

Biogeographic Assessment of the American Samoa Archipelago: Creating the Basis for a Network of Marine Protected Areas

A cooperative investigation between NOAA and American Samoa



September 2008



About this document

This document was created to inform project partners and other interested groups and individuals about the planned biogeographic assessment activities in American Samoa. The document is intended to foster discussion, explore ideas, and obtain feedback on the evolving scope and approach of the work. These discussions will be used in the next phase of project implementation; development of a project work plan. The work plan will define tasks, products and project milestone dates.

For more information

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Photographs on the report cover from the National Park Service's American Samoa website.
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Project Summary

The proposed NOAA partnership project will provide information to help identify candidate areas for an integrated network of national marine sanctuaries within the American Samoa archipelago. The project will also directly support the Territory's goal of identifying 20% of their coral reefs for designation as no-take marine protected areas. In addition, the project will complement the ongoing Fagatele Bay National Marine Sanctuary (FBNMS) management plan review. The planned assessment includes biological, oceanographic, and human dimension components and will serve as a prototype for assessments in other areas of the Pacific. Planned products include geospatial analyses and maps depicting the spatial and temporal distribution of selected marine species; species assemblages; socioeconomic patterns; identification of biologically significant areas; and delineation of a potential network(s) of marine protected areas based ecological, socioeconomic, and cultural information.

Background

American Samoa consists of five high-volcanic islands plus two low-lying atolls. The volcanic islands are part of a hotspot chain which also includes two larger volcanic islands of the independent nation of Samoa to the west as well as an active undersea volcano to the east. These islands typically have narrow reef flats (50-500 meters), fringing reefs, and steep offshore banks dropping to oceanic depths within 0.5-8 kilometers from shore (Figure 1). The archipelago lies within the South Equatorial Current which is characterized by warm (28-30 °C), westward flowing, highly oligotrophic tropical surface waters, with a deep thermocline (~120-200 m). Winds are generally light and variable during the austral summer rainy season except during occasional cyclones. Consistently stronger trade winds from the east-southeast dominate in the other seasons.

Purpose

The proposed NOAA partnership project will support multiple marine managed area initiatives in the Samoan archipelago. This will be done through geospatial analyses that depict the spatial and temporal distribution of selected marine species, habitats, and socioeconomic patterns. The project will identify candidate areas for a potential network of national marine sanctuaries and other marine protected areas (MPA) throughout the archipelago based on ecological, socioeconomic, and cultural information. The planned assessment will specifically complement the ongoing Fagatele Bay National Marine Sanctuary management plan review and the Territory's MPA efforts.

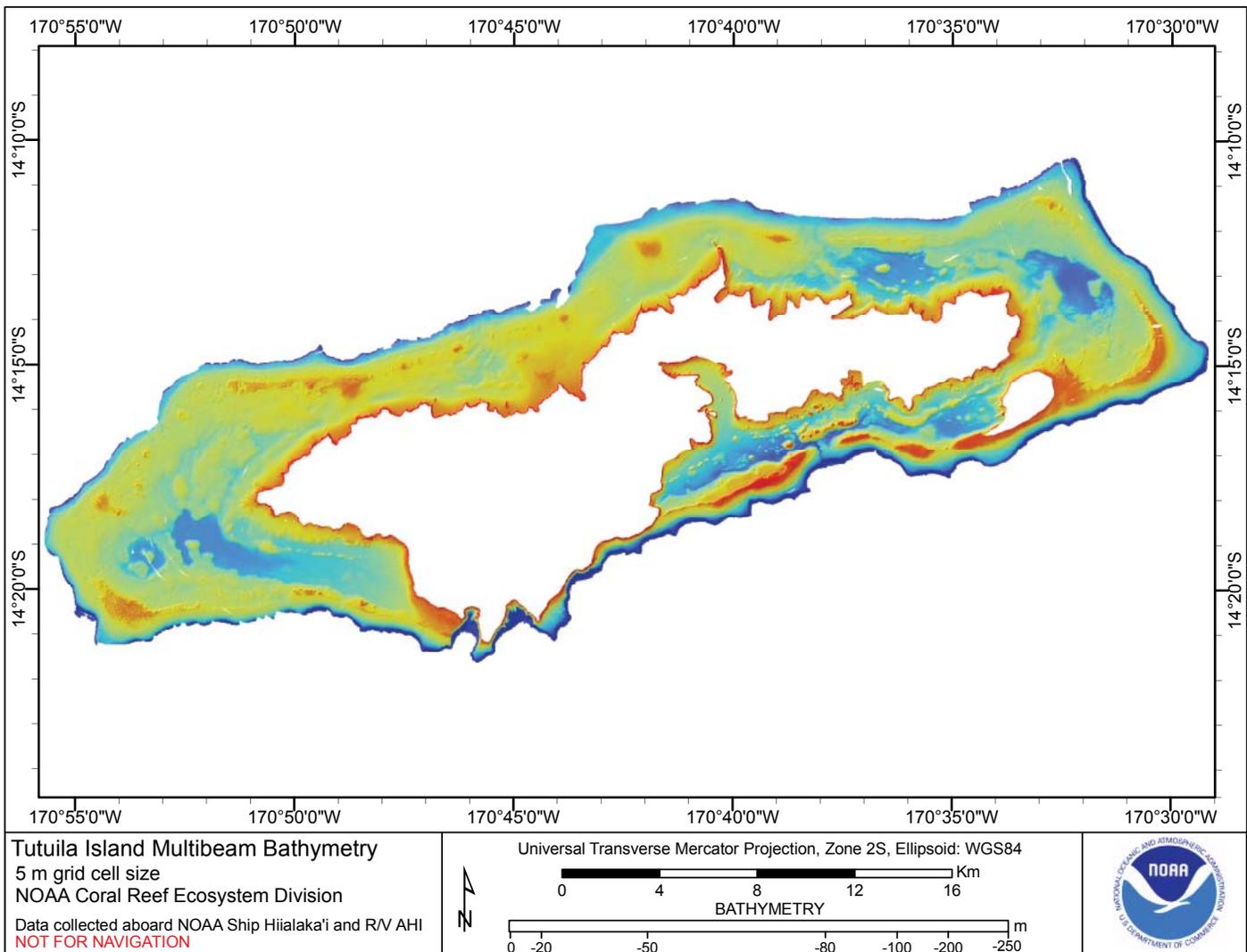


Figure 1. Nearshore bathymetry around Tutuila Island, American Samoa (NOAA, Coral Reef Ecosystem Division).

The capital of American Samoa is Pago Pago, located on Tutuila, the main island of the territory. Tutuila has a land area of approximately 56 square miles and is home to over 90 percent of the territory's total population of 65,000. The harbor at Pago Pago is one of the deepest and best protected in the South Pacific. The total land area of all seven islands is 76 square miles. The primary economy of American Samoa consists of government activities and tuna canneries which each comprise one-third of total employment respectively. The remaining one-third of employed workers is in the secondary economy, which consists mainly of retail and service enterprises.

There are two types of fisheries that harvest coral reef fishes and invertebrates: 1) subsistence fishing by villagers, which is usually a shoreline activity using a variety of gear, such as rod and reel, spear guns, gillnet, and gleaning; and 2) artisanal fishing by free-divers who spear fish, and small-boat fishers who jig for bottomfish around the steeply sloping islands. Most of these fish are sold at local stores. Subsistence fishing has been declining over the past two decades as a result of the gradual change from a subsistence to a cash-based economy. A third type of fishery focuses on pelagic fishes, especially tuna. The pelagic fishery includes small longline boats and large commercial boats that deliver tuna to the local canneries.

The Proposed Study

Several complementary activities related to MPAs in the Samoan Archipelago are presently underway and provide the impetus for the proposed regional Biogeographic Assessment (Figure 2). Fagatele Bay National Marine Sanctuary is engaged in a review and update of their management plan including consideration of border modification to potentially expand or include multiple sites thereby forming an Integrated American Samoa National Marine Sanctuary Network (IASNMSN). In addition, the government of American Samoa is considering a Territorial MPA Network Strategy that will identify preferred sites to include in a no-take network consisting of 20% of the territory's reefs (Oram 2008). Last, American Samoa and the independent nation of Samoa are engaged in an initiative to identify shared environmental problems, exchange management approaches, and consider resources that would benefit from coordinated management. Such resources may include a network of MPAs throughout the entire Samoan Islands archipelago.

Project kickoff meetings for the proposed assessment were held in American Samoa the week of April 28, 2008. At a series of meetings, NOAA met with local groups to brief them on the potential work and obtain initial feedback on project design and objectives (Appendix A). First, NOAA briefed the Coral Reef Advisory Group and FBNMS Advisory Council. Both groups expressed support for the project and recognized the linkages and benefits to their own needs and activities. Next a more focused series of meetings and site visits were held between NOAA and several staff with the American Samoa Department of Marine and Wildlife Resources, the American Samoa Environmental Protection Agency, and the National Park Service to discuss data availability. At these meetings, accessible datasets were transferred, other key datasets were identified for later acquisition, and points of contact were identified for data transfer and collaborative analysis. The final meeting of the week was with the Governor of American Samoa. At this briefing, NOAA and local project partners presented a unified project plan, summary of the week's productive meetings, and a commitment to collaborate on common objectives including resource assessment and MPA network design. Overall, the project kickoff meetings resulted in agreement among Federal and Island partners to move forward with development of a project concept plan (this document) and project work plan (forthcoming) that will describe the technical aspects of the assessment. The next set of meetings were held the week of August 17, 2008 in American Samoa and resulted in initial data compilation and completion of this project concept document.

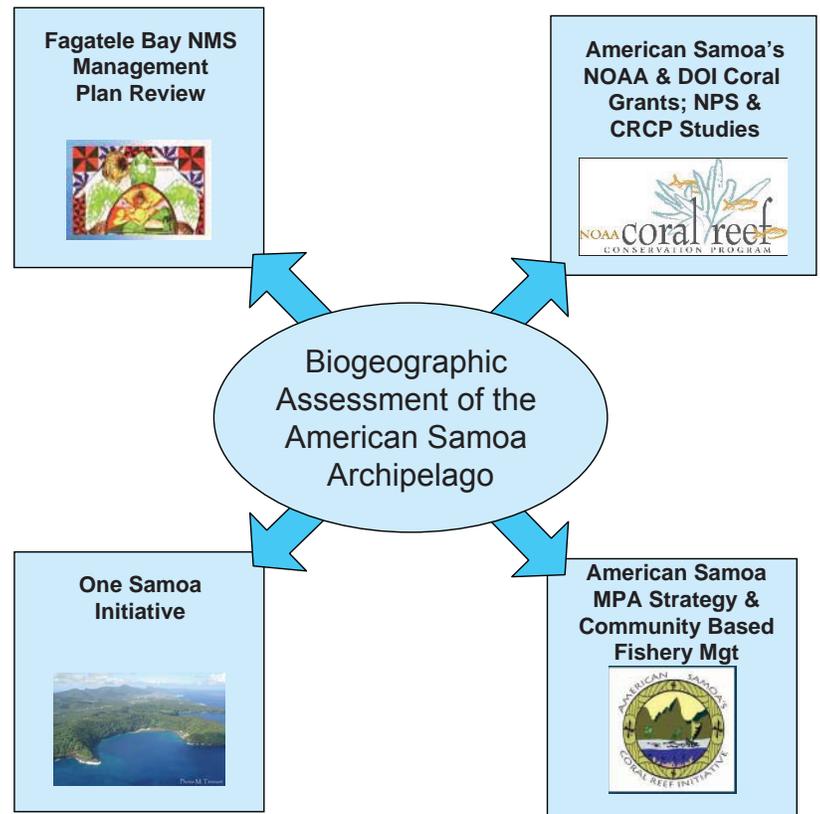


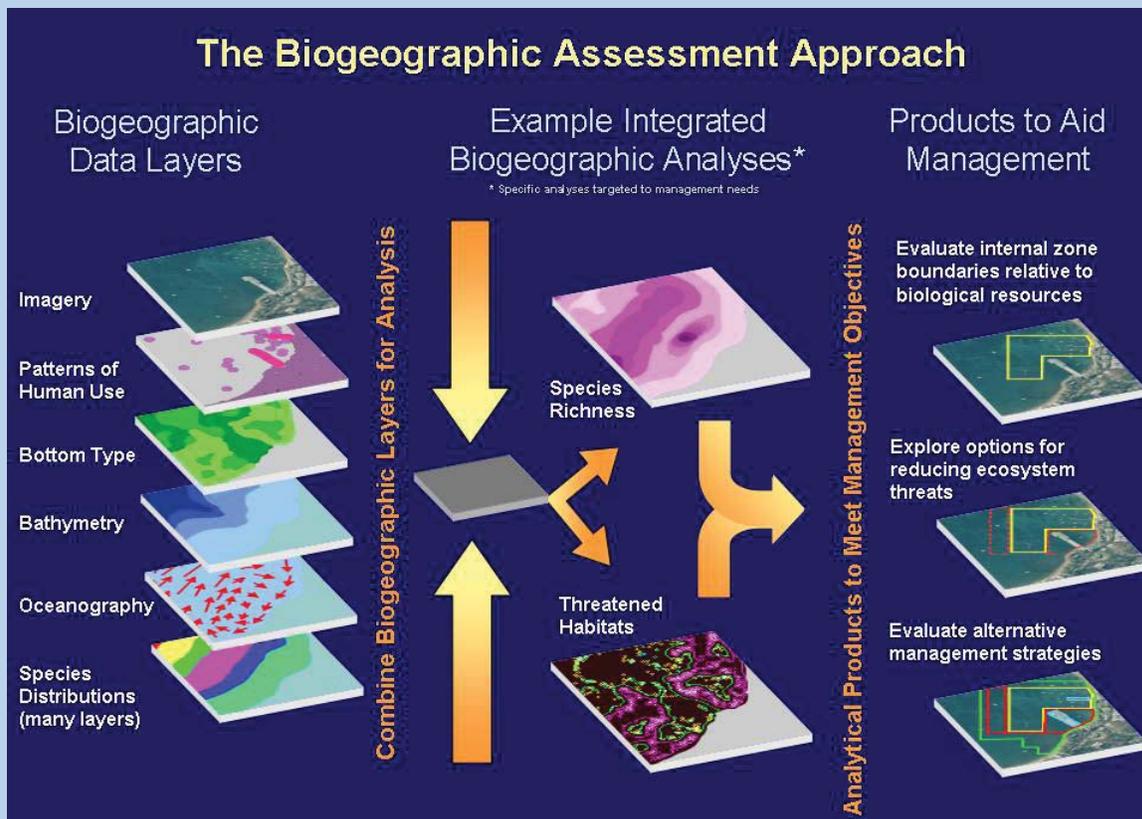
Figure 2. Interrelated MPA activities of the Samoan archipelago.

What are Biogeographic Assessments?

The mission of NOAA's Office of National Marine Sanctuaries (ONMS) is to serve as the trustee for a system of marine protected areas, to conserve, protect, and enhance biodiversity. To assist in accomplishing this mission, the ONMS has developed a partnership with NOAA's Center for Coastal Monitoring and Assessment (CCMA) to conduct biogeographic assessments of marine resources within and adjacent to the marine waters of NOAA's National Marine Sanctuaries (Kendall and Monaco 2003).

Biogeography is the study of spatial and temporal distributions of organisms, their associated habitats, and the historical and biological factors that influence species' distributions. Biogeography provides a framework to integrate species distributions and life history data with information on habitats of a region to characterize and assess living marine resources within a sanctuary. The biogeographic data are integrated in a Geographical Information System (GIS) to enable visualization of species' spatial and temporal patterns, and to predict changes in abundance that may result from a variety of natural and anthropogenic perturbations or management strategies (Monaco et al 2005; Battista and Monaco 2005). The complexity of products from biogeographic analysis range from simple species distribution maps or a particular habitat, to more complex products that combine single data layers to create maps of biodiversity or habitat complexity (NOAA 2003; Pittman et al. 2007).

The biogeographic assessment approach was developed by CCMA's Biogeography Branch in consultation with the ONMS in 2003 (Kendall and Monaco 2003, Monaco et al. 2005). Typically a biogeographic assessment is comprised of the three primary activities: 1) compile individual biogeographic data layers, 2) perform integrated biogeographic analyses, and 3) develop products to aid in management. A key tool used to develop and implement the assessment is the use of GIS technology which aids in data compilation, spatial analyses, and visualization of results to support place-based management needs (Battista and Monaco, 2004). The assessment process shown below is based on geospatial and temporal analyses of existing physical and biological data and has resulted in many spatially-oriented products that assist help managers in understanding how ecosystems function. Often biogeographic analyses focus on determining the strength of coupling between habitats and species and defining discrete areas of biological significance (NOAA 2003; NOAA 2005; Monaco et al., 2005).



Spatial Scope

The assessment will be conducted for waters within the Exclusive Economic Zone (EEZ) of American Samoa and more broadly over the entire Samoan Archipelago as datasets and coordination allow (Figure 3). The majority of the analyses will focus on the narrow shelf around the islands where the coral reef ecosystems are located. To provide geographic context beyond Samoa, selected oceanographic analyses will be conducted at a wider spatial extent to include the EEZ of the surrounding island nations.

General Approach

The assessment will consist of three interrelated components: biogeography, human dimensions, and MPA network design (Figure 4). Human dimensions and biogeographic activities are further described below. MPA network design will be defined based on human dimensions and biogeographic components. The assessment will provide spatially explicit depictions of ecological resources, oceanographic patterns, socioeconomic concerns, and the connectivity among them. These factors represent a primary information need for marine and coastal management decisions.

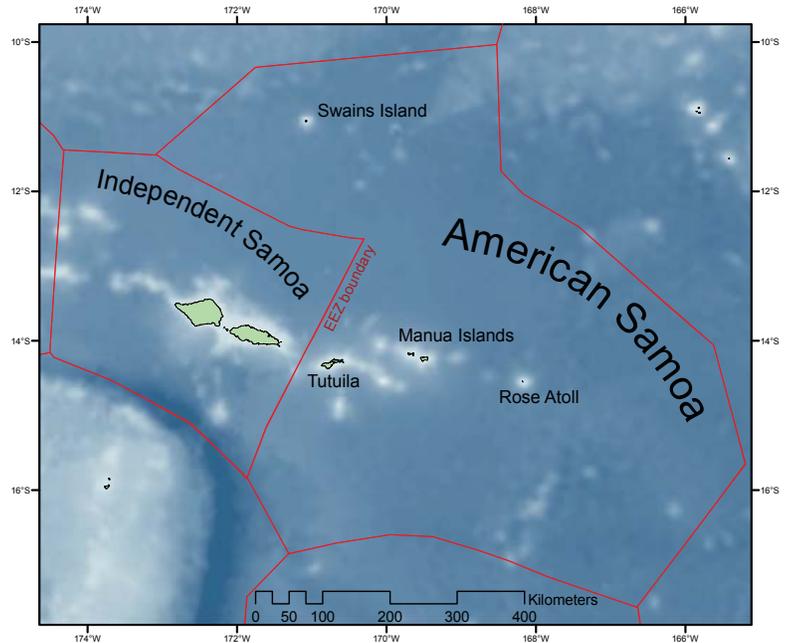


Figure 3. Samoan archipelago/EEZ.

Study Objectives

- Provide spatial and temporal analyses of key geophysical features including reefs and associated habitats, marine fish, fish assemblages, shelf features, and oceanographic variables.
- Identify the resource users (subsistence fishermen, consumptive divers, eco-tourism, etc.), extent of use (person-days of recreational activity, fishing catch, etc.), spatial distribution of resource use, and how much income, if any, is dependent upon the resources.
- Provide alternative boundary scenario's for a network of protected areas that is integrated with all Samoan MPA initiatives.

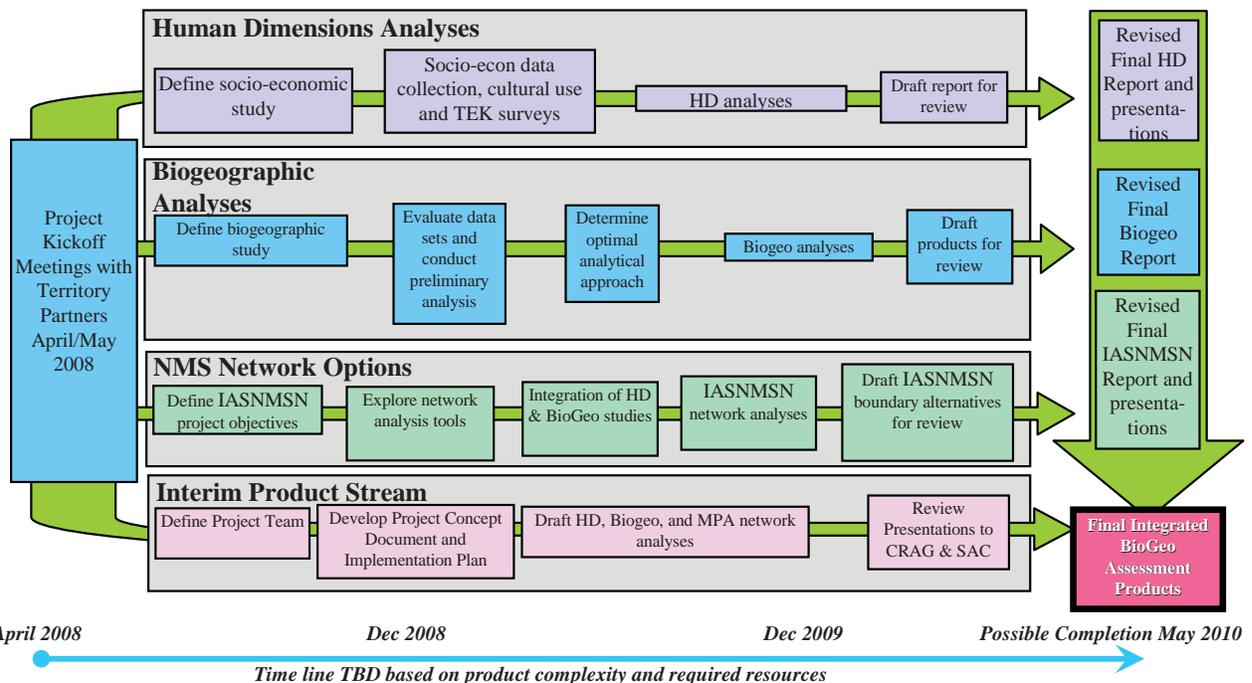


Figure 4. American Samoa biogeographic assessment project flow chart.

Schedule

A two-year project is anticipated after implementation of the project work plan which is scheduled to begin in January 2009.

Biogeography: Year 1 Activities

Initial activities for the project include identifying, obtaining, and evaluating the many biogeographic datasets available in the region (Tables 1-3; Fenner et al. 2008). These preliminary evaluations and analyses will help guide production of a detailed work plan that will include a specific list of analyses, tasks, and products along with milestone dates and assignment of responsible parties for each task. Appropriate data will be processed into individual biogeographic layers.

Table 1. Ongoing biological monitoring activities in American Samoa (Fenner et al. 2008).

PROJECT	LOCATION	YEAR	AFFILIATION/ FUNDING	PRINCIPLE INVESTIGATOR	FREQUENCY	STATUS
Aua Transect	Aua Village, Tutuila	1917	CRAG, CRI	Birkeland	Periodic	Ongoing
TMP	Tutuila and Manua	2005	DMWR, CRAG, NOAA	Fenner and Carroll	Annual	Ongoing
Resource Assessment and Monitoring Program	All Islands	2002	NOAA PIFSC-CRED	Brainard et al.	Biannual	Ongoing
Key Reef Species (fish)	Tutuila and Manua	2005	DMWR, FedAid Sportfish Recovery	Sabater	Annual	Ongoing
Coral Disease	Tutuila and Manua	2005	DMWR, FedAid Sportfish Recovery	Fenner	Annual	Ongoing
Rose Atoll	Rose Atoll	2002	USFWS	Maragos	Periodic	Ongoing
MPA Reef Flats	MPA Villages, Tutuila	2004	DMWR, FedAid Sportfish Recovery	Vaitautolu	Approx. Annual	Ongoing
Fagatele Bay Monitoring	Fagatele Bay, Tutuila	1985	Fagatele Bay NMS	Birkeland and Green	3 years (Approx.)	Ongoing
Long-Term Monitoring	Tutuila and Manua	1982	DMWR	Green and Birkeland	5 years (Approx.)	Ongoing
Nonpoint Source Pollution	Tutuila	2003	AS EPA	Houk and Peshut	Annual	Ongoing
Inshore Creel Survey	South Shore, Tutuila	1978	DMWR, FedAid Sportfish Recovery	Iramatra	Daily	Ongoing
Reef Monitoring	National Park, North Shore, Tutuila	2007	National Park of American Samoa	Brown and Craig	Annual	Ongoing
Stream/ Beach Monitoring	Tutuila	2002	AS EPA	Zennaro and Paselio	Weekly	Ongoing
Shallow-water Benthic Habitat Maps	All Islands	2005	NOAA CCMA-BB	Battista and Monaco	One Time	One Time

Table 2. Ongoing oceanographic monitoring activities (Fenner et al. 2008).

System	Variables Monitored	Dates	Agency
Deepwater CTDs* at select locations near the islands	Conductivity (salinity), temperature, depth, dissolved oxygen, chlorophyll to a depth of 500 m	February 2002 - present	PIFSC-CRED
Shallow-water CTDs* - multiple sites each island/atoll	Temperature, salinity, turbidity	February 2002 - present	PIFSC-CRED
Water Samples	chlorophyll and nutrients (nitrate, nitrite, silicate, phosphate) concurrent with deep and shallow-water CTDs at select depths	January 2006 - present	PIFSC-CRED
Coral Reef Early Warning Buoys -1 Standard (Rose Atoll)	Enhanced: temperature (1 m), conductivity (salinity), wind, atmospheric pressure	February 2002 - present	PIFSC-CRED
Sea Surface Temperature (SST) Buoys - 3 (Tau, Tutuila)	Temperature at 0.5 m	February 2002 - present	PIFSC-CRED
Subsurface Temperature Recorders - 33 (all islands)	Temperature at depths between 0.5 m and 30 m	February 2004 - present	PIFSC-CRED
Ocean Data Platforms (ODP) - 1 (Swains)	Temperature, conductivity (salinity), spectral waves, current profiles	February 2002 - present	PIFSC-CRED
Wave and Tide Recorders (WTR) - 2 (Rose Atoll, Tutuila)	Wave and tidal heights	February 2004 - present	PIFSC-CRED
Ecological Acoustic Recorder (EAR) - 4 (Tutuila)	Ambient sounds up to 12.5 kHz and vessel generated sounds	February 2006 - present	PIFSC-CRED

* CTD: Conductivity, temperature and depth.

Table 3. Key fishery independent data for American Samoa (Fenner et al. 2008).

STUDY	PROJECT	YEAR	AVAILABLE DATA	METHOD USED	DEPTH	# OF SITES	REP'S/ SITE	TRANSECT/ SURVEY DIMENSION
Wass (1982)	Fish community characterization	1977-1979	Abundance, biomass, and species composition of diurnal fish	Belt transect	4-15 m ^a	63	1 5	100 x 2 m ^b 20 x 2 m
Green (1996)	Status of coral reefs of the Samoan archipelago	1996	Abundance, biomass, and species composition of diurnal fish	Belt transect	1,5,10,20 m	18	5	50 x 3 m
Green (2002)		2002		Belt transect	10 m	18	5	50 x 3 m
Page (1998)	Ecology, biology and fishery of parrot-fishes	1996-1998	Abundance, biomass, species composition,	Belt transect	3,10,20 m	26	5	50 x 5 m
Green et al. (2005)	Fagatele Bay National Marine Sanctuary Monitoring Program	1977-2004	Abundance, biomass, and species composition of diurnal fish	Belt transect	12,6,9m ^c	3	3	100 x 2 ^d
					3,6,9,12,18 m	1	6	30 x 2 m
PIFSC-CRED ongoing	American Samoa Reef Assessment and Monitoring Program	2002-2006	Abundance, biomass, and species composition of diurnal fish	Belt transect	10-15 m	76 ^f	3	25 x 4 m ^g ,
				Stationary point count ⁱ	10-15 m	76 ^f	4	25 x 2 m ^h
				Towed-diver survey ^j	15 m	n/a	n/a	10 m radius n/a
Whaylen and Fenner (2006); Fenner and Carroll (<i>in review</i>)	American Samoa Territorial Monitoring Program (ASCRMP)	2005	Abundance, biomass, and species composition of diurnal fish	Stationary point count	10 m	11	6	7.5 m radius
		2006		Belt transect	10 m	11	6	30 x 10 m ^k , 30 x 5 m ^l , 30 x 2 m ^m
Sabater and Tofaeono (2006)	Key Reef Species Program	2005	Abundance, biomass, and species composition of targeted fish species	Belt transect	10 m	24	3-4	30 x 5 m
Sabater and Tofaeono (2007)		2006		Belt transect	10 m	20	3-4	30 x 5 m

A: Depth varies depending on the habitat being surveyed
 B: Belt area varies between habitat types and transect orientation
 C: Depth shown are for Fagatele Bay, Sita Bay and Cape Larsen, respectively
 D: Transect area for years prior to 2004; later surveys used 30 x 2 m transect area
 E: Belt transect used for quantifying relatively small bodied and abundant fish
 F: The number of sites successfully surveyed varies between years. Numbers show total number of monitoring sites.
 G: Transect dimension used to survey fish ≥20 cm TL
 H: Transect dimension used to survey fish < 20 cm TL
 I: Stationary point count for quantifying relatively larger and agile fish species
 J: Towed-diver survey was used for quantify large bodied (>50 cm TL), wide-ranging fishes over a broad spatial scale
 K: Belt dimension used to survey highly mobile species (e.g. Kyphosidae, Scaridae, Siganidae, Lethrinidae, Serranidae, etc.)
 L: Belt dimension used to survey demersal species (e.g., Chaetodontidae, Pomacantidae, Acanthuridae, Balistidae, etc.)
 M: Belt dimension used to survey Pomacentridae including only herbivorous and excluding planktivorous species

Socioeconomics: Year 1 Activities

Initial activities for the project include identifying, obtaining, and evaluating the many human dimension datasets available in the region (Table 4). In addition, the Fagatele Bay National Marine Sanctuary (FBNMS) will explore environmental attitudes towards marine conservation in American Samoa through a synthesis of existing research and in-person interviews. Information from this and other sources will be used to define the socioeconomic component of the overall project work plan. Appropriate data will be used to create a socio-geographic assessment GIS for American Samoa.

MPA network design: Year 1 Activities

Explore analysis framework options for MPA network study (e.g. grid, sliding window, watershed, village boundaries, other) based upon data resolution, geopolitical boundaries, network objectives, and consultation with project partners.

Key products/activities Year 1

- Collect relevant biogeographic and socioeconomic data layers
- Project work plan
- Derive comprehensive biogeographic and socioeconomic datalayers
- Review with local project partners

Biogeography: Year 2 Activities

Integrated biogeographic datalayers, identification of biogeographic break points, ocean climatology, larval transport and island connectivity models (e.g. Figure 4), and identification of biological hotspots will be conducted early in Year 2. These will serve as inputs for the socioeconomic impact study, MPA analysis, and network design.

Socioeconomics: Year 2 Activities

Integrated socioeconomic and biogeographic data layers; identification of users; resource use patterns, expected changes due to altered behavior and potential management changes; and anticipated impacts to resources will be analyzed early in Year 2.

MPA network design: Year 2 Activities

Use derived biogeographic and socioeconomic data layers as inputs for MPA network analysis. Design alternative MPA network scenarios that address territorial, federal, and international goals. Use socioeconomic data layers to predict relative benefits and impacts of alternative MPA boundary designs.

Key products/Activities Year 2

- Final integrated biogeographic data products
- Socioeconomic analyses and data products specific to proposed management alternatives
- Placement options to support Territorial MPA, IASNMSN, and international MPA network planning

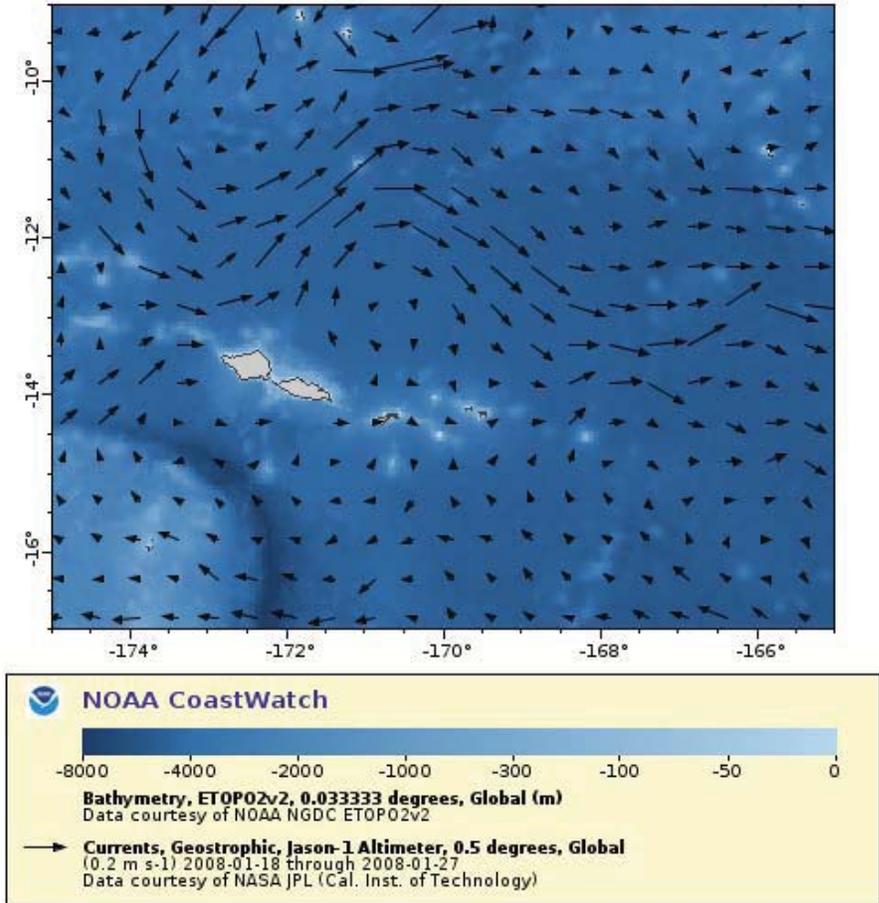


Figure 4. Example geostrophic current / connectivity vectors for the study area.



Table 4. Key human dimension data sets for American Samoa.

Project	Location	Year	Affiliation/ Funding	Available Data	Principle Investigator	Project Status
Documenting Traditional Knowledge of Marine Resource Use and Management in American Samoa	Tutuila and Manua	2008	NOAA, CRAG	Yes	Arielle Levine	Ongoing
Knowledge, Attitudes and Perceptions Towards Marine Conservation in American Samoa. Survey of Villages Adjacent to Fagatele Bay	Tutuila	2008	NOAA	Yes	Emily Gaskin	Ongoing
Public Knowledge and Perceptions of Coral Reefs: A Study of Tutuila, American Samoa	Tutuila	2005	CRAG	Yes	Rachel Turner	Final
Economic Valuation of Coral Reefs and Adjacent Habitats in American Samoa (Jacobs)	All Islands	2004	ASDOC	Yes	James Spurgeon	Final
Initial assessment of the potential for applying economic values to enhance coastal environmental policy in American Samoa (Jacobs)	All Islands	2007	ASDOC	Yes	Toby Roxburgh	Draft
American Samoa Territorial Marine Science Center Business Plan	Tutuila	2008	ASDOC	No	Steve LeGore	Final
A Description and Economic Analysis of Large American Samoa Longline Vessels	Tutuila	2002	UH, JIMAR, NOAA	No	O'Malley and Pooley	Final
The Commercial, Subsistence and Recreational Fisheries of American Samoa	All Islands	1993	DMWR	No	Peter Craig	Final
Ecotourism Plan for American Samoa	All Islands	2005	ASDOC	No	UH Pacific Business Center Program & School of Travel Industry Management	Final
American Samoa Business Opportunities Report	All Islands	2007	USDOJ - OIA	No	Adam Stein and Rick Turner	Final
A Geographic Information System for Fisheries Management in American Samoa	All Islands	2005	DMWR	Yes	Francesca Riolo	Final
Impact of Increased Minimum Wages on the Economies of American Samoa and the Commonwealth of the Northern Mariana Islands	All Islands	2008	USDOL	No	Office of the Assistant Secretary for Policy	Final
American Samoa Archipelago Fishery Ecosystem Management Plan	All Islands	2005	Western PRFMC	Yes		Final
American Samoa's Economic Future and The Cannery Industry	Tutuila	2008	USDOJ - OIA	Yes	Malcolm D. McPhee	Final

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NOAA Coral Reef Ecosystem Division

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A Proposed Biogeographic Assessment of the American Samoa Archipelago: Creating a Basis for a National Marine Sanctuary Network

The proposed NOAA partnership project will provide information to help identify candidate areas for an integrated network of national marine sanctuaries within the American Samoa archipelago. The planned assessment includes biological and human dimension components and will complement the ongoing Fagatele Bay National Marine Sanctuary management plan review. The assessment will also serve as a prototype for additional assessments in other areas of the Pacific. Planned integrated assessment products include geospatial analyses and maps depicting the spatial and temporal distribution of selected marine species; species assemblages; socioeconomic patterns; identification of biologically significant areas; and delineation of a potential network(s) of marine protected areas based ecological, socioeconomic, and cultural information.

Background

Since the spring of 2001, NOAA's Center for Coastal Monitoring and Assessment (CCMA) and the Office of the National Marine Sanctuaries (ONMS) have conducted a suite of investigations to define the biogeography of selected marine species and assemblages found within and near the boundaries of the nation's national marine sanctuaries (Monaco et al. 2005). Assessments are completed and/or underway at nine national marine sanctuaries and have provided critical information in support of ONMS management plans that include place-based ecosystem management actions and various human dimension assessments (see example @ http://ccma.nos.noaa.gov/ecosystems/sanctuaries/chanis_nms.html). CCMA and the ONMS are leading the partnership efforts to define biologically significant areas and potential socioeconomic impacts of place management actions (e.g., zoning) within and outside national marine sanctuary boundaries.

Project Synopsis

Using a similar approach that has been implemented successfully in other national marine sanctuaries, NOAA in consultation with the Territory of American Samoa plans to define the oceanographic, socioeconomic, and biogeographic characteristics of the American Samoa archipelago (Figure 1). The integration of ecological and socioeconomic information is critical for planning the extent and location of a network of national marine sanctuaries. The role of socioeconomic analysis will be to identify users, determine behaviors, and estimate socioeconomic impacts.

The proposed effort builds on previous American Samoa initiatives to develop marine protected areas in the Territory and will make maximum use of existing data. Data sets that cover large areas of American Samoa territorial and adjacent federal waters will be critical components of a biogeographic assessment that could help identify potential marine sanctuaries within a larger network of sites. Much of the of recent American Samoa coral reef

ecosystem information about species distribution and abundance, habitat and bathymetry map products, and local monitoring data is supported by NOAA's Coral Reef Conservation Program (CRCP). Many of the CRCP data are generated, analyzed, and published by NOAA's Coral Reef Ecosystem Division (CRED) and CCMA. Data and products generated by CRED, CCMA, the Territories and other spatially robust mapping and monitoring efforts are critical in assessing the feasibility of expanding the ONMS presence in American Samoa from the relatively small Fagatele Bay National Marine Sanctuary to an integrated American Samoa national marine sanctuary network (IASNMSN). The study will be conducted in parallel with the Fagatele Bay National Marine Sanctuary management plan review, and where applicable, directly support the review process. Potential network(s) design will be based on the principles of biogeography, socioeconomic evaluations, and American Samoan traditional ecological knowledge and integrated using a suite of marine protected areas analysis tools. Thus, the

IASNMSN data synthesis, analysis, and assessment activities will be tailored to the ONMS mission of enhancing biodiversity, ecological integrity, and cultural heritage of the region through focused efforts in describing the overall biogeography of the American Samoa archipelago.

Approach and Schedule

The proposed time frame is subject to change and is based on management needs and available resources from partner agencies. One to three years is typically required to conduct an integrated biogeographic assessment, depending on the complexity of the management issues, data availability, and the existence of published information. With limited funding in FY08, plans are to conduct the activities listed below for year one of the study (May 2008 – May 2009). A comprehensive project plan will be developed within the

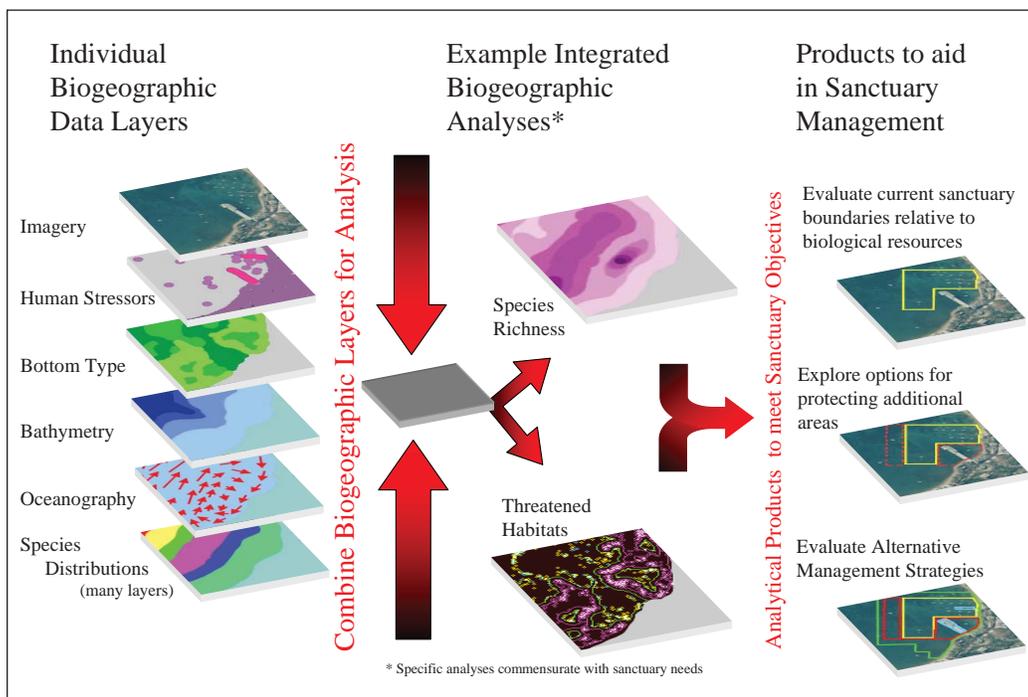


Figure 1. Generalized biogeographic assessment process.

first year identifying project partners, tasks, and time frames. It will also outline data availability, assessment products, and required funding to meet milestone dates.

Biogeography: Year 1 Activities

- Identify the ONMS and American Samoa desired outcomes for IASNMSN through a series of meetings.
- Conduct initial evaluation of available biological, physical, and human dimension data for the region.
- Propose necessary modifications to the biogeographic assessment process to meet IASNMSN objectives.
- Develop a project plan in consultation with regional and territory partners.
- Conduct initial biogeographic analyses with project partners that include synthesis of biological, physical, and human dimension data into a GIS.

Socioeconomics: Year 1 Activities

- Conduct a socioeconomic analysis supporting the Fagatele Bay National Marine Sanctuary management plan review, and possible boundary expansion and/or reserves. This analysis will include descriptive information, such as who the stakeholders and users are, the extent of their use (person-days of recreational activity, fishing catch, etc.) and how much of their income, if any, is dependent upon sanctuary resources. Socioeconomic analysis will identify who the affected users are, determine how their behavior will be altered, and estimate the socioeconomic impact of that change.
- Develop a sociogeographic assessment GIS of Samoa and American Samoa. This assessment will facilitate integrated analysis of multiple data sets for possible management scenarios.

Biogeography: Year 2 Activities

- Conduct a biogeographic assessment that includes synthesis, analysis, and integration of selected ecological, oceanographic, and human dimension data.
- Conduct peer reviewed workshops with local experts and incorporate comments into proposed IASNMSN.
- Develop draft of the proposed IASNMSN report. The report will include text, maps, and summary tables that document the process used to integrate scientific and traditional ecological knowledge into proposed IASNMSN.

- Deliver project results and recommendations via hard copy atlas, CD-ROM, and internet-based products.

Socioeconomics: Year 2 Activities

- Conduct a socioeconomic analysis supporting the IASNMSN and the Territory's Integrated Samoan MPA Network Strategy. This analysis will document the socioeconomic information relevant to both the IASNMSN and the Integrated Samoan MPA Network Strategy.

Integrated biogeographic assessment: Year 2 Activities

- Integrate sociogeographic analyses with biogeographic assessment results.
- Publish results and recommendations to support a proposed IASNMSN.

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