

U.S. PACIFIC REMOTE INSULAR AREAS

The U.S. has sovereign Federal jurisdiction over eight low coral islands, atolls, and reefs in the central Pacific that are not under the control of other U.S. territories or states. They are Rose Atoll (see American Samoa Section's Figure AMSAM-1), at the east end of American Samoa; Wake Atoll, north of the Marshall Islands; Johnston Atoll, southwest of the Hawaiian Islands; Kingman Reef, Palmyra Atoll, and Jarvis Island, all in the northern Line Islands; and Howland Island and Baker Island, northwest of the Phoenix Islands (Figure PRIA-1). The U.S. Pacific Remote Insular Areas (PRIAs) span latitudes from 19°N to 14°S, include three islands on the Equator, and serve as natural reef laboratories to monitor the effects of oceanic processes and climate over time and space because of minimal anthropogenic impacts. All of the PRIAs were free of human habitation at the time of their discovery by Americans and Europeans two centuries ago, although Rose and Wake Atolls have local island names (Nu'u O Manu and Enen Kio, respectively) and were periodically visited by Samoans and Marshallese, respectively. These eight remain among the most remote and pristine coral reefs in the world.

All eight PRIAs except Wake Atoll are NWRs administered by the FWS, and are among the Nation's most important MPAs. Rose Atoll is under the joint jurisdiction of the FWS and the Department of Commerce in cooperation with the Territory of American Samoa (WPRFMC 2001).¹⁵ Wake Atoll is under the jurisdiction of DOI and presently serves as a military base under the administration of the U.S. Air Force.

The PRIAs provide key habitats for many native species of plants, insects, birds, reptiles, marine mammals, and thousands of reef species. Many nationally and internationally recognized threatened, endangered, migratory, vulnerable, and depleted species thrive and are protected at the PRIAs, including the green turtle, hawksbill turtle, coconut crab, pearl oyster, giant clams, reef sharks, groupers, humphead wrasse, bumphead parrotfish, whales, and dolphins.

¹⁵ Note: Elements of the American Samoa regional sections of this plan may apply to Rose Atoll, if they are consistent or complementary to the research needs identified in this section.

Although historically spared of impacts that degrade reefs near more populated U.S. areas, these remote oceanic and reef ecosystems have suffered from a variety of human impacts since the mid 19th century, including guano mining, feather gathering, sea turtle harvest, alien species predation, fishing, temporary settlements, ship groundings, World War II era military occupation, and atmospheric missile and nuclear weapons testing. Remoteness was a blessing in past centuries, keeping these areas generally free of anthropogenic effects, but now they are the targets of fishers and trespassers beyond the watchful eye and reach of enforcement and surveillance authorities, and threatened by unauthorized harvests and the invasive species that accompany them (J. Maragos, personal communication). Derelict debris, ship groundings, fuel spills, hazardous/toxic waste, and climate change are additional impacts. Although the FWS has been successful in eradicating alien rats and cats from most PRIA refuges, rats and mice remain at Palmyra, and invasive ants and scale insects are now decimating rare beach forest stands at Rose and Palmyra.

Lagoon, reef, and island habitats at Palmyra, Wake, Johnston, and Baker still suffer from the residual effects of coastal construction and dumping of contaminants, toxics, and debris, exacerbating some of the adverse effects of climate change and degrading the resilience of resident species, populations, and habitats.

The remoteness of the PRIAs has also thwarted access to and scientific characterization of these areas, including terrestrial, shallow reef, and deep sea habitats surrounding the islands. Before NOAA-sponsored research cruises began in 2000, there was little information available for proper management, recovery of species, and restoration of habitats, especially in marine waters. Even today very little is known about marine habitats below diving depths of about 30 m. Scuba diving at the PRIAs is also constrained by the great distance to the nearest medical facilities, and scuba divers must emphasize safety and accident prevention via limitations on maximum depth, duration, and frequency of diving. Hence, future data collection must rely more on alternatives to scuba, especially remote sensing data collection. Moreover, FWS terrestrial wildlife biologists, coral reef biologists, and ecotoxicologists have relied on NOAA research vessels and the U.S. Coast Guard to provide access to evaluate, monitor, and restore wildlife and habitats, which presently is the only reliable means of access to the PRIAs.

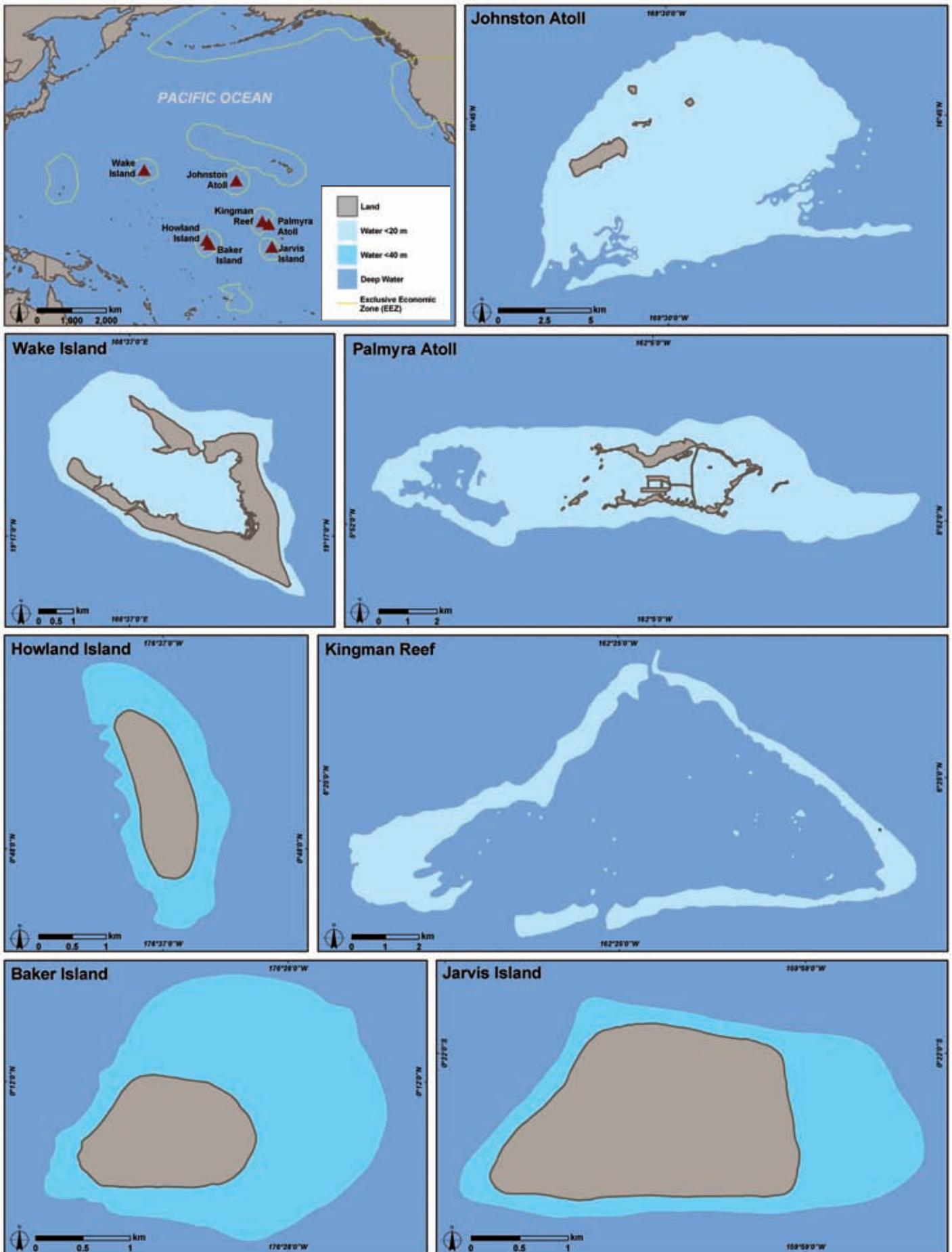


Figure PRIA-1. Locator map for the U.S. Pacific Remote Insular Areas. (See Figure 5 for geographical context.) Map: A. Shapiro. Source: Brainard et al. (2005).

The research needs for the PRIAs address the issues of reduced access, surveillance, enforcement, research, monitoring and management capacity, and takes advantage of NOAA research vessels, satellites, bathymetric mapping platforms, oceanographic buoys, instrumentation, remotely

operated and towed vehicles, deep-diving submersibles, and other NOAA assets to address these deficiencies in a spirit of cooperation with FWS, DOI, the U.S. Department of Defense, and other collaborating institutions.

Research Needs

U.S. Pacific Remote Insular Areas	FISHING
Management Objective	Research Need
Conserve and manage fisheries to prevent overfishing, rebuild stocks, and minimize destructive fishing. ¹⁶ <i>See Jurisdiction-Wide Section for additional research needs.</i>	Determine the natural fluctuation of fishery species in the PRIAs to enable comparison with exploited populations outside the NWRs.
	Compare fishery-independent assessments of species in the Samoan archipelago to non-fished stocks at no-take Rose Atoll NWR.
	Evaluate the feasibility of the low-level, catch-and-release recreational bone-fishery at Palmyra NWR ¹⁷ and recommend measures to sustain the fishery.
	Assess the recovery of fish populations at Johnston Atoll NWR since closure of the recreational fishery in 2004 when the U.S. military abandoned its presence at the atoll.
Evaluate and improve the effectiveness of MPAs as a fisheries management tool. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Develop and establish visual and sonic sensors that can be remotely activated and monitored via satellite to document and discourage unauthorized access and harvest of fish and wildlife resources within the no-take PRIAs, and for application to manage fisheries outside refuges.
	Assess targeted fishery species within and outside refuges to demonstrate the values of no-take areas in replenishing overfished stocks outside the refuges.

U.S. Pacific Remote Insular Areas	POLLUTION
Management Objective	Research Need
Reduce the impacts of pollutants on coral reef ecosystems by improving the understanding of their effects. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Characterize the ecological impacts of land-based discharges on lagoon water quality at Palmyra Atoll NWR, and evaluate potential ecological benefits of restoration alternatives.
Improve water quality by reducing land-based pollutant inputs and impacts on coral reef ecosystems. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Determine the need for remediation of contaminants (i.e., unexploded ordnance, fuel spills, other toxic and hazardous waste, material disposal, and historic sewage discharges in lagoon, reef, and coastal areas) on Johnston, Palmyra, and Baker NWRs, and at Wake Atoll.
	Evaluate the impacts of pollutants at Palmyra, Johnston, Midway, and Baker NWRs, and at Wake Atoll, and evaluate the efficacy of alternative measures to restore habitats.
	Assess, model, and monitor planned restoration of water quality and circulation within the lagoon at Palmyra Atoll NWR degraded by World War II military construction.

¹⁶ Note: commercial fishing is prohibited within the eight remote Pacific NWRs.

¹⁷ Researchers working at Palmyra Atoll should consult with the FWS, NOAA, the Western Pacific Regional Fishery Management Council, The Nature Conservancy, and researchers at Scripps Institution of Oceanography.

U.S. Pacific Remote Insular Areas	POLLUTION
<i>Management Objective</i>	<i>Research Need</i>
Monitor coral reef condition to understand and address unexpected changes or events related to land-based and atmospheric pollution.	Implement a detailed monitoring program, in collaboration with FWS at the eight NWRs and Department of Defense and DOI at Wake Atoll, including multiple depth regimes and permanently-marked sites to determine the impact of previous disturbances and characterize future changes.

U.S. Pacific Remote Insular Areas	COASTAL USES
<i>Management Objective</i>	<i>Research Need</i>
Assess the impacts from former recreational use and coastal development on coral reefs.	Assess lagoon and shoreline impacts attributed to World War II era military construction on Johnston and Wake Atolls, and evaluate the efficacy of possible remedial measures.
Balance resource use to minimize user conflicts, provide equitable uses, and ensure optimal benefits to present and future generations.	Provide data to support the preparation and coordination of comprehensive conservation plans by the FWS for the eight PRIAs refuges.
Reduce impacts from and restore habitat damaged by vessel anchoring and groundings.	Evaluate the use of deep sea in situ assets to survey possible shipwreck sites at Baker and other PRIAs.
	Develop a response plan with the FWS and U.S. Coast Guard to conduct initial damage assessments of fuel spills and ship groundings in the NWRs.
	Assess the impacts of fuel spills and ship groundings on PRIA reefs during and after shipwreck removal and other restoration actions.
	Assess the ecosystem recovery after the completion of wreckage removal in 2005 of a 1993 fishing vessel grounding offshore at Rose Atoll.
	Assess the ecosystem recovery of the 1991 fishing vessel grounding at Palmyra Atoll.
Protect, conserve, and enhance the recovery of protected, threatened, and other key species.	Conduct research aimed at the protection, conservation, and recovery of protected species (i.e., marine mammals, sea turtles, and birds) that utilize coral reef ecosystems.
Restore injured and degraded coral reef habitats. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Evaluate the deep sea World War II era dumping of military material off Baker Island NWR, and possibly off other refuges.
Manage coral reef ecosystems and their uses in a holistic manner. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Describe species diversity, trophic structure, and associated dynamics of shallow coral reef ecosystems in the eight islands in the PRIAs.

U.S. Pacific Remote Insular Areas	INVASIVE SPECIES ¹⁸
<i>Management Objective</i>	<i>Research Need</i>
Minimize the introduction and spread of alien species.	<i>See Jurisdiction-Wide Section for research needs.</i>
Control or eradicate invasive species that have potential to cause damage to coral reef ecosystems.	Document the diversity, distribution, and abundance of invasive species, identify impacts on coral reef ecosystems, and identify ways to prevent their spread.

U.S. Pacific Remote Insular Areas	CLIMATE CHANGE
<i>Management Objective</i>	<i>Research Need</i>
Minimize the effects of climate change on coral reef ecosystems. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Collect and analyze coral cores for past climatic events, and conduct assessments to identify active coral bleaching events denoting bleached vs. non-bleached species.
Mitigate the impacts from climate change on coral reef ecosystems.	Restore lagoonal circulation at Palmyra degraded by World War II construction and track the ability of these actions at preventing a repeat of the massive bleaching event and coral die-off on the western terrace that was associated with the discharge of heated lagoonal waters. Model the effectiveness of various measures to maximize lagoon circulation and flushing at Palmyra and reduce water residence time in the lagoon to reduce heating of lagoon waters before exiting the lagoon.

U.S. Pacific Remote Insular Areas	EXTREME EVENTS
<i>Management Objective</i>	<i>Research Need</i>
Identify causes and consequences of diseases in coral reef ecosystems and mitigate their impacts. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Evaluate the impacts of episodic wave events and the role of these events in forming and maintaining spatial and vertical distributions of corals, algae, and fishes. Characterize the prevalence of disease, and document affected species and the types of diseases present at each site to serve as a baseline.

¹⁸ To prevent introduction of alien species during research activities in the PRIAs, the hulls of NOAA research ships should be scrubbed and cleaned of fouling organisms just prior to departure to the PRIAs. Also, scuba gear should be decontaminated when diving in different areas to prevent introduction of pathogens.