

Appendix D. Implementation

D.1 Overview

Implementation of the entire CCP would require increased funding which would be sought from a variety of sources. This plan would depend on additional appropriations, partnerships, and grants. There are no guarantees that additional Federal funds would be made available to implement all of these projects so other sources of funds would also be sought (both public and private). Activities and projects identified would be implemented as funds become available. Funding for Rose Atoll NWR for Fiscal Year 2011 was \$141,145.

The CCP proposes several projects to be implemented over the next 15 years. All of these projects are included in the Refuge Management Information System (RONS [Refuge Operational Needs System] or MMS [Maintenance Management System]), which are used to request funding from Congress.

Monitoring activities would be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time, habitat conditions, and responses to management practices. Actual monitoring and evaluation procedures would be detailed in SDMP (see below).

In addition to the actual strategies outlined in the CCP, some activities would require more detailed plans. An Inventory and Monitoring Plan (by 2017) has been identified as an SDMP that would be developed as part of implementation.

D.2 Costs to Implement CCP

The following sections detail both one time and recurring costs for various projects. One-time costs (Table D-1) reflect the initial costs associated with a project, such as the purchase of equipment, contracting services, etc. Recurring costs (Tables D-2 and D-3) reflect the future operational and maintenance costs associated with the project. Table D-4 summarizes the total budgets needed to implement the CCP across the different alternatives. The potential funding sources identify both base funding that is appropriated by Congress as part of the NWRS budget (e.g., 1261=operations, 1262=maintenance, 1263=visitor services, etc.) and grants/external funds received (e.g., Endangered Species [ES], Deferred Maintenance [DFM], etc.). Note that for both tables D-1 and D-2, only costs the Refuge is directly responsible for have been identified. For partnering strategies identified, due to the unknown costs associated and timing, these costs have not been identified in the tables below. However some partnering costs have been identified in section D.4 (partnering opportunities).

Table D-1. One-Time Costs in Thousands

CCP Objective/Strategy	Alt A (\$K)	Alt B (\$K)	Potential Fund Source
Obj. 1.1: Within 10 years characterize nutrient budgets and dynamics at Rose Atoll and evaluate them relative to data from other similar reef sites to identify possible stressors and the positive effects of healthy seabird colonies adjacent to living reefs		\$30	1261
Obj. 1.1: Within 4 years, install remote sensing systems to document boat traffic in the lagoon		\$100	1265

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CCP Objective/Strategy	Alt A (\$K)	Alt B (\$K)	Potential Fund Source
Obj. 4.1: Within 10 years, investigate the ecological relationships between marine gastropods such as turban shells (<i>Turbo</i> spp.), and land hermit crabs (<i>Coenobita perlatus</i> and <i>C. brevimanus</i>). Evaluate factors affecting crab populations, including observed reduction in availability of shells to crabs at the Refuge and what management may improve mollusk shell availability to the <i>Coenobita</i> spp. which are important scavengers and herbivores on both islands		\$100	1261
Obj. 7.1: Install minimal signage on Rose Island to inform people of Refuge boundary and regulations	\$1	\$1	1263 or DM
Obj. 7.1: Develop brochures, Website, and utilize social media and other outreach tools specifically designed to communicate Refuge protection and safety issues and make these available to mariners		\$30	1263
Obj. 7.1: Develop outreach messages using social media such as blogs or interpretive videos on line to “bring the Refuge to the people”		\$30	1263
Obj. 7.1: Enhance law enforcement through the production of interpretive brochures for distribution in American Samoa and to the yachting community and collaboration with the USCG and NOAA for enforcement		\$150	1263 or 1265
Obj. 7.2: Create EE materials such as DVDs and posters for use with school groups		\$30	1263
Obj. 8.1: Restore the cement monument erected on Rose Island during the Governor’s 1920 visit		\$100	DM
To support strategies, purchase of one vehicle for Refuge staff		\$30	1261
TOTAL:	\$1	\$601	

Table D-2. Recurring Operational Recurring Costs Annual in Thousands

CCP Objective/Strategy (these costs would run through the entire 15 year plan and are annual)	Alt A (\$K)	Alt B (\$K)	Potential Fund source
Obj. 1.1: Identify, prioritize, and implement restoration needs such as debris removal in lagoon habitats affected by anthropogenic impacts such as iron contamination from shipwrecks	\$10	\$20	NRDA
Obj. 1.1: Within 5 years, develop and implement monitoring protocols to track populations of focal lagoon species including: fish, corals, fairsua, other invertebrates, and marine pests to determine abundance, density, and biomass of each at selected sites		\$20	I&M grant or 1261
Obj. 2.1: Continue monitoring abundance and distribution of the cyanobacteria community which became dominant on a section of the southwest arm of the atoll due to elevated iron levels following a 1993 shipwreck	\$20	\$60	NRDA

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CCP Objective/Strategy (these costs would run through the entire 15 year plan and are annual)	Alt A (\$K)	Alt B (\$K)	Potential Fund source
Obj. 2.1: Within 5 years, develop and implement monitoring protocols to track abundance and distribution of focal perimeter reef species including eels and urchins to determine abundance, density, and biomass of each at selected sites		\$20	I&M grant or 1261
Obj. 2.1: Monitor benthic succession of the reef which was damaged due to the 1993 shipwreck		\$20	NRDA
Obj. 2.1: Within 2 years, establish systematic marine debris removal program		\$10	NRDA
Obj. 3.1: Within 5 years, develop and implement monitoring protocol to track abundance and biomass of fish, including predatory and prey fish species, around the opening of the ava to detect any changes in structure or function of this important geological feature for large predators in the Refuge		\$10	I&M grant or 1261
Obj. 3.1: Work toward the inclusion of better warnings about the hazard to mariners of waters in and near the ava to prevent vessel groundings, and improve public communications about the Refuge being closed		\$10	1263
Obj. 4.1: Within 2 years, use GPS to map the perimeter of the islands at high and low tide on each visit to the Refuge and obtain any available satellite imagery for incorporation into GIS in order to document changes in island size and location		\$5	PICCC grant
Obj. 4.1: Within 15 years, restore and protect native coastal plants using best available information about original indigenous ecosystem. Restore native tamole (<i>Portulaca lutea</i>) population that was extirpated on Rose Atoll by introduced rats (<i>Rattus exulans</i>) but survived on an offshore coral block. Monitor survivorship, growth, and maturation of planted tamole	\$5	\$5	1261
Obj. 4.1 & 5.1: Within 2 years, prepare and implement a monitoring plan and rapid response program for terrestrial nonnative pest species and respond immediately if detected		\$35	ISST
Obj. 5.1: Within 10 years, eradicate the scale insect (<i>Pulvenaria urbicola</i>) and any other nonnative insects, specifically focusing on eradicating introduced ant species that facilitate scale growth and spread		\$40	ISST
Obj. 5.1: Continue monitoring presence or absence of breeding bird populations (annual or less often depending on visit schedule to the Refuge) as one indicator of the success of habitat restoration measures	\$5		1261
Obj. 5.1: Within 3 years, develop and implement a monitoring protocol to track seabird abundance, nesting rates, and feeding territories. Include remote sensing observations to improve future monitoring efforts		\$10	I&M grant or 1261

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CCP Objective/Strategy (these costs would run through the entire 15 year plan and are annual)	Alt A (\$K)	Alt B (\$K)	Potential Fund source
Obj. 5.1: Within 4 years, develop and implement a monitoring protocol to track changes in numbers, cover, and basal area of different plant species		\$3	1261
Obj. 5.1: Within 2 years, review existing vegetation community distribution data and develop GIS database of terrestrial and marine habitats and update them every 5 years		\$4	I&M grant or 1261
Obj. 5.1: Maintain cover of niu (<i>Cocos nucifera</i>) at or below 5% using mechanical or direct application of herbicides as appropriate	\$1	\$1	ISST or 1262
Obj. 5.1: Within 5 years, implement restoration design and begin outplanting vegetation		TBD	1261
Obj. 6.1: Within 5 years, monitor climate change variables and responses including: sea level, temperature, water quality (pH, conductivity, dissolved oxygen, nitrogen, photosynthetically available light [PAR], phosphorus, iron) and the frequency and duration of extreme storm events		\$15	PICCC grant or I&M
Obj. 6.1: Within 5 years, monitor the growth and survival rate of coral colonies at different depths		\$10	I&M
Vessel acquisition and maintenance for management, law enforcement, and monitoring: full ownership; partial ownership; or contract of a vessel for management.	\$20	- \$550 - \$275 - \$60	1262
TOTAL:	\$61	\$294 + \$12 (5 year interval veg. mapping) + • \$550 • \$275 • \$60 (vessel options)	

Costs identified below in Table D-3 include salary, COLA, and benefits (applicable only to Federal employees). The Refuge/Monument Manager is supported by staff in Honolulu (notably the biologist) that are part of the larger Pacific Reefs National Wildlife Refuge Complex (Complex). Therefore (*) positions are these Complex positions and staffing costs identified for these positions is equally proportioned among the other refuges in the Complex.

Table D-3. Staffing Costs (annual in thousands)

Staff	Alt A (\$K)	Alt B (\$K)	Potential Funding Source
Current Staff			
Refuge/Monument Manager (GS-12) – Permanent	\$117,392	\$117,392	1261
Staff at Honolulu Complex Headquarters also supporting Rose Atoll NWR			
Superintendent/Project Leader (GS-14)* – Permanent	\$16,309	\$16,309	1261
Wildlife Biologist (GS-12)* – Permanent	\$12,594	\$12,594	1261
Administrative Officer (GS-9)* – Permanent	\$8,859	\$8,859	1261
Proposed Additional Staff			
Wildlife Biologist (GS-11)		\$84,411	1261
Biological Technician (GS-7)		\$57,404	1261
Admin officer (GS-5/7)		\$57,404	1261
Park Ranger (GS-5/7) – Half time		\$28,702	1261
TOTAL:	\$155,154	\$383,075	

In 2008, the Refuge System undertook a comprehensive review of staffing needs on all refuges based on a set of 15 standard criteria (e.g., acreage, annual public visitation, number of invasive species populations, etc.). The staffing needs identified under this review (National Staffing Model) for Rose NWR/MNM was 4.5.

The following table summarizes data from Tables D-1 through D-3 and displays the overall funding needed for the Refuge to implement the CCP across the different alternatives.

Table D-4. Budget Summary (annual in thousands/millions)

Budget Category	Alt A		Alt B	
	One time cost	Annual recurring cost	One time cost	Annual recurring cost
Management Actions	\$1,000	\$61,000 x 15 years = \$915,000	\$601,000	\$294,000 x 15 years + \$12,000 (5 year interval veg. mapping) + \$550,000 + \$275,000 + \$60,000 (vessel option range) = \$4,972,000 \$4,697,000 \$4,482,000
Staffing	\$155,154 x 15 years = \$2,327,310		\$383,075 x 15 years = \$5,746,125	
TOTAL:	\$3,243,310		\$11,319,125	

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Budget Category	Alt A		Alt B	
	One time cost	Annual recurring cost	One time cost	Annual recurring cost
			\$11,044,125	
			\$10,829,125	

D.3 Timeline for CCP Implementation

The following table depicts the timeline for implementing the preferred strategies outlined in Chapter 2. As stated previously, the timeline is funding dependent but does reflect Refuge priorities.

Table D-4. Timeline for Implementation of Preferred Alternative Strategies

CCP objective/strategy	Implementation Year
Obj. 4.1: Within 6 months, revise existing biosecurity measures to comprehensively address prevention of introducing nonnative pest species to the atoll	6 months (2013)
Obj. 1.1: Identify, prioritize, and implement restoration needs such as debris removal in lagoon habitats affected by anthropogenic impacts such as iron contamination from shipwrecks	Year 1 (2013) to identify/prioritize (implementation TBD based on findings)
Obj. 6.1: Finalize Memorandum of Understanding (MOU) with DMWR to coordinate data collection and management activities at the Refuge	Year 1 (2013)
Obj. 8.1: Work with the American Samoa Historical Preservation Office to conduct an archaeological survey at Rose Atoll	Year 1 (2013)
Obj. 8.1: Work with partners to create information materials such as videos, reports, and pamphlets regarding cultural uses and the oral history of Rose Atoll	Year 1 (2013)
Obj. 2.1: Within 2 years, establish systematic marine debris removal program	Year 2 (2014)
Obj. 4.1 and 6.1: Within 2 years, use GPS to map the perimeter of the islands at high and low tide on each visit to the Refuge and obtain any available satellite imagery for incorporation into GIS in order to document changes in island size and location	Year 2 (2014)
Obj. 4.1 and 6.1: Within 2 years, working with NOAA/NMFS and other partners, develop and implement monitoring protocol to track turtle abundance and movements using field counts, tagging, remote sensing, and satellite telemetry	Year 2 (2014)
Obj. 4.1, 5.1, and 6.1: Within 2 years, prepare and implement a monitoring plan and rapid response program for terrestrial nonnative species and respond immediately if detected	Year 2 (2014)
Obj. 5.1 and 6.1: Within 2 years, review existing vegetation community distribution data and develop GIS database of terrestrial and marine habitats and update them every 5 years	Year 2 (2014)
Obj. 8.1: Research the history of Samoan names for Rose Atoll and consider changing Refuge name accordingly	Year 2 (2014)
Obj. 1.1 and 6.1: Work with partners to conduct REA to document habitat associations and species distribution, density, and diversity in marine habitats	Year 3 (2015)
Obj. 3.1: Work toward the inclusion of better warnings about the hazard to mariners of waters in and near the ava to prevent vessel groundings, and improve public communications about the Refuge being closed	Year 3 (2015)

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CCP objective/strategy	Implementation Year
Obj. 5.1: Within 3 years and working with experts, prepare a restoration design that identifies which desired species would require active propagation and outplanting and which would recruit naturally now that rat herbivory has been eliminated. Part of this strategy would be to work with universities and other partners to investigate composition and structure of terrestrial communities on Rose Island prior to the introduction of rats to inform ecological restoration activities (see Objective 6.2)	Year 3 (2015)
Obj. 5.1: and 6.1: Within 3 years, develop and implement a monitoring protocol to track seabird abundance, nesting rates, and feeding territories. Include remote sensing observations to improve future monitoring efforts	Year 3 (2015)
Obj. 7.1: Explore opportunities and community interest for supporting the development of a Refuge “Friends” group to help with interpretation, outreach, and other Refuge needs	Year 3 (2015)
Obj. 7.1: Install minimal signage on Rose Island to inform on Refuge boundary and regulations	Year 3 (2015)
Obj. 7.1: Develop brochures, Website, social media, and other outreach tools specifically designed to communicate Refuge protection and safety issues and make these available to mariners	Year 3 (2015)
Obj. 7.2: Create EE materials such as DVDs and posters for use with school groups	Year 3 (2015)
Obj. 7.2: Develop a brief, picture-oriented Powerpoint presentation describing the ecology of the Refuge and present this to three American Samoa schools each year	Year 3 (2015)
Obj. 7.2: Develop a student intern program with the Refuge office to introduce students to protected areas and wildlife management	Year 3 (2015)
Obj. 1.1: Within 4 years, install remote sensing systems to document boat traffic in the lagoon	Year 4 (2016)
Obj. 5.1 and 6.1: Within 4 years, develop and implement a monitoring protocol to track changes in numbers, cover, and basal area of different plant species	Year 4 (2016)
Obj. 7.1: Work with partners to develop interpretive displays and printed materials to provide outreach messages at visitor centers as well as mobile displays for traveling exhibits	Year 4 (2016)
Obj. 7.2: Explore appropriate on-site EE opportunities (<once every 3 years) to allow a small group of teachers and students (<10 people) to visit the Refuge for specific EE purposes developed with the Refuge’s EE program	Year 4 (2016)
Obj. 1.1 and 6.1: Within 5 years, develop and implement monitoring protocols to track populations of focal lagoon species including: fish, corals, giant clams (faisua), other invertebrates, and marine pests to determine abundance, density, and biomass of each at selected sites	Year 5 (2017)
Obj. 2.1 and 6.1: Within 5 years, work with partners to develop and implement reef monitoring program, including rate of growth, elevation change, chemical composition and other variables related to reef growth and the atoll’s ability to maintain itself in an anticipated environment of climate change and ocean acidification	Year 5 (2017)
Obj. 2.1 and 6.1: Within 5 years, develop and implement monitoring protocols to track abundance and distribution of focal perimeter reef species including eels and urchins to determine abundance, density, and biomass of each at selected sites	Year 5 (2017)

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CCP objective/strategy	Implementation Year
Obj. 3.1 and 6.1: Within 5 years, work with partners to monitor water flow rate and direction in the ava using archival pressure and flow rate instruments that can be downloaded at every visit in order to document any changes in flow through the ava	Year 5 (2017)
Obj. 3.1 and 6.1: Within 5 years, develop and implement monitoring protocol to track abundance and biomass of fish, including predatory and prey fish species, around the opening of the ava to detect any changes in structure or function of this important geological feature for large predators in the Refuge	Year 5 (2017)
Obj. 4.1 Within 5 years, working with NOAA/NMFS and other partners, develop a cooperative management plan with Fiji to protect shared stocks of threatened green turtles that migrate between Rose Atoll (to nest) and Fiji (to feed). Meet with appropriate Fiji managers as needed	Year 5 (2017)
Obj. 4.1 and 6.2: Within 5 years, work with universities and other partners to evaluate the geomorphology, hydrology, and sediment budget of Rose Atoll to understand the processes that have maintained the islands as dynamic units	Year 5 (2017)
Obj. 5.1: Within 5 years, implement restoration design and begin outplanting vegetation	Year 5 (2017)
Obj. 6.1: Within 5 years, begin to monitor climate change variables and responses including: sea level, temperature, water quality (pH, conductivity, dissolved oxygen, nitrogen, photosynthetically available light [PAR], phosphorus, iron) and the frequency and duration of extreme storm events	Year 5 (2017)
Obj. 6.1: Within 5 years, monitor the growth and survival rate of coral colonies at different depths	Year 5 (2017)
Obj. 7.1: Develop outreach messages using social media such as blogs or interpretive videos on line to “bring the Refuge to the people”	Year 5 (2017)
Obj. 7.1: Enhance law enforcement through the production of interpretive brochures for distribution in American Samoa and to the yachting community and collaboration with the USCG and NOAA for enforcement	Year 5 (2017)
Obj. 7.1: Develop a Refuge volunteer program to provide local and national stewardship opportunities and assist in Refuge management activities	Year 5 (2017)
Obj. 1.1 and 6.2: Within 10 years characterize nutrient budgets and dynamics at Rose Atoll and evaluate them relative to data from other similar reef sites to identify possible stressors and the positive effects of healthy seabird colonies adjacent to living reefs	Year 10 (2022)
Obj. 4.1 and 6.2: Within 10 years, investigate the ecological relationships between marine gastropods such as turban shells (<i>Turbo</i> spp.), and land hermit crabs (<i>Coenobita perlatus</i> and <i>C. brevimanus</i>). Evaluate factors affecting crab populations, including observed reduction in availability of shells to crabs at the Refuge and what management may improve mollusk shell availability to the <i>Coenobita</i> spp. which are important scavengers and herbivores on both islands	Year 10 (2022)
Obj. 5.1: Within 10 years, eradicate the scale insect (<i>Pulvenaria urbicola</i>) and any other nonnative insects, specifically focusing on eradicating introduced ant species that facilitate scale growth and spread	Year 10 (2022)
Obj. 8.1: Restore the cement monument erected on Rose Island during the Governor’s 1920 visit	Year 10 (2022)
Obj. 1.1 and 6.1: Work with NOAA’s CRED and other partners to collect oceanographic and water quality data in order to track changes that could affect the reef or wildlife	Ongoing

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CCP objective/strategy	Implementation Year
Obj. 1.1, 3.1, and 6.1: Work with partners to collect bathymetry data every 10 years in order to document changes in the lagoon, reef, or ava that could affect hydrography or habitat characteristics	Ongoing
Obj. 2.1: Continue monitoring abundance and distribution of the cyanobacterial community which became dominant on a section of the southwest arm of the atoll due to elevated iron levels following a 1993 shipwreck	Ongoing
Obj. 2.1 and 6.1: Monitor benthic succession of the reef which was damaged due to the 1993 shipwreck	Ongoing
Obj. 4.1 and 6.1: Within 15 years, restore and protect native coastal plants using best available information about original indigenous ecosystem. Restore native tamole (<i>Portulaca lutea</i>) population that was extirpated on Rose Atoll by introduced rats (<i>Rattus exulans</i>) but survived on an offshore coral block. Monitor survivorship, growth, and maturation of planted tamole	Ongoing
Obj. 5.1: Continue monitoring presence or absence of breeding bird populations (annual or less often depending on visit schedule to the Refuge) as one indicator of the success of habitat restoration measures	Ongoing
Obj. 5.1: Maintain cover of niu (<i>Cocos nucifera</i>) at or below 5% using mechanical or direct application of herbicides as appropriate	Ongoing
Obj. 6.1: Work with partners to monitor status and trends of focal communities (hard corals, algae), including the incidence and severity of coral and algal disease and bleaching	Ongoing
Obj. 6.1: Work with partners to deploy an Ecological Acoustic Recorder (EAR) in the ava to collect biological data that may improve monitoring of behavior and abundance of marine organisms	Ongoing
Obj. 7.1: Maintain Refuge Website and update at least annually with current information such as species lists, interactive tools, management updates, news releases, science reports, etc.	Ongoing
Obj. 7.1: Participate in community meetings and local events to educate people about the Refuge, especially within the Manu'a Islands	Ongoing
Obj. 7.1: Work with partners to deploy an EAR in the ava to collect data on boat entry into the lagoon	Ongoing
Obj. 7.2: Work with partners to develop EE curriculum and classroom materials that introduce students to American Samoa wildlife, protected areas, and conservation of natural resources, especially in relation to effects from man-made climate change	Ongoing
Obj. 7.2: Partner with schools and universities to conduct surveys and/or relevant research	Ongoing
Obj. 8.1: Consult with the OSA and local villagers to understand and perpetuate Refuge-appropriate traditional cultural practices related to Rose Atoll	Ongoing

D.4 Partnering Opportunities

Partnerships are an important component of the implementation of this CCP. The Refuge has never been fully funded to accomplish adequate Refuge management. Towards this end, we rely on partnering opportunities to assist with this shortfall, both in terms of funding and personnel. Partnering opportunities

are reflected in the goals, objectives, and strategies identified in Chapter 2. Coordinated partnership efforts focus on species and habitat restoration and protection; surveys, inventories, and research; and cultural resources management. Refuge staff would work to strengthen existing partnerships and would actively look for new partnerships to assist in achieving the goals, objectives, and strategies in this CCP.

The following list of partners and recently funded projects provides some information on how the Refuge has benefitted from partnerships for Refuge management. This information illuminates how partnering is critical for the Refuge to accomplishing species and habitat restoration and protection.

- Refuge Inventory and Monitoring Program has funded a survey of arthropods and distribution of invasive ants on Rose Atoll and development of methods (\$38,437);
- The ASCC, USGS, and AmeriCorps provided entomologists to conduct arthropod surveys;
- The NOAA CRED has conducted coral reef assessment and monitoring surveys in the Refuge and adjoining fore reef biannually since 2002, providing more than a dozen specialists each survey period in oceanography, fishes, corals, other invertebrates, algae, and data management. NOAA vessels have also provided Refuge access for Service terrestrial biologists and American Samoa government representatives, including the Governor;
- The DMWR has provided biologists for monitoring and management actions, as well as assisting with transportation to the Refuge;
- The NMFS provided funds for a trip to Rose Atoll for Manu'a chiefs, teachers and students;
- The ONMS and ASDoC provided staff on the trip funded by NMFS;
- The NPS and ASHPO provided archeologists to conduct the first in-depth archeology survey of Rose Island;
- The NPS provided experienced scuba divers to conduct coral surveys;
- The NPS provides office space and support for the Refuge/Monument office.