9.0 TABLE OF PROJECTS

Table 3. List projects to consider for implementation in the marine and terrestrial units of the HERA (ranked by priority).

Priority	Project Name	Project Objective
	TERRESTRIAL	
	Vegetation	
1.1	Vegetation Survey	Carry out extensive vegetation surveys and botanical inventories of the HERA on NBG. NOTE: This survey is currently being undertaken and is expected to be completed in 2010.
1.2	Detailed GIS resource mapping	Prioritize (e.g., high, medium, low) habitats and related natural resources for migratory bird and seabird, and native and federally/locally protected birds, fruit bats, snails, coconut crabs, and reptiles in the ERA. Maps should include the locations of cultural resources and features.
1.3	Monitoring program for *Heritiera longipetiolata*	Further understand the distribution, abundance, and life history of this rare and locally endangered tree in the ERA.
	Restoration	
2.1	Native tree restoration	Promote growth of native and federally/locally protected flora in the ERA.
2.2	Restoration – Identification of suite of plants	Determine the best suite of plants to plant in order to enhance the existing forest (including the coconut grove) and provide suitable habitat for species of special interest such as the host tree for the butterfly, *Maytenus thompsonii*.
2.3	Adaptive restoration management	Determine the best arrangement of plants and methods of planting and post-planting maintenance.

Priority	Project Name	Project Objective
2.4	Biocontrol of cycad scale	Quantify impact of cycad scale on plants within the ERA. Investigate viable biocontol agents such as invertebrates from neighboring areas to control scale and restore healthy populations of *Cycas micronesica.*
2.5	Erosion and sediment control through tree-planting	Study the effects of tree planting and erosion control methods in reducing pollution from adjacent land use areas.
	Soil and Geology	
3.1	Soil and Geological surveys	Determine substrate composition, drainage and soil profile.
	Herpetofauna	
4.1	Herpetofauna surveys	Determine the presence and distribution of native reptiles in the terrestrial ERA and their association with specific habitat components.
	Invasive Species	
5.1	Interdiction and control of brown treesnakes	Prevent additional immigration of brown treesnakes to the ERA and control those snakes already present. Trapping, visual searches, toxicants and limited fencing could be used
5.2	Feral ungulate eradication program	Eliminate Philippine deer and feral pigs from the ERA.
5.3	Eradication program for invasive invertebrates in the terrestrial units	Eliminate invasive invertebrates (e.g., *Erythrina* gall wasp, coconut rhinoceros beetle), which cause detrimental effects to native flora (implement if they are found to occur in the ERA).

Priority	Project Name	Project Objective
5.4	Invasive plant species control plan	Eliminate invasive plant species (e.g., chain-of-love, tangantangan, mile-a-minute), which cause detrimental effects to native flora.
	Threatened/endangered/ species of concern	
6.1	Monitor and inventory of rare tree snails	Further understand the distribution, abundance, and life history of tree snails that are federal candidates for listing: Mariana Islands tree snail, Pacific tree snail, and Mariana Islands fragile tree snail in the ERA.
6.2	Mariana fruit bat monitoring	Determine whether Mariana fruit bats utilize the ERA for roosting and/or foraging purposes.
	Other	
7.1	Assessment of anthropomorphic impacts to TU	Characterize the major threats to the TU, conduct assessment of all terrestrial recreational activities; determine the effects of beach visitation, camping, shore fishing, beach combing, trash and waste management.
7.2	Seabird monitoring	Further understand the distribution, abundance, and life history of seabird species that utilize the ERA for nesting purposes.
7.3	Migratory bird monitoring	Implement a monitoring program that will gain a better understanding of which avian species use the ERA for resting and/or foraging purposes during their migratory paths.
7.4	Ecosystem Engineers baseline study	Monitor the physical, chemical, and biological components of the ERA forest habitats to will reveal the major "ecosystem engineers" that are steering community development. This approach will help define conservation and restoration policy decisions.

Priority	Project Name	Project Objective
7.5	Symbiotic relationships involving *Cycas micronesica*	This information will define how management decisions can sustain ecosystems within the ERA.
	MARINE	
8.1	Sea turtle population and nesting monitoring	Further understand the distribution, abundance, and life history of the federally and locally protected green sea and hawksbill turtles in the HERA.
8.2	Fish, coral, algae and marine invertebrate monitoring	Determine the condition of different functional groups (e.g., herbivores, detritivores) and whether changes in community structure have occurred over time.
8.3	Evaluate/improve ERA as management tool	Evaluate the effectiveness of the HERA in terms of marine biodiversity and abundance and whether ERA can act as source populations for adjacent areas.
8.4	Assessment of anthropomorphic impacts to MU	Characterize the major threats to the MU, conduct assessment of all marine recreational activities, determine the effects of boating, fishing, anchoring and diving on the MU coral reef ecosystem.
8.5	Adaptive management strategies for control of harmful species	Minimize harm caused by species such as Atlantic barnacle and outbreaks of crown of thorns, through the development of an adaptive management plan.
8.6	Survey and eradication program for Atlantic barnacle	Determine if the species is still found in the HERA and if so, eliminate it before it causes detrimental effects to native marine organisms in the ERA.
8.7	Pollution and sedimentation reduction	Develop sedimentation models and heavy metal sampling to determine the likely impact of increased military development adjacent to the HERA on water and soil movement into the HERA

Priority	Project Name	Project Objective
	SOCIAL AND EDUCATIONAL	
9.1	Visitor Use Survey	Determine level of use and correlate to level of impact on HERA TU and MU.
9.2	Fishing educational program	Determine optimal method to implement and promulgate a ban on fishing in the HERA. To include public education and enforcement.
9.3	Environmental education program	Promote environmental education among recreational users of the HERA by determining the effectiveness of different public awareness and outreach programs and materials.
9.4	Installation of fencing along ERA borders	Prevent Philippine deer, feral pigs, and carabao from entering the ERA.
9.5	Balance recreational use with resource management	Conduct a feasibility study on the viability of instituting a recreational user fee of permit system for management and security.

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10.0 REFERENCES

Aguon, C. F., E. W. Campbell, III, and J. M. Morton. 2002. Efficacy of electrical barriers used to protect Mariana Crow nests. Wildlife Society Bulletin 30: 703-708.

Aguon, L. B. 1985. Hilaan cave shelter inventory data form. Guam Department of Parks and Recreation.

Amesbury, S., V. Bonito, R. Chang, L. Kirkendale, C. Meyer, G. Paulay, R. Ritson-Williams, and T. Rongo. 2001. Marine biodiversity resource survey and baseline reef monitoring survey of the Haputo Ecological Reserve Area, COMNAVMARIANAS. U.S. Department of the Navy.

Amori, G. and M. Clout. 2003. Rodents on islands: a conservation challenge. In: G. R. Singleton, L. A. Hinds, C. J. Krebs, and D. M. Spratt (eds.), Rats, mice and people: rodent biology and management. ACIAR Monograph No. 96, pp. 63-68.

Asami, R., T. Yamada, Y. Iryu, C. P. Meyer, T. M. Quinn, and G. Paulay. 2004. Carbon and oxygen isotopic composition of a Guam coral and their relationship to environmental variables in the western Pacific. Palaeography, Palaeoclimatology, Paleoecology 212: 1-22.

Baker, J. D., C. L. Littnan, and D. W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna in the northwestern Hawaiian Islands. Endangered Species Research 4: 1-10.

Baker, R. H. 1951. The avifauna of Micronesia, its origin, evolution, and distribution. University of Kansas Publication, Museum of Natural History 3: 1-359.

Birkeland, C. 1997. Life and death of coral reefs. Chapman and Hall, NY.

Blitz, J. B. and S. A. Norton. 2008. Possible environmental effects of sunscreen run-off. Journal of American Academy of Dermatology 59: 898.

Brooke, A. 2008. Mariana fruit bat surveys on Tinian and Aguiguan. NAVFAC Marianas Environmental. Guam.

Buddemeier, R. W., J. A. Kleypas, and R. B. Aronson. 2004. Coral reefs & global climate change: potential contributions of climate change to stresses on coral reef ecosystems. The Pew Center on Global Climate Change. Arlington, VA.

Burdick, D., V. Brown, J. Asher, M. Gawel, L. Goldman, A. Hall, J. Kenyon, T. Leberer, E. Lundblad, J. McIlwain, J. Miller, D. Minton, M. Nadon, N. Pioppi, L. Raymundo, B. Richards, R. Schroeder, P. Schupp, E. Smith, and B. Zgliczynski. 2008. The state of coral reef ecosystems of Guam. In: J. E. Waddell and A. M. Clarke (eds.), The state of coral reef ecosystems of the United States and Pacific Freely Associated States: NOAA Technical Memorandum NOS NCCOS 73, pp. 465-509. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD.

Chaloupka, M., T. M. Work, G. H. Balazs, S. K. K. Murakawa, and R. Morris. 2008. Cause-specific temporal and spatial trends in green turtle strandings in the Hawaiian Archipelago (1982 - 2003). Marine Biology 154: 887-898.

Chan, T., Y. Sadovy, and T. J. Donaldson. 2007. *Bolbometopon muricatum*. In: IUCN 2009. IUCN Red List of Threatened and Endangered Species. Version 2009.1. www.iucnredlist.org, (accessed 27 October 2009).

Chesher, R. H. 1969. Destruction of Pacific corals by the sea star *Acanthaster planci*. Science 165: 280-283.

Christy, M. T., C. S. Clark, D. E. Gee, II, D. Vice, D. S. Vice, M. P. Warner, C. L. Tyrrell, G. H. Rodda, and J. A. Savidge. 2007. Recent records of alien anurans on the Pacific island of Guam. Pacific Science 61: 469-483.

Clements, D. R. and C. Daehler. 2007. Introducing a new series: biology and impacts of Pacific island invasive species. Pacific Science 61: 1.

Craib, J. L. and A. K. Yoklavich. 1996. Cultural resources management overview survey U.S. Naval Activities, Guam Waterfront Annex, Mariana Islands, Territory of Guam. Prepared for the U.S. Department of the Navy by Ogden Environmental and Energy Services, Inc., Honolulu, HI.

Craig, R. J. 1992. Ecological characteristics of a native limestone forest on Saipan, Mariana Islands. Micronesica 25: 85-97.

Craig, R. K. 2008. Coral reefs, fishing, and tourism: tensions in U.S. ocean law and policy reform. Stanford Environmental Law Journal 27: 3-41.

Crossland, M. R. 2000. Direct and indirect effects of the introduced toad *Bufo marinus* (Anura: Bufonidae) on populations of native anuran larvae in Australia. Ecography 23: 283-290.

Cummings, V. 2002. Sea turtle conservation in Guam. In: I. Kinan (ed.), Proceedings of the Western Pacific Sea Turtle Cooperative Research and Management Workshop. Pacific Regional Fishery Management Council, pp. 37-38. Honolulu, HI.

Danielsen, F., M. K. Sorensen, O. F. Mette, S. Vaithilingham, F. Parish, N. D. Burgess, T. Hiraishi, M. Vagarappa, Karunagaran, M. S. Rasmussen, L. B. Hansen, A. Quarto, and N. Sutyadiputra. 2005. The Asian tsunami: a protective role for coastal vegetation. Science 310: 643.

Danovaro, R., L. Bongiorni, C. Corinaldesi, D. Giovannelli, E. Damiani, P. Astolfi, L. Greci, and A. Pusceddu. 2008. Sunscreens cause coral bleaching by promoting viral infections. Environmental Health Perspectives 116: 441-447.

Davenport, J. and J. L. Davenport. 2006. The impact of tourism and personal leisure transport on coastal environments: a review. Estuarine, Coastal and Shelf Science 67: 280-292.

de Moor, J. M., T. P. Fisher, D. R. Hilton, E. Hauri, L. A. Jaffe, and J. T. Camacho. 2005. Degassing at Anatahan volcano during the May 2003 eruption: implications from petrology, ash leachates, and SO2 emissions. Journal of Volcanology and Geothermal Research 146: 117-138.

DeMattia, E. A., L. M. Curran, and B. J. Rathcke. 2004. Effects of small rodents and large mammals on neotropical seeds. Ecology 85: 2161-2170.

Dickman, C. R. 1996. Impact of exotic generalist predators on the native fauna of Australia. Wildlife Biology 2: 185-195.

Donaldson, T. J. and T. Rongo. 2006. Coral reef investigations at the Guam National Wildlife Refuge, Ritidian Unit. Report No. 117. University of Guam Marine Laboratory. Mangilao, Guam.

Dow, K. and T. Downing. 2006. The atlas of climate change. Earthscan. Brighton, UK.

Duffy, D. C. 1993. Stalking the southern oscillation: environmental uncertainty, climate change, and North Pacific seabirds. In: K. Vermeer, K. T. Briggs, K. H. Morgan, and D. Siegel-Causey (eds.), The status, ecology, and conservation of marine birds of the North Pacific, pp. 61-67. Canadian Wildlife Service Special Publication, Ottawa.

EERI, (Earthquake Engineering Research Institute). 1993. The Guam earthquake of August 8,

1993. Earthquake Engineering Research Institute.

Ehleringer, J. R., D. R. Bowling, L. B. Flanagan, J. Fessenden, B. Helliker, L. A. Martinelli, and J. P. Ometto. 2002. Stable isotopes and carbon cycle processes in forests and grasslands. Plant Biology 4: 181-189.

Eichenseher, T. 2006. The cloudy side of sunscreens. Environmental Science and Technology 40: 1377-1378.

Eldredge, L. 2003. The marine reptiles and mammals of Guam. Micronesica 35-36: 653-660.

Eldredge, L. G. 1983. Summary of environmental and fishing information on Guam and the Commonwealth of the Northern Mariana Islands: historical background, description of the islands, and review of the climate, oceanography, and submarine topography. NOAA Technical Memorandum NOAA-TM-NMFS-SWFC-40.

Engbring, J. and F. L. Ramsey. 1984. Distribution and abundance of the forest birds of Guam: results of a 1981 survey. U.S. Fish and Wildlife Service. Honolulu, HI.

FICM-NEW, (Federal Interagency Committee for the Management of Noxious and Exotic Weeds). 2003. A national early detection and rapid response system for invasive plants in the United States.

Foster, R., A. Hagan, N. Perera, C. A. Gunawan, I. Silaban, Y. Yaha, Y. Manuputty, I. Hazam, and G. Hodgson. 2006. Tsunami and earthquake damage to coral reefs of Aceh, Indonesia. Reef Check Foundation. Pacific Palisades, CA.

Fritts, T. H. and G. H. Rodda. 1998. The role of introduced species in the degradation of island ecosystems: a case history of Guam. Annual Review of Ecology and Systematics 29: 113-140.

GDAWR, (Guam Division of Aquatic and Wildlife Resources). 2000-2008a. Aquatics. Department of Agriculture. http://www.guamdawr.org/aquatics, (accessed 4 November 2008).

GDAWR, (Guam Division of Aquatic and Wildlife Resources). 2000-2008b. Marine preserve areas. Department of Agriculture. http://www.guamdawr.org/aquatics (accessed 4 November 2008).

GDAWR, (Guam Division of Aquatic and Wildlife Resources) 2006. Guam comprehensive wildlife conservation strategy. Department of Agriculture. Mangilao, Guam.

GEPA, (Guam Environmental Protection Agency). 1998. Clean water action plan for Guam - unified watershed assessment. CWAP Working Group. Guam.

GEPA, (Guam Environmental Protection Agency). 2007. Guam EPA and the National Weather Service on Guam observe National Air Quality Awareness Week. http://node.guamepa.net/programs/admin/news2007/050207.html, (accessed 20 October 2008).

GEPA, (Guam Environmental Protection Agency). 2008a. Recreational waters pollution report. http://www.guamepa.govguam.net/programs/emas/beach.html, (accessed 10 November 2008).

GEPA, (Guam Environmental Protection Agency). 2008b. Water programs division. http://www.guamepa.govguam.net/programs/water/index.html, (accessed 10 November 2008).

Gingerich, S. B. 2003. Hydrologic resources of Guam. Report No. 03-4126. U.S. Geological Water-Resources Investigations.

Goldberg, J., K. Adams, J. Albert, J. Asher, P. Brown, V. Brown, D. Burdick, B. Carroll, P. Craig, D. Fenner, C. Fillmed, V. Fread, M. Gawel, A. George, Y. Golbuu, L. Goldman, C. Graham, A. Hall, M. Hasurmai, L. Jacob, D. Jacobson, E. Joseph, J. Kenyon, W. Kostka, T. Leberer, M. Luckymis, E. Lundblad, S. Malakai, J. Maragos, A. Marcus, S. Marino, D. Mathias, J. Mcilwain, J. Miller, D. Minton, M. Nadon, S. Palik, N. Pioppi, L. Raymundo, B. Richards, M. Sabater, R. Schchroeder, P. Schchupp, E. Smith, A. Takesy, and B. Zgliczynski. 2008. Status of coral reef resources in Micronesia and American Samoa: 2008. In: J. E. Waddell and A. M. Clarke (eds.), The state of the coral reef ecosystems of the United States and Pacific Freely Associated States: 2008. NOAA. Silver Spring, MD.

Goldstein, G., D. R. Drake, C. Alpha, P. Melcher, J. Heraux, and A. Azocar. 1996. Growth and photosynthetic responses of *Scaevola sericea*, a Hawaiian coastal shrub, to substrate salinity and salt spray. International Journal of Plant Sciences 157: 171-179.

Griffiths, M. E. and C. M. Orians. 2004. Salt spray effects on forest succession in rare coastal sandplain heathlands: evidence from field surveys and *Pinus rigida* transplant experiments. Journal of the Torrey Botanical Society 131: 23-31.

Grimsditch, G. D. and R. V. Salm. 2005. Coral reef resilience and resistance to bleaching. The World Conservation Union. Gland, Switzerland.

Guard, C., A. N. L. Chiu, and M. A. Lander. 2003. NOAA/NWS meteorological assessment for Typhoon Pongsona in Pohnpei State, FSM; Chuuk State, FSM, Guam and Rota, CNMI. Tiyan, Guam.

Guard, C. P., M. P. Hamnett, C. J. Neumann, M. A. Lander, and H. G. Siegrest, Jr. 1999. Typhoon vulnerability study for Guam. Report No. 85. Water and Environmental Research Institute of the Western Pacific, University of Guam. Maniglao, Guam.

Gvirtzman, Z. and R. J. Stern. 2004. Bathymetry of Mariana trench-arc system and formation of the Challenger Deep as a consequence of weak plate coupling. TC2011, doi:10.1029/2003TC001581. Tectonics 23.

Heald, C. L., D. J. Jacob, A. M. Fiore, L. K. Emmons, J. C. Gille, M. N. Deeter, J. Warner, D. P. Edwards, J. H. Crawford, A. J. Hamlin, G. W. Sachse, E. V. Browell, M. A. Avery, S. A. Vay, D. J. Westberg, D. R. Blake, H. B. Sing, S. T. Sandholm, R. W. Talbot, and H. E. Fuelberg. 2003. Asian outflow and transpacific transport of carbon monoxide and ozone pollution: an integrated satellite, aircraft and model perspective. Journal of Geophysical Research 108: 4804.

Helber Hastert and Fee. 2005. Draft ecological reserve feasibility study, Commander Navy Region Marianas. Prepared for Naval Facilities Engineering Command, Pacific.

Hinkley, A. D. 1962. Diet of the giant toad, *Bufo marinus* (L.), in Fiji. Herpetologica 18: 253-259.

Hodson, G. 1999. A global assessment of human effects on coral reefs. Marine Pollution Bulletin 38: 345-355.

Hollier, D. 2009. A fish diet. Hawai'i Business. January 2009.

Hopper, D. R. and B. D. Smith. 1992. Status of tree snails (Gastropoda: Partulidae) on Guam, with a resurvey of sites studied by H. E. Crampton in 1920. Pacific Science 46: 77-85.

IUCN/SSG, (International Union for the Conservation of Nature/Invasive Species Specialist Group). 2006a. *Leucaena leucocephala*. www.issg.org, (accessed 20 October 2008).

IUCN/SSG, (International Union for the Conservation of Nature/Invasive Species Specialist Group). 2006b. *Quadrastichus erythrinae*. www.issg.org, (accessed 20 October 2008).

IUCN/SSG, (International Union for the Conservation of Nature/Invasive Species Specialist Group). 2007. *Chthamalus proteus*. www.issg.org, (accessed 24 October 2008).

Jaffe, D., A. Mahura, J. Kelley, J. Atkins, P. C. Novelli, and J. Merrill. 1997. Impact of Asian emissions on the remote North Pacific atmosphere: interpretation of CO data from Shemya, Guam, Midway and Mauna Loa. Journal of Geophysical Research 102: 28, 627-628, 635.

Jenkins, J. M. 1983. The native forest birds of Guam. American Ornithologists' Union. Washington, D.C.

JGPO, (Joint Guam Program Office). 2009. Draft Environmental Impact Statement/Overseas Environmental Impact Statement for Guam and CNMI military relocation - relocating Marines from Okinawa, visiting aircraft carrier berthing, and Army Air and Missile Defense Task Force. Naval Facilities Engineering Command, Pacific. Pearl Harbor, HI.

Jocson, J. M. U., J. W. Jenson, and D. N. Contractor. 2002. Recharge and aquifer response: Northern Guam Lens Aquifer, Guam, Mariana Islands. Journal of Hydrology 260: 231-254.

Jones, R. S., R. H. Randall, and R. D. Strong. 1976. Biological impact caused by changes on a tropical reef. Report No. 28. University of Guam Marine Laboratory.

Kelty, R. and J. Kuartei. 2004. Status of the coral reefs in Micronesia and American Samoa. In: C. Wilkinson (ed.), Status of the coral reefs of the world: 2004, pp. 381-409. Australian Institute of Marine Science. Townsville, Australia.

Kenis, M., M. A. Auger-Rozenberg, A. Roques, L. Timms, C. Pere, M. J. W. Cock, J. Settele, S. Augustin, and C. Lopez-Vaamonde. 2009. Ecological effects of invasive alien insects. Biological Invasions 11: 21-45.

Kerr, A. M. 2000. Defoliation of an island (Guam, Mariana Archipelago, Western Pacific Ocean) following a salt spray laden 'dry' typhoon. Journal of Tropical Ecology 16: 985-901.

Kessler, C. 2006. Management implications of a coconut crab (*Birgus latro*) removal study in Saipan, Commonwealth of the Northern Mariana Islands. Micronesica 39: 31-39.

Khosrowpanah, S. and J. M. U. Jocson. 2005. Environmental assessment for non-point sources of pollution for UGUM watershed. Report No. 109. Water and Environmental Research Institute.

King, B. 1962. Guam field notes. 'Elepaio 23: 29-31.

Kohl, P. A., A. P. O'Rourke, D. L. Schmidman, W. A. Dopkin, and M. L. Birnbaum. 2005. The Sumatra-Andaman earthquake and tsunami of 2004: the hazards, events, and damage. Prehospital and Disaster Medicine 20: 356-363.

Lander, M. A. and C. P. Guard. 2003. Creation of a 50-year rainfall database, annual rainfall climatology, and annual rainfall distribution map for Guam. Technical Report No. 102. University of Guam, Water and Environmental Research Institute of the Western Pacific.

Limtiaco, S. 2004. Coral reefs protect Guam from tsunamis. Pacific Daily News. 28 December 2004.

Loope, L. L. and D. Mueller-Dombois. 1989. Characteristics of invaded islands, with special reference to Hawaii In: J. A. Drake, H. A. Mooney, F. D. Castri, R. H. Grooves, F. J. Kruger, M. Rejmanek, and M. Williamson (eds.), Biological invasions: a global perspective. SCOPE 37: 257-280. John Wiley and Sons, UK.

Marshall, J. T. 1949. The endemic avifauna of Saipan, Tinian, Guam, and Palau. Condor 51:

200-221.

Morris, E. C. 1992. Canopy damage to native vegetation on the central coast of New South Wales: current status and detection of future changes. Australian Journal of Ecology 17: 141-154.

Morrissey, W. A. 2005. Tsunamis: monitoring, detection, and early warning systems. Congressional Research Service, The Library of Congress. Washington D.C.

Morton, J. M. and G. J. Wiles. 2002. Observations of Mariana fruit bats (*Pteropus mariannus*) in the upper Talofofo watershed on southern Guam. Micronesica 34: 155-163.

Mueller-Dombois, D. and F. R. Fosberg. 1998. Vegetation of the tropical Pacific islands. Ecological Studies. Springer, New York.

Munns, R. 1993. Physiological processes limiting plant growth in saline soils: some dogmas and hypotheses. Plant Cell and Environment 16: 5-24.

Mylroie, J. E., J. W. Jenson, J. M. U. Jocson, and M. A. Lander. 1999. Karst geology and hydrology of Guam: a preliminary report. Report No. 98. Water and Environmental Research Institute.

Mylroie, J. E., J. W. Jenson, D. Taborosi, J. M. U. Jocson, D. T. Vann, and C. Wexel. 2001. Karst features of Guam in terms of a general model of carbonate island karst. Journal of Cave and Karst Studies 63: 9-22.

Nakada, S., T. Matsushima, M. Yoshimoto, T. Sugimoto, T. Kato, T. Watanabe, R.Chong, and J. T. Camacho. 2005. Geological aspects of the 2003-2004 eruption of Anatahan volcano, Northern Mariana Islands. Journal of Volcanology and Geothermal Research 146: 226-240.

National Audubon Society. 1989-2006. The Christmas Bird Count historical and current year's results. http://www.audubon.org/bird/cbc, (accessed 20 October 2008).

National Park Service. 2008. National register of historic places database. http://www.nps.gov/history/nr/research/index.htm, (accessed 7 November 2008).

Neill, C. and J. Rea. 2004. Territory of Guam fire assessment. U.S. Forest Service, Pacific Southwest Region Fire Management. Vallejo, CA.

Nicholls, R. J., P. P. Wong, V. R. Burkett, J. O. Codignotto, J. E. Hay, R. F. McLean, S. Ragoonaden, and C. D. Woodroffe. 2007. Coastal systems and low-lying areas. Climate change 2007: impacts, adaptation and vulnerability. In: M. L. Parry, O.F.Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson (eds.), Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change, pp. 315-356. Cambridge University Press, Cambridge, UK.

NOAA, (National Oceanic and Atmospheric Administration). 2001. Oil spills in coral reefs: planning and response considerations. National Ocean Service Office of Response and Restoration.

NOAA, (National Oceanic and Atmospheric Administration). 2009. Office of response and restoration. http://response.restoration.noaa.gov/, (accessed 10 September 2009).

Ogden, J. C. and J. P. Ebersole. 1981. Scale and community structure of coral reef fishes: a long-term study of a large artificial reef. Marine Ecology - Progress Series 4: 97-103.

Olmo, R., T. Mangieri, D. J. Welch, and T. S. Dye. 2000. Phase II archaeological survey and detailed recording at Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) Communications Annex, Territory of Guam, Mariana Islands. Prepared for Department of the

Navy, Pacific Division, Naval Facilities Engineering Command. International Archaeological Research Institute Inc., Pearl Harbor, HI.

Olmo, R. K. and O. Kataoka. 2009. Haputo Village project prospectus. Submitted to Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) Guam. University of Guam, Mangilao, Guam.

Osborne, D. 1947. Chamorro archaeology. Micronesian Area Research Center, University of Guam. Mangilao, Guam.

Paine, J. R. 1991. IUCN directory of protected areas in Oceania. Gland, Switzerland.

Parmesan, C. and J. Matthews. 2006. Biological impacts of climate change. In: M. J. Groom, G. K. Meffe, and C. R. Carroll (eds.), Principles of conservation biology. Sinauer Associates Inc., Sunderland, MA.

Paulay, G. and Y. Benayahu. 1999. Patterns and consequences of coral bleaching in Micronesia (Majuro and Guam) in 1992-1994. Micronesica 32: 109-124.

Paulay, G. 2003. Marine biodiversity of Guam and the Marianas: overview. Micronesica 35-36: 3-25.

Pimental, D. 2005. Environmental consequences and economic costs of alien species. In: Inderjit (ed.) Invasive plants: ecological and agricultural aspects. Birkhauser-Verlag AG, Basel.

Porter, V., T. Leberer, M. Gawel, J. Gutierrez, D. Burdick, V. Torres, and E. Lujan. 2005. The state of coral reef ecosystems of Guam. In: J. Waddell (ed.), The state of coral reef ecosystems of the United States and Pacific freely Associated States: NOAA Technical Memorandum NOS NCCOS 11, pp. 442-487. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD.

Prasad, U. K. and H. I. Manner. 1994. Climate change and sea level rise issues in Guam. Report on a preliminary mission. SPREP Reports and Studies SeriesReport No. 82. Apia, Western Samoa: South Pacific Regional Environmental Programme.

Pratchett, M. 2005. Dynamics of an outbreak population of *Acanthaster planci* at Lizard Island, northern Great Barrier Reef. Coral Reefs 24: 453-462.

Pratt, H. D., P. L. Bruner, and D. G. Berrett. 1987. The birds of Hawaii and the tropical Pacific. Princeton University Press, Princeton, NJ.

Puglise, K. A. and R. Kelty. 2007. NOAA coral reef ecosystem research plan for Fiscal Years 2007 to 2011. NOAA Coral Reef Conservation Program. NOAA Technical Memorandum CRCP 1.

Quinata, L. R. 1994. Vegetation baseline survey - Andersen Air Force Base, Guam. U.S. Fish and Wildlife Service. Dededo, Guam.

Ramade, F. and H. Roche. 2006. Pollutant effects on coral reefs ecosystems. Revue D Ecologie-La Terre et la Vie 61: 3-33.

Randall, J. E. 1963. An analysis of the fish populations of artificial and natural reefs in the Virgin Islands. Caribbean Journal of Science 3: 31-47.

Randall, J. E. 1972. Chemical pollution in the sea and the crown-of-thorns starfish (*Acanthaster planci*). Biotropica 4: 132-144.

Randall, R. H. 1979. Geological features within the Guam seashore study area. Report No. 55. University of Guam Marine Laboratory.

Reinman, F. M. 1977. An archaeological survey and preliminary test excavations on the island of Guam, Mariana Islands, 1965-66. University of Guam Micronesian Area Research Center. Mangilao, Guam.

Restrepo, C. and P. Vitousek. 2001. Landslides, alien species, and the diversity of a Hawaiian montane mesic ecosystem. Biotropica 33: 490-420.

Richmond, R. H., T. Rongo, Y. Golbuu, S. Victor, N. Idechong, G. Davis, W. Kostka, L. Neth, M. Hamnett, and E. Wolanski. 2007. Watersheds and coral reefs: conservation science, policy and implementation. BioScience 57: 598-607.

Richmond, R. H. and G. Davis. 2008. Status of the coral reefs of Guam. In: J. E. Waddell and A. M. Clarke (eds.), The state of the coral reef ecosystems of the United States and Pacific Freely Associated States: 2008. NOAA. Silver Spring, MD.

Roberts, D. 2006. Marine fish feeding: why the FWC thinks it's bad for everyone. Florida Fishing Weekly. Florida Fish and Wildlife Conservation Commission.

Rodda, G. H., T. H. Fritts, and J. D. Reichel. 1991. The distributional patterns of reptiles and amphibians in the Mariana Islands. Micronesica 24: 195-210.

Rouphael, A. B. and G. J. Inglis. 2001. "Take only photographs and leave only footprints"?: an experimental study of the impacts of underwater photographers on coral reef dive sites. Biological Conservation 100: 281-287.

Russell, B. 2004. *Cheilinus undulatus*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.1. www.iucnredlist.org, (accessed 23 April 2010).

Savidge, J. A. 1987. Extinction of an island forest avifauna by an introduced snake. Ecology 68: 660-668.

Scheffer, M., J. Bascompte, W. A. Brock, V. Brovkin, S. R. Carpenter, V. Dakos, H. Held, E. H. van Nes, M. Rietkerk, and G. Sugihara. 2009. Early-warning signals for critical transitions. Nature 461: 53-59.

Schreiner, I. H. and D. M. Nafus. 1997. Butterflies of Micronesia. Agricultural Experiment Station, College of Agriculture and Life Sciences, University of Guam. Mangilao, Guam.

Schueler, T. 1994. The importance of imperviousness. Watershed Protection Techniques 1: 100-111.

Seale, A. 1901. Report of a mission to Guam. Occasional Papers, Bernice P. Bishop Museum 1: 17-128.

SER, (Society for Ecological Restoration) 2004. The SER international primer on ecological restoration. SER International Science & Policy Working Group. Tucson, AZ.

Smith, B. D., R. Cooper-Nurse, and A. Gawel. 2008. Survey of endangered tree snails on Navy-owned lands in Guam. COMNAVMARIANAS. U.S. Department of the Navy. Guam.

Solomon, S., D. Qin, M. Manning, Z. Chen, K. B. Marquis, M. Averyt, and H. L. Miller (eds.). 2007. Climate change 2007: the physical science basis - Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

SPC Fisheries. 2004. Divers feeding fishes: a continuing issue in MPA Management. SPC Fisheries Newsletter, No. 111.

Stone, B. C. 1970. The flora of Guam. Micronesica 6: 1-659.

SWCA, (SWCA, Incorporated, dba Environmental Consultants) and TNWRE, (Tom Nance Water Resource Engineering). 2007. Proposed supplemental water supply for the Fena Reservoir System, Naval Magazine, Guam. U.S. Navy Region Marianas.

SWCA, (SWCA, Incorporated, dba Environmental Consultants). 2008a. The effects of flight operations on endangered Mariana fruit bats and Mariana crows: a monitoring program for Andersen AFB, Guam. Final report prepared for Air Force Center for Engineering and the Environment. Brooks City-Base, TX.

SWCA, (SWCA, Incorporated, dba Environmental Consultants). 2008b. Mariana fruit bat monitoring services during remediation activities at IRP site 12/Landfill 17: Areas A, B, and F - Andersen Air Force Base, Guam. Final report prepared for Shaw Environmental and Infrastructure Group.

SWCA, (SWCA, Incorporated, dba Environmental Consultants). 2009. Marine monitoring at Orote and Haputo Ecological Reserve Areas. Final Report prepared for Naval Facilities Engineering Command, Marianas. Santa Rita, Guam.

SWCA, (SWCA, Incorporated, dba Environmental Consultants). 2010. Herpetological surveys on Department of Defense lands, Guam, in support of a Marine Corps relocation initiative to various locations on Guam. Final report prepared for AECOM, Inc., Bloomfield, NJ.

Sweatman, H. P. A. 1996. Impact of tourist pontoons on fish assemblages on the Great Barrier Reef. CRC Reef Research Centre. Townsville.

Sweeney, R. 2008. Rhino beetles discovered up at Urunao. http://www.kuam.com, (accessed 27 October 2008).

Tabata, R. S. 1992. Hawai'i's recreational dive industry. Sea Grant Marine Economics Report No. 98. Ocean Resources Branch, Hawaii Department of Business, Economic Development & Tourism.

Taborosi, D. 2004. Field guide to caves and karst of Guam. Bess Press, Honolulu, HI.

Takano, L. L. and S. M. Haig. 2004. Distribution and abundance of the Mariana subspecies of the common moorhen. Waterbirds 27: 245-250.

Thompson, L. 1932. Archaeology of the Mariana Islands. No. 100. Bernice P. Bishop Museum Bulletin, Honolulu, HI.

Tracey, J. I., S. O. Schlanger, J. T. Stark, D. B. Doan, and H. G. May. 1964. General geology of Guam. U.S. Geological Survey Professional Paper 403-A.

Tratalos, J. A. and T. J. Austin. 2001. Impacts of recreational scuba diving on coral communities of the Caribbean island of Grand Cayman. Biological Conservation 102: 67-75.

U.S. Navy, (United States Department of the Navy). 1986. Management Plan for the Haputo Ecological Reserve Area. Naval Facilities Engineering Command, Pacific Division.

UNEP, (United Nations Environment Programme). 2006. After the Tsunami: rapid environmental assessment. UNEP Asian Tsunami Task Force.

USEPA, (United States Environmental Protection Agency). 2008. Emergency management. http://www.epa.gov/emergencies/info.htm, (accessed 4 November 2008).

USFWS, (United States Fish and Wildlife Service). 1986. Fish and wildlife resources of the Haputo Ecological Reserve Area. Prepared for Department of the Navy. Honolulu, HI.

USFWS, (United States Fish and Wildlife Service). 1988. Fish and wildlife resources of the

Haputo Ecological Reserve Area, Naval Communications Area Master Station, western Pacific, Guam (NAVCAMSWESTPAC), first biennial resurvey, June and August 1988.

USFWS, (United States Fish and Wildlife Service). 1991. Recovery plan for the Mariana common moorhen (Gallinule), *Gallinula chloropus guami*. Portland, OR.

USFWS, (United States Fish and Wildlife Service). 1992. Draft Environmental Assessment, proposed Guam National Wildlife Refuge, Territory of Guam. Portland, OR.

USFWS, (United States Fish and Wildlife Service). 1994a. Draft Environmental Assessment for the proposed Ritidian Point Territorial Park, Territory of Guam. Portland, OR.

USFWS, (United States Fish and Wildlife Service). 1994b. Recovery plan for *Serianthes nelsonii*. Portland, OR.

USFWS, (United States Fish and Wildlife Service) and USAF, (United States Air Force). 2001. Draft Integrated Natural Resources Management Plan for Andersen Air Force Base, Guam, Mariana Islands. Report No. I. Prepared for 36 CEV Environmental Office, Andersen Air Force Base. Guam.

USFWS, (United States Fish and Wildlife Service) and USAF, (United States Air Force). 2003. Integrated Natural Resources Management Plan for Andersen Air Force Base, Guam, Mariana Islands. Report No. I. Prepared for 36 CEV Environmental Office, Andersen Air Force Base. Guam.

USFWS, (United States Fish and Wildlife Service). 2004. Endangered and threatened wildlife and plants: removing the Mariana mallard and the Guam broadbill from the federal list of endangered and threatened wildlife. 50 CFR Part 17. Federal Register 69 (35): 8116-8119.

USFWS, (United States Fish and Wildlife Service). 2005. Pacific islands (excluding Hawaii) plants and animals: updated August 29, 2005. Listed, proposed or candidate species, as designated under the U.S. Endangered Species Act.

USFWS, (United States Fish and Wildlife Service) 2001. Assessment of the coconut crab (*Birgus latro*) population on the Naval Computer and Telecommunications Master Station. Prepared for Department of the Navy Environmental Section Commander U.S. Naval Forces, Marianas. U.S. Fish and Wildlife Service, Guam National Wildlife Refuge, Dededo, Guam.

USGS, (United States Geological Survey). 2008. Guam earthquake information, earthquake density map. http://earthquake.usgs.gov/regional/world/guam/density.php, (accessed 30 October 2008).

van Beukering, P., W. Haider, M. Longland, H. Cesar, J. Sablan, S. Shjegstad, B. Beardmore, Y. Liu, and G. O. Garces. 2007. The economic value of Guam's coral reefs. Technical Report No. 116. University of Guam Marine Laboratory.

Varnham, K. and IUCN/SSG, (International Union for the Conservation of Nature/Invasive Species Specialist Group). 2006. *Suncus murinus*. www.issg.org, (accessed 20 October 2008).

Vitousek, P. M. 1994. Beyond global warming: ecology and global change. Ecology 75: 1861-1876.

Vogt, S. 2008. Coconut crab (*Birgus latro*) surveys on the military lease lands on Tinian, Commonwealth of the Northern Marianas Islands. U.S. Navy, NAVFAC Pacific. Honolulu, HI.

WA-ANSC, (Washington State Aquatic Nuisance Species Committee) 2005. Draft early detection and rapid response plan for aquatic invasive species In Washington State.

Walther, G.-R., E. Post, P. Convey, A. Menzel, C. Parmesan, T. J. C. Beebee, J.-M. Fromentin,

O. Hoegh-Guldberg, and F. Bairlein. 2002. Ecological responses to climate change. Nature 416: 389-395.

Wanless, R. M., A. Angel, R. J. Cuthbert, G. M. Hilton, and P. G. Ryan. 2007. Can predation by invasive mice drive seabird extinctions? Biology Letters 3: 241-244.

Wiewel, A. S., A. A. Yackel-Adams, and G. H. Rodda. 2009. Distribution, density, and biomass of introduced small mammals in the southern Mariana Islands. Pacific Science 63: 205-222.

Wiles, G. J., C. F. Aguon, G. W. Davis, and D. J. Grout. 1995. The status and distribution of endangered animals and plants in northern Guam. Micronesica 28: 31-49.

Wiles, G. J., I. H. Schreiner, D. Nafus, L. K. Jurgensen, and J. C. Manglona. 1996. The status, biology, and conservation of *Serianthes nelsonii* (Fabaceae), an endangered Micronesian tree. Biological Conservation 76: 229-239.

Wiles, G. J., J. Bart, R. E. Beck, and C. F. Aguon. 2003. Impacts of the brown tree snake: patterns of decline and species persistence in Guam's avifauna. Conservation Biology 17: 1350-1360.

Wiles, G. J. 2005. A checklist of the birds and mammals of Micronesia. Micronesica 38: 141-189.

Wilkinson, C. (ed.). 2008. Status of coral reefs of the world: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia.

Wolanski, E., R. H. Richmond, G. Davis, E. Deleersnijder, and R. R. Leben. 2003. Eddies around Guam, an island in the Mariana Islands group. Australian Institute of Marine Science. http://www.aims.gov.au/ibm/pages/news/eddies-around-guam.html, (accessed 6 November 2009).

Young, F. J. 1988. Soil survey of Territory of Guam. U.S. Department of Agriculture-Soil Conservation Service.

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11.0 APPENDICES

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Appendix 1. Comprehensive List of Regulatory Drivers on Policies for the Management of the HERA

NATURAL RESOURCES

Federal Laws, Executive Orders, Directives, Regulations and Policies

- Animal Damage Control Act; (7 USC 426-426b, 47 Stat. 1468)
- Clean Air Act, as amended
- Clean Water Act (CWA), Section 404; (33 USC 1311)
- Coastal Barrier Resources Act of 1982
- Coastal Zone Management Act (Public Law 92-583)
- Comprehensive Employment and Training Act Amendments of 1978; (Public Law 95-524)
- Comprehensive Environmental Response Compensation and Liability Act; (Superfund) of 1980, (26 USC 4611-4682, Public Law 96-510, 94 Stat. 2797)
- Conservation and Rehabilitation Program on Military and Public Lands, as amended; (Public Law 86-797)
- Coral Reef Conservation Act of 2000
- Executive Order 11514, Protection and Enhancement of Environmental Quality
- Executive Order 11644, Use of Off-Road Vehicles on the Public Lands
- Executive Order 11987, Exotic Organisms
- Executive Order 11988, Floodplain Management
- Executive Order 11990, Protection of Wetlands
- Executive Order 12962, Recreational Fisheries
- Executive Order 13089, Coral Reef Protection
- Executive Order 13112, Invasive Species
- Executive Order 13158, Marine Protected Areas
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
- Energy Efficiency and Water Conservation at Federal Facilities; (Executive Order No. 12902)
- Federal Agency Recycling and the Council on Federal Recycling and Procurement Policy; (Executive Order 12780)
- Federal Aid in Wildlife Restoration Act of 1937; (16 USC 669-6691; 50 Stat. 917). Also known as the Pittman-Roberts Act
- Federal Consistency with Approved Coastal Management Programs under CZMA (15

CFR 930)

- Federal Environmental Pesticide Control Act of 1972; (Public Law 7 USC 2809)
- Federal Water Pollution Control Act, as Amended by the Clean Water Act of 1977; (Public Law 92-500)
- Fish and Wildlife Conservation Act; (16 USC 2901-2911; 94 Stat. 1322. Public Law 96-366)
- Fish and Wildlife Conservation and Natural Resources Management Programs on Military Reservations; (Public Law 96-561)
- Fish and Wildlife Coordination Act (16 USC 661 et seq.)
- Fish and Wildlife Improvement Act of 1978; (16 USC 7421; 92 Stat. 3110)
- Fishery Conservation and Management Act of 1976 as amended, (Public Law 94-265; 16 USC 1801-1 882; 90 Stat. 331)
- Forest Resources Conservation and Shortage Relief Act
- Lacey Act of 1900; (50 CFR 10-14)
- Sikes Act, as amended (16 USC 670a-670o; Public Law 92-583, 74 Stat. 1052)
- Section I of Public Law 90-465, the Sikes Act Amendment Act. (IG USC 670c)
- National Wildlife Refuge System Administration Act of 1996; (16 USC 668dd-668ee)
- Marine Mammal Protection Act of 1972 (Public Law 92-522)
- Marine Protection, and Sanctuaries Act of 1972, as amended (Public Law 92-532)
- Marine Protection, Research, and Sanctuaries Act of 1972 of 1972
- Military Construction Authorization Act; (10 USC 2667(d)), Leases: Non-excess property (Military Lands)
- Military Construction Authorization Act Military Reservation and Facilities: Hunting and Trapping; (10 USC 2671)
- Military Construction Authorization Act Sale of Certain Interests in Lands; Logs (10 USC 2665)
- Migratory Bird Conservation Act (16 USC 715 parts 25-28)
- Migratory Bird Treaty Act of 1918 (16 USC 703-7 1 1)
- National Environmental Policy Act (NEPA) of 1969 (Public Law 91-1 90)
- National Heritage Policy Act of 1979 (H.R. 6502)
- National Trails System Act of 1968 (16 USC 1271)
- Non-Indigenous Aquatic Nuisance Prevention Act of 1990 as amended; (25 USC 3001-13, 104 Stat. 3042, Public Law 101-646)
- Noxious Weed Act of 1974 (Public Law 90-583)

- Oil Pollution Act of 1990 (OPA 90)
- Presidents Directive on Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds
- Public Law 108–136
- Rivers and Harbors Act of 1899 (33 USC 401)
- Sikes Act (Public Law 106–580)
- Soil and Water Conservation Act (16 USC 2001, Public Law 95-193)
- Soil Conservation Act (Public Law 74-461)

Department of Defense Directives, Regulations and Policies

- Accounting of Production and Sale of Lumber and Timber Products of 9 January 1979; (DOD Instruction 7310.51)
- DOD Plan; Recreational Fishery Resources Conservation Plan, Department of Defense Annex for Military Installations
- Environmental and Natural Resources Protection Manual; (OPNAVINST 5090.1C)
- Environmental Security - Fish & Wildlife Conservation and Management; (DOD Directive 4715.3)
- Legacy Resources Management Program; (Congressional/DoD Appropriations Act, Section 8120 of 1991)
- Use of Off-Road Vehicles on DoD Lands of 19 April 1979 as amended; (DOD Directive 6050.2)
- Management and Recreation of Natural and Cultural Resources on U.S. Naval Activities, Guam; (OPNAVINST 5090.6)
- Memorandum of Understanding DOD & 0011978
- MOU between the Department of the Interior and the Department of Defense for the Development of Public Outdoor Recreation Resources on Military Installations of April 7, 1978
- Memorandum of Agreement for Control and Eradication of the Brown Tree Snake; (12 August 1993)
- National Defense Authorization Act (2004)
- Natural Resources; (Secretary of Defense Natural Resources Conservation Award of 13 December 1976, (DOD Instruction 5000.13)
- Natural Resources Management and Conservation on Military Lands; (DOD Directive 6050.2)
- Navy Natural Resources Program Implementation; (SECNAVINST 6240.E)
- Navy Real Estate Operations and Natural Resources Management (NAVAC P-73); Volume I, Chapter 19 and VOL II

- Comprehensive Environmental Response, Compensation, and Liability Act; (CERCLA) as amended, (26 USC 4611-4682, Public Law 96-510,94 Stat. 884)

Navy Directives, Regulations and Policies

- CINCPACFLTINST 5090.IB; Pacific Fleet Environmental Protection Program
- COMNAVMARIANAS Fire Prevention Program Instruction; (COMNAVMARIANAS Instruction 11320.1)
- Concurrent Jurisdiction Act, (48 USC 1704)
- Cooperative Agreement for the Establishment of the Guam Overlay National Wildlife Refuge Overlay Unit (10 December 1993)
- Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Communication Area Master Station, WESTPAC (14 March 1988), 8 pp.
- Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Magazine, Guam (7 March 1988). 6 pp.
- Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Station, Guam (12 April 1988). 8 pp.
- Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Navy Public Works Center; (11 April 1988) Guam. 8 pp.
- Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Supply Depot, Guam 29 February 1988), 8 pp.
- Criminal Procedure Code, 8 GCA 5.55
- Management and Recreation of Natural and Cultural Resources on U.S. Naval Activities, Guam; (OPNAVINST 5090.6)
- Memorandum of Agreement for Cooperative Law Enforcement between the U.S. Fish and Wildlife Service and Division of Aquatic and Wildlife Resources Department of Agriculture, Territory of Guam. 5 pp. (9 July 1990)
- Memorandum of Understanding among the Government of Guam and the U.S. Air Force and the U.S. Navy and the U.S. Fish and Wildlife Service; (14 December 1993), 6 pp. with 3 pp. of signatures
- Memorandum of Understanding to Foster the Ecosystem Approach; (15 December 1995)
- NCTAMS WESTPAC Guam Instruction 11011.IC; (currently undergoing revision as COMNAVMARIANAS instructions)

Government of Guam Laws, Regulations and Policies

- Endangered Species Act of Guam: (5 GCA 63208, Public Law 6-85)
- Game, Forestry and Conservation; (5 GCA, Chapter 63, Public Law 6-85)
- Government Code of Guam (Section 47104)

- Government Code of Guam; (1 GCA 4002 (a) as amended by Public Law 20-185)
- Importation: Harboring; (5 GCA 63124)
- Organic Act of Guam of 1950, as amended; (48 USC 1421, et seq., 64 Stat. 384)
- Protection of Wild Animals; (5 GCA 63121)
- Protection of Wild Birds; (5 GCA 63120)

CULTURAL RESOURCES

Laws, Executive Orders, Directives, Regulations and Policies

- American Indian, Religious Freedom Act of 1978
- Antiquities Act of 1906; (Public Law 59-209, 16 USC 431 -433)
- Archaeological and Historic Preservation Act of 1974 (Moss-Bennet Act)
- Archaeological Resources Protection Act of 1979; (Public Law 96-95, 16 USC 470aa-47011)
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Historic Resources Inventories and Protection on Federal Lands; (Executive Order 11593)
- Historic Sites Act of 1935; (Public Law 74-292, 16 USC 461-467)
- National Historic Preservation Act of 1966, as amended 1980; (Public Law 88-29)
- Native American Graves Protection and Repatriation Act of 1990; (Public Law 101-106; 104 Stat., 25 USC 101-601)

Department of Defense Directives, Regulations and Policies

- Archaeological and Historical Resources on Military Lands; (DOD Directive 4710.1, Environmental Security)
- Memorandum of Agreement - Concurrent Jurisdiction (for law enforcement). 5 pp.; (1 September 1988)
- Memorandum of Understanding between the Department of Defense and the U.S. Fish and Wildlife Service for the Ecosystem-based Management of Fish, Wildlife and Plant Resources on Military Lands, 17 May 1999

Navy Directives, Regulations and Policies

- Management and Recreation of Natural and Cultural Resources on U.S. Naval Activities, Guam; (OPNAVI NST 5090.6)

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Appendix 2: Legal Description of Haputo Ecological Reserve Area

APPENDIX A

The legal description of the Haputo Ecological Reserve Area is as follows:

All that tract or parcel of land comprising of both land (cliff line area) and the submerged land (including the body of water above it) lying on the western side of Finegayan, Dededo, Island of Guam, Mariana Islands, and marked by seven (7) geographical position points as shown on PACNAVFACENGCOM Drawing No. RE-83-22 (Revised), (Map 1) the cliff line area being a portion of the U.S. Naval Communication Area Master Station, WESTPAC, a naval reservation, on which land the United States of America has title in fee simple absolute (Civil 10-50), and the adjoining submerged land area located within the three (3) geographical miles of Guam Territorial waters placed under the jurisdiction of the Department of the Navy as defined under the Public Law 93-435 of 5 October 1974, 88 Stat. 1210 (H.R. 11559, 93rd Congress), and said parcel of land is more particularly described as follows:

Beginning at the SE corner of this parcel of land, a point on the FAA/Naval Reservation Boundary line at contour elevation 300 feet, marked as "HERA-l," said point of beginning having its assigned geographic position based on the Defense Mapping Agency Quad Maps, series W844, Sheet 3127 II SE, Ritidian Point, Guam 1:25000, and described as follows:

1. HERA-1 Lat. 13° 34' 20.15" N
Long. 144° 49' 30.15" E

Follows along FAA/Naval Reservation Boundary line on a bearing of N 54° 59' 57" W, down the cliff line to a water edge of Mean Sea Level and to the edge of the outer coral reef line;

2. HERA-2 Lat. 13° 34' 20.50" N
Long. 144° 49' 20.70" E

Follows along outer edge of Haputo Point coral reef line on a northerly direction;

3. HERA-3 Lat. 13° 35' 30.35" N
Long. 144° 50' 10.00" E

On a northwesterly direction to the outer edge of a coral reef;

4. HERA-4 Lat. 13° 35' 40.40" N
Long. 144° 49' 40.90" E
Follows along outer edge of a coral reef on a northeasterly direction to a point on an extended line of the Air Force/Navy reservation boundary;

5. HERA-5 Lat. 13° 35' 50.30" N
Long. 144° 49' 55.50" E
Follows along Air Force/Navy Reservation Boundary line on a bearing due East, to a point on a water edge line (M.L.L.W.)

6. HERA-6 Lat. 13° 35' 50.30" N

Long. 144° 50' 20.50" E

Follows along Air Force/Navy Reservation Boundary line on a bearing due East, up the cliff line to a point on a 300 feet contour line;

7. HERA-7 Lat. 13° 35' 50.30" N
Long. 144° 50' 00.85" E

Follows along cliff line on a 300 feet contour and/or as indicated, on a southerly direction to a point of beginning.

Appendix 3: Cooperative Agreement with the U.S. Air Force, Dated March 10, 1994

COOPERATIVE AGREEMENT

between the

U.S. AIR FORCE

and the

U.S. FISH AND WILDLIFE SERVICE

for the

ESTABLISHMENT AND MANAGEMENT OF THE
GUAM NATIONAL WILDLIFE REFUGE,
GUAM

I. Introduction

The U.S. Air Force (Air Force), the U.S. Navy (Navy), the Government of Guam, and the U.S. Fish and Wildlife Service (Service) share common goals for the recovery of endangered and threatened species, the protection of native flora and fauna, the conservation of unique ecosystems, and the maintenance of the native biological diversity of Guam. These shared goals are expressed in the 1993 Memorandum of Understanding among the Government of Guam, the Navy, the Air Force, and the Service (Attachment 1).

To address the complex ecological and endangered species issues facing the island of Guam, the Government of Guam, the Navy, the Air Force, and the Service have mutually agreed to establish the Guam National Wildlife Refuge on certain lands owned and administered by the Navy, the Air Force, the Government of Guam, and the Service as described in the Final Environmental Assessment for the Guam National Wildlife Refuge. Within certain lands administered by the Air Force, the Guam National Wildlife Refuge encompasses lands identified in recovery plans as essential habitat for the recovery of the endangered Mariana common moorhen, the Mariana crow, the Guam rail, the Guam broadbill, the Guam bridled white-eye, the Guam Micronesian kingfisher, the Mariana fruit bat, the little Mariana fruit bat, and the Vanikoro swiftlet. The Guam National Wildlife Refuge also includes certain beaches and reefs used for nesting and foraging by endangered and threatened sea turtles.

The establishment and management of the Guam National Wildlife Refuge on Air Force lands provides a commitment by the Air Force and the Service for a coordinated program centered on the protection of endangered and threatened species and other native flora and fauna, maintenance of native ecosystems, and the conservation of native biological diversity in cooperation with the Guam Department of Agriculture-Division of Aquatic and Wildlife Resources, consistent with the national defense mission of the Air Force. The Air Force has provided $105,000 for a Natural Resource Management Plan and $120,000 for botanical surveys of endangered plants for Andersen Air Force Base to the Service and continues to contribute staff, resources, and in-kind services for the recovery of endangered and threatened species on Guam.

II. Authorities

This Cooperative Agreement is hereby made and entered into by and between the Air Force and the Service under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), as amended; the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e), as amended; the Fish and Wildlife Act of 1956 (16 U.S.C. 742(a)-754), as amended; the Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended; the Economy Act of 1932 (31 U.S.C. 1535); the Sikes Act of 1960 (16 U.S.C. 670a-670o), as amended; and other laws, as applicable.

III. Purposes of the Cooperative Agreement

A. This Cooperative Agreement establishes overlay units of the Guam National Wildlife Refuge on certain lands containing important biological values under Federal ownership and administered by the Air Force on Guam.

B. This Cooperative Agreement also defines the management and administrative roles and responsibilities of the Air Force and the Service for the Guam National Wildlife Refuge.

IV. Establishment of the Guam National Wildlife Refuge

A. The Service recognizes that the primary purpose of the Air Force lands within the Guam National Wildlife Refuge is to support the national defense mission of the Air Force. The Air Force recognizes that their lands included within the Guam National Wildlife Refuge provide habitats essential to the survival and recovery of endangered and threatened species.

B. The boundaries of the Guam National Wildlife Refuge on Air Force lands may include lands identified in the July 1993 Final Environmental Assessment for the Guam National Wildlife Refuge and shall be based on mutual consultations between the Air Force and the Service. Those lands mutually approved by the Air Force and the Service shall be included within the Guam National Wildlife Refuge as overlay units and are identified on the attached map (Attachment 2). These lands shall be made available by the Air Force for the establishment of the Guam National Wildlife Refuge in conjunction with lands owned by the Government of Guam, the Navy, and the Service.

C. The boundaries of Air Force lands included within the Guam National Wildlife Refuge may be amended by the following:

1. Written mutual agreement between the Air Force and the Service; or

2. Unilateral written declaration by either the Air Force or the Service in accordance with the provisions of Section V of this Cooperative Agreement.

V. Tenure of the Guam National Wildlife Refuge

A. The Air Force lands identified under Section IV.B. and as amended under Section IV.C. of this Cooperative Agreement shall be made available for inclusion in the Guam National Wildlife Refuge under a license, lease, easement, use agreement, or other appropriate instrument until such time as any of the following conditions apply:

1. The Air Force may withdraw any or all land from the Guam National Wildlife Refuge boundaries when necessary for national emergency or national defense requirements, as determined by the Secretary of the Air Force, or higher authority;

2. The Air Force shall retain the option of unilaterally withdrawing any or all Air Force lands from the Guam National Wildlife Refuge in the event that any Air Force lands on Guam are designated critical habitat;

3. Inclusion of Air Force lands within the Guam National Wildlife Refuge shall not preclude the Air Force from determining that those areas are excess to the military mission of the Department of Defense and reporting them as excess to the General Services Administration for disposition in accordance with the Federal Property and Administrative Service Act of 1949, as amended (40 U.S.C. 471-535). As to such Air Force lands, this Cooperative Agreement shall have no further application upon title passing from the Air Force under that Act or any other Act of Congress or Executive Order; or

4. The Secretary of the Interior, using the best available scientific and commercial data, determines that all endangered and threatened species found within the Guam National Wildlife Refuge have become extinct, or have recovered to the point where protection under the Endangered Species Act is no longer required, or the scientific data for the classification of the endangered or threatened species were in error.

VI. Purposes of the Guam National Wildlife Refuge

The purposes of the Guam National Wildlife Refuge are as follows:

A. ". . . to conserve (A) fish or wildlife which are listed as endangered species or threatened species . . . or (B) plants . . . (C) the ecosystems upon which endangered species and threatened species depend . . ." (Endangered Species Act of 1973, 16 U.S.C. 1534);

B. ". . . shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements . . . and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon . . ." (Fish and Wildlife Coordination Act, 16 U.S.C. 664);

C. ". . . for the development, advancement, management, conservation, and protection of fish and wildlife resources" (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(a)(4));

D. ". . . for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude, if such terms are deemed by the Secretary to be in accordance with law and compatible with the purposes for which acceptance is sought." (Fish and Wildlife Act of 1956, 16 U.S.C. 742f(b)(1);

E. ". . . (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species and threatened species (Refuge Recreation Act, 16 U.S.C. 460k-1);

F. ". . . the Secretary . . . may accept and use . . . donations of . . . real . . . property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by the donors . . ." (Refuge Recreation Act, 16 U.S.C. 460k-2); and

G. To ensure that Air Force lands within the Guam National Wildlife Refuge remain available for the use of the Air Force to carry out its responsibilities to organize, supply, equip, train, service, mobilize, demobilize, administer, and maintain forces (10 U.S.C. 8013).

VII. Goals of the Guam National Wildlife Refuge

The Air Force and the Service mutually agree that the Air Force lands included within the Guam National Wildlife Refuge shall be managed and administered for the following goals, consistent with the accomplishment of the national defense mission of the Air Force:

A. To develop and implement a long-term, comprehensive program to conserve and recover endangered and threatened species, candidate and proposed species, migratory birds, and other native flora and fauna. This conservation program includes, but is not limited to, brown tree snake control and eradication, wildlife habitat and ecosystem protection, endangered and threatened species recovery and reintroduction, research, environmental education, compatible public use, and law enforcement;

B. To complement the ongoing efforts of the Air Force, the Government of Guam, the Navy, the Service, and other agencies in natural resources and wildlife management and conservation, protection of historic and cultural resources, law enforcement, research, and environmental education;

C. To exchange technical information and expertise to implement appropriate wildlife conservation and environmental protection mandates;

D. To provide increased coordination on applicable law enforcement issues in accordance with the 1990 Memorandum of Agreement for Cooperative Law Enforcement between the Service and the Department of Agriculture-Division of Aquatic and Wildlife Resources and the Cooperative Agreements between the Air Force, the Navy, the Service, and the Government of Guam under the Sikes Act;

E. To develop research and environmental education programs and to consider public use and public access compatible with the Guam National Wildlife Refuge and consistent with the national defense mission;

F. To ensure that Federal actions, including management plans, within the Guam National Wildlife Refuge comply with the National Environmental Policy Act of 1969; Endangered Species Act of 1973, as amended; the Migratory Bird Treaty Act of 1918; Coastal Zone Management Act of 1972; Federal Water Pollution Control Act, as amended; Rivers and Harbors Act of 1938; National Historic Preservation Act of 1966; and other laws, as applicable;

G. To provide for consultation with the Service for actions which are funded, authorized, or carried out by the Federal Government within the Guam National Wildlife Refuge that may impact habitat of endangered or threatened species even if those species are extirpated from the affected area, but are not extinct, and for contemplated projects that affect nesting beaches of endangered and threatened sea turtles;

H. To develop and implement a Refuge Management Plan for the Guam National Wildlife Refuge and to provide periodic updates of the Refuge Management Plan;

1. The Refuge Management Plan for the Guam National Wildlife Refuge shall be developed by the Service in consultation with and with the concurrence of the landowners;

2. The Refuge Management Plan shall incorporate the relevant sections of each landowner's natural resources management plans.

I. To consider wildlife and fishery concerns in the development of other management plans such as law enforcement, prescribed burning, public use, public hunting, public fishing, and integrated pest management; and

J. To develop and implement an Annual Work Plan and an Annual Accountability Report for the Guam National Wildlife Refuge.

K. To administer and manage the Guam National Wildlife Refuge consistent with the national defense mission.

VIII. Specific Obligations of the Parties

A. The U.S. Fish and Wildlife Service's Obligations

The Service shall:

1. Recommend the specific Air Force lands to be included within the boundaries of the Guam National Wildlife Refuge based on consultations with the Air Force. Provide information on habitat quality and sensitivity for listed species for the development of management plans and zoning maps for Air Force lands within the Guam National Wildlife Refuge;

2. Locate and post the boundaries of Air Force lands included within the Guam National Wildlife Refuge with National Wildlife Refuge and Air Force signs. The wording, format, and placement of signs shall be coordinated with the Air Force;

3. Request annual funding for the management and administration of the Guam National Wildlife Refuge;

4. Undertake the staffing of the Guam National Wildlife Refuge, subject to adequate funding for a Refuge Manager, Biologist, and administrative, maintenance, and program support staff.

5. Participate directly in the development of the Annual Work Plan and shall:

   a. Coordinate the input of the Navy, the Government of Guam, and the Air Force in the development of the Annual Work Plan;

   b. Finalize the Annual Work Plan including mutually agreed-upon Annual Work Plan Tasks;

   c. Administer and track the Service's budget for the Guam National Wildlife Refuge;

   d. Distribute the Annual Work Plan to the Navy, the Government of Guam, the Air Force, and other participating agencies;

   e. Implement the Service's Annual Work Plan Tasks as identified in the Annual Work Plan within the limits of funds and personnel;

   f. Monitor the implementation and completion of the Annual Work Plan Tasks agreed upon by the Navy, the Government of Guam, and the Air Force;

   g. Provide a written report of Service accomplishments of the Annual Work Plan Tasks in the Annual Accountability Report; and

   h. Participate in the evaluation of the Annual Accountability Reports from the Government of Guam, the Navy, the Air Force, and other participating agencies.

6. Provide law enforcement support as specified in Section IX of this Cooperative Agreement;

7. Conduct, assist, and/or support surveys, censuses, and population monitoring of endangered and threatened species, proposed and candidate species, and other rare native species in coordination with the Air Force and the Guam Division of Aquatic and Wildlife Resources;

8. Conduct, assist, and/or support surveys and censuses of the distribution and condition of the habitats for endangered and threatened species, proposed and candidate species, and other rare native species in coordination with the Air Force and the Guam Division of Aquatic and Wildlife Resources;

9. Conduct, assist, and/or support research on the natural history and limiting factors of endangered and threatened species, proposed and candidate species, and other rare native species in coordination with the Air Force and the Guam Division of Aquatic and Wildlife Resources;

10. Conduct, assist, and/or support control and research programs in understanding the natural history of the alien brown tree snake in coordination with the Air Force and the Guam Division of Aquatic and Wildlife Resources;

11. Participate in recovery plan actions as outlined in the implementation schedules for the various recovery plans (Guam Mariana Fruit Bat and Little Mariana Fruit Bat Recovery Plan. 1990. U.S. Fish and Wildlife Service. 63 pp.); (Native Forest Birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands Recovery Plan. 1990. U.S. Fish and Wildlife Service. 86 pp.); (Recovery Plan for the Mariana Islands Population of the Vanikoro Swiftlet, *Aerodramus vanikorensis bartschi*. 1991. U.S. Fish and Wildlife Service. 49 pp.); (Recovery Plan for the Mariana Common Moorhen (= Gallinule), *Gallinula chloropus guami*. 1991. U.S. Fish and Wildlife Service. 55 pp.); and (Draft Recovery Plan for *Serianthes nelsonii*. 1993. U.S. Fish and Wildlife Service. 47 pp.);

12. Provide opportunities for public environmental education within the Guam National Wildlife Refuge;

13. Participate fully in the Endangered Species Act consultation process, including early advice on projects and ways to minimize the impacts of Federal actions to endangered species and their habitats;

14. Coordinate and consult with all parties and with the concurrence of the appropriate landowner to identify opportunities for compatible public access and recreation on Federal and Government of Guam lands included within the Guam National Wildlife Refuge;

15. Obtain appropriate primary landowner approval prior to issuance of any permit, easement, license, grant, right-of-way, or concession contract affecting Air Force lands or the national defense mission; and,

16. Coordinate and consult with the Government of Guam and the Air Force in establishing compatible recreational access and uses at the Ritidian Point Unit of the Guam National Wildlife Refuge. The Service shall be responsible for issuing a Special Use Permit to the Government of Guam for the operation and management of the compatible recreational uses on certain lands at the Ritidian Point Unit upon compliance with the National Environmental Policy Act of 1969; the Endangered Species Act of 1973, as amended; the Coastal Zone Management Act of 1972; the National Historic Preservation Act of 1966; the National Wildlife Refuge System Administration Act of 1966; other applicable Federal laws and Executive Orders and to be compatible with the purposes for which the Guam National Wildlife Refuge was established.

B. U.S. Air Force's Obligations

The Air Force shall:

1. Consult with the Service and determine the specific areas to be included within the boundaries of the Guam National Wildlife Refuge;

2. Identify existing uses on Air Force lands within the boundaries of the Guam National Wildlife Refuge;

3. Request additional funding and in-kind services as justified and negotiated for the establishment and management of the Guam National Wildlife Refuge on Air Force lands and subject to the availability of funding and in-kind services;

4. The Service and the Air Force shall enter into inter-agency agreements for the transfer of funds related to the administration and management of the Guam National Wildlife Refuge in accordance with the Economy Act, 31 U.S.C. 1535 as implemented by the Federal Acquisition Regulations Section 17.501 and DFARS Section 217.502;

5. Participate directly in the development of the Annual Work Plan as specified in Section X of this Cooperative Agreement;

6. Provide law enforcement support as specified in Section IX of this Cooperative Agreement;

7. Provide access to the employees of the Service and the Guam Division of Aquatic and Wildlife Resources who require access to Air Force lands on a regular basis for purposes related to this Cooperative Agreement. The Air Force may temporarily suspend access to certain areas for emergency or national defense purposes or for situations/purposes declared essential by the Wing Commander, 633rd Air Base Wing, Andersen Air Force Base;

8. Provide access to realty maps and survey information to Service personnel participating in the boundary surveys;

9. Provide access to the Service for the posting of the Guam National Wildlife Refuge boundaries;

10. Participate fully in the Endangered Species Act consultation process as required by statute;

11. Coordinate and consult with the Service and the Government of Guam in establishing compatible recreational access and uses at the Ritidian Point Unit of the Guam National Wildlife Refuge. The Air Force shall assist the Service in developing the Special Use Permit for public access at the Ritidian Point Unit in compliance with the National Environmental Policy Act of 1969; the Endangered Species Act of 1973, as amended; the Coastal Zone Management Act of 1972; the National Historic Preservation Act of 1966; the National Wildlife Refuge System Administration Act of 1966; other applicable Federal laws and Executive Orders and to be compatible with the purposes for which the Guam National Wildlife Refuge was established; and

12. Coordinate and consult with the Service to identify opportunities for compatible public access and recreation on Air Force lands included within the Guam National Wildlife Refuge.

IX. Law Enforcement

A. The Air Force and the Service shall coordinate on relevant law enforcement issues on Air Force lands included within the Guam National Wildlife Refuge;

B. This Cooperative Agreement does not nullify or supersede the exercise of concurrent jurisdiction by the Government of Guam in accordance with 48 U.S.C. 1704 and the 1988 Memorandum of Agreement between the Government of Guam, the Commander, U.S. Naval Forces Marianas, and the Commander, 43D Combat Support Group, Andersen Air Force Base, Guam and the 1990 Memorandum of Agreement for Cooperative Law Enforcement between the U.S. Fish and Wildlife Service and the Division of Aquatic and Wildlife Resources, Department of Agriculture, Territory of Guam; and

C. The Air Force and the Service shall provide support for the Guam National Wildlife Refuge for prevention, apprehension, investigation, and prosecution of violators and cases as provided for in the Annual Work Plan and guided by an approved Law Enforcement Management Plan for the Guam National Wildlife Refuge.

X. Coordination and Consultation Between the Air Force and the Service

A. The official representatives of the Service and the Air Force shall coordinate and consult with the official representatives of the Navy and the Government of Guam in developing and implementing the Annual Work Plan for the Guam National Wildlife Refuge. This coordination will include the identification of Annual Work Plan Tasks, negotiation and agreement of identified Annual Work Plan Tasks, implementation and support of the approved Annual Work Plan Tasks, and development of a written Annual Accountability Report of the Annual Work Plan Tasks. The Project Officers identified in Section XI of this Cooperative Agreement shall have the authority to finalize the Annual Work Plan.

B. The Air Force and the Service shall attend Annual Work Plan coordination meetings at least twice a year. One meeting will be devoted to developing the Annual Work Plan and the other meeting will be devoted to reviewing the Annual Accountability Report.

1. The Annual Work Plan coordination meetings shall include the Government of Guam, the Air Force, the Navy, the Service, and other agencies as mutually determined by all parties; and

2. The Service shall coordinate the development of the meeting agendas, prepare and distribute background information and minutes, schedule meetings, and hold meetings on Guam or other locations.

C. The Air Force and the Service may meet jointly as needed for any Federal action that may affect endangered and threatened species, proposed and candidate species, habitats for endangered and threatened species, and habitats for proposed and candidate species within Air Force lands included within the Guam National Wildlife Refuge;

1. These meetings may include the Guam Division of Aquatic and Wildlife Resources and other agencies as mutually agreed to by the Service and the Air Force; and,

2. These meetings may constitute informal consultations between the Service and the Air Force. The Air Force and the Service shall work together to identify, propose, and implement project modifications consistent with the purposes of this Cooperative Agreement that minimize or mitigate adverse effects to endangered and threatened species, proposed and candidate species, habitats for endangered and threatened species, and habitats for proposed and candidate species within Air Force lands included within the Guam National Wildlife Refuge.

D. The Air Force shall consult with the Service on any action authorized, funded, or carried out, in whole or in part, by the Air Force that may affect endangered and threatened species, as provided for in 50 C.F.R. 402, Interagency Cooperation under the Endangered Species Act of 1973, as amended. Since the Service is also a cooperator for land management actions on Air Force lands, the Service may initiate intra-Service Section 7 consultation under appropriate circumstances;

E. Similarly, the Air Force shall coordinate with the Service for any Federal action that may affect Air Force lands included within the Guam National Wildlife Refuge and identified as providing essential habitat for the endangered Mariana fruit bat (Guam Mariana Fruit Bat and Little Mariana Fruit Bat Recovery Plan. 1990. U.S. Fish and Wildlife Service. 63 pp.); the endangered Guam rail, the Guam Micronesian kingfisher, and the Mariana crow (Native Forest Birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands Recovery Plan. 1990. U.S. Fish and Wildlife Service. 86 pp.); habitats for the endangered Vanikoro swiftlet (Recovery Plan for the Mariana Islands Population of the

Vanikoro Swiftlet, *Aerodramus vanikorensis bartschi*. 1991. U.S. Fish and Wildlife Service. 49 pp.); habitats for the endangered Mariana common moorhen (Recovery Plan for the Mariana Common Moorhen (= Gallinule), *Gallinula chloropus guami*. 1991. U.S. Fish and Wildlife Service. 55 pp.); habitats for the endangered hayun lagu tree (Draft Recovery Plan for *Serianthes nelsonii*. 1993. U.S. Fish and Wildlife Service. 47 pp.); habitats identified in other recovery plans; or beaches and reefs used for nesting and foraging by endangered and threatened sea turtle species;

F. The Service shall provide the draft biological opinion for review and comment to the Air Force. The Air Force may provide the draft biological opinion to the Guam Division of Aquatic and Wildlife Resources. The Service shall fully consider the views of the Air Force and the Guam Division of Aquatic and Wildlife Resources, as appropriate, in carrying out the consultation process under Section 7 of the Endangered Species Act;

G. The Service shall be the final authority on scientific matters relating to whether a Federal action may affect endangered and threatened species and proposed and candidate species on Air Force lands included within the Guam National Wildlife Refuge and shall provide recommendations on minimizing or mitigating any adverse impacts.

H. Either party may elevate legal disputes to the Department of Justice for resolution in accordance with Executive Order 12146, Sections 1-4.

I. Nothing in this Cooperative Agreement shall be interpreted to diminish the responsibilities of the Air Force or the Service to comply with 50 C.F.R. 402, Interagency Cooperation under the Endangered Species Act of 1973, as amended.

XI. Project Officers

A. Project Officer for the Service shall be:

1. Project Leader
Hawaiian and Pacific Islands National Wildlife Refuge Complex
300 Ala Moana Boulevard, Room 5302
Honolulu, Hawaii 96850
Telephone: (808) 541-1201
Fax: (808) 541-1216

2. The Project Leader shall be recognized as the official representative of the Service.

3. The Guam National Wildlife Refuge Manager shall be recognized as the on-island point-of-contact for routine affairs related to the management of the Guam National Wildlife Refuge. Telephone: (671) 355-5096. Fax: (671) 355-5098.

B. Project Officer for the Air Force shall be:

1. Commander
633rd Civil Engineering Squadron
Andersen Air Force Base, Guam
APO, AP 96543-4007
Telephone: (671) 366-7101 or 366-6205
Fax: (671) 366-8010

2. The Commander shall be recognized as the official representative of the Air Force.

3. The point-of-contact for routine affairs shall be the Natural Resource Planner, 633 CES/CEV, APO AP 96543-4007. Telephone: (671) 366-2549 or 366-2101.

XII. Special Provisions

A. This Cooperative Agreement does not nullify or supersede any existing Cooperative Agreements or Memorandum of Agreements including the following:

1. 1993 Memorandum of Understanding between the Government of Guam, the U.S. Navy, the U.S. Air Force, and the U.S. Fish and Wildlife Service for the Establishment and Management of the Guam National Wildlife Refuge, Island of Guam;

2. 1990 Memorandum of Agreement for Cooperative Law Enforcement between the U.S. Fish and Wildlife Service and the Department of Agriculture-Division of Aquatic and Wildlife Resources;

3. 1988 Memorandum of Agreement Related to Concurrent Jurisdiction between the Government of Guam, the Commander, U.S. Naval Forces Marianas, and the Commander, 43D Combat Support Group, Andersen Air Force Base, Guam;

4. 1988 Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Communication Area Master Station, WESTPAC between the Navy, the Service, and the Government of Guam;

5. 1988 Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Supply Depot, Guam between the Navy, the Service, and the Government of Guam;

6. 1988 Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Magazine, Guam between the Navy, the Service, and the Government of Guam;

7. 1988 Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Navy Public Works Center, Guam between the Navy, the Service, and the Government of Guam;

8. 1988 Cooperative Agreement for the Protection, Development and Management of Fish and Wildlife Resources at U.S. Naval Station, Guam between the Navy, the Service, and the Government of Guam; and

9. 1986 Cooperative Agreement for the Protection, Development, and Management of Fish and Wildlife Resources at Andersen Air Force Base, Territory of Guam, between the Air Force, the Service, and the Government of Guam.

B. The Air Force lands identified in this Cooperative Agreement will be included within the Guam National Wildlife Refuge as an overlay national wildlife refuge. The primary administration of those lands will be retained by the Air Force and the Guam National Wildlife Refuge will be superimposed as a secondary interest in the property.

C. The Government of Guam, the Navy, the Air Force, and the Service shall mutually reconsider the goals of the Guam National Wildlife Refuge upon the decision by the Secretary of the Interior, based upon the best available scientific and commercial data, that all endangered and threatened species found within the Guam National Wildlife Refuge have become extinct, or have recovered to the point where protection under the Endangered Species Act is no longer required, or the scientific data for the classification of the endangered or threatened species were in error.

D. Nothing in this Cooperative Agreement shall relieve, and no action may be taken under this Cooperative Agreement to relieve the Secretary of the Air Force or any responsible party from any obligation or other liability on Air Force lands under the Comprehensive Environmental Response, Compensation and Liability Act (26 U.S.C. 4611-4682; 94 Stat. 2797; P.L. 96-510, December 11, 1980; as amended); Toxic Substances Control Act (15 U.S.C. 2601-2671; 90 Stat. 2003; P.L. 94-469; as amended); Resource Conservation and Recovery Act (42 U.S.C. 6901-6992; 90 Stat. 2795; P.L. 94-580, October 21, 1976; as amended); Clean Air Act (42 U.S.C. 7401-7642; as amended) and the Clean Air Amendments (P.L. 95-95; 91 Stat. 685; as amended); National Emission Standards for Hazardous Air Pollutants (40 C.F.R. Part 61, Subpart M); and other laws and regulations, as applicable.

E. Nothing in this Cooperative Agreement shall be construed to affect the degree of cleanup at any Air Force lands required to be carried out under the Comprehensive Environmental Response, Compensation and Liability Act, Toxic Substances Control Act, Resource Conservation and Recovery Act, Clean Air Act, Clean Air Amendments, the National Emission Standards for Hazardous Air Pollutants, and other laws and regulations, as applicable.

F. If critical habitat is designated on any Air Force lands on Guam, the Air Force shall have the right to unilaterally declare this Cooperative Agreement null and void, and may, at its discretion, reinitiate consultations and negotiations with the Service.

Cooperative Agreement Guam National Wildlife Refuge
U.S. Air Force and U.S. Fish and Wildlife Service

XIII. IN WITNESS WHEREOF, each party hereto has caused this Cooperative Agreement to be executed by an authorized official on the day and year set forth opposite their signature. This Cooperative Agreement shall become effective upon the date of the final signature.

U.S. Air Force

By: _____ Date: 10 Mar 94
Dennis R. Larsen, Colonel, USAF
U.S. Air Force
Commander, 633rd Air Base Wing

U.S. Fish and Wildlife Service

By: _____ Date: _____
Marvin Plenert
Regional Director, Region 1
U.S. Fish and Wildlife Service

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Cooperative Agreement Guam National Wildlife Refuge
U.S. Air Force and U.S. Fish and Wildlife Service

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U.S. Air Force

By: _____ Date: _____
Dennis R. Larsen, Colonel, USAF
U.S. Air Force
Commander, 633rd Air Base Wing

U.S. Fish and Wildlife Service

By: Marvin Plenert Date: 3-4-94
Marvin Plenert
Regional Director, Region 1
U.S. Fish and Wildlife Service

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Appendix 4: Federally Listed, Proposed or Candidate Species, Species of Concern Found on Guam

As designated under the U.S. Endangered Species Act (updated 29 August 2005). Species status: E = endangered; T = threatened; C = candidate for listing; SOC = species of concern; * = possibly extinct; [1]Occurs only in captivity; [2]Occurs on Andersen Air Force Base (AAFB) overlay refuge; [3]Occurs on Navy overlay refuge; [4]Occurs in Haputo ERA. Extracted from http://www.fws.gov/pacificislands/wesa/pacificislandslisting.pdf

Scientific Name	Common/Chamorro Name	Status
Plants		
Coelogyne guamensis	No common name	SOC
Lycopodium phlegmaria var.	No common name/Disciplina	SOC
Nervilia jacksoniae	No common name	SOC
Serianthes nelsonii[2]	Fire tree/Hayun Lagu	E
Tabernaemontana rotensis	No common name	SOC
Thelypteris warburgii	No common name	SOC
Tinosperma homosepela	No common name	SOC
Bats		
Emballonura semicaudata	Sheath-tailed bat/Payesyes	*C**
Pteropus tokudae	Little Mariana fruit bat/Fanihi	E*
Pteropus mariannus mariannus[2,3]	Mariana fruit bat/Fanihi	T
Birds		
Acrocephalus luscinia	Nightingale reed-warbler/Ga'ga Karisu	E*
Aerodramus bartschi[3]	Mariana swiftlet/Yayaguak	E
Corvus kubaryi[2]	Mariana crow/Aga	E
Gallinula chloropus guami[3]	Mariana moorhen/Pulattat	E
Halcyon cinnamomina cinnamomina[1]	Micronesian kingfisher/Sihek	E
Megapodius laperouse	Micronesian megapode/Sasangat	E*
Rallus owstoni[1]	Guam rail/Koko	E
Zosterops conspicillatus	Bridled white-eye/Nosa	E*
Reptiles		
Chelonia mydas[4]	Green sea turtle/Haggan Bed'di	T
Eretmochelys imbricata[4]	Hawksbill turtle/Haggan Karai	E

Snails		
Partula gibba[2,4]	Mariana Islands tree snail/Akaleha	C
Partula radiolata[2,3,4]	Pacific tree snail/Akaleha	C
Partula salifana	Guam tree snail/Akaleha	SOC*
Samoana fragilis[2,4]	Mariana Islands fragile tree snail/Akaleha	C
Succinea guamensis	No common name	SOC*
Succinea piratarum	No common name	SOC
Succinea quadrasi	No common name	SOC
Invertebrates		
Catacanthus sp. nov.	Guam bronze boony bug	SOC
Hypolymnus octicula	Marianas eight spot butterfly	C
Vagrans egestina	Marianas wandering butterfly	C

Appendix 5. Endangered and Threatened Species List for Guam

Source: (GDAWR 2006)

Scientific Name	English Name	Chamorro Name
Birds		
Aerodramus vanikorensis bartschi	Island swiftlet	Yayaguak
Aplonis opaca guami	Micronesian starling	Sali
Corvus kubaryi	Mariana crow	Aga
Gallicolumba x. xanthonura	White-throated ground dove	Puluman Apaka/Fache
Gallinula chloropus guami	Mariana common moorhen	Pulattat
Gallirallus owstoni	Guam rail	Koko
Halcyon c. cinnamomina	Micronesian kingfisher	Sihek
Myiagra freycineti	Guam flycatcher	Chuguangguang
Myzomela rubratra saffordi	Micronesian honeyeater	Egigi
Ptilinopus roseicapilla	Mariana fruit-dove	Totot
Rhipidura rufifrons uraniae	Rufous fantail	Chichirika
Zosterops c. conspicillata	Bridled white-eye	Nossa
Mammals		
Emballonura semicaudata	Pacific sheath-tailed bat	Payesyes
Pteropus m. mariannus	Marianas fruit bat	Fanihi
Pteropus tokudae	Little Marianas fruit bat	Fanihi
Reptiles		
Chelonia mydas	Green sea turtle	Haggan Betde
Eretomochelys imbricata	Hawksbill sea turtle	Haggan Karai
Cryptoblepharus poecilopleurus	Snake-eyed skink	Guali'ek Halom Tano'
Emoia atrocostata	Tide-pool skink	Guali'ek Kantun Tasi
Emoia cyanura	Azure-tailed skink	Guali'ek Halom Tano'
Emoia slevini	Slevin's skink	Guali'ek Halom Tano'
Lipinia noctua	Moth skink	Guali'ek Halom Tano'
Gehyra oceanica	Oceanic gecko	Achiak

Nactus pelagicus	Pacific Slender-toed gecko	Guali'ek
Perochirus ateles	Micronesian gecko	Guali'ek
Molluscs		
Partula salifana	Guam tree snail	Akaleha'
Partula gibba	Mariana Islands tree snail	Akaleha'
Partula radiolata	Pacific tree snail	Akaleha'
Samoana fragilis	Mariana Islands fragile tree snail	Akaleha'
Plants		
Cyathea lunulata	Tree fern	Tsatsa
Heritiera longipetiolata	Fire tree	Ufa-halomtano
Serianthes nelsonii		Hayun-lago

Appendix 6. Policy for Research and Scientific Studies

Scientific studies involving defined objectives and scopes of study are permitted within the Haputo ERA. Approval for the use of Haputo ERA for scientific study purposes is required prior to the onset of any study. The FWS, NMFS and DAWR are required to submit relevant requisite information to NBG to conduct work within the ERA. These agencies will also submit a schedule of proposed ERA visits to NAVFACMAR - Environmental Natural Resources (EV) for the purposes of attaining proper base security access and necessary identification badges. Agencies wishing to conduct scientific study should submit a schedule of activities to the JRM or NAVFACMAR EV depending on the project and source of funding. The J4 JRM has final approval authority for all studies involving the ERA.

1. Study Approval Procedure

a. The following procedure will be followed in order to obtain approval to conduct scientific studies or research within the Haputo ERA.

    1) Each researcher will submit three copies of the proposed study to JRM or NAVFACMAR EV at least 45 days prior to the study start date.

    2) NAVFACMAR EV will provide a technical review of each project and will request comments from FWS, NOAA and GOVGUAM personnel where appropriate.

    3) NAVFACMAR EV will then forward recommendations to JRM and Installation Command Officer for final review and approval.

    4) When approved by Installation Command Officer, a Letter of Approval (LOA) will be sent to the principal investigator with appropriate conditions. Copies of each LOA will be provided to JRM and NAVFACMAR EV.

b. When submitting a proposal for scientific use of the ERA, the following information must be included in the application to begin the LOA process.

    1) Name, address and telephone number for Principal Investigator (PI) and all assistants.

    2) Curriculum vitae (PI only)

    3) Sponsoring Agency or Institution

    4) Detailed description of research to include:

a) Objective

b) Methods and equipment

c) Expected results and benefit to the ERA

d) Duration

e) Anticipated schedule on-the-ground use of the ERA

f) Collection needs (No. of species, amount and collection location for each species, disposition of species)

g) Permits required and attached

h) Any other information the PI may deem pertinent to the review of his/her application.

c. All proposals or requests for information should be directed to NAVFACMAR EV or JRM where appropriate.

d. In addition to the above requirements, applications for archaeological research must be in accordance with 36 CFR Part 229 and other Federal and Guam historic preservation statutes and regulations.

e. In addition to the above requirements, scientific research involving any Guam endangered or threatened species shall require a permit from the DAWR, Department of Agriculture.

f. In addition to the above requirements, scientific research involving any Federal endangered of threatened species shall require a permit from the FWS, Department of Interior and/or NMFS NOAA Fisheries.

2. Study Approval Policy

a. Only written applications for scientific use of the ERA shall be considered.

b. A LOA may not be amended or otherwise altered without the written approval of the CO NBG. A copy of any LOA amendments or changes shall be forwarded to Joint Region Marianas,

NAVFACPAC and NAVFACMAR EV along with a copy of the original LOA.

c. The Principal Investigator must obtain a license agreement from the Navy prior to use of the ERA. This license will require the user to obtain adequate insurance coverage. Application for this license should be made to CO NBG at the time the request for approval for scientific study is made.

d. No study shall interfere with the normal cycles and fluctuations of native plant and animal populations.

e. Collecting of specimens for scientific purposes will be kept to a minimum. Any collections made within the ERA shall be deposited in a public institution approved in advance by CO NBG.

f. Once a LOA is approved, the PI or his assistant must check in with NBG security personnel at each visit to the ERA for security purposes.

g. The following prohibited activities may be authorized in connection with a scientific study in the ERA:

    1) Possession and use of a firearm (specimen collecting).

    2) Use of mist nets to capture birds; copies of appropriate credentials for use of mist nets must accompany application including Federal permit and amount of experience of user(s).

    3) Use of road for transport of equipment into and out of ERA.

    4) Overnight camping in other than designated areas, if requested and required by study.

3. Scientific Collecting

a. Collecting of plant, fish and wildlife may be permitted within the ERA providing that it is determined that such proposed collection will not adversely affect the continued existence or maintenance of that species in the ERA.

b. Approval for collecting specimens will be considered only when required Federal or Territory of Guam permits have been obtained by the principal investigator prior to the collecting request.

4. Reports

a. An annual report on the progress of the research must be provided to CO NBG and NAFACMAR EV (3 copies each) no later than 60 days following each 12 month increment or less of research. A final report will also be submitted to CO NBG and NAFACMAR EV (3 copies each) within 60 days of the end of the study. NAVFACMAR EV will provide copies of all reports to the DAWR, FWS and the NMFS.

b. Copies of any other reports written or published as a result of studies carried out on the ERA shall be provided in triplicate to NAVFACMAR EV within one month of completion.

c. Upon request, the PI shall provide NAVFACMAR EV with copies of unpublished data or photographs (2 copies) at no cost to the Navy. It is understood that any such data provided by the PI will be for Navy use only and not for public use or publication by the Navy unless authorized by the PI. Photographs used by the Navy for official purposes will be credited to the photographer.

Appendix 7: Checklist of Procedures Following a Tsunami

Tsunami warning from Pacific Tsunami Warning Center (PTWC). Coordination of Guam Emergency Response Plan is through Guam Homeland Security, Office of Civil Defense (Source: http://guamhs.org/main/?pg=guam_emergency_response).

C

HAZARD-SPECIFIC ANNEX C — TAB A
TSUNAMIS CHECKLIST

A. Preparedness Measures

- ❑ The OCD will activate the Emergency Alert System (EAS) to alert the general public.

  Tsunami Evacuation Staging Areas will be identified, general public "what to do" messages will be made and the Village Mayors notified. See appendix.

- ❑ Primary response agencies begin agency specific pre-event preparations
- ❑ EOC prepares for activation
- ❑ All emergency communication equipment (hand-held radios and cellular phones) tested and ready for emergency use
- ❑ Identify/Pre-stage equipment
- ❑ Information & Planning section will prepare to develop situation status reports *and remain in communication with the JTWC in Hawaii and the NWS on Guam.*
- ❑ Contact DHS/FEMA
- ❑ Initiate contact with all media sources

B. Response Efforts

- ❑ Unified Command structure will coordinate all response activities from the EOC
- ❑ Implementation of the ***City Watch*** notification system.
- ❑ Emergency Alert Systems activated
- ❑ Emergency Vehicles having loud speaker capability will provide on site notification to effected areas
- ❑ Emergency shelters opened
- ❑ Emergency vehicles (buses & vans) deployed to pre-designated locations to assist in evacuation.
- ❑ Response materials, supplies, manpower and equipment identified