in American Samoa, and examine the effect of eutrophication and sedimentation affecting these systems due to agriculture and effluent run-off. Secondly, it aims to develop a standards and baseline for sedimentation and turbidity. These data are important in deriving ecosystem indicators.

**Description:** Reef flats, back-reef pools, and lagoons are critical habitats for juvenile reef fish recruitment and development. Due to the nature of coral reefs in the territory, these habitats are limited in extent. Due to human habitation and a large increase in human population, especially over the last 30 years, these habitats have also been physically altered and subject to degradation due to urban development, eutrophication and sedimentation. Studies will be conducted to assess the health and quality of juvenile reef fish habitats by examining the quality and extent of the habitats, by examining water quality and possible eutrophication of these habitats, and by conducting sedimentation studies (e.g. turbidity indicators).

**Evaluative criteria:** Reports and publications will be produced from these studies to help inform and guide management, as well as leading to a greater understanding of factors affecting reef habitats and the fish that rely upon them.

**Budget estimate:** \$60,000

**Executing agency:** DMWR, ASEPA, contractors

**Duration:** 2 years

**Priority:** Medium

**Project Title:** Mangrove Assessment - Health and Quality of Habitat - Nu'uuli and Leone Pala

**Purpose:** The aim of this project is to assess the health and quality of the mangrove forest at the Nu'uuli and Leone Pala and in doing so establish a monitoring baseline, and establish the effect of eutrophication affecting these systems due to agriculture and effluent run-off. The project aims to build on the work conducted by the American Samoa Coastal Zone Management under the Department of Commerce.

**Description:** Mangroves are critical habitats for juvenile marine life and serves as a buffer area for land-based disturbances that threatens coral reef habitats. A significant amount of mangrove forest was degraded due to urban development in the past 100 years of US occupation. The different mangrove areas in Tutuila was assessed and mapped in 1985 (Yamasaki et al. 1985). The Nu’uli Pala has been declared as Special Management Area by the American Samoa Coastal Management Program but the threat from urban development (human habitation encroachment) still persists. In-filling of the wetlands still continues that reduces natural mangrove forests. A contractor will be hired to conduct biological and ecological assessment of the mangrove forests in the Nu’uuli and Leone Pala. This contract will also establish permanent sites that DMWR and ASCMP monitor. This study will aid in evaluating projects routed through the Project Notification and Review System that involve any development within the vicinity of these areas.

**Evaluative criteria:** The study will be the basis to revisit the management plan for the Nu’uuli Pala and evaluate if further management intervention is needed in either Nu'uuli or Leone.

**Budget estimate:** \$60,000

**Executing agency:** DMWR, ASCMP, contractor

**Duration:** 1 year

**Priority:** High

**Activity 2.3** Develop Fisheries GIS capacity for improved ecosystem management

**Objective:** Enhancing Fisheries GIS capacity for improved marine ecosystem management in American Samoa

**Progress:** A Fisheries GIS position existed at the DMWR until 2004, however since then only piece-meal GIS analysis has been undertaken through various projects at the DMWR, and there is now a gap in the technical support available to analyze marine science data produced by the various programs. Initial work has included the development of a GIS Fisheries Framework as part of a CRI Coral Reef Advisory Grant, to analyze the existing Commerical Biosampling fisheries data, however a more comprehensive analysis is required to include other datasets and answer wider ecosystem management questions.

**Project Title: Enhancing Fisheries GIS capacity for improved marine ecosystem management in American Samoa**

**Purpose:** There currently exists a large amount of marine-related data within the DMWR, and there is a great need for a concentrated effort to analyze this data to assist in answering important marine ecosystem management questions, especially in relation to coral reef fisheries, MPA network design and watershed management.

**Description:** This project proposes to address this by increasing local marine Geographic Information System (GIS) capacity and reducing the amount of GIS work that is out-sourced, by providing a GIS Fisheries position within the DMWR, training workshops and equipment and software that can be accessed easily by the different fisheries programs. Examples of work that needs to be undertaken includes:

- Complement existing Marine Protected Area network design using existing site-specific data, and identify gaps in the network by overlaying existing and new data sets onto NOAA derived bathymetric and habitat maps, incorporating small-scale oceanographic data, incorporate highly taxonomic data on coral species distribution and incorporate coral reef resilience factors such as shading, currents, temperature, and salinity.
- Further develop fishery data from boat based, shore-based and in-water surveys to determine fishing effort and catch distributions, map distribution of large fishes to determine possible habitat specificity, and incorporate key reef species data to map species, biomass and depth distribution.
- Further develop a DMWR-ASEPA collaborative project to develop a human impact model to inform watershed management planning and prioritization of MPAs.

**Evaluative criteria:** The number of different datasets that are analyzed and the number of maps produced.

**Budget estimate:** \$150,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

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**OBJECTIVE 3: PROMOTE AN ECOSYSTEM APPROACH IN FISHERIES MANAGEMENT, REDUCE WASTE IN FISHERIES AND MINIMIZE INTERACTIONS BETWEEN FISHERIES AND PROTECTED SPECIES**

**Objective:** Monitoring by-catch and fishery interactions with protected species

**Progress:** Monitoring of by-catch and interactions with protected species continues thorough daily logs of longline fishing vessels administered by DMWR and NMFS. This direct assessment of the impact of the fishery on protected species has been enhanced with the implementation of an observer program on longliners by NOAA beginning 2006. The potential for interactions and by-catch may also be inferred from movements and spatial distribution patterns currently under study by DMWR's Wildlife Division. Tagging (both flipper and satellite) and in-water surveys (opportunistic and systematic) of hawksbill (*Eretmochelys imbricata*) and green (*Chelonia mydas*) turtles can provide spatial profiles of occurrence and frequencies that may be useful in predicting potential for interactions.

Marine mammals are also being monitored. Annual seasonal surveys and genetic sampling of humpback whales has been conducted by the Hawaiian Island Humpback Whale National Marine Sanctuary with participation from DMWR Wildlife and Fagatele Bay National Marine Sanctuary. A program to monitor abundance and spatial patterns of resident populations of cetaceans is under development by the Wildlife Division of DMWR. There are plans in place to establish a local marine mammal stranding response program as part of NOAA-PIRO's Pacific-wide Stranding Response Network. All local efforts are in their infancy and are supported with limited funding. Additional financial support is needed to further develop and sustain these programs.

**Activity 3.1 By-catch, protected species interaction and related issues**

<p><b>Project Title:</b> Assessment of by-catch and interactions with protected species in local fishery</p>
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**Purpose:** This document interaction with protected species through monitoring of by-catch and evaluation of mortalities in marine turtles and cetaceans to determine need for shifting fishing methods to reduce impacts.

**Description:** The project would implement a short term monitoring program through key informant interviews and/or focus group discussions, followed by field enumeration to determine fishing effort and level of fisheries interaction of marine turtles with hook and line fishers (sport fishers) (that engage in fishing activities regularly on the reef flats and the reef slopes) of American Samoa. Fishing hooks and lines have been recorded in previously necropsied turtles. During the duration of the project, full necropsies would be performed on all recovered dead turtles to determine probable/possible causes of death.

Additional data can be taken from the on-board observer project for small alias proposed along with this Marine Conservation Plan. Any interactions from this project will be recorded by the observer.

**Evaluative criteria:** An assessment of the feasibility of implementing a long term monitoring program on fisheries related deaths of marine turtles

**Budget estimate:** \$65,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** Medium

<p><b>Project Title:</b> Assessing distribution and population abundance of resident marine mammals in American Samoa</p>
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**Purpose:** Evaluate the status of small resident cetaceans in American Samoa waters through population estimation

**Description:** Baseline assessment of local marine mammals was conducted in 2003 by NOAA (Johnston et al. in press). The lack of regular surveys or monitoring efforts precludes a comprehensive assessment of the status and ecology of resident marine mammal population (DMWR 2006). The Wildlife Division of DMWR is developing a population monitoring program for cetaceans in waters surrounding the main islands (Tutuila and Manua) of American Samoa to address this need. Already a preliminary study and training was conducted by Dr. Louella Dolar for DMWR staff to get familiarized with the boat-based line transect method and analysis using program DISTANCE. Planning (Dolar 2005), training (Dolar 2006), and survey protocol (Dolar 2007) documents has been submitted to DMWR for implementation. This project aims to determine distribution patterns and abundance of resident marine mammal population around the different islands of American Samoa. The survey would involve boat-based line transect method along a pre-determined track line. Bearing, estimated distance of the animal, species identification, estimated abundance, and some environmental variables will be recorded by a minimum of 3 observers. Surveys will be conducted on a bi-annual basis to account for seasonality in patterns and numbers. The data will be analyzed using Program DISTANCE. This project would require assistance and would contract part of the work to a marine mammal expert.

**Evaluative criteria:** Population estimates including spatial and temporal variations will be analyzed. A report on the status of resident marine mammal population will be prepared for distribution and publication. A discussion on potential interactions with and

impact of fisheries on the population will be useful for management and reduction of interactions.

**Budget estimate:** \$10,000 per year

**Executing agency:** DMWR in collaboration with Dr. Louella Dolar (consultant)

**Duration:** 3 years

**Priority:** Medium

<p><b>Project Title:</b> Spatio-temporal patterns in abundance, distribution and movements of green and hawksbill turtles</p>
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**Purpose:** Hawksbill and greens are listed as endangered and threatened species under the federal ESA. The population statuses of population nesting and frequenting American Samoa beaches and waters needs to be assessed As well, given the migratory nature of the species, movement patterns need to be documented if regional management plans are to be established and the potential impact of regional fisheries is to be assessed

**Description:** The sea turtle population of American Samoa is dominated by the green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtle. Their distribution has been documented by DMWR through the Turtle Tagging Program. Beach mapping has been conducted to determine potential nesting sites. The data on their abundance is sparse since very little in-water surveys has been conducted so far. Reports from opportunistic sightings have been collected and currently being analyzed but the data from this type of source is not standardized. This project aims to determine both local and regional patterns of distribution and abundance. Locally, spatio-temporal variations in abundance and occurrence will be studied through conduct of systematic in-water surveys. The in-water survey would involve roving dives along the slope and snorkeling survey on the reef flat to determine habitat variations and utilization. This will be a part of the long-term monitoring program of DMWR. To complement this, tagging (flippers and satellite) of post nesting adults and immatures (subadults) will be continued to establish local as well as large-scale movements. The movement pattern can help establish local patches for foraging and connectivity among population in the region.

**Evaluative criteria:** The data generated from this study will achieve a solid baseline for these species in terms of their abundance and provide trend in their population size. This could be used as a basis for further analysis of other factors causing impacts on the turtle population.

**Budget estimate:** \$65,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

### **Activity 3.2 Habitat assessment and monitoring**

**Objective:** Encourage the conservation and enhancement of essential fish habitat

**Progress:** Several monitoring and surveys of the coral reef habitat was conducted in American Samoa. The largest monitoring program is being carried out by the Coral Reef Ecosystem Division of NOAA that occurs every 2 years. A habitat characterization map was generated by the NOAA NCCOS Division (NCCOS 2001) that details different habitats found at different island within the American Samoa Territory. Local efforts include benthic monitoring by DMWR under the American Samoa Coral Reef Monitoring Program and the Key Reef Species Program. The Fagatele Bay National Marine Sanctuary conduct monitoring in Fagatele Bay and some selected sites every 3 years through off-island researchers. Recently, the National Parks of American Samoa conducts monitoring within the park borders using a standardized park system wide protocol. American Samoa Environmental Protection Agency conducted a study on the impacts on non point source pollution on the benthic habitats and associated marine resources (Houk and Musburger 2007)

<p><b>Project Title:</b> Determining reef carrying capacity through fishery and ecosystem modeling</p>
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**Purpose:** Coral reefs at different locations often have varying levels of reef fish carrying capacity depending on the extent and status of the various components that influence reef fish populations and the habitat upon which they rely. Recent comparative methods examining the status of reef ecosystems and populations of associated marine organisms has involved comparing various population metrics (i.e. fish biomass, abundance, trophic structures) between reef systems (specifically test area versus an assumed pristine coral reef system). Interpretations of trends from these direct comparisons, however, becomes problematic without taking into account the different (natural and anthropogenic) factors affecting these populations. A better understanding of the different factors affecting reef fish populations is needed to determine what the local carrying capacity of reef fish populations is here in American Samoa.

**Description:** Models will be developed to determine the local reef fish carrying capacity accounting for the influence of primary productivity, reef complexity, availability and supply of larvae, the availability and extent of suitable juvenile and adult habitat etc. Comparative analysis of modeling results will be done for the different islands in the territory to determine if each island needs a different management strategy.

**Evaluative criteria:** The results of the study would benefit management of the fishery by further focusing management actions on factors that negatively affect the ecosystem. A report and publication will be drafted from this study.

**Budget estimate:** \$60,000

**Executing agency:** DMWR

**Duration:** 1 year

**Priority:** High

<p><b>Project Title:</b> Determining extent and quality of deep reef and shelf habitat using drop camera</p>
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**Purpose:** A substantial deep water shelf habitat was uncovered by one of the recent research cruise by NOAA-CRED. This area could be a potential bottom fish habitat thus warrants further investigation. Mapping of these areas is needed in order to plan out a proper stock assessment of the fish population residing in these deep shelf areas.

**Description:** DMWR will be collaborating with Deep Along-Track Reef Imaging System (ATRIS) team of US Geological Survey to map out these deep shelf habitats to determine viability as a bottom fish habitat. The deep ATRIS system involves underwater tow of a high speed camera with peripheral instrumentation to measure depth, temperature and other parameters. The camera system will be supplemented with a forward facing camera from DMWR tasked to take footage of possible fish population found in the area. This camera system is already calibrated for detection differences between diver and camera observations thus would enable correction for video limitations. A habitat map will be generated from the series of tows and abundance estimate of the fish population from the fish video footages.

**Evaluative criteria:** The data generated from this study will be the basis for formulation of management actions for these habitats.

**Budget estimate:** \$50,000

**Executing agency:** DMWR and USGS

**Duration:** 1 year

**Priority:** High

**Project Title:** Coral recruitment survey and monitoring

**Purpose:** Living coral provides habitat for reef fish, without which there would be much lower reef fish populations and reduced reef fisheries catches. Coral populations are sustained by growth and reproduction. Most monitoring programs measure coral cover, and at best coral community composition. Coral reproduction consists of asexual fragmentation and sexual reproduction by producing gametes. A critical step in the life history is the survival, settlement, and early growth of juvenile corals. Such reproduction is critical for the maintenance of coral populations over longer periods of time. The only species for which we have any information is one table coral species which has had significant recruitment in recent years. Without monitoring recruitment, reproduction could end, dooming the future of the reefs, and we wouldn't even know it. The purpose of this project is to determine the current level of coral recruitment and compare with published values for other locations to determine whether coral recruitment is at healthy levels.

**Description:** Coral recruitment will be measured by placing seasoned tiles on the reef, using standard methods described in the literature. Tiles will be placed on the reef slopes, but could also be placed on the reef flat and/or in pools. Tiles will need to be secured very well to the reef to avoid their being lost in wave surge. Tiles will be placed around September before the presumptive main coral spawning period just before Palolo spawning in October or November. Other tiles may be placed at another time of year, such as spring or summer. After the presumptive spawning period the tiles will be removed so that newly settled coral colonies can be counted under a dissecting microscope. The density of new coral recruits will be compared with published values for other locations to determine whether coral recruitment is high or low.

**Budget estimate:** \$80,000

**Executing agency:** DMWR

**Duration:** 2 year

**Priority:** Medium

**Project Title:** Reef resilience to macroalgae phase shift, measured by exclusion cages

**Purpose:** Macroalgae compete with corals for space. If something like mass coral bleaching or a hurricane kills corals, macroalgae can expand to occupy the space that corals used to occupy, in what is called a phase shift. Once macroalgae occupy an area, it may be harder for corals to reclaim that area from the algae. Many macroalgae are well defended against herbivores like fish that might eat them, with tough cellulose or calcium, and/or with chemicals that are bad tasting or toxic. Macroalgae may be held in check by fish eating newly settled plants that are tiny and edible, but there may be few species that can eat the full size adult plants. So if corals are killed and macroalgae take

over, it may be far harder for fish to remove the adult macroalgae, than it is to keep it from growing in the first place. A caging experiment can find out if indeed macroalgae will grow in American Samoa if herbivores are excluded, and whether there are enough of the right kind of fish to eat the adult macroalgae. In effect, this is a way to test whether there are enough of the right kind of herbivorous fish to prevent or reverse a phase shift to algae. This is a way to measure one kind of ecosystem resilience. The objective of this project is to determine how much macroalgae grows when herbivores are excluded by caging them out, and what kinds grow, and how fast it grows, and what eats them when the cages are removed, and how fast it is eaten.

**Description:** Exclusion cages are built to exclude herbivores from relatively small areas of reef. The cages are built to cover a few meters of reef area, and will primarily exclude herbivorous fish. Because light and water can move through the cage walls, the only change is the exclusion of herbivores. Macroalgae will be photographed and cover measured immediately after cage placement, and then periodically. The cages will be in place several months at a minimum, until macroalgae growth is asymptotic. The species composition will be recorded. When the macroalgae stops growing any thicker, the cage will be removed. Then the macroalgae will be observed on a daily to weekly basis and any fish found eating it will be identified and photographed. The amount of algae remaining will be recorded each time it is observed until it reaches levels similar to areas outside the cage. The cages will be placed on reef slopes and in pools. The cages will have to be secured very well on the reef slopes to keep them in place in spite of the wave surge.

**Budget estimate:** \$80,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** Medium

**Activity 3.3** Reducing the impact of marine debris and coastal trash.

**Objective:** Reducing debris and trash in the coastal and marine environment around Tutuila and Manu'a.

**Progress:** A marine debris project was initiated by DMWR in November 2011, as part of a NOAA (Marine Debris division) -funded project. The project had 2 goals, a short term goal to resurvey and remove the tsunami generated debris from the marine environment around Tutuila Island and a longer-term goal to reduce the trash in the coastal zone by creating 10 'Trash Free Territory' community groups. Further work is required to remove non-tsunami generated marine debris that exists in the marine environment around the island of Tutuila and a continuation of the Trash Free Territory program needs to be

implemented in other villages not already included in the program. The existing marine debris project closely collaborates with the recycling initiatives being implemented by the Coral Reef Advisory Group and the Territorial Energy Office, to promote the reduction of trash that is taken to the landfill site.

<p><b>Project Title:</b> Removing marine debris from the marine environment around Tutuila Island.</p>
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**Purpose:** The aim of this project is to reduce the impact on coral reef and fisheries habitat from large marine debris objects in the marine environment around Tutuila.

**Description:** Large marine debris objects exist in the marine environment around the main island of Tutuila, mainly as a result of dumping activities at specific village areas. The debris impacts the coral reef and fisheries habitat by physically damaging coral reef colonies during strong currents and storm events, in addition to chemical contamination leaching from debris such as refrigerators, electrical appliances and batteries. A marine debris survey was undertaken by DMWR Fisheries staff as part of the NOAA Marine Debris project to identify the location of tsunami-generated marine debris, however further surveys need to be undertaken to complete the coverage around the whole island. Surveys can be undertaken in the shallow areas using towed snorkelers, and in the deeper areas using drop camera equipment. On-island salvage contractors will be utilized to remove the large heavy debris and off-island trainers will work with the DMWR fisheries staff to teach marine debris removal skills for removing medium-sized marine debris from the marine environment. Work will be undertaken to remove the debris from the different sites. The project will also involve an education and outreach component whereby photographs and project activity reports will be utilized in outreach presentations, and educational material to educate the village communities about the impacts of marine debris on the environment, with the aim of reducing incidences of solid waste dumping.

**Evaluative criteria:** Project activities can be evaluated by measuring total weight of trash and debris removed, and the acreage of coastal and coral reef habitat enhanced.

**Budget estimate:** 100,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

**Project Title:** Reducing coastal trash through community-based ‘Trash-free Territory’ groups.

**Purpose:** The aim of this project is to reduce the amount of trash in the coastal and marine environment around Tutuila Island, through community-based cleanup group activities. The secondary aim of this project is to public increase awareness about the trash problem and its threat to the marine environment.

**Description:** The NOAA-funded Marine Debris project has led to the creation of 10 ‘Trash Free Territory’ community and school groups in Tutuila. Further work is required to expand the Trash Free Territory program to other villages not already included in the program, including in the Manu’a Islands. Community groups are motivated by a team-based approach with an element of competition with the other community and school groups. Uniform will consist of high-visibility t-shirts with the program and specific group logo and name, in addition to sun hats for wearing during cleanup events. Supplies in the form of trash bags and gloves will also be provided for the groups. A Marine debris project officer will be required to implement the program activities through outreach and education presentations, supporting community groups to implement cleanups and assist with survey work to collect data on the amount and types of trash that is found in different areas. Support will also be provided by coordination with other relevant agencies to assist with the reduction in trash in each community involved in the program. The ‘Reduce, Reuse, Recycle’ theme will also be promoted through food composting initiatives, and the availability of promotional material in the form of reusable cloth bags and reusable drinks bottles. Recycling initiative will also be supported through provision of recycle bin construction materials and paint. Education and Outreach materials will also be developed specifically addressing the issues occurring in American Samoa.

**Evaluative criteria:** Project activities can be evaluated by measuring total weight of trash removed from the coastal environment, the number of volunteers involved in the project and the number of volunteer hours undertaken on project activities.

**Budget estimate:** \$120,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

### Activity 3.4 Coral reef rehabilitation and enhancement of fisheries

**Objective:** Enhancing coral reef fisheries habitat through coral reef rehabilitation techniques

**Progress:** The main coral restoration work in American Samoa has been undertaken by the non-profit corporation, the Coalition of Reef Lovers (CORL), which has conducted coral farming and coral reef restoration/rehabilitation in American Samoa since 2005. Successfully completed projects include; building and operating the Alofau village coral farm, and the creation of the Amouli land based coral farm and Nu'uuli ocean based coral farm. Discussions have also been had with Tetsyzan Benny Ron from the aquaculture department at the University of Hawaii, with regard to interest in supporting coral aquaculture development in American Samoa.

<p><b>Project Title:</b> Developing a community-based coral rehabilitation program in American Samoa</p>
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**Purpose:** To address natural and anthropogenic impacts to coral reef habitat through community-based coral rehabilitation projects.

**Description:** Many of the shallow coral reef areas in American Samoa have been impacted somehow by natural events such as hurricanes, the 2009 tsunami and coral bleaching events, or by anthropogenic activities related to destructive fishing practices and land-based sources of pollution and sedimentation. The development of a community-based coral rehabilitation program to address these impacts will involve the construction of a land-based and an ocean-based coral farm. A two-step coral restoration protocol will be followed by 'farming' or mariculture of coral recruits in an ocean-based farm / nursery. 'Parent' colonies (taken from around the area to be rehabilitated) would be grown there for which to take cuttings that are then put in stock tanks in the land-based farm. These recruits are then moved out of the tanks onto the reef once they start establishing or 'basing out'. The land-based coral farm will be powered by solar technology and will concentrate on species found to be most successful for planting, and also those that seem more tolerant to high temperatures. These corals will then be planted out at specific sites in collaboration with village community members. An educational component will also be involved through training and volunteering opportunities for local students and community members. DMWR fisheries staff will undergo training and assist with managing and implementing the project activities. Training workshops will be provided by the ATOLL (Aquaculture Training On-Line Learning) program through the University of Hawaii, and technical assistance will also be provided by ATOLL staff in addition to support from the locally-based non-profit corporation CORL. An increase in area of healthy coral colonies will in turn increase the habitat available for fish and invertebrates and an increase in the cover of temperature tolerant and sediment tolerant coral reef species will increase the resiliency of the coral reef areas following bleaching events and any other disturbances. Reef rehabilitation can also include designing structures that enhance coral reef fishery opportunities for village communities.

**Evaluative criteria:** The number of coral colonies successfully propagated and area of coral reef habitat rehabilitated

**Budget estimate:** \$150,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

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#### **OBJECTIVE 4: FOSTER BROAD AND DIRECT PUBLIC PARTICIPATION IN THE COUNCIL'S DECISION MAKING PROCESS**

There are no activities proposed for this objective

#### **OBJECTIVE 5: RECOGNIZE THE IMPORTANCE OF ISLAND CULTURE AND TRADITIONAL FISHING IN MANAGING FISHERY RESOURCES AND FOSTER OPPORTUNITIES FOR PARTICIPATION**

**Objective:** Establish or improve management measures and controls necessary for responsible fishing and the achievement of optimum yield.

**Progress:** The amended version of the fishing and hunting regulations was ratified last 1995. The ban in SCUBA spearfishing was included in the regulations in 2001 and was not updated since then. New regulation has been put forth that is waiting for inclusion in the fishing and hunting regulations specifically the protection of some species of concern. It generally states that it is prohibited and unlawful to possess, fish, kill, and sell (part or whole) *Cheilinus undulatus* (humphead wrasse), *Bolbometopon muricatum* (bumphead parrotfish), *Caranx ignobilis* (giant trevally), *Epinephelus lanceolatus* (giant grouper), and all species of reef sharks. The regulation is now at the Attorney General's Office for review. DMWR is looking into drafting regulations on bag limits, seasonal closure and size limits.

##### **Activity 5.1 Management procedures**

<p><b>Project Title:</b> Enhancing enforcement capability of village by deputizing the local community representatives</p>
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**Purpose:** Enforcement of fishing regulations and village management rules has been limited due to lack of funding. Currently, the enforcement officers of DMWR are leading this effort. However, due to the overwhelming responsibilities needed to protect the

resource with a handful of staff, deputizing community constituents to look after their resources and making sure their village resource management rules are met is a viable option to aid in the enforcement activities.

**Description:** Enforcement training will be given to village community member part of the Community-based Fishery Management Program (preferably the Au’ maga members) to brief them on the rules and regulations specified in the 11 village management plans, rules of engagement, and their roles during enforcement operations. These individual will be deputized to allow them to enforce their village management rules. They will be issued with equipment and supplies for them to carry out their responsibilities supervised by the DMWR Enforcement Officers.

**Evaluative criteria:** The number of enforcement training and participants will be recorded. The participants will be tested for the knowledge they gained in the training. Enforcement Officers will also evaluate the trainee during the actual enforcement activity (i.e. surveillance and monitoring).

**Budget estimate:** \$20,000 per year

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

<p><b>Project Title:</b> Promoting traditional fishing practices by producing videos and conducting annual workshops for young Samoans</p>
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**Purpose:** Traditional management was considered as an effective way of sustainably managing the natural resources. These traditional management regimes are slowly fading brought about by globalization, a more top down government approach and western style management. The purpose of this project is to enhance and promote traditional fishing practice and management by education and outreach.

**Description:** The documentation of traditional fishing practices has been carried out by DMWR in 2007. This includes video documentation of the palolo and i’asina fishing. This also includes library research on traditional and prehistoric fishing practices at the Bishop Museum and University of Hawaii library by the Historic Preservation Office. The information generated from these researches should be taken to the public for increased public awareness and for the Samoan people to take pride in their heritage. The information will be summarized for easier dissemination to fit infomercial format. Annual workshops will be conducted to make young Samoans appreciate their culture and possibly relive the Samoan traditional fishery practice and management.

**Evaluative criteria:** Workshop documents and video materials will be used to evaluate this project.

**Budget estimate:** \$40,000

**Executing agency:** DMWR

**Duration:** 1 year

**Priority:** High

## **Activity 5.2 Fishery management plan revision**

<b>Project Title:</b> Revision of American Samoa fishery regulations
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**Purpose:** The nature of the fishery has slowly evolved over the years. Artisanal long lining had decreased but was compensated by an increase in spearfishing activities. Overall trend showed a decrease in fishing effort over the decades. The fishery regulations should adapt to dynamic nature of the fishery. Revisiting and revising the fishery regulation is considered long overdue.

**Description:** The latest version fishery regulation was dated 1995. As the some of the provision in the fishery regulation may still apply, there are some management needs that have to be included since fishery had evolved from the last version. A fishery workshop will be conducted to be participated by resource users and managers, biologists, and contract attorney to review the existing regulation and evaluate whether the provision are still applicable and identify issue that needed to be addressed. Current data from fishery dependent and independent studies could be used as a basis to revise the fishery regulations. This exercise could also identify data gaps that are needed to revise or even draft new regulations.

**Evaluative criteria:** Revised administrative regulations for DMWR needed to include sections on legal frameworks for Marine Protected Area management and village based enforcement, bag limits, catch size limits, annual catch limits, and possible seasonal closures in some critical areas.

**Budget estimate:** \$60,000

**Executing agency:** DMWR and Attorney General's Office

**Duration:** 1 year

**Priority:** High

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**OBJECTIVE 6: PROMOTE EDUCATION AND OUTREACH ACTIVITIES, AS WELL AS REGIONAL COLLABORATION, REGARDING FISHERIES CONSERVATION ISSUES**

**Objective:** Broaden public knowledge of marine conservation issues and initiatives and develop patterns of behavior for responsible and sustainable use of the marine environment.

**Progress:** DMWR Education Division conducts annual Fishing and Boating Week to train the youth on the proper fishing techniques and educate them on concepts of coral reef conservation. The Division also conducts outreach to schools through the school's science curriculum educating students on marine conservation and proper resource stewardship. The Community-based Fishery Management Program conducts village outreach to inform community and village council members on the status of their resources and educate them on conservation concepts. The Marine Protected Area Program would also be conducting the same activity to its no-take villages and stake holders.

**Activity 6.1 Marine conservation education**

<b>Project title:</b> Conduct high school marine fisheries resource management course
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**Purpose:** There is a lack of education on the topic marine fisheries resource management in American Samoa. Students are increasingly becoming interested in marine resource field and this course allow education opportunities in diverse fields associated in marine resource management (e.g. fisheries science, oceanography, conservation biology, ecology, resource economics).

**Description:** Replicating the successful Hawaii marine fisheries course, a two week summer course would be developed for high school students in American Samoa. The course would focus on different daily marine resource topics as well as conduct field trips to various locations. Guest lecturers would also be invited to present information there are knowledgeable in.

**Evaluative criteria:** Curriculum development for two week course and implementation of course.

**Budget estimate:** \$20,000 per year (on-going)

**Duration:** 3 years

**Priority:** High

**Project title:** Developing and testing a local Marine Science Integrated Curriculum.

**Purpose:** EECE (Elementary and Early Childhood Education) students and teachers continue to go through each year with inadequate and outdated educational materials, lack of proper training or certification, and lack of practical or field activities to link lessons learned in classroom with realities of their physical environment. EECE students in the public school system are often left without the Marine Science basic knowledge and lack of appreciation for environmental conservation. This project aims to create a local Marine Science curriculum/ guide for EECE teachers to teach Marine Science so that EECE students will have a transition of home and school, as well as EECE teachers to integrate Marine Science to other content areas.

**Description:** Various divisions in DMWR will work together to compile a local curriculum based on their studies and projects set up according to the DMWR standards and procedures. The Aquatic Education Division will lead the project by exposing it first to the Teacher Workshop set up for June, 2008. The local Marine Science Integrate Curriculum will be pilot for the first two years in various EECE schools stationed by the coastal line, and then rotate it to the other EECE schools for another two years. EECE schools will integrate the DMWR local Marine Science Integrate Curriculum with the DOE Science Integrate Curriculum as well as the other content area. Six (6) schools will be selected for the first two year and then shift/ alternate it with another set of six (6) schools for the last two (2) years. Selections will be two from each district (Eastern, Central, and Western). The target levels for the DMWR local Marine Science Integrate Curriculum will be the ECE, K-5, Level 3, Level 5 and Level 7.

**Evaluative criteria:** An assessment tool will be distributed to all EECE public schools in American Samoa to compare and contrast the pilot schools and non-pilot schools. This assessment will be done every year for progress, feedback and adoption of the DMWR local Integrate Curriculum by DOE public schools and private schools. There is a need to assign a lead to implement and finalize the draft.

**Budget estimate:** \$20,000 per year

**Duration:** The DMWR local Marine Science curriculum is set for a five (5) year plan. The pilot schools program will last two (2) years then rotate to the other selected schools for another two (2) years. The last year/ the 5<sup>th</sup> year of the program will be the teacher assessment.

**Priority:** High

**Project Title:** Develop education tools to educate the public on the conservation issues involving reef sharks, atule, palolo, Napoleon wrasse, bumphead parrotfish, turtles, and other species of concern and in general coral reefs and fisheries

**Purpose:** Reef sharks are locally seen as a threat to humans and are often being reported being slaughtered by local residents on the reef flats. The regulation for protecting species of concern, including reef sharks, is currently being processed. To aid in proper compliance to this regulation, education and outreach campaigns should be conducted to correct the misinformation linked to these species. This also aims to improve compliance to the new regulation by disseminating information of other species of concerns are already protected.

**Description:** Video production for infomercials will be produced to introduce the new regulation and correct the stereotyped image of reef sharks. Newspaper articles will be drafted to aid the legislation and science-based information will be included to change the view of Samoans with regards to these species. Both strategies will be in English and Samoan. This will be aired on local public television on a primetime slot to maximize audience capture.

**Evaluative criteria:** Production and distribution of a video

**Budget estimate:** \$85,000

**Executing agency:** DMWR

**Duration:** 2 years

**Priority:** High

## **Activity 6.2 Marine conservation training**

**Project Title:** Enhancing research capabilities of local staff through participation in research training

**Purpose:** The tasks and responsibilities of DMWR to protect and manage the fishery of the Territory are overwhelming compared to the number of trained staff doing the work. Majority of the research staff specifically research technicians only has high school degree and learn by hands-on-training from their supervisors. The reliability of the data being gathered by the research technicians depend on the level of knowledge and training they receive. This project aims to upgrade the basic knowledge base of research technicians allowing them to increase their work coverage, efficiency, and appreciation for their job.

**Description:** Candidate research technicians will be chosen based on the years of experience and the proficiency to perform their duties in each project they are assigned

to. They will be sent of to various training appropriate to the work they are assigned to. Depending on the number of candidates, the option of bringing in a trainer/instructor to conduct the training could be used as an option. Improving the knowledge base and skill allows for a more proficient conduct of the work allowing for a more accurate data that will be used for management decisions.

**Evaluative criteria:** The number of research technician trained will be monitored and their work quality will be evaluated by the project supervisors.

**Budget estimate:** \$100,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

### **Activity 6.3 Regional cooperation**

**Project Title:** Enhancing regional cooperation by collaborative meetings and cross site visits with other South Pacific Territories

**Purpose:** American Samoa being a US territory has been largely US-centric in terms of its collaborative efforts, management and conservation. Subsequently there has been minimal interaction between American Samoa and our South Pacific island neighbors. This project aims to enhance the working relationship and conservation strategies with our South Pacific island neighbors.

**Description:** DMWR will collaborate with the Ministry of Natural Resources and Environment of Samoa as an initial step to plan out conservation strategies and research opportunities. Cross-site visits between projects (i.e. CFMP and monitoring research) will be conducted to share in-sights and compare notes on what works and how the resources differ between the two island territories. Once a formal collaboration has been established, DMWR will be expanding its collaborative efforts with Fiji, Tonga, Tokelau, Niue, Cook Islands as well as utilizing regional organizations such as SPREP and SPC.

**Evaluative criteria:** DMWR will draft a memorandum of understanding that collaborations will be established between island territories. Information exchange will be documented as this collaboration develops.

**Budget estimate:** \$50,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** Medium

**Project Title:** Improving scientific awareness of local junior biologist through scientific exchange and providing courses and training

**Purpose:** This project aims to increase the experience of junior biologists who are locally hired by allowing them to participate in international meetings and conferences.

**Description:** DMWR suffers from high staff turn-over rates from contract biologists that runs and leads the projects. In order to invest on sustainability and long term success of projects, junior biologists should step up and gain experiences under the supervision of contract biologists. This includes scientific exchange where junior biologist (usually with bachelor degree) will be given a chance to represent the department in international meetings and symposium. They will be assigned to present their project research and allow them to consult and interact with other scientist in the field. This gives them a sense of pride in their work and allows them to internalize the science behind their work.

**Evaluative criteria:** Staff will be supervised and mentored by the contract biologist during the preparation of their work for presentation. They will also be evaluated during their presentation and their interaction with other scientists.

**Budget estimate:** \$50,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

**Project Title:** Coral Reef Monitoring in Independent Samoa

**Purpose:** As has been known for some time, and as recently highlighted by the "Biogeographic Assessment" conducted by Matt Kendall and others, there is a distinct knowledge gap in the state of the reefs and reef fish resources of Independent Samoa as there is currently no ongoing long-term monitoring of their coral reefs. What monitoring does occur in Samoa occurs in a few MPA areas and is largely conducted on the reef flat with no reef slope surveys being conducted for either benthic life-forms or reef fish. This proposal would allow for the establishment and implementation of a coral reef monitoring program in Independent Samoa similar to the monitoring program that already exists in American Samoa. This will allow a more complete understanding of the state of coral reef resources, and ongoing trends in reef resources, at a larger, archipelagic scale, not just in one half of the island group. Having a monitoring program in both

jurisdictions will also tie in nicely with the 'Two Samoa's Initiative' and hopefully lead to greater collaboration, cooperation and partnership between the two jurisdictions.

**Description:** DMWR will expand on the monitoring program that has been running in the territory for the past 7 years to include monitoring activities in Independent Samoa. If successful in gaining funding for this purpose, it is envisioned that the Reef Fish Monitoring Biologist will become the Principal Investigator (PI) and project lead in Independent Samoa while the Benthic Monitoring Biologist will be the PI and project lead in American Samoa. The Reef Fish Monitoring Biologist would also continue to conduct annual surveys in American Samoa as described above to provide continued support and continuity to a program that has already been operational for 7 years.

**Evaluative criteria:** An annual monitoring plan would be developed and implemented, sites would be chosen, surveys will be initiated and comparisons between jurisdictions can then be made. An annual report would be produced to highlight the state of the reefs in each territory with any similarities and/or differences being highlighted.

**Budget estimate:** \$150,000/year

**Executing agency:** DMWR (MNRE/SPREP)

**Duration:** 3 years

**Priority:** Medium

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## **OBJECTIVE 7: ENCOURAGE DEVELOPMENT OF TECHNOLOGIES AND METHODS TO ACHIEVE THE MOST EFFECTIVE LEVEL OF ENFORCEMENT AND TO ENSURE SAFETY AT SEA**

**Objective:** Promote the development and application of creative fisheries surveillance and enforcement solutions to ensure cost effective enforcement and to promote voluntary compliance with fisheries management measures and controls.

**Progress:** DMWR Enforcement Officers were deputized by the federal government to enforce federal fishing regulations. Agents were trained in rules of engagements to violator, citation issuance, and boat safety operations. They also conduct intermittent monitoring and patrols in the Community-base Fishery Management Program villages and Fagatele Bay National Marine Sanctuary. The Division is also assisting in the formulation of the by-laws of the CFMP management plan where community members will be deputized to enforce their own village fishery regulations.

## **Activity 7.1 Enhance monitoring and enforcement capabilities through improved communication and the use of new technologies**

**Project Title:** Installation of a radar facility to monitor vessel and small craft movements within the Territory of American Samoa

**Purpose:** Monitoring of the fishery is difficult due to lack of technological resources of the Enforcement Division. The surveillance and monitoring activities they conduct at present is based only by chance and from local intelligence when people observe fishing activities in their area. Upgrading the technological base of DMWR by installing a radar facility would enable closer and real time monitoring of vessels and potentially increasing apprehension of violators. This would support the present DMWR efforts in establishing no-take MPA's and also in the enforcement of the CFMP village management.

**Description:** This project aims to upgrade the enforcement capability by making newer technology available for enforcement use. Monitoring of protected areas is currently on an opportunistic basis. Violators may have left prior to arrival of enforcement team. Installing a mid-range radar system allows for real-time monitoring of protected areas and fishing grounds. This allows for the enforcement team to immediately respond to violations and increase the possibility of apprehension. The radar will be monitored for 24 hours. This also supports the no-take marine protected area effort where the possible no-take area will be located on the outer banks. Monitoring these areas and prove trespassing by fishermen is difficult without any technological help. Reefs frequented by fishermen can be monitored and indirectly monitor effort by timing the period the boat remains in one area. Data that this project generates is essential for management.

**Evaluative criteria:** Enhancement of monitoring and surveillance will be monitored and the rate of apprehension will be compared to the previous methods.

**Budget estimate:** \$200,000

**Executing agency:** DMWR and NMFS

**Duration:** Installation for 1 year and operation will continue beyond funding timeframe

**Priority:** High

## **Activity 7.2 Surveillance and enforcement**

**Project Title:** Surveillance and enforcement of marine protected areas

**Purpose:** The key to a successful marine protected area relies on effective enforcement of rules and regulations. This project aims to effectively enforce the rules and regulations of the various MPA's in the territory by conducting routine surveillance and monitoring.

**Description:** Currently DMWR has 11 established Community-based Fishery Management areas and is working towards establishing a number of no-take MPA's. The department is working towards enforcing the management regulations for these sites by deputizing local community member in order for them to conduct the enforcement activities themselves. However, this would take a long process. In the meantime, there is an urgent need to monitor these areas for violators. The Enforcement Division will conduct bi-weekly monitoring and surveillance on these areas via land and sea. The operation costs for these activities are beyond the budget available from the local funds. Night vision goggles will be used to monitor the area. Two officers will be conducting the enforcement activities. This project aims to minimize illegal intrusions to protected areas.

**Evaluative criteria:** The number of apprehension and violations will be monitored and compared to previous years to determine if there are any improvements on the compliance to the rules and regulations.

**Budget estimate:** \$100,000

**Executing agency:** DMWR

**Duration:** 3 years

**Priority:** High

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