ANNUAL STOCK ASSESSMENT AND FISHERY EVALUATION REPORT: PACIFIC REMOTE ISLAND AREA FISHERY ECOSYSTEM PLAN 2024

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The ANNUAL STOCK ASSESSMENT AND FISHERY EVALUATION REPORT for the PACIFIC REMOTE ISLAD AREA FISHERY ECOSYSTEM PLAN 2024 was drafted by the Fishery Ecosystem Plan Team. This is a collaborative effort primarily between the Western Pacific Regional Fishery Management Council (WPRFMC), National Marine Fisheries Service (NMFS) Pacific Island Fisheries Science Center (PIFSC) and Pacific Islands Regional Office (PIRO), Hawaii Division of Aquatic Resources (HDAR), American Samoa Department of Marine and Wildlife Resources (DMWR), Guam Division of Aquatic and Wildlife Resources (DAWR), and Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife (DFW).

This report attempts to summarize annual fishery performance looking at trends in catch, effort and catch rates as well as provide a source document describing various projects and activities being undertaken on a local and federal level. The report also describes several ecosystem considerations including fish biomass estimates, biological indicators, protected species, habitat, climate change, and human dimensions. Information like marine spatial planning and best scientific information available for each fishery are described. This report provides a summary of annual catches relative to the Annual Catch Limits established by the Council in collaboration with the local fishery management agencies.

Cover Image: School of fish swimming underwater. Photo: Cassandra Pardee

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EXECUTIVE SUMMARY

As part of its five-year fishery ecosystem plan (FEP) review, the Western Pacific Regional Fishery Management Council (WPRFMC; the Council) identified its annual reports as a priority for improvement. The former annual reports have been revised to meet National Standard regulatory requirements for Stock Assessment and Fishery Evaluation (SAFE) reports. The purpose of the reports is twofold: to monitor the performance of the fishery and ecosystem to assess the effectiveness of the FEP in meeting its management objectives; and to maintain the structure of the FEP living document. The reports are comprised of three chapters: Fishery Performance, Ecosystem Considerations, and Data Integration. The Council will iteratively improve the annual SAFE report as resources allow.

The 2024 Pacific Remote Island Area (PRIA) FEP annual SAFE report does not contain fully developed Fishery Performance or Data Integration chapters due to the absence of consistent fisheries data in the PRIA. Available data is acquired from the National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) Sustainable Fisheries Division (SFD) permits program. There were zero bottomfish permits issued from 2020 through 2024, a decrease from four issued in both 2018 and 2019. Similarly, there were no lobster or deepwater shrimp permits issued in 2024, and there is no record of these permits being issued since 2009 for lobster and 2010 for shrimp. There has been no logbook data reported since the establishment of federal permit and reporting requirements in 2006 for bottomfish and lobster and 2009 for shrimp. This is due to zero of the issued permit holders reporting catch to PIRO SFD.

An Ecosystem Considerations chapter was added to the annual SAFE report following the Council's review of its FEPs and revised management objectives. Coral reef ecosystem parameter, protected species, socioeconomic, oceanic and climate indicator, essential fish habitat, and marine planning information are all included in this chapter.

Fishery independent ecosystem data were acquired through visual surveys conducted by the NMFS Pacific Islands Fisheries Science Center (PIFSC) National Coral Reef Monitoring Program (NCRMP) under the Ecosystem Sciences Division (ESD) in the PRIA, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), the Main Hawaiian Islands (MHI), and the Northwestern Hawaiian Islands (NWHI). This report describes mean fish biomass of functional, taxonomic, and trophic groups for coral reef areas as well as habitat condition using mean coral coverage per island averaged over the past decade for each of these locations. The most recent data from the PRIA was in 2023 for Baker and Howland, and 2018 for Jarvis, Kingman, Wake, and Palmyra.

The highest amount of mean coral coverage increased at Howland and Baker Islands from 2018 to 2023. The lowest observed coral cover was at Jarvis Island in 2018 with less than 10% coverage. Fish biomass remained high compared to other fished locations such as the MHI, CNMI, Guam, and American Samoa. Within the PRIA, Wake Island had the lowest estimated fish biomass for all fishes, and Baker Island had the highest total fish biomass, while all other locations had similar levels of total fish biomass at around $100 g/m^2$.

The protected species section of this report describes monitoring and summarizes protected species interactions in fisheries managed under the PRIA FEP. There are currently no major bottomfish, crustacean, or precious coral fisheries operating in the PRIA, and no historical observer data are available for fisheries under this FEP. No new fishing activity was reported in

2024, and there is no new information to indicate that impacts to protected species from PRIA fisheries have changed over in recent years. Regarding the status of Endangered Species Act listing processes, leatherback sea turtles and cauliflower coral are no longer monitored in this report, since these processes concluded in 2020, and shortfin mako sharks were added.

The socioeconomics section is meant to outline the pertinent economic, social, and community information available for assessing the successes and impacts of management measures or the achievements of the FEP within the PRIA. The section provides an overview of the socioeconomic context for the region, but socioeconomic information is limited because human habitation is scarce. The socioeconomics section of this report will be expanded in later years if activity increases and as resources allow. There were no new socioeconomic data reported for the PRIA in 2024.

The climate change section of this report includes indicators of current and changing climate and related oceanic conditions in the geographic areas for which the Council has jurisdiction. In developing this section, the Council relied on a number of recent reports conducted in the context of the U.S. National Climate Assessment including, most notably, the 2012 Pacific Islands Regional Climate Assessment and the 'Ocean and Coasts' chapter of the 2014 report on a Pilot Indicator System prepared by the National Climate Assessment and Development Advisory Committee. The primary goal for selecting the indicators used in this report is to provide fisheries-related communities, resource managers, and businesses with climate-related situational awareness. In this context, indicators were selected to be fisheries relevant and informative, build intuition about current conditions considering changing climate, provide historical context, and recognize patterns and trends.

The trend of atmospheric concentration of carbon dioxide (CO_2) is increasing exponentially with a time series maximum at 424 ppm in 2024**:** The ocean is roughly 12% more acidic than it was in 1989. Over this time, pH has declined by 0.05 at a constant rate with average pH in 2023 at 8.05. The Oceanic Niño Index, which is a measure of the El Niño – Southern Oscillation (ENSO) phase, indicated a transition from El Niño conditions to a neutral state in 2024. The Pacific Decadal Oscillation (PDO) was negative in 2024. Annual mean SST was 28.74 ºC in 2024. Over the period of record, monthly SST shows a weak increasing trend. After experiencing major heat stress events in 2015–2016 and 2019, both Howland and Baker Islands and the Northern Line Islands experienced major heat stress events in 2023 and the beginning months of 2024 with mass mortality expected. Annual mean Chl-A was 0.185 mg/m^3 in 2024. Over the period of record, annual Chl-A has shown a significant linear decrease.

The essential fish habitat (EFH) section of the 2024 annual SAFE report for the PRIA FEP includes responses to previous Council recommendations regarding EFH, habitat use by management unit species (MUS) in the PRIA, trends in habitat conditions, and levels of EFH information available for MUS. Guidelines also require a report on the condition of the habitat; mapping progress and benthic cover are included as preliminary indicators pending development of habitat condition indicators for the PRIA not otherwise represented in other sections of this report. Levels of available EFH information are summarized for bottomfish, crustacean, and precious coral MUS. In 2024, the Council reaffirmed the importance of incorporating recent scientific data into EFH definitions for PRIA and committed to working closely with NMFS on upcoming habitat assessments integrating new data from updated remote sensing and environmental surveys into future EFH and HAPC revisions.

The marine planning section of the annual SAFE report for the PRIA FEP tracks activities with multi-year planning horizons and begins to monitor the cumulative impact of established facilities. The Pacific Islands Marine National Monument remains intact around the islands and atolls of the PRIA. No new ocean activities were identified for the PRIA in 2024, though there will be additional considerations for the proposed PRIA sanctuary designation.

The Data Integration chapter of this report is not fully developed. In late 2016, the Council hosted a data integration workshop with participants from NMFS PIRO and PIFSC to identify policy-relevant fishery ecosystem relationships. However, no major updates have been made for the PRIA Data Integration chapter for the 2024 annual SAFE report. Despite the presence of data for certain ecological parameters throughout the PRIA, there exists no fishery performance data in the absence of consistent fishery-dependent information streams. The chapter will be expanded in the future if fishing activity and data availability increases in the PRIA.

At its May 2025 meeting, the Plan Team had no recommendations relevant to the PRIA annual SAFE report.

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ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
ACE	Accumulated Cyclone Energy
BiOp	Biological Opinion
BMUS	Bottomfish Management Unit Species
BRFA	Bottomfish Restricted Fishing Area
CFR	Code of Federal Regulations
Chl-A	Chlorophyll-*a*
CMAP	CPC Merged Analysis of Precipitation
CMUS	Crustacean Management Unit Species
CRED	Coral Reef Ecosystem Division (PIFSC)
CREP	Coral Reef Ecosystem Program (PIFSC)
CNMI	Commonwealth of the Northern Mariana Islands
COOPS	Center for Operational Oceanographic Products and Services
Council	Western Pacific Regional Fishery Management Council
CPC	Climate Prediction Center (NOAA)
CPUE	Catch Per Unit Effort
CREMUS	Coral Reef Ecosystem Management Unit Species
DIC	Dissolved Inorganic Carbon
DHW	Degree Heating Weeks
DPS	Distinct Population Segment
ECS	Ecosystem Component Species
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ENSO	El Niño – Southern Oscillation
EO	Executive Order
ESA	Endangered Species Act
ESD	Ecosystem Sciences Division (PIFSC)
FEP	Fishery Ecosystem Plan
FMP	Fishery Management Plan
FR	Federal Register
FSSI	Fish Stock Sustainability Index
GAC	Global Area Coverage
HAPC	Habitat Area of Particular Concern
HOT	Hawaii Ocean Time Series
LAA	Likely to Adversely Affect
LAC	Local Area Coverage
LOC	Letter of Concurrence
LOF	List of Fisheries
MBTA	Migratory Bird Treaty Act
MCP	Marine Conservation Plan
MERIS	Moderate Resolution Imaging Spectroradiometer
MHI	Main Hawaiian Islands
MLCD	Marine Life Conservation District

Acronym	Meaning
MMA	Marine Managed Area
MMPA	Marine Mammal Protection Act
MODIS	Moderate Resolution Imaging Spectroradiometer
MPA	Marine Protected Area
MPCC	Marine Planning and Climate Change
MPCCC	MPCC Committee (WPRFMC)
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MUS	Management Unit Species
N/A	Not Applicable
NCADAC	National Climate Assessment and Development Advisory Committee
NCDC	National Climate Data Center
NEPA	National Environmental and Policy Act
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
NWHI	Northwestern Hawaiian Islands
ONI	Oceanic Niño Index
PCMUS	Precious Coral Management Unit Species
PDO	Pacific Decadal Oscillation
PIAFA	Pacific Insular Area Fishery Agreement
PIFSC	Pacific Islands Fisheries Science Center
PIRO	NOAA NMFS Pacific Islands Regional Office
PMUS	Pelagic Management Unit Species
ppm	Parts Per Million
PRI	Pacific Remote Islands
PRIA	Pacific Remote Island Areas
PRIMNM	Pacific Remote Islands Marine National Monument
RAMP	Reef Assessment and Monitoring Program (PIFSC)
RPB	Regional Planning Body
SAFE	Stock Assessment and Fishery Evaluation
SeaWiFS	Sea-Wide Field-of-View Sensor
Secretary	Secretary of Commerce
SFD	Sustainable Fisheries Division (PIRO)
SST	Sea Surface Temperature
TA	Total Alkalinity
TBA	To Be Announced
TBD	To Be Determined
USFWS	United States Fish and Wildlife Service
VIIRS	Visible and Infrared Imager/Radiometer Suite
WPRFMC	Western Pacific Regional Fishery Management Council

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1 FISHERY PERFORMANCE

Fisheries in the Pacific Remote Island Areas (PRIA), including Palmyra Atoll, Kingman Reef, Jarvis Island, Baker Island, Howland Island, Johnston Atoll, and Wake Island, are limited. Fishery performance data for the PRIA are presented where available.

1.1 FEDERAL LOGBOOK DATA

1.1.1 Number of Federal Permit Holders

In the PRIA, the following federal permits are required for fishing in the exclusive economic zone (EEZ) under the PRIA Fishery Ecosystem Plan (FEP). Regulations governing fisheries under this FEP are in the Code of Federal Regulations (CFR), Title 50, Part 665.

1.1.1.1 Special Coral Reef Ecosystem Permit

Regulations require the special coral reef ecosystem fishing permit for anyone fishing for coral reef ecosystem component species (ECS) in a low-use marine protected area (MPA), fishing for species on the list of Potentially Harvested Coral Reef Taxa or using fishing gear not specifically allowed in the regulations. The National Marine Fisheries Service (NMFS) will make an exception to this permit requirement for any person issued a permit to fish under any FEP who incidentally catches Hawaii coral reef ECS while fishing for bottomfish management unit species (BMUS), crustacean MUS or ECS, western Pacific pelagic MUS, precious coral, or seamount groundfish. Regulations require a transshipment permit for any receiving vessel used to land or transship potentially harvested coral reef taxa, or any coral reef ECS caught in a low-use MPA.

1.1.1.2 Western Pacific Precious Corals Permit

Regulations require a Western Pacific Precious Corals permit for anyone harvesting or landing black, bamboo, pink, red, or gold corals in the EEZs of the U.S. Western Pacific. There have been no Western Pacific Precious Coral permits since 2008.

1.1.1.3 Western Pacific Crustaceans Permit (Lobster or Deepwater Shrimp)

Regulations require a Western Pacific Crustaceans permit for any owner of a U.S. fishing vessel used to fish for lobster or deepwater shrimp in the EEZs around of the U.S. Western Pacific. The number of Western Pacific lobster and shrimp permits by year are presented in Table 2and Table 3, respectively.

1.1.1.4 PRIA Bottomfish Permit

Regulations require obtaining a PRIA Bottomfish permit for anyone using bottomfish gear to fish for bottomfish MUS in the EEZ around the PRIA. Commercial fishing is prohibited within the boundaries of the Pacific Remote Islands Marine National Monument (PRIMNM). The numbers of PRIA Bottomfish permits by year are presented in Table 1 and 3.

1.1.2 Summary of Catch and Effort for FEP Fisheries

The PRIA FEP requires fishermen to obtain a federal permit to fish for certain MUS in federal waters and to report all catch and discards. While NMFS annually issues permits for various FEP fisheries, there is currently limited available data on the level of catch or effort made by federal non-longline permit holders. Determining the level of fishing activity through the required federal logbook reporting for each fishery helps establish the level of non-longline fishing occurring in federal waters to assess whether there is a continued need for active conservation and management measures (e.g., annual catch limits) for these fisheries. For each FEP fishery, the number of federal permits issued since implementation of the federal permit and logbook reporting requirement became effective as well as available catch and effort data are presented.

1.1.2.1 Bottomfish

Table 1. Summary of available federal logbook data for bottomfish fisheries in the PRIA

Year	No. of Federal Permits Issued[1]	Federal Permits Reporting Catch	No. of Trips in PRIA EEZ	Total Reported Logbook Catch (lb)		Total Reported Logbook Release/Discard (lb)	
				BMUS	*ECS*	*BMUS*	*ECS*
2006	1	n.d.					
2007	6	-					
2008	5	-					
2009	5	-					
2010	5	-					
2011	6	-					
2012	5	-					
2013	2	n.d.					
2014	2	n.d.					
2015	1	n.d.					
2016	1	n.d.					
2017	1	n.d.					
2018	4	-					
2019	4	-					
2020	0	-					
2021	0	-					
2022	0	-					
2023	0	-					
2024	0	-					

[1] Source: PIRO SFD unpublished data.

Note: Federal permit and reporting requirements for PRIA bottomfish fisheries became effective on December 4, 2006 (71 FR 69496, December 1, 2006).

1.1.2.2 Spiny and Slipper Lobster

Table 2. Summary of available federal logbook data for lobster fisheries in the PRIA

Year	Federal Permits Issued[1]	Federal Permits Reporting Catch	No. of Trips in PRIA EEZ	Total Reported Logbook Catch (lb)		Total Reported Logbook Release/Discard (lb)	
				Spiny lobster	*Slipper lobster*	*Spiny lobster*	*Slipper lobster*
2006	0	-					
2007	3	0					
2008	5	0					

Year	Federal Permits Issued[1]	Federal Permits Reporting Catch	No. of Trips in PRIA EEZ	Total Reported Logbook Catch (lb)		Total Reported Logbook Release/Discard (lb)	
				Spiny lobster	*Slipper lobster*	*Spiny lobster*	*Slipper lobster*
2009	4	-					
2010	0	-					
2011	0	-					
2012	0	-					
2013	0	-					
2014	0	-					
2015	0	-					
2016	0	-					
2017	0	-					
2018	0	-					
2019	0	-					
2020	0	-					
2021	0	-					
2022	0	-					
2023	0	-					
2024	0	-					

[1] Source: PIRO SFD unpublished data.
Note: Federal permit and reporting requirements for PRIA lobster fisheries became effective on December 4, 2006 (71 FR 69496, December 1, 2006).

1.1.2.3 Deepwater Shrimp

Table 3. Summary of available federal logbook data for deepwater shrimp fisheries in the PRIA

Year	Federal Permits Issued[1]	Federal Permits Reporting Catch	No. of Trips in PRIA EEZ	Total Reported Logbook Catch (lb)	Total Reported Logbook Release/Discard (lb)
2009	0				
2010	1	n.d.			
2011	0				
2012	0				
2013	0				
2014	0				
2015	0				
2016	0				
2017	0				
2018	0				
2019	0				
2020	0				
2021	0				
2022	0				

Year	Federal Permits Issued[1]	Federal Permits Reporting Catch	No. of Trips in PRIA EEZ	Total Reported Logbook Catch (lb)	Total Reported Logbook Release/Discard (lb)
2023	0				
2024	0				

[1] Source: PIRO SFD unpublished data.
Note: Federal permit and reporting requirements for deepwater shrimp fisheries became effective on June 29, 2009 (74 FR 25650, May 29, 2009).

1.2 ADMINISTRATIVE AND REGULATORY ACTIONS

This summary describes management actions NMFS implemented for insular fisheries in the PRIA during calendar year 2024.

On May 2, 2024, NMFS announced the approval of Amendments to the five fishery ecosystem plans (FEP) for fisheries in the Pacific Islands Region, including the FEP for the PRIA. The FEPs are amended to update data collection mechanisms identified as standardized bycatch reporting methodologies (SBRM) and to revise descriptions of SBRM for consistency with current NMFS regulations. These Amendments comply with the SBRM requirement in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

2 ECOSYSTEM CONSIDERATIONS

2.1 CORAL REEF FISH ECOSYSTEM PARAMETERS

2.1.1 Regional Reef Fish Biomass and Habitat Condition

Description: 'Reef fish biomass' is mean biomass of reef fishes per unit area derived from visual survey data between 2010 and 2024. 'Hard Coral Cover' is mean cover derived from benthic imagery (photoquadrats) collected by divers across the survey domain, including most sites where reef fish surveys occurred. In previous reports, this parameter stemmed from diver visual rapid assessments of coral cover. Note that no surveys were conducted in 2020 or 2021 in any region due to COVID-19.

Rationale: Reef fish biomass has been widely used as an indicator of relative ecosystem status and has repeatedly been shown to be sensitive to changes in fishing pressure, habitat quality, and oceanographic regime. Hard coral cover is an indicator of relative status of the organisms that build coral reef habitat and has been shown to be sensitive to changes in oceanographic regime, and a range of direct and indirect anthropogenic impacts. Most fundamentally, cover of hard corals has been increasingly impacted by temperature stress as a result of global heating.

Data Category: Fishery-independent

Timeframe: Triennial

Jurisdiction: American Samoa, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), Main Hawaiian Islands (MHI), Northwestern Hawaiian Islands (NWHI), and Pacific Remote Island Areas (PRIAs)

Spatial Scale: Regional

Data Source: Data used to generate cover and biomass estimates come from surveys conducted by the National Marine Fisheries Service (NMFS) Pacific Island Fisheries Science Center (PIFSC) Ecosystem Sciences Division (ESD) and their partners as part of the Coral Reef Conservation Program's (CRCP) National Coral Reef Monitoring Program (NCRMP). Fish survey methods are described in detail in Ayotte et al. (2015). In brief, they involve teams of divers conducting stationary point count cylinder (SPC) surveys within a target domain of < 30 meter hard-bottom habitat at each island, stratified by depth zone and, for larger islands, by section of coastline. For consistency among islands, only data from forereef habitats are used. At each SPC, divers record the number, size, and species of all fishes within or passing through paired 15 meter-diameter cylinders over the course of a standard count procedure. Cover estimates are derived from photoquadrats collected by divers within the same survey domain, including at all the fish survey sites. Post-hoc annotation methods are described in detail in Lamirand et al. (2022).

Fish sizes and abundance are converted to biomass using standard length-to-weight conversion parameters, taken largely from FishBase and converted to biomass per unit area by dividing by the area sampled per survey. Site-level data were pooled into island-scale values by first calculating mean and variance within strata, and then calculating weighted island-scale mean and variance using the formulas given in Smith et al. (2011) with strata weighted by their respective sizes.

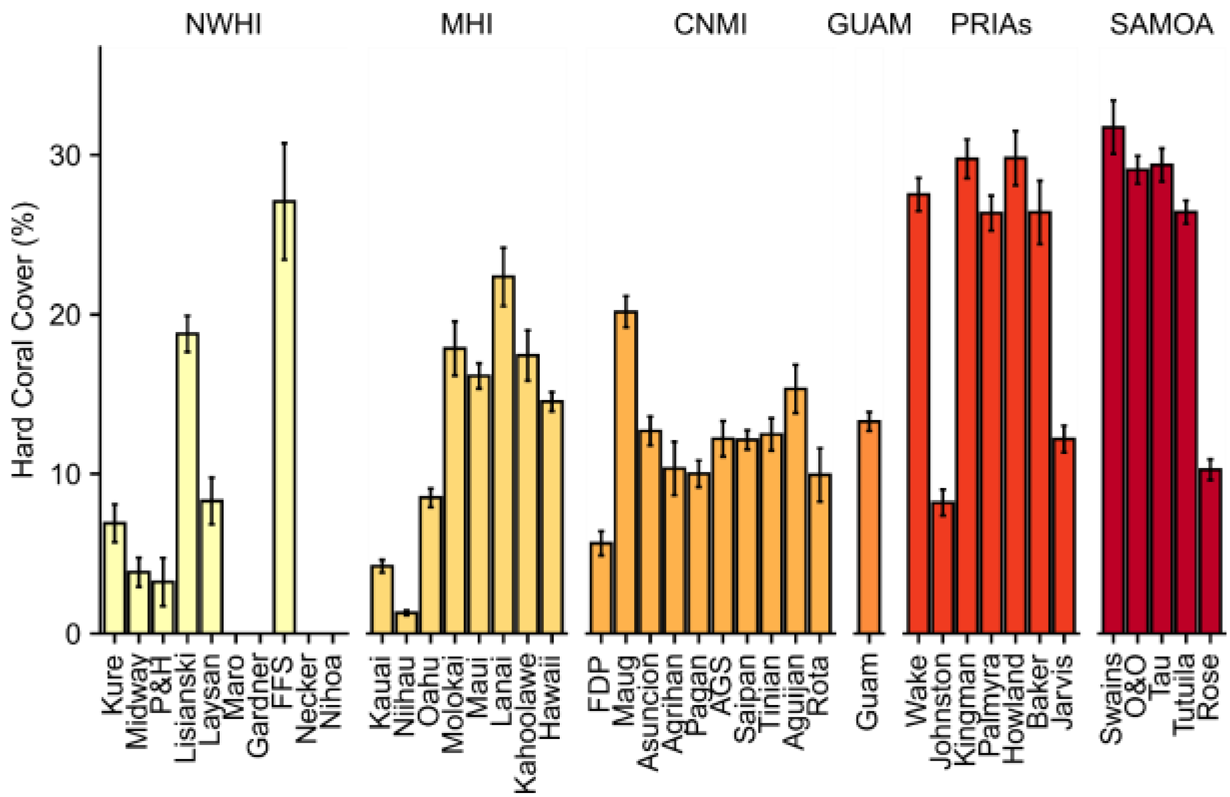

Figure 1. Mean coral cover (% ± standard error of the mean, or SEM) per U.S. Pacific Island from 2010–2023 by latitude

Note: Coverage data presented here is derived from benthic imagery (photoquadrats) collected by divers across the survey domain. In previous reports, hard coral cover stemmed from diver visual assessments, which is a less rigorous method for estimating this parameter.

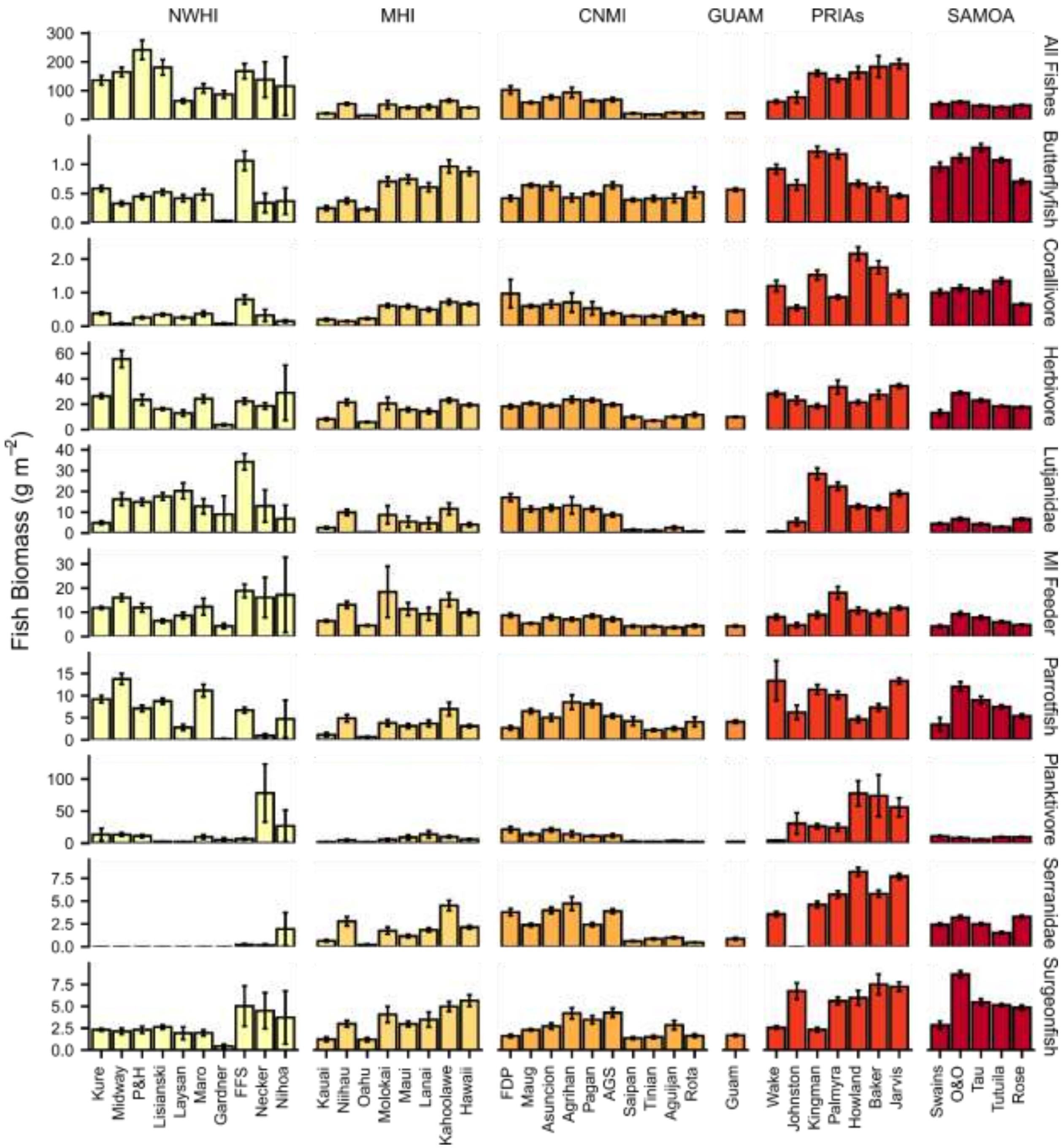

Figure 2. Mean fish biomass (g/m^2 ± SEM) of functional, taxonomic, and trophic groups by U.S. Pacific reef area from 2010–2024 by latitude

Note: The group 'Serranidae' excludes planktivorous members of that family (i.e., anthias), which can be hyper-abundant in some regions. Similarly, the bumphead parrotfish, *Bolbometopon muricatum*, has been excluded from the corallivore group. The group 'MI Feeder' consists of fishes that primarily feed on mobile invertebrates; 'Butterflyfish' are non-planktivorous butterflyfish species; and 'Surgeonfish' are mid-large targeted surgeonfish species.

2.1.2 Archipelagic Reef Fish Biomass and Habitat Condition

Description: 'Reef fish biomass' is mean biomass of reef fishes per unit area derived from visual survey data between 2010 and 2024. 'Hard Coral Cover' is mean cover derived from benthic imagery (photoquadrats) collected by divers across the survey domain, including most sites where reef fish surveys occurred. In previous reports, this parameter stemmed from diver visual rapid assessments of coral cover. Note that no surveys were conducted in 2020 or 2021 in any region due to COVID-19.

Rationale: Reef fish biomass has been widely used as an indicator of relative ecosystem status and has repeatedly been shown to be sensitive to changes in fishing pressure, habitat quality, and oceanographic regime. Hard coral cover is an indicator of relative status of the organisms that build coral reef habitat and has been shown to be sensitive to changes in oceanographic regime, and a range of direct and indirect anthropogenic impacts. Most fundamentally, cover of hard corals has been increasingly impacted by temperature stress as a result of global heating.

Data Category: Fishery-independent

Timeframe: Triennial

Jurisdiction: PRIA

Spatial Scale: Island

Data Source: Data are sourced from surveys conducted by NMFS PIFSC ESD and partners, as part of the Pacific NCRMP. Survey methods and sampling design, and methods to generate biomass and cover parameters are described in Section 2.1.1.

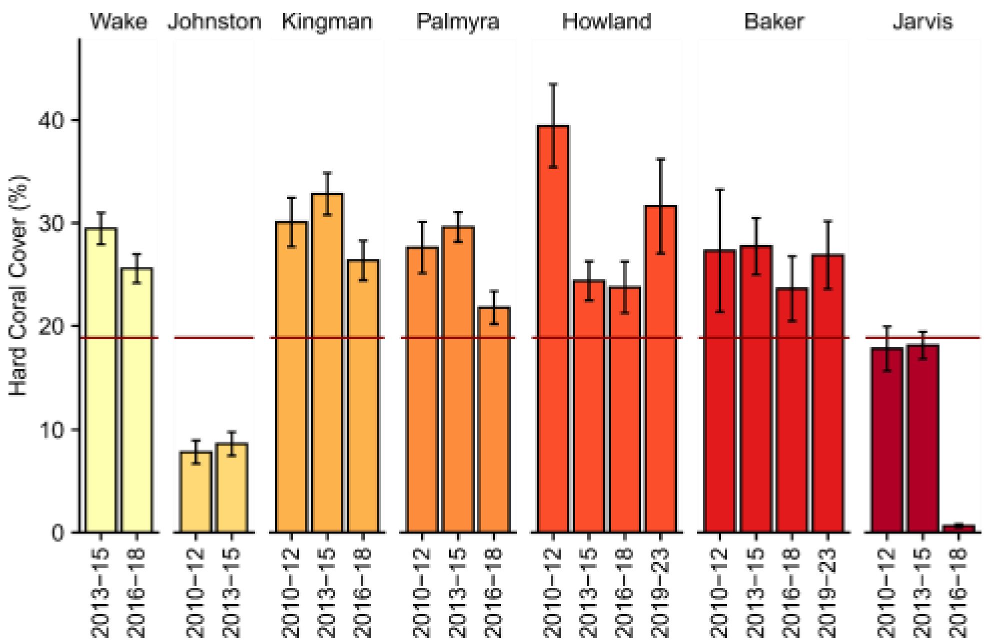

Figure 3. Mean coral cover (% ± SEM) per island of the PRIA from 2010–2024 by latitude

Note: The red horizontal line is the region-wide mean estimate for the entire time period. Coverage data presented here is derived from benthic imagery (photoquadrats) collected by divers across the survey domain. In previous reports, hard coral cover stemmed from diver visual assessments, which is a less rigorous method for estimating this parameter.

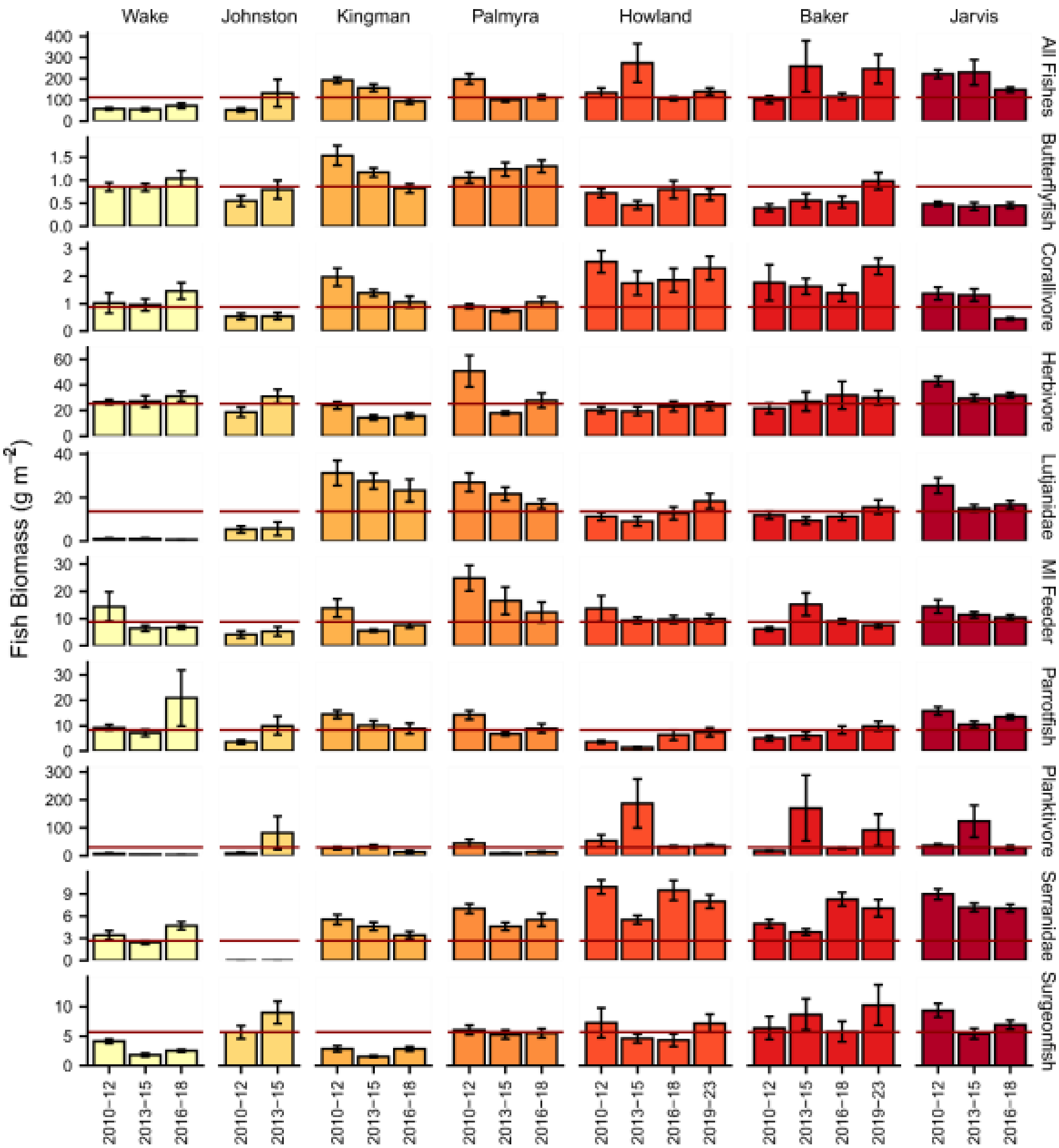

Figure 4. Mean fish biomass (g/m^2 ± SEM) of PRIA functional, taxonomic, and trophic groups from 2010–2024 by island

Note: The group 'Serranidae' excludes planktivorous members of that family (i.e., anthias), which can be hyper-abundant in some regions. Similarly, the bumphead parrotfish, *Bolbometopon muricatum*, has been excluded from the corallivore group. The group 'MI Feeder' consists of fishes that primarily feed on mobile invertebrates; 'Butterflyfish' are non-planktivorous butterflyfish species; and 'Surgeonfish' are mid-large targeted surgeonfish species. Red horizontal lines are the region-wide mean estimates for the entire time period.

2.2 PROTECTED SPECIES

This section of the report summarizes information on protected species interactions in fisheries managed under the PRIA Fisheries Ecosystem Plan (FEP). Protected species covered in this report include sea turtles, seabirds, marine mammals, elasmobranchs, and precious corals. Most of these species are protected under the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and/or the Migratory Bird Treaty Act (MBTA). A list of protected species found in or near PRIA waters and a list of critical habitat designations in the Pacific Ocean are included in Appendix B.

2.2.1 Monitoring Protected Species Interactions in the PRIA FEP Fisheries

This report monitors the status of protected species interactions in the PRIA FEP fisheries using proxy indicators such as fishing effort and changes in gear types as these fisheries do not have observer coverage. Logbook programs are not expected to provide reliable data about protected species interactions due to the lack of active fisheries in these areas.

2.2.1.1 FEP Conservation Measures

Bottomfish, precious coral, coral reef, and crustacean fisheries managed under this FEP have not had reported interactions with protected species, and no specific regulations are in place to mitigate protected species interactions. Destructive gear such as bottom trawls, bottom gillnets, explosives, and poisons are prohibited under this FEP, and these prohibitions benefit protected species by preventing potential interactions with non-selective fishing gear.

2.2.1.2 ESA Consultations

ESA consultations were conducted by NMFS and the U.S. Fish and Wildlife Service (USFWS; for species under their jurisdiction) to ensure ongoing fisheries operations managed under the PRIA FEP are not jeopardizing the continued existence of any ESA-listed species or adversely modifying critical habitat. The results of these consultations, conducted under section 7 of the ESA, are briefly described below and summarized in Table 5.

NMFS concluded on January 16, 2015 that all fisheries managed under the PRIA FEP have no effects on ESA-listed reef-building corals. NMFS concluded in an informal consultation dated February 20, 2015 that all fisheries managed under the PRIA FEP are not likely to adversely affect the Indo-West Pacific distinct population segment (DPS) of scalloped hammerhead shark.

Table 4. Summary of ESA consultations for PRIA FEP Fisheries

Fishery	Consultation Date	Consultation Type[a]	Outcome[b]	Species
Bottomfish	3/8/2002	BiOp	NLAA	Loggerhead sea turtle, leatherback sea turtle, olive ridley sea turtle, green sea turtle, hawksbill sea turtle, humpback whale, blue whale, fin whale, sei whale, sperm whale
Coral reef ecosystem	3/7/2002	LOC	NLAA	Loggerhead sea turtle, leatherback sea turtle, olive ridley sea turtle, green sea turtle, hawksbill sea turtle, humpback whale, blue whale, fin whale, sei whale, sperm whale
	5/22/2002	LOC (USFWS)	NLAA	Green, hawksbill, leatherback, loggerhead and olive ridley turtles, Newell's shearwater, short-tailed albatross, Laysan duck, Laysan finch, Nihoa finch, Nihoa millerbird, Micronesian megapode, 6 terrestrial plants
	9/18/2018	No effect memo	No effect	Oceanic whitetip shark, giant manta ray
Crustacean	9/28/2007	LOC	NLAA	Loggerhead sea turtle, leatherback sea turtle, olive ridley sea turtle, green sea turtle, hawksbill sea turtle, humpback whale, blue whale, fin whale, sei whale, sperm whale
	9/18/2018	No effect memo	No effect	Oceanic whitetip shark, giant manta ray
Precious coral	10/4/1978	BiOp	Does not constitute threat	Sperm whale, leatherback sea turtle
	12/20/2000	LOC	NLAA	Humpback whale, green sea turtle, hawksbill sea turtle
	9/18/2018	No effect memo	No effect	Oceanic whitetip shark, giant manta ray
All fisheries	1/16/2015	No effect memo	No effect	Reef-building corals
	2/20/2015	LOC	NLAA	Scalloped hammerhead shark (Indo-west Pacific DPS)

[a] BiOp = Biological Opinion; LOC = Letter of Concurrence
[b] LAA = likely to adversely affect; NLAA = not likely to adversely affect

Bottomfish Fishery

In a biological opinion issued on March 3, 2002, NMFS concluded that the ongoing operation of the Western Pacific Region's bottomfish and seamount fisheries is not likely to jeopardize the continued existence of five sea turtle species (loggerhead, leatherback, olive ridley, green, and hawksbill turtles) and five marine mammal species (humpback, blue, fin, sei, and sperm whales).

Crustacean Fishery

An informal consultation completed by NMFS on September 28, 2007 concluded that PRIA crustacean fisheries are not likely to adversely affect five sea turtle species (loggerhead, leatherback, olive ridley, green, and hawksbill turtles) and five marine mammal species (humpback, blue, fin, sei, and sperm whales).

On September 18, 2018, NMFS concluded that PRIA crustacean fisheries will have no effect on the oceanic whitetip shark and giant manta ray.

Coral Reef Fishery

An informal consultation completed by NMFS on March 7, 2002 concluded that fishing activities conducted under the Coral Reef Ecosystems Fishery Management Plan (FMP) are not likely to adversely affect five sea turtle species (loggerhead, leatherback, olive ridley, green, and hawksbill turtles) and five marine mammal species (humpback, blue, fin, sei, and sperm whales).

On May 22, 2002, the USFWS concurred with the determination of NMFS that the activities conducted under the Coral Reef Ecosystems FMP are not likely to adversely affect listed species under USFWS's exclusive jurisdiction (i.e., seabirds and terrestrial plants) and listed species shared with NMFS (i.e., sea turtles).

On September 18, 2018, NMFS concluded that PRIA coral reef ecosystem fisheries will have no effect on the oceanic whitetip shark and giant manta ray.

Precious Coral Fishery

An informal consultation completed by NMFS on December 20, 2000 concluded that PRIA precious coral fisheries are not likely to adversely affect humpback whales, green turtles, or hawksbill turtles.

On September 18, 2018, NMFS concluded that PRIA precious coral reef fisheries will have no effect on the oceanic whitetip shark and giant manta ray.

2.2.1.3 Non-ESA Marine Mammals

The MMPA requires NMFS to annually publish a List of Fisheries (LOF) that classifies commercial fisheries in one of three categories based on the level of mortality and serious injury of marine mammals associated with that fishery. PRIA fisheries are not classified under the LOF due to the lack of active commercial fisheries.

2.2.2 Status of Protected Species Interactions in the PRIA FEP Fisheries

There are currently no bottomfish, crustacean, coral reef, or precious coral fisheries operating in the PRIA, and no historical observer data are available for fisheries under this FEP. No new fishing activity has been reported, and there is no other information to indicate that impacts to protected species from PRIA fisheries have changed in recent years.

2.2.3 Identification of Emerging Issues

Table 5 summarizes current candidate ESA species, recent listing status, and post-listing activity (critical habitat designation and recovery plan development). Impacts from FEP-managed fisheries on any new listings and critical habitat designations will be considered in future versions of this report.

Table 5. Status of candidate ESA species, recent ESA listing processes, and post-listing activities

Species		Listing Process			Post-Listing Activity	
Common Name	**Scientific Name**	**90-Day Finding**	**12-Month Finding / Proposed Rule**	**Final Rule**	**Critical Habitat/Other**	**Recovery Plan**
Oceanic whitetip shark	*Carcharhinus longimanus*	Positive (81 FR 1376, 1/12/2016)	Warranted, threatened (81 FR 96304, 12/29/2016)	Listed as threatened (83 FR 4153, 1/30/18)	Critical habitat: Designation not prudent; no areas within US jurisdiction that meet definition of critical habitat (85 FR 12898, 3/5/2020) Other: Protective regulations under ESA 4(d) proposed (89 FR 41917, 5/14/2024)	Final Recovery Plan published July 11, 2024 (89 FR 56865)
Giant manta ray	*Manta birostris*	Positive (81 FR 8874, 2/23/2016)	Warranted, threatened (82 FRN 3694, 1/12/2017)	Listed as threatened (83 FR 2916, 1/22/18)	Designation not prudent; no areas within US jurisdiction that meet definition of critical habitat (84 FR 66652, 12/5/2019)	Recovery outline published 12/4/19 to serve as interim guidance until full recovery plan is developed; recovery planning workshop planned for 2021.
Corals	N/A	Positive for 82 species (75 FR 6616, 2/10/2010)	Warranted, threatened for 66 species (77 FR 73219, 12/7/2012)	20 species listed as threatened (79 FR 53851, 9/10/2014)	Critical habitat proposed (85 FR 76262, 11/27/2020, withdrawn), Critical habitat proposed (88 FR 83644, November 30,	In development, interim recovery outline in place; recovery workshops convened in

Species		Listing Process			Post-Listing Activity	
Common Name	**Scientific Name**	**90-Day Finding**	**12-Month Finding / Proposed Rule**	**Final Rule**	**Critical Habitat/Other**	**Recovery Plan**
					2023)	May 2021.
Giant clams	*Hippopus hippopus*, *H. porcellanus*, *Tridacna squamosina*, *T. derasa*, *T. gigas*, *T. squamosa*, and *T. tevoroa*	Positive for 7 species (82 FR 28946, 06/26/2017)	Warranted; endangered for 5 species, threatened for 1 species, threatened due to similarity in appearance for 4 species (89 FR 60498, 7/25/24)	TBD	Protective regulations under ESA 4(d) proposed for H,hippopus (89 FR 60498, 7/25/24)	N/A
Green sea turtle	*Chelonia mydas*	Positive (77 FR 45571, 8/1/2012)	Identification of 11 DPSs, endangered and threatened (80 FR 15271, 3/23/2015)	11 DPSs listed as endangered and threatened (81 FR 20057, 4/6/2016)	Critical habitat proposed (88 FR 46572, 07/19/2023)	TBA

2.2.4 Identification of Research, Data, and Assessment Needs

The following research, data, and assessment needs for insular fisheries were identified by the Council's Plan Team:

- Improve species identification of commercial and non-commercial fisheries data (e.g., outreach, use FAO species codes) to improve understanding of potential protected species impacts.
- Define and evaluate innovative approaches to derive robust estimates of protected species interactions in insular fisheries.
- Conduct genetic and telemetry research to improve understanding of population structure and movement patterns for listed elasmobranchs.
- Estimates of post release survival for incidental protected species.

2.3 SOCIOECONOMICS

This section outlines the pertinent economic, social, and community information available for assessing the successes and impacts of management measures and the achievements of the FEP for the Pacific Remote Islands Area (WPRFMC 2009). It meets the objective of "Support Fishing Communities" adopted at the 165th Council meeting; specifically, it identifies the various social and economic groups within the region's fishing communities and their interconnections. The section begins with an overview of the socioeconomic context for the region, and then provides a summary of relevant studies and data for the PRIA.

In 1996, the Magnuson-Stevens Fishery Conservation and Management Act's National Standard 8 (NS8) specified that conservation and management measures need to account for the importance of fishery resources in fishing communities, to support sustained participation in the fisheries, and to minimize adverse economic impacts, provided that these considerations do not compromise conservation. Unlike other regions of the United States, the settlement of the Western Pacific region was intimately tied to the ocean, which is reflected in local culture, customs, and traditions (Figure 5).

Figure 5. Settlement of the Pacific Islands, courtesy Wikimedia Commons (from https://commons.wikimedia.org/wiki/File:Polynesian_Migration.svg)

Polynesian voyagers relied on the ocean and marine resources on their long voyages in search of new islands, as well as in sustaining established island communities. Today, the population of the region also represents many Asian cultures from Pacific Rim countries, which have a similar reliance on marine resources. Thus, fishing and seafood are integral to local community ways of life. This is reflected in the amount of seafood eaten in the region relative to the rest of the United States, as well as in the language, customs, ceremonies, and community events. The amount of available seafood can also affect seasonality in prices of fish. Because fishing is such an integral part of the culture, it is difficult to discern commercial from non-commercial fishing where most trips involving multiple motivations and multiple uses of the fish caught. While the economic perspective is an important consideration, fishermen report other motivations, such as customary exchange, as being equally important. Due to changing economies and westernization, waning recruitment of younger fishermen is becoming a concern for the sustainability of fishing and fishing traditions in the region.

2.3.1 Response to Previous Council Recommendations

There were no Council recommendations related to socioeconomic considerations in the Pacific Remote Islands Area during 2024.

2.3.2 Background

Human habitation in the PRIAs is limited. The FEP for the PRIAs provides a description of the geography, history, and socioeconomic considerations of the archipelago (WPRFMC 2009). Grace-McCaskey (2014) provided a brief review of the importance of these areas from a cultural perspective. She noted that although the PRIAs were uninhabited when first visited by Westerners, Polynesians and Micronesians likely had been periodically visiting these islands for centuries. Many of the islands in the PRIAs were altered during World War II, and many have subsequently become National Wildlife Refuges or part of the Pacific Remote Islands Marine National Monument (PRIMNM). Only Wake, Johnston, and Palmyra have seasonal- and year-round residents, primarily related to the U.S. military and refuge management. The surrounding reef ecosystems are considered to be some of the healthiest in the world due to their distance to areas of high human population densities, though some are experiencing residual impacts from military activity nearby. There are no designated fishing communities residing in the PRIAs. Most of the fishing effort has been concentrated around Johnston and Palmyra Atolls by members of the Hawaii fishing community. The proposed Pacific Remote Islands National Marine Sanctuary (PRINMS) raised concerns about potential impacts to other fishing communities that may fish commercially in PRIA waters. A report on Fishery Management Scenarios for the Monument Adjacent Area identified potential impacts primarily to American Samoa fishing communities (Malloy et al. 2023). No formal Sanctuary designation was finalized in 2024.

In 2023 there was also strong local opposition to the proposed marine sanctuary designation for the Pacific Remote Island Areas (PRIA), including petitions signed by Starkist employees (Samoa News Staff 2023). In this case, the proposed PRIA National Marine Sanctuary raised concerns about potential impacts to the American Samoa economy related to potential reduction in fish offloaded at the cannery. A study using an IMPLAN model to examine economic contributions of U.S. commercial fisheries in American Samoa found that indirect, induced, and value-added effects of purse seine, longline, and small boat fisheries contributed the equivalent of 20% of total employment, 18% of total labor income, more than a quarter of the total economic output, and more than one-fifth of the 2019 GDP in American Samoa (Chan 2023). Hypothetical scenarios of reduced fish landings of 10%, 30%, and 50% showed large ripple effects on the local economy, leading to a potential 2-10% reduction in employment, 2-9% reduction in labor income, 2-11% reduction in GDP, and 3-14% reduction in output (Chan 2023).

2.3.3 Ongoing Research and Information Collection

There is currently no ongoing research specific to the PRIA.

2.3.4 Relevant PIFSC Economics and Human Dimensions Publications: 2024

Publication	**MSA priority**
Fisk JJ, Leong KM, Berl REW, Long JW, Landon AC, Adams MM, Hankins DL, Williams CK, Lake FK, Salerno J. 2024. Evolving wildlife management cultures of governance through Indigenous Knowledges and perspectives. *Journal of Wildlife Management*. https://doi.org/10.1002/jwmg.22584	HC2.1.4 HC3.1
Ingram, R. J., Leong, K. M., Nakachi, A., & Gove, J. M. (2024). Dimensions of cultural ecosystem service contributions to human well-being in marine environments. *Ecosystems and People*, 20(1). https://doi.org/10.1080/26395916.2024.2378155	HC2.1.1 HC2.1.4 HC3.1
Kleiber D, Terry J, Elliot S, Selgrath, J, et al. 2024. NOAA and Demographic Data Collection. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-163, 77 p. https://doi.org/10.25923/kw71-b226	HC1.2.1
Leong KM, Ingram RJ, Kleiber D, Long SH, Mastitski A, Norman K, Weng C, Wise S 2024. Aligning fisheries terminology with diverse social benefits *Marine Policy*, 170,106377. https://doi.org/10.1016/j.marpol.2024.106377	HC1.1.2 HC1.1.4
Leong KM, Quiocho K, Blacklow A, Rosa S, Kleiber D, Winter KB, Long KS, Puniwai N, Poe MR. 2024. Relational research to elevate cultural dimensions of marine organisms in Hawaiʻi. *Ecology and Society* 29 (4):30. https://doi.org/10.5751/ES-15573-290430	HC2.1.1 HC2.1.4 HC3.1
Wallmo K, Kleiber D, Tomberlin D, Woodworth-Jefcoats P and Oliver T (2024) The Diversity of Science Behind U.S. Seafood. *Front. Young Minds*. 12:1331893. https://doi.org/10.3389/frym.2024.1331893	HC1.1

2.4 CLIMATE AND OCEANIC INDICATORS

2.4.1 Introduction

Over the past several years, the Council has incorporated climate change considerations into the overall management of the fisheries over which it has jurisdiction. This 2024 annual SAFE report includes a standard chapter on indicators of climate and oceanic conditions in the Western Pacific region. These indicators reflect global climate variability and change as well as trends in local oceanographic conditions.

The reasons for the Council's decision to provide and maintain an evolving discussion of climate conditions as an integral and continuous consideration in their deliberations, decisions, and reports are numerous:

- Emerging scientific and community understanding of the impacts of changing climate conditions on fishery resources, the ecosystems that sustain those resources, and the communities that depend upon them;
- Recent Federal Directives including the 2010 implementation of a National Ocean Policy that identified Resiliency and Adaptation to Climate Change and Ocean Acidification as one of nine National priorities as well as the development of a Climate Science Strategy by NMFS in 2015 and the subsequent development of the Pacific Islands Regional Action Plan for climate science; and
- The Council's own engagement with NOAA as well as jurisdictional fishery management agencies in American Samoa, the CNMI, Guam, and Hawaii as well as fishing industry representatives and local communities in those jurisdictions.

In 2013, the Council began restructuring its Marine Protected Area/Coastal and Marine Spatial Planning Committee to include a focus on climate change, and the committee was renamed as the Marine Planning and Climate Change (MPCC) Committee. In 2015, based on recommendations from the committee, the Council adopted its Marine Planning and Climate Change Policy and Action Plan, which provided guidance to the Council on implementing climate change measures, including climate change research and data needs. The revised Pelagic Fisheries Ecosystem Plan (FEP) included a discussion on climate change data and research as well as a new objective (Objective 9) that states the Council should consider the implications of climate change in decision-making, with the following sub-objectives:

a) To identify and prioritize research that examines the effects of climate change on Council-managed fisheries and fishing communities.
b) To ensure climate change considerations are incorporated into the analysis of management alternatives.
c) To monitor climate change related variables via the Council's Annual Reports.
d) To engage in climate change outreach with U.S. Pacific Islands communities.

Beginning with the 2015 report, the Council and its partners began providing continuing descriptions of changes in a series of climate and oceanic indicators. The MPCCC was disbanded in early 2019, re-allocating its responsibilities among its members already on other committees or teams, such as the Fishery Ecosystem Plan Teams.

This annual report focuses previous years' efforts by refining existing indicators and improving communication of their relevance and status. Future reports will include additional indicators as the information becomes available and their relevance to the development, evaluation, and revision of the FEPs becomes clearer. Working with national and jurisdictional partners, the Council will make all datasets used in the preparation of this and future reports available and easily accessible.

2.4.1.1 Response to Previous Council Recommendations

There were no Council recommendations relevant to the climate and oceanic indicators section of the annual SAFE report for the PRIA in 2024.

2.4.2 Conceptual Model

In developing this chapter, the Council relied on a number of recent reports conducted in the context of the U.S. National Climate Assessment including, most notably, the 2012 Pacific Islands Regional Climate Assessment and the Ocean and Coasts chapter of the 2014 report on a Pilot Indicator System prepared by the National Climate Assessment and Development Advisory Committee (NCADAC).

The Advisory Committee Report presented a possible conceptual framework designed to illustrate how climate factors can connect to and interact with other ecosystem components to impact ocean and coastal ecosystems and human communities. The Council adapted this model with considerations relevant to the fishery resources of the Western Pacific Region (Figure 6).

As described in the 2014 NCADAC report, the conceptual model presents a "simplified representation of climate and non-climate stressors in coastal and marine ecosystems." For the purposes of this Annual Report, the modified Conceptual Model allows the Council and its partners to identify indicators of interest to be monitored on a continuing basis in coming years. The indicators shown in red were considered for inclusion in the annual SAFE reports, though the final list of indicators varied somewhat. Other indicators will be added over time as data become available and an understanding of the causal chain from stressors to impacts emerges.

The Council also hopes that this Conceptual Model can provide a guide for future monitoring and research. This guide will ideally enable the Council and its partners to move forward from observations and correlations to understanding the specific nature of interactions, and to develop capabilities to predict future changes of importance in the developing, evaluating, and adapting of FEPs in the Western Pacific region.

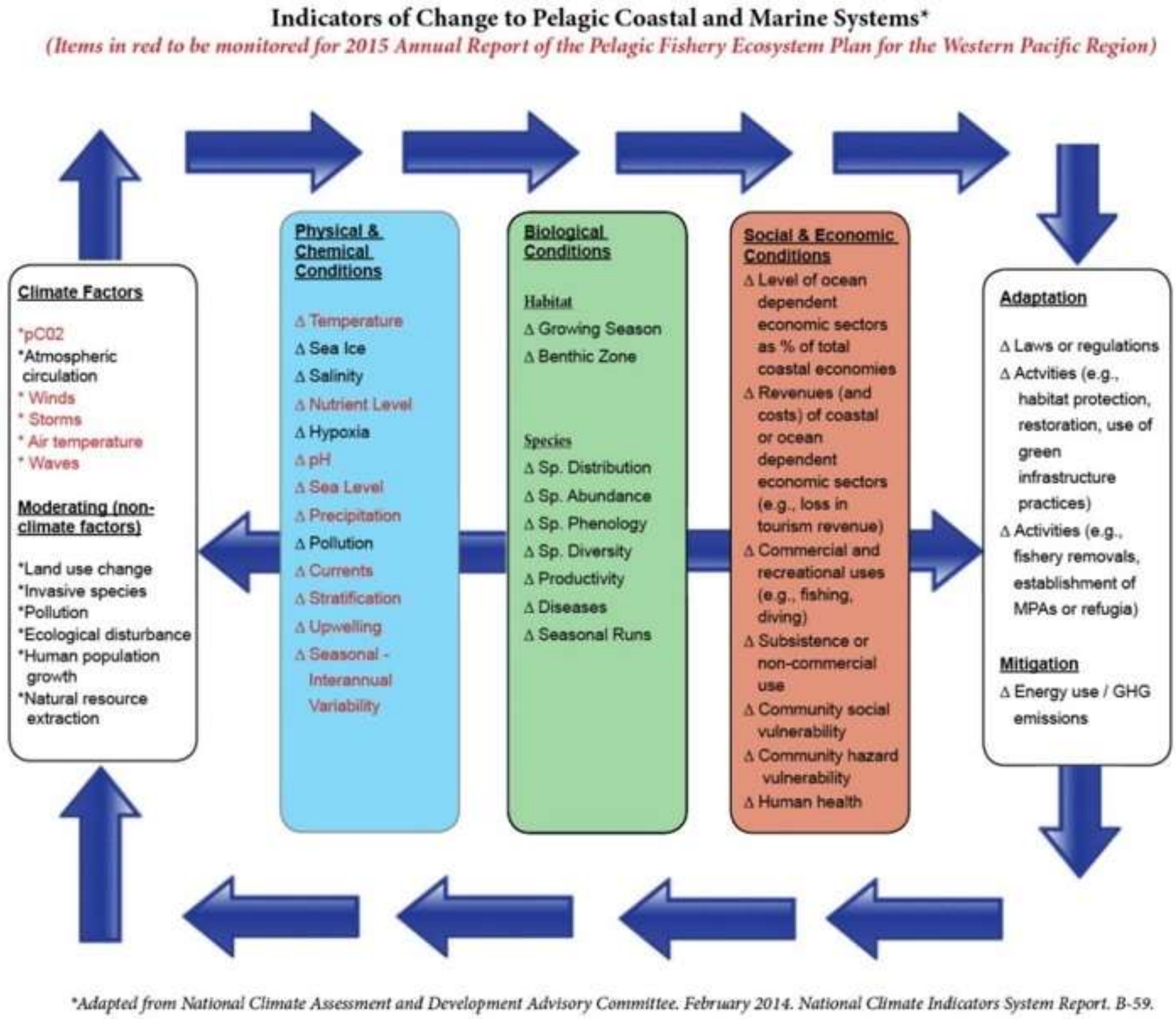

Figure 6. Indicators of change of pelagic coastal and marine systems; conceptual model

2.4.3 Selected Indicators

The primary goal for selecting the indicators used in this report is to provide fisheries-related communities, resource managers, and businesses with a climate-related situational awareness. In this context, indictors were selected to:

- Be fisheries relevant and informative.
- Build intuition about current conditions in light of a changing climate;
- Provide historical context; and
- Allow for recognition of patterns and trends.

In this context, this section includes the following climate and oceanic indicators:

- Atmospheric concentration of carbon dioxide (CO_2)
- Oceanic pH at Station ALOHA;
- Oceanic Niño Index (ONI);
- Pacific Decadal Oscillation (PDO);
- Tropical cyclones;
- Sea surface temperature (SST);
- Coral thermal stress exposure;
- Chlorophyll-a;
- Rainfall; and
- Sea level (sea surface height).

Figure 7 and Figure 8 provide a description of these indicators and illustrate how they are connected to each other in terms of natural climate variability and anthropogenic climate change.

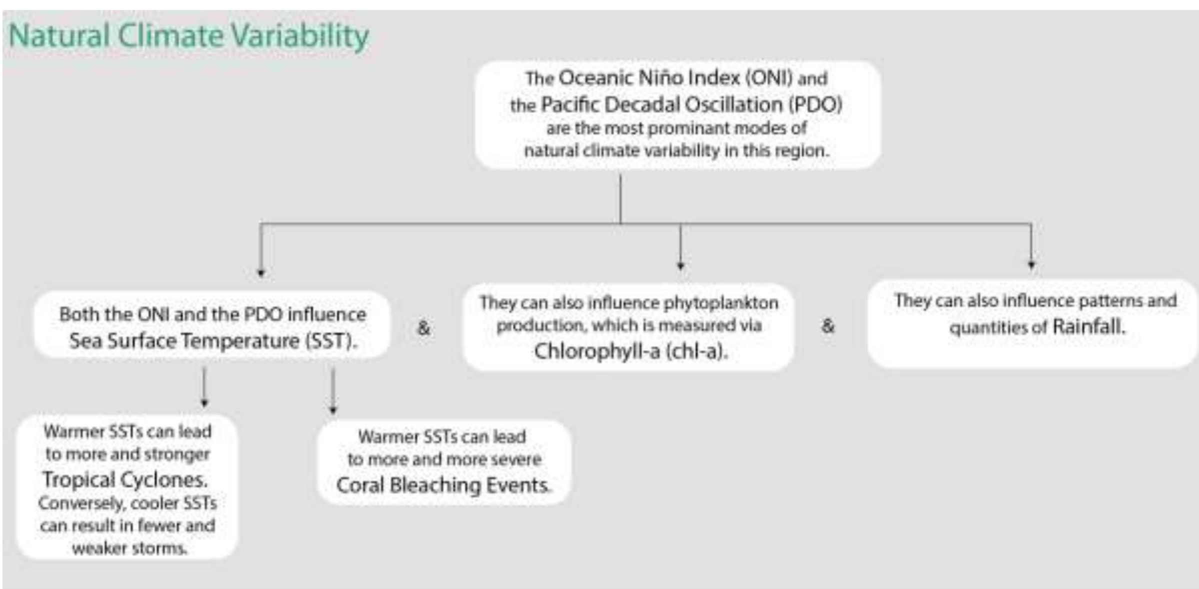

Figure 7. Schematic diagram illustrating how indicators are connected to one another and how they vary as a result of natural climate variability

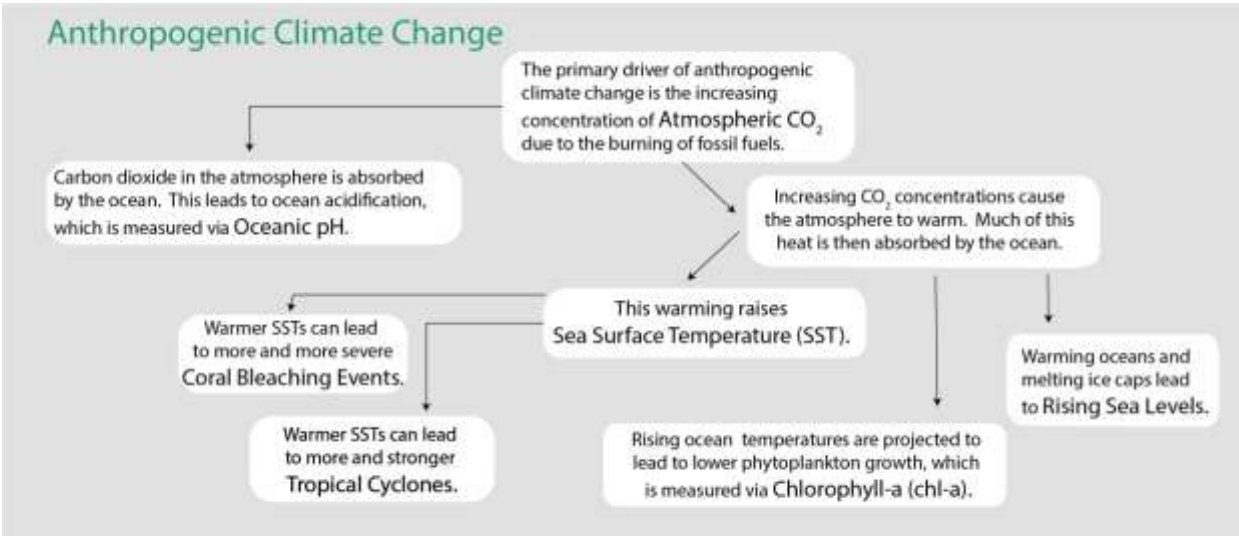

Figure 8. Schematic diagram illustrating how indicators are connected to one another and how they vary as a result of anthropogenic climate change

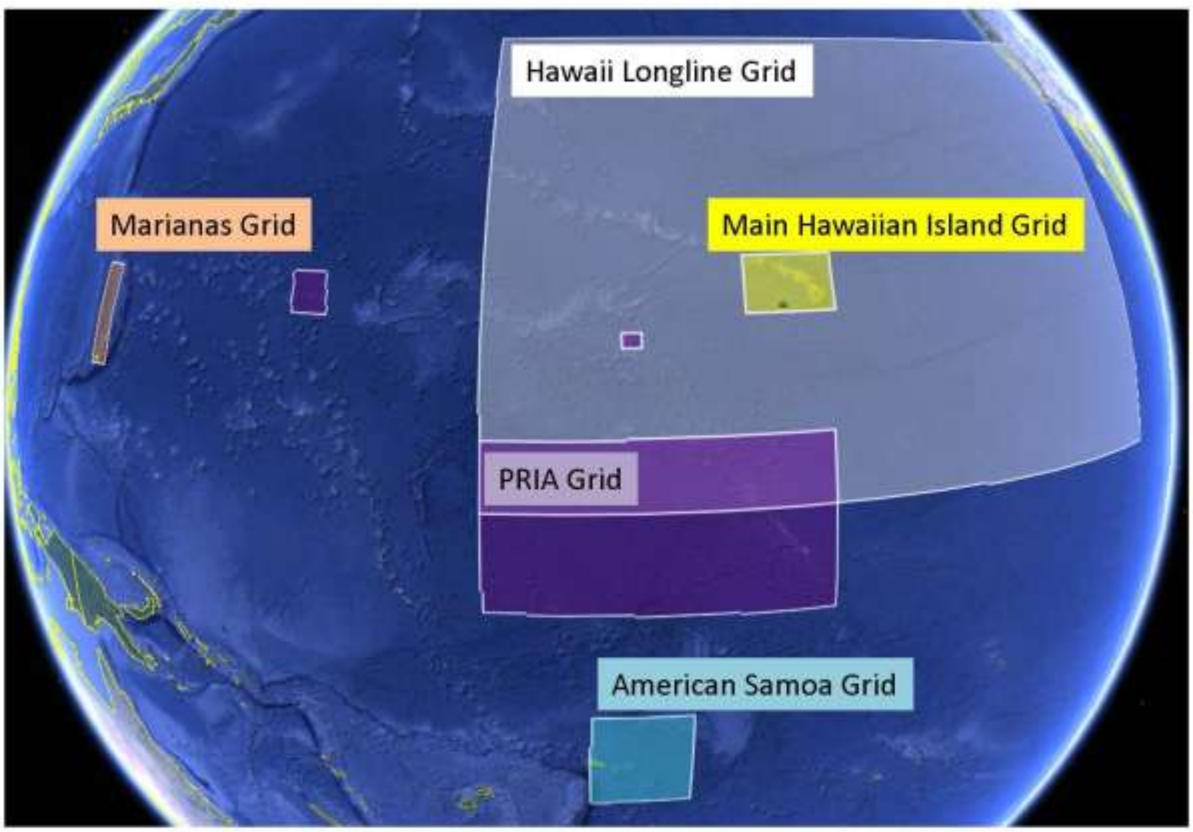

Figure 9. Regional spatial grids representing the scale of the climate change indicators being monitored

2.4.3.1 Atmospheric Concentration of Carbon Dioxide at Mauna Loa

Rationale: Atmospheric carbon dioxide (CO_2) is a measure of what human activity has already done to affect the climate system through greenhouse gas emissions. It provides quantitative information in a simplified, standardized format that decision makers can easily understand. This indicator demonstrates that the concentration (and, in turn, warming influence) of greenhouse gases in the atmosphere has increased substantially over the last several decades.

Status: Atmospheric CO_2 is increasing exponentially. This means that atmospheric CO_2 is increasing more quickly over time. In 2024, the annual mean concentration of CO_2 was 424.61 ppm. This is the highest annual value recorded. This year also saw the highest monthly value, which was 426.91 ppm. In 1959, the first year full of the time series, the atmospheric concentration of CO_2 was 316 ppm. The annual mean passed 350 ppm in 1988, and 400 ppm in 2015.

Description: Monthly mean atmospheric CO_2 at Mauna Loa Observatory, Hawaiʻi in parts per million (ppm) from March 1958 to present. The observed increase in monthly average carbon dioxide concentration is primarily due to CO_2 emissions from fossil fuel burning. Carbon dioxide remains in the atmosphere for a very long time, and emissions from any location mix throughout the atmosphere in approximately one year. The annual variations at Mauna Loa, Hawaiʻi are due to the seasonal imbalance between the photosynthesis and respiration of terrestrial plants. During the summer growing season, photosynthesis exceeds respiration, and CO_2 is removed from the atmosphere. In the winter (outside the growing season), respiration exceeds photosynthesis, and CO_2 is returned to the atmosphere. The seasonal cycle is strongest in the northern hemisphere because of its larger land mass.

Timeframe: Annual, monthly.

Region/Location: Mauna Loa, Hawaiʻi, but representative of global atmospheric carbon dioxide concentration. Note that due to the eruption of the Mauna Loa Volcano, measurements from Mauna Loa Observatory were suspended as of 29 November 2022. Observations from December 2022 to 4 July 2023 are from a site at the Maunakea Observatories, approximately 21 miles north of the Mauna Loa Observatory. Mauna Loa observations resumed in July 2023.

Measurement Platform: *In-situ* station.

Data available at: https://gml.noaa.gov/ccgg/trends/data.html.

Sourced from: Keeling et al. (1976), Thoning et al. (1989), and NOAA (2025a). Graphics produced in part using Stawitz and Li (2025).

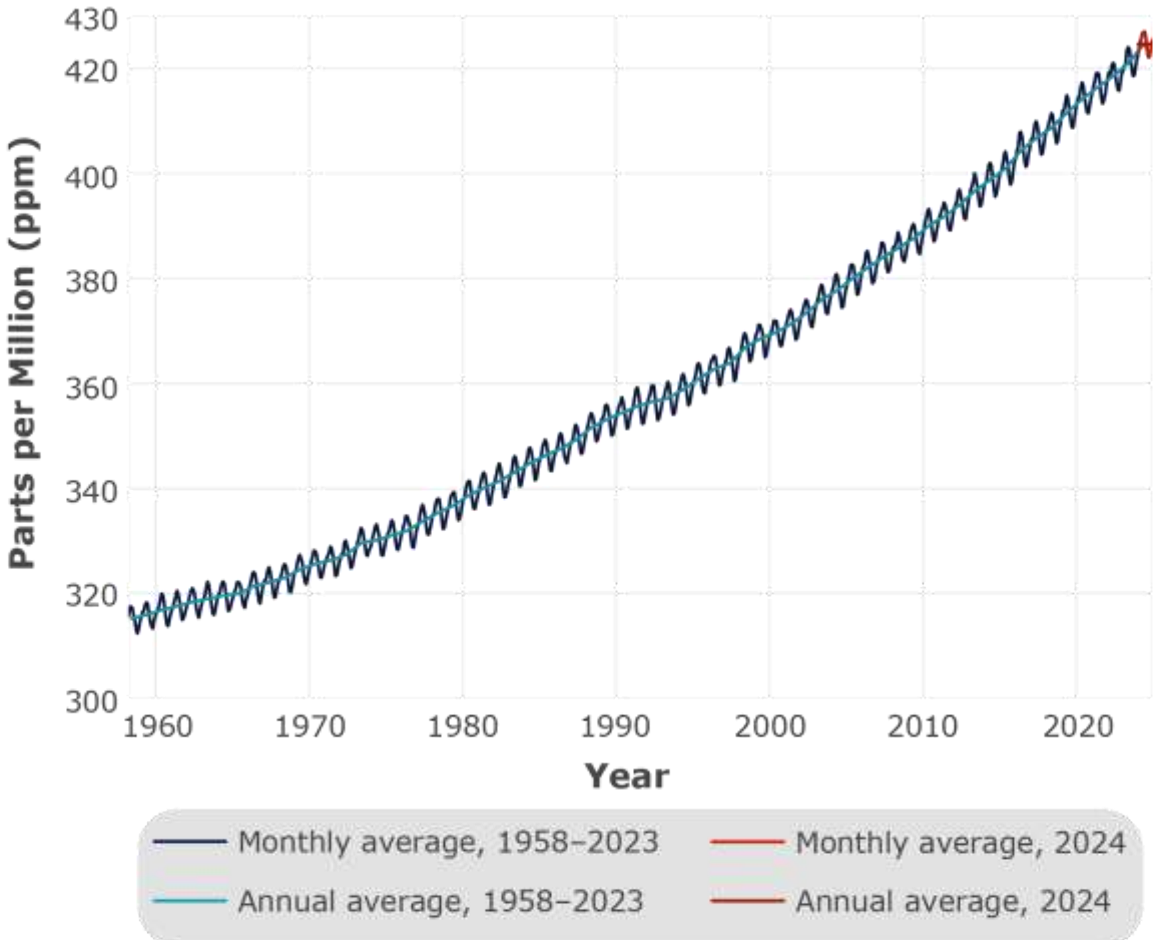

Figure 10. Monthly mean (black) and seasonally corrected (blue) atmospheric carbon dioxide at Mauna Loa Observatory, Hawaii

2.4.3.2 Oceanic pH

Rationale: Oceanic pH is a measure of how greenhouse gas emissions have already affected the ocean. This indicator demonstrates that oceanic pH has decreased significantly over the past several decades (i.e., the ocean has become more acidic). Increasing ocean acidification limits the ability of marine organisms to build shells and other calcareous structures. Recent research has shown that pelagic organisms such as pteropods and other prey for commercially valuable fish species are already being negatively impacted by increasing acidification (Feely et al. 2016). The full impact of ocean acidification on the pelagic food web is an area of active research (Fabry et al. 2008).

Status: The ocean is roughly 12.2% more acidic than it was over 30 years ago at the start of this time series. Over this time, pH has declined by 0.05 at a constant rate. In 2023, the most recent year for which data are available, the average pH was 8.05. This year also saw a time series minimum of 8.026. Additionally, for the 8th year, small variations seen over the course of the year are outside the range seen in the first year of the time series. The highest pH value reported for the most recent year (8.063) is lower than the lowest pH value reported in the first year of the time series (8.083).

Description: Trends in surface (5 m) pH at Station ALOHA, north of Oahu (22.75°N, 158°W), are collected by the Hawai‘i Ocean Time-Series (HOT) from October 1988 to 2023 (2024 data are not yet available). Oceanic pH is a measure of ocean acidity, which increases as the ocean absorbs carbon dioxide from the atmosphere. Lower pH values represent greater acidity. Oceanic pH is calculated from total alkalinity (TA) and dissolved inorganic carbon (DIC). Total alkalinity represents the ocean’s capacity to resist acidification as it absorbs CO_2 and the amount of CO_2 absorbed is captured through measurements of DIC. The multi-decadal time series at Station ALOHA represents the best available documentation of the significant downward trend in oceanic pH since the time series began in 1988. Oceanic pH varies over both time and space, though the conditions at Station ALOHA are considered broadly representative of those across the Western and Central Pacific’s pelagic fishing grounds.

Timeframe: Monthly.

Region/Location: Station ALOHA: 22.75°N, 158°W.

Measurement Platform: *In-situ* station.

Data available at: https://hahana.soest.hawaii.edu/hot/hot-dogs/bseries.html.

Sourced from: Fabry et al. (2008), Feely et al. (2016), and the Hawai‘i Ocean Time-Series as described in Karl and Lukas (1996) and on its website (HOT 2025) using the methodology provided by Zeebe and Wolf-Gladrow (2001). Graphics produced in part using Stawitz and Li (2025).

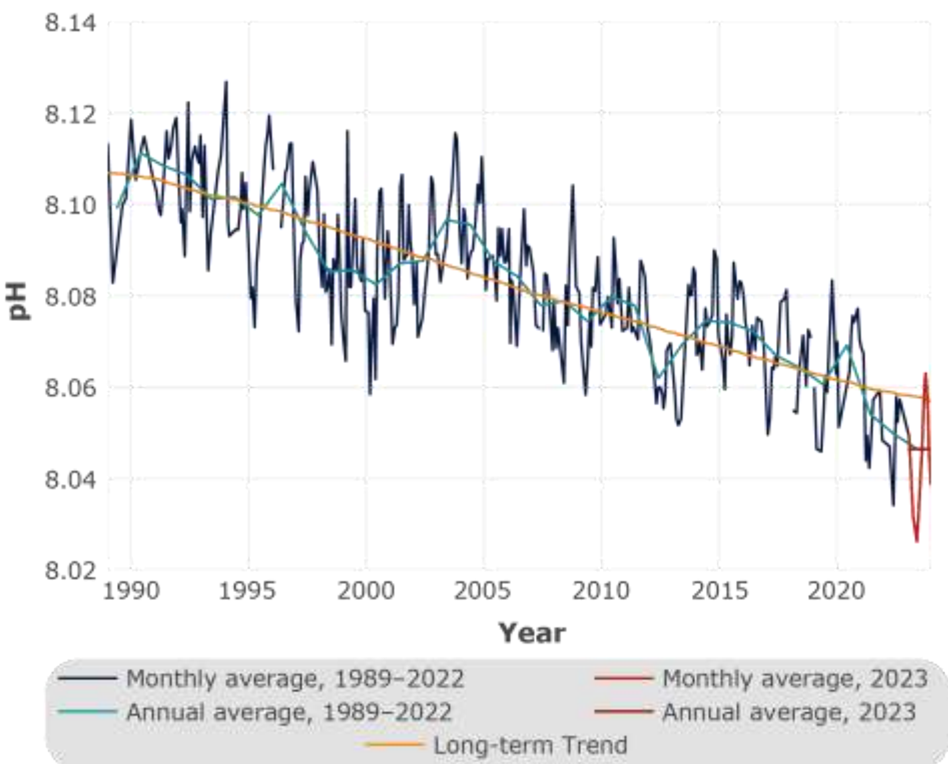

Figure 11. Time series and long-term trend of oceanic pH measured at Station ALOHA

2.4.3.3 Oceanic Niño Index

Rationale: The El Niño – Southern Oscillation (ENSO) cycle is known to have impacts on Pacific fisheries including tuna fisheries. The Oceanic Niño Index (ONI) focuses on ocean temperature, which has the most direct effect on these fisheries.

Status: The Oceanic Niño Index (ONI) indicated a transition from El Niño to neutral conditions in 2024. In 2024, the ONI ranged from -0.53 to 1.78. This is within the range of values previously observed in the time series.

Description: The three-month running mean (referred to as a season) of satellite remotely-sensed sea surface temperature (SST) anomalies in the Niño 3.4 region (5°S – 5°N, 120° – 170°W). The ONI is a measure of the ENSO phase. Warm and cool phases, termed El Niño and La Niña respectively, are based in part on an ONI threshold of ± 0.5 °C being met for a minimum of five consecutive overlapping seasons. Additional atmospheric indices are needed to confirm an El Niño or La Niña event, as the ENSO is a coupled ocean-atmosphere phenomenon. The atmospheric half of ENSO is measured using the Southern Oscillation Index.

Timeframe: Three-month running mean.

Region/Location: Niño 3.4 region, 5°S – 5°N, 120° – 170°W.

Measurement Platform: *In-situ* station, satellite, model.

Data available at: https://www.cpc.ncep.noaa.gov/data/indices/oni.ascii.txt.

Sourced from: NOAA CPC (2025). Graphics produced in part using Stawitz and Li (2025).

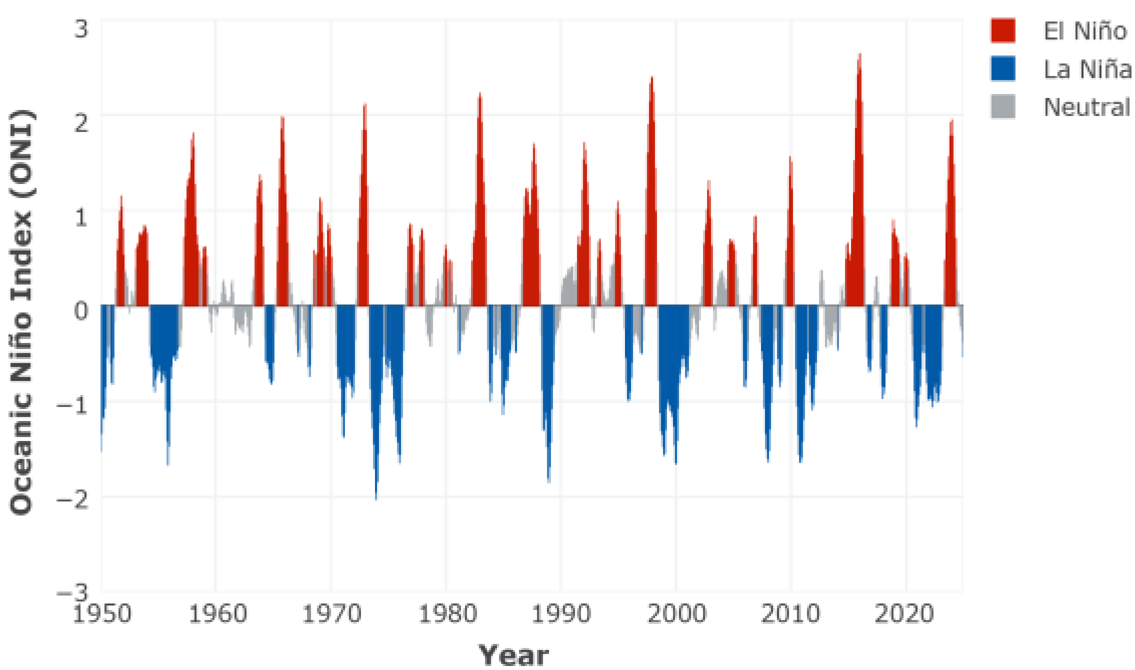

Figure 12. Oceanic Niño Index from 1950–2024 El Niño periods in red, La Niña periods in blue, and neutral periods in grey

2.4.3.4 Pacific Decadal Oscillation

Rationale: The Pacific Decadal Oscillation (PDO) was initially named by fisheries scientist Steven Hare in 1996 while researching connections between Alaska salmon production cycles and Pacific climate. Like ENSO, the PDO reflects changes between periods of persistently warm or persistently cool ocean temperatures, but over a period of 20 to 30 years (versus six to 18 months for ENSO events). The climatic fingerprints of the PDO are most visible in the Northeastern Pacific, but secondary signatures exist in the tropics.

Status: The PDO was negative in 2024. The index ranged from -3.04 to -1.07 over the course of the year. This is within the range of values previously observed in the time series.

Description: The PDO is often described as a long-lived El Niño-like pattern of Pacific climate variability. As seen with the better-known ENSO, extremes in the PDO pattern are marked by widespread variations in the Pacific Basin and the North American climate. In parallel with the ENSO phenomenon, the extreme cases of the PDO have been classified as either warm or cool, as defined by ocean temperature anomalies in the northeast and tropical Pacific Ocean. When SST is below average in the [central] North Pacific and warm along the North American coast, and when sea level pressures are below average in the North Pacific, the PDO has a positive value. When the climate patterns are reversed, with warm SST anomalies in the interior and cool SST anomalies along the North American coast, or above average sea level pressures over the North Pacific, the PDO has a negative value. Description inserted from NOAA (2025b).

Timeframe: Monthly.

Region/Location: Pacific Basin north of 20°N.

Measurement Platform: *In-situ* station, satellite, model.

Data available at: https://psl.noaa.gov/pdo/.

Sourced from: NOAA (2025b), Mantua (1997), and Newman (2016). Graphics produced in part using Stawitz and Li (2025).

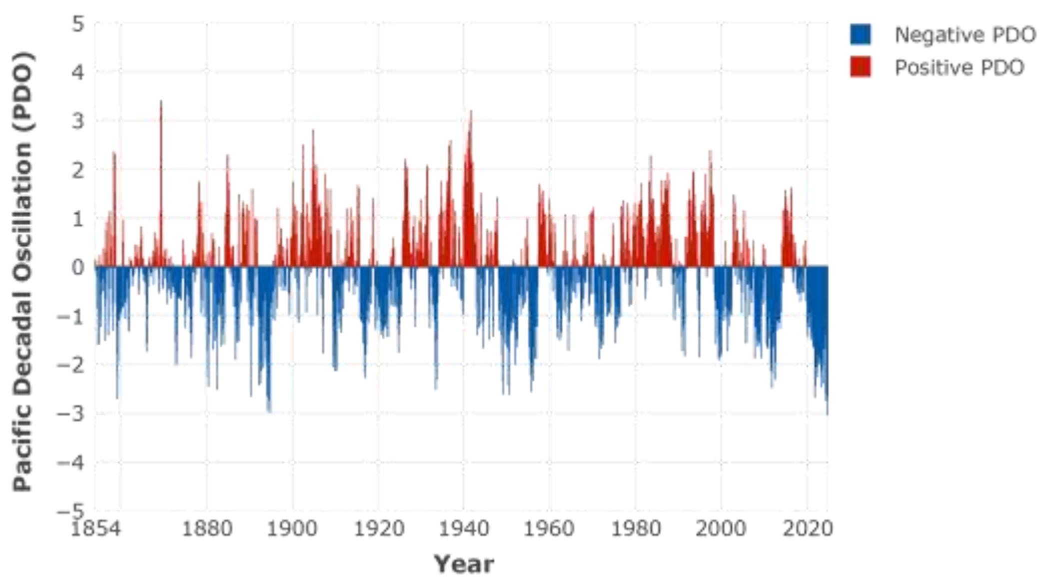

Figure 13. Pacific Decadal Oscillation from 1854–2024 with positive warm periods in red and negative cool periods in blue

2.4.3.5 Tropical Cyclones

Rationale: The effects of tropical cyclones are numerous and well known. At sea, storms disrupt and endanger shipping traffic as well as fishing effort and safety. The Hawaiʻi longline fishery, for example, has had serious problems with vessels dodging storms at sea, delayed departures, and inability to make it safely back to Honolulu because of bad weather. When cyclones encounter land, their intense rains and high winds can cause severe property damage, loss of life, soil erosion, and flooding. Associated storm surge, the large volume of ocean water pushed toward shore by cyclones' strong winds, can cause severe flooding and destruction.

Status:

Eastern North Pacific. Tropical cyclone activity was below the 1991–2020 average in the Eastern Pacific in 2024. There were 13 named storms, 4 of which were hurricanes. There were 3 major hurricanes (category 3 or higher). Accumulated Cyclone Energy (ACE) was about 67% the 1991–2020 average in the Eastern North Pacific. In addition to season totals, early season tropical cyclone activity and ACE were at a record low in 2024, with this being only the second year in this time series with no activity in June. Portions of this summary inserted from https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202406 and https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202413.

Central North Pacific. Early season tropical cyclone activity and ACE were at a record low in 2024 in the Central North Pacific, with this being only the second year in this time series with no activity in June. On August 19th, Hurricane Hone formed in the Central Pacific and peaked as a Category 1 hurricane with winds of 85 mph. Hone brought gusty winds and flooding rains to the Island of Hawaiʻi as it passed south of the island chain. Overall, Central Pacific tropical cyclone activity was below the 1991–2020 average in 2024. There were 2 named storms, both hurricanes, though neither became a major hurricane. On average (1991–2020), the central Pacific sees four named storms, two hurricanes, and one major hurricane each year. The 2024 ACE index was well below the 1991–2020 average. Portions of this summary inserted from https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202406, https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202407, and https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202408.

Western North Pacific. Early season tropical cyclone activity and ACE were at a record low in 2024. However, this changed in November, when four named storms were simultaneously active. This was the first instance of four simultaneous named storms in the West Pacific during the month of November. Overall, though, storm activity was near average. The Western Pacific saw 23 named storms in 2024. Of these storms, 15 were typhoons, and 9 became major typhoons. These counts were all close to average (1991–2020), although ACE was only about 67% the long-term average. Since 1980, the number of named storms and typhoons has decreased slightly at a rate of about 1 storm per decade and the total number of storms has decreased at a rate of about 2 storms per decade. Portions of the summary inserted from https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202406 and https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202411.

South Pacific. South Pacific tropical cyclone activity was roughly average in 2024. There were 11 named storms, 4 of which became cyclones and 2 major cyclones. The 2024 ACE was less than the 1991–2020 average.

Description: This indicator uses historical data from the NOAA National Climate Data Center (NCDC) International Best Track Archive for Climate Stewardship to track the number of tropical cyclones in the western, central, eastern, and southern Pacific basins. This indicator also monitors the Accumulated Cyclone Energy (ACE) Index which is a way of monitoring the frequency, strength, and duration of tropical cyclones based on wind speed measurements.

The annual frequency of storms passing through each basin is tracked and Figure 14 shows the representative breakdown of Saffir-Simpson hurricane categories.

Every cyclone has an ACE Index value, which is a number based on the maximum wind speed measured at six-hourly intervals over the entire time that the cyclone is classified as at least a tropical storm (wind speed of at least 34 knots; 39 mph). Therefore, a storm's ACE Index value accounts for both strength and duration. Figure 15 shows the ACE values for each hurricane/typhoon season and has a horizontal line representing the average annual ACE value.

Timeframe: Annual.

Region/Location:

Eastern North Pacific: east of 140° W, north of the equator.
Central North Pacific: 180° - 140° W, north of the equator.
Western North Pacific: west of 180°, north of the equator.
South Pacific: south of the equator.

Measurement Platform: Satellite.

Data available at: https://www.ncei.noaa.gov/data/international-best-track-archive-for-climate-stewardship-ibtracs/v04r01/access/csv/.

Sourced from: Knapp et al. (2010), Knapp et al. (2018), and NOAA (2025c).

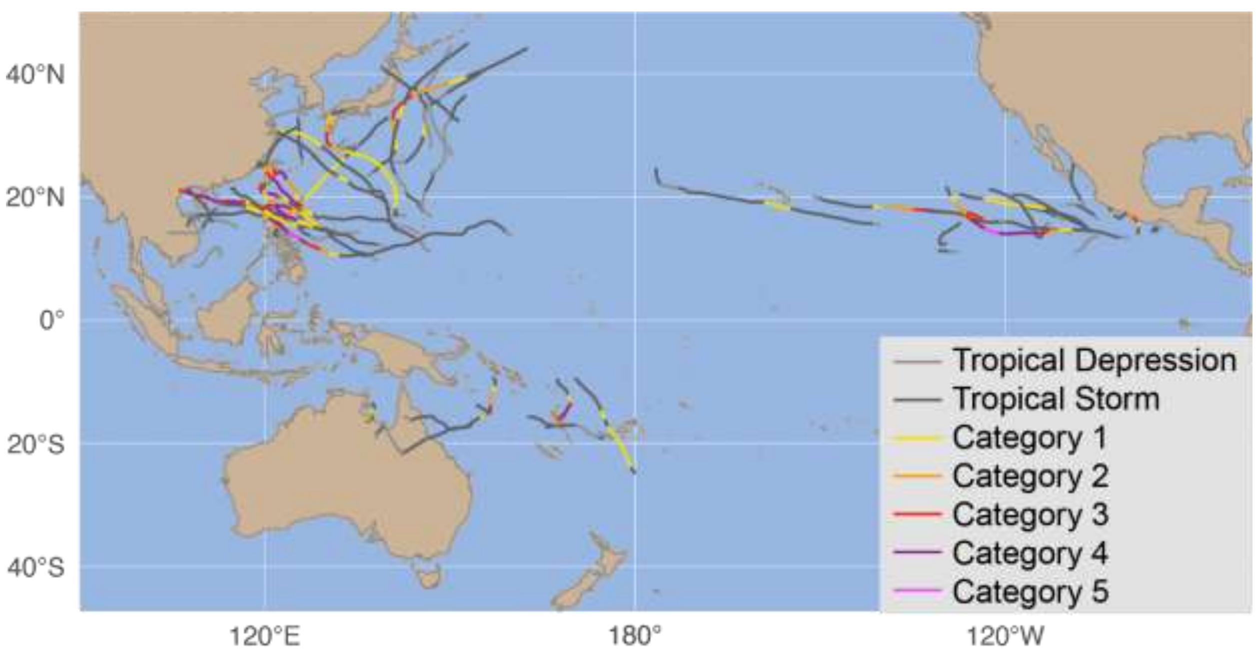

Figure 14. 2024 Pacific basin tropical cyclone tracks

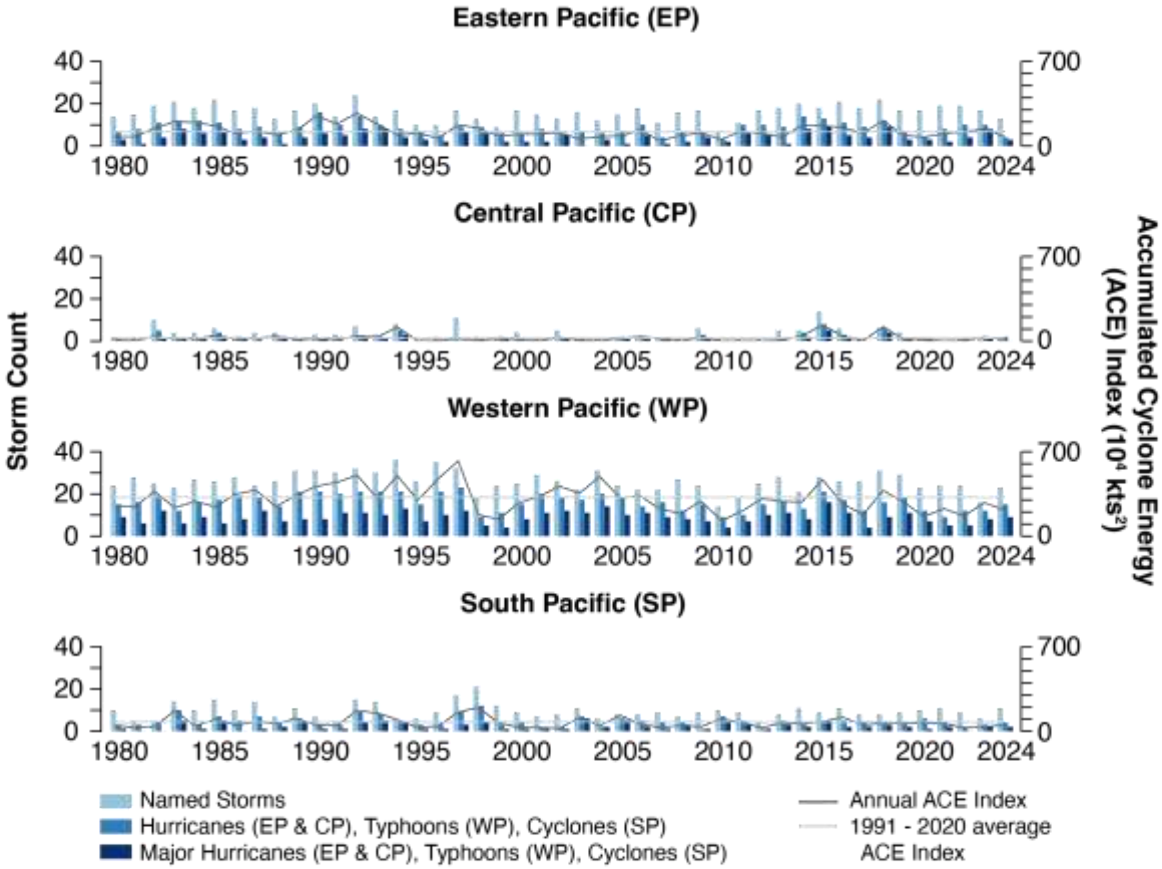

Figure 15. Storm counts (bars) and Accumulated Cyclone Energy (ACE) index values (lines) in each region of the Pacific. Both annual ACE index (black lines) and 1991–2020 average ACE index (grey lines) are shown

2.4.3.6 Sea Surface Temperature and Anomaly

Rationale: Sea surface temperature (SST) is one of the most directly observable existing measures for tracking increasing ocean temperatures. SST varies in response to natural climate cycles such as the ENSO and is projected to rise as a result of anthropogenic climate change. Both short-term variability and long-term trends in SST impact the marine ecosystem. Understanding the mechanisms through which organisms are impacted and the time scales of these impacts is an area of active research.

Status:

Pacific Remote Island Areas Grid: Annual mean SST was 28.74 ºC in 2024. Over the period of record, monthly SST shows a weak increasing trend of 0.0075 ºC yr^{-1}. Monthly SST values in 2024 ranged from 27.47 – 29.36 ºC, within the range of temperatures seen (25.70 – 30.15 ºC) over the previous years of the time series (1985-2022). The annual anomaly was 0.67 ºC warmer than the reference (1985-2009) climatology, with strongest warming in the northern part of the region.

Johnston Atoll Grid: Annual mean SST was 27.03 ºC in 2024. Over the period of record, annual SST has increased at a rate of 0.017 ºC yr^{-1}. Monthly SST values in 2024 ranged from 25.86 – 28.14ºC, within the range of temperatures seen (24.56 – 29.31 ºC) over the previous years of the time series (1985-2022). The annual anomaly was 0.44ºC hotter than the reference (1985-2009) climatology.

Wake Atoll Grid: Annual mean SST was 27.93 ºC in 2024. Over the period of record, annual SST has increased at a rate of 0.025 ºC yr^{-1}. Monthly SST values in 2024 ranged from 26.32– 29.37ºC, within the range of temperatures seen (24.77 – 30.06 ºC) over the previous years of the time series (1985-2023). The annual anomaly was 0.49ºC hotter than the reference (1985-2009) climatology.

Note that from the top to bottom in Figure 16, Figure 17, and Figure 18, panels show climatological SST (1985-2009), 2024 SST anomaly, time series of monthly mean SST, and time series of monthly SST anomaly.

Description: Satellite remotely-sensed monthly sea surface temperature (SST) is averaged across each of the PRIA Grid (1°S – 7°N, 159° – 177°W; including Howland, Baker, Jarvis, Palmyra, Kingman Reef), Johnston Island (16° – 17°N, 168° – 170°W), and Wake Atoll (17.7° – 20.7°N, 165° – 168°W). Time series of monthly mean SST averaged over the respective grids are presented. Additionally, spatial climatology and anomalies are shown. Data are from NOAA Coral Reef Watch CoralTemp v3.1.

Timeframe: 1985-2024, Monthly.

Location: PRIA Grid (1°S – 7°N, 159° – 177°W); Johnston Atoll (16° – 17°N, 168° – 170°W), and Wake Atoll (17.7° – 20.7°N, 165° – 168°W)

Measurement Platform: Satellite.

Sourced from: NOAA OceanWatch (2025a).

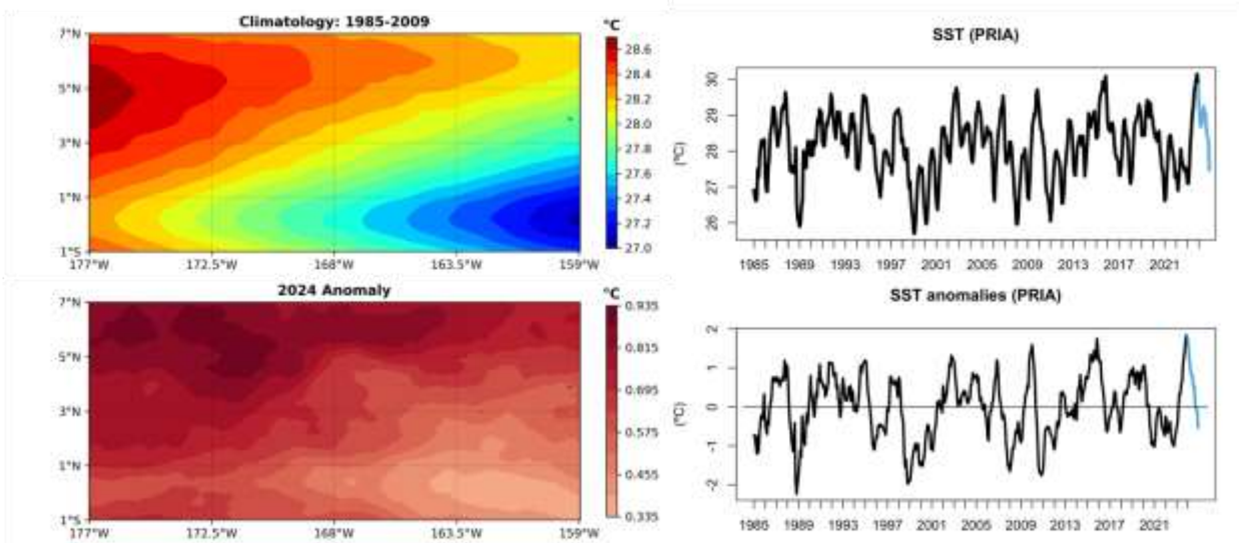

Figure 16. Sea surface temperature climatology and anomalies from the PRIA Grid

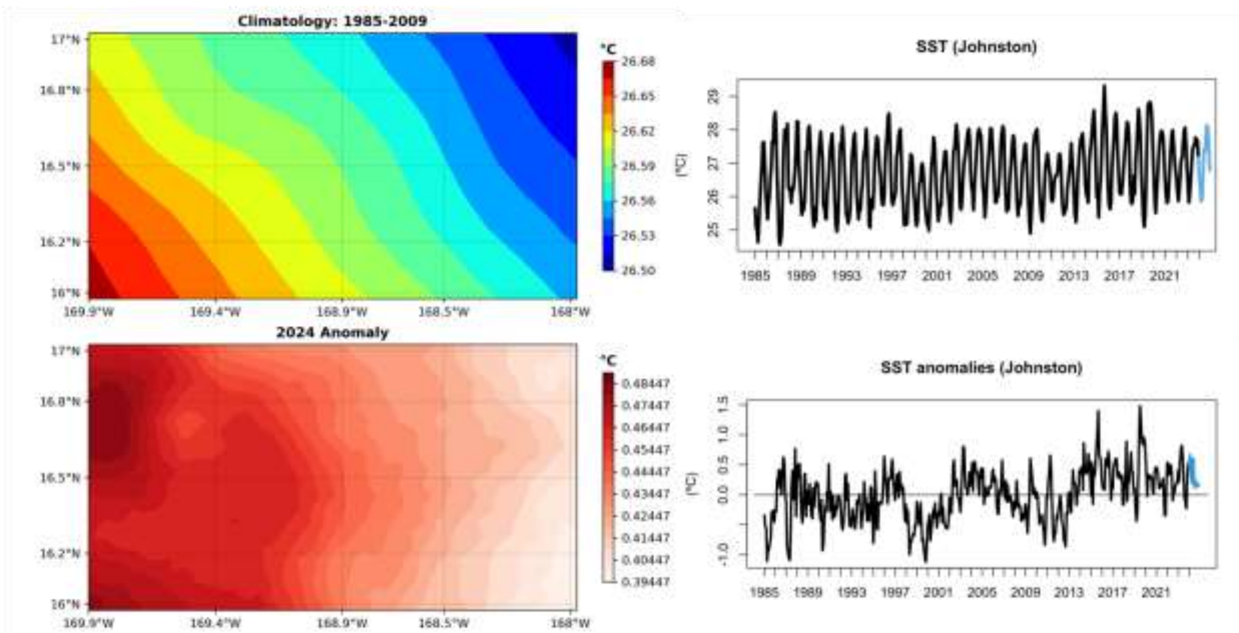

Figure 17. Sea surface temperature climatology and anomalies from Johnston Atoll Grid

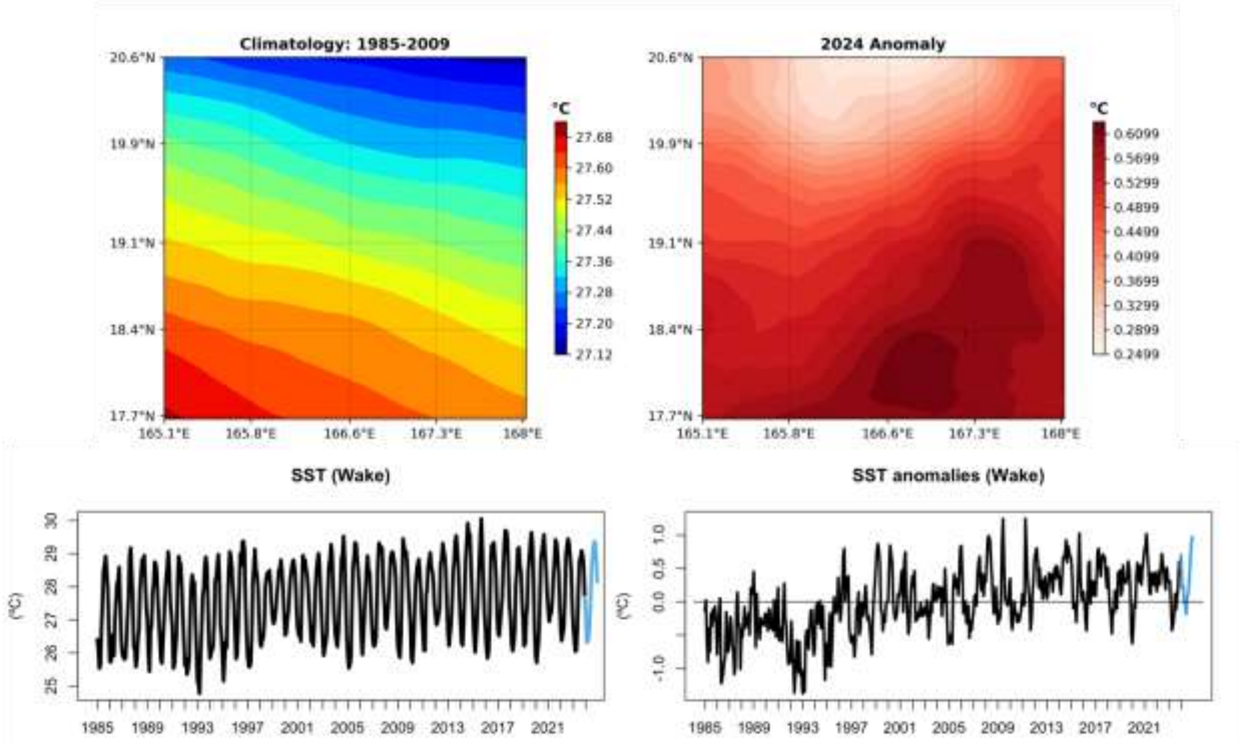

Figure 18. Sea surface temperature climatology and anomalies from Wake Atoll Grid

2.4.3.7 Coral Thermal Stress Exposure: Degree Heating Weeks

Rationale: Degree heating weeks are one of the most widely used metrics for assessing exposure to coral bleaching-relevant thermal stress.

Description: Here we present a metric of exposure to thermal stress that is relevant to coral bleaching. Degree Heating Weeks (DHW) measure time and temperature above a reference 'summer maximum', presented as a rolling sum weekly thermal anomalies over a 12-week window. Higher DHW measures imply a greater likelihood of mass coral bleaching or mortality from thermal stress.

Status: After experiencing major heat stress events in 2015–2016 and 2019, both Howland and Baker Islands and the Northern Line Islands experienced major heat stress events in 2023 and the beginning months of 2024 with mass mortality expected.

The NOAA Coral Reef Watch program uses satellite data to provide current reef environmental conditions to quickly identify areas at risk for coral bleaching. Bleaching is the process by which corals lose the symbiotic algae that give them their distinctive colors. If a coral is severely bleached, disease and death become likely.

The NOAA Coral Reef Watch (CRW) daily 5-km satellite coral bleaching Degree Heating Week (DHW) product presented here shows accumulated heat stress, which can lead to coral bleaching and death. The scale goes from 0 to 20 °C-weeks. The DHW product accumulates the instantaneous bleaching heat stress (measured by Coral Bleaching HotSpots) during the most-recent 12-week period. It is directly related to the timing and intensity of coral bleaching. Significant coral bleaching usually occurs when DHW values reach 4 °C-weeks. By the time

DHW values reach 8 °C-weeks, widespread bleaching is likely and significant mortality can be expected.

Timeframe: 2014–2024, daily data.

Region/Location: Global.

Sourced from: NOAA Coral Reef Watch (2024).

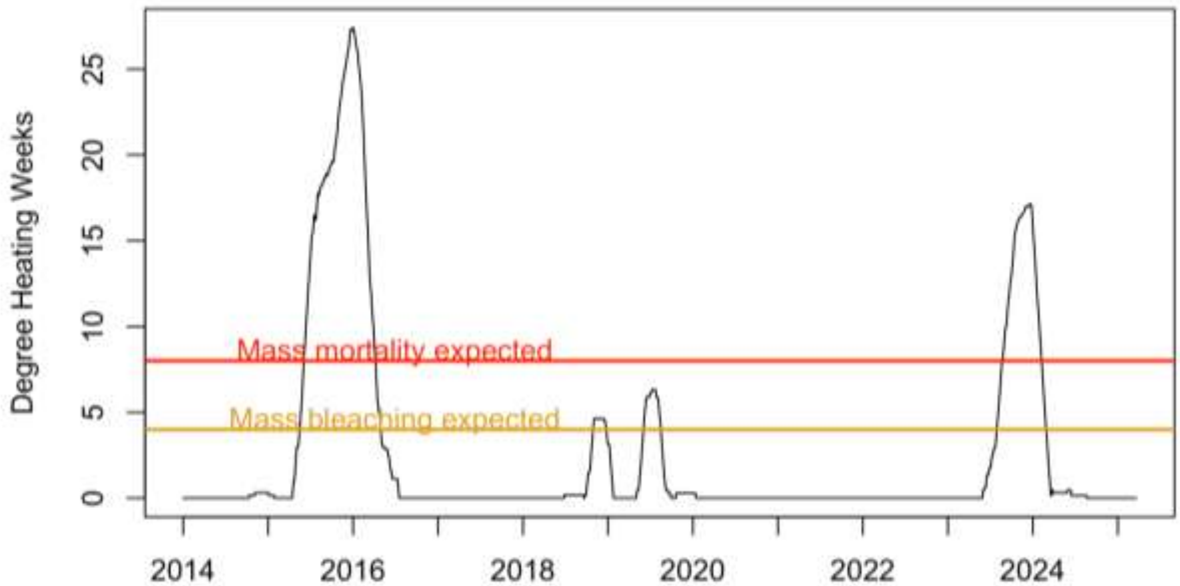

Figure 19. Coral Thermal Stress Exposure, Northern Line Islands Virtual Station 2014–2024 (Coral Reef Watch Degree Heating Weeks)

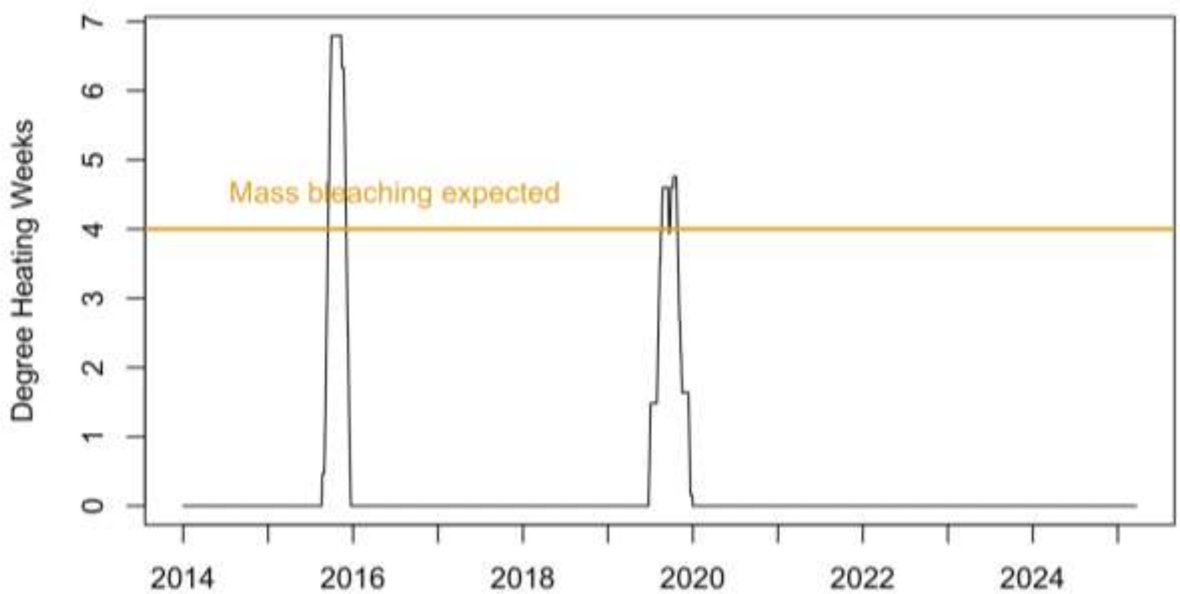

Figure 20. Coral Thermal Stress Exposure, Johnston Atoll Virtual Station 2014–2024 (Coral Reef Watch Degree Heating Weeks)

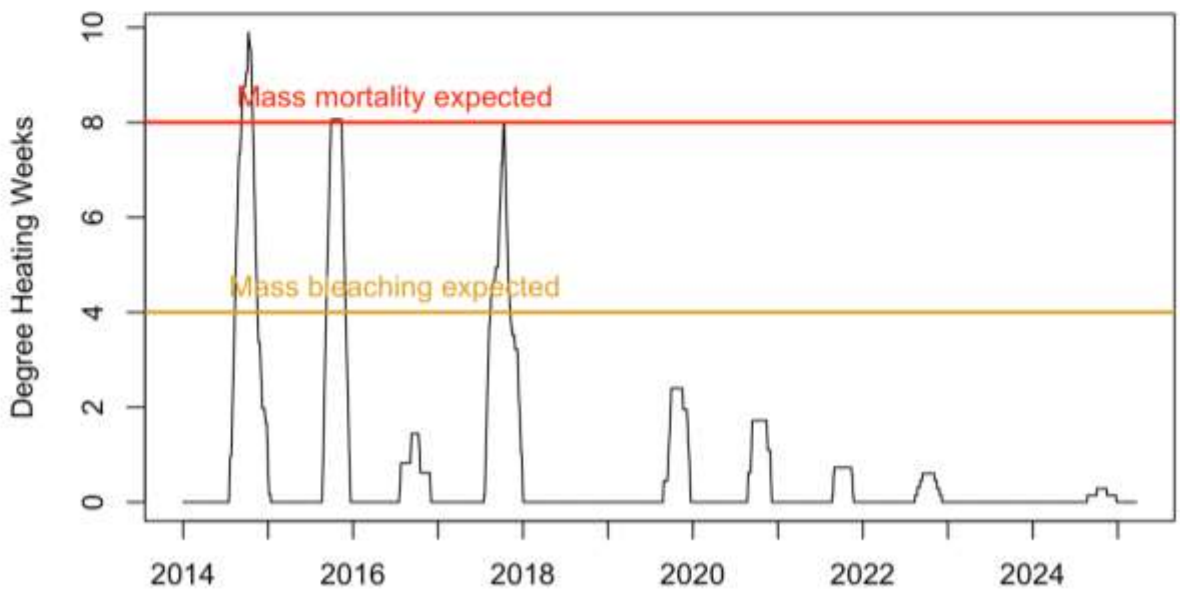

Figure 21. Coral Thermal Stress Exposure, Wake Atoll Virtual Station 2014–2024 (Coral Reef Watch Degree Heating Weeks)

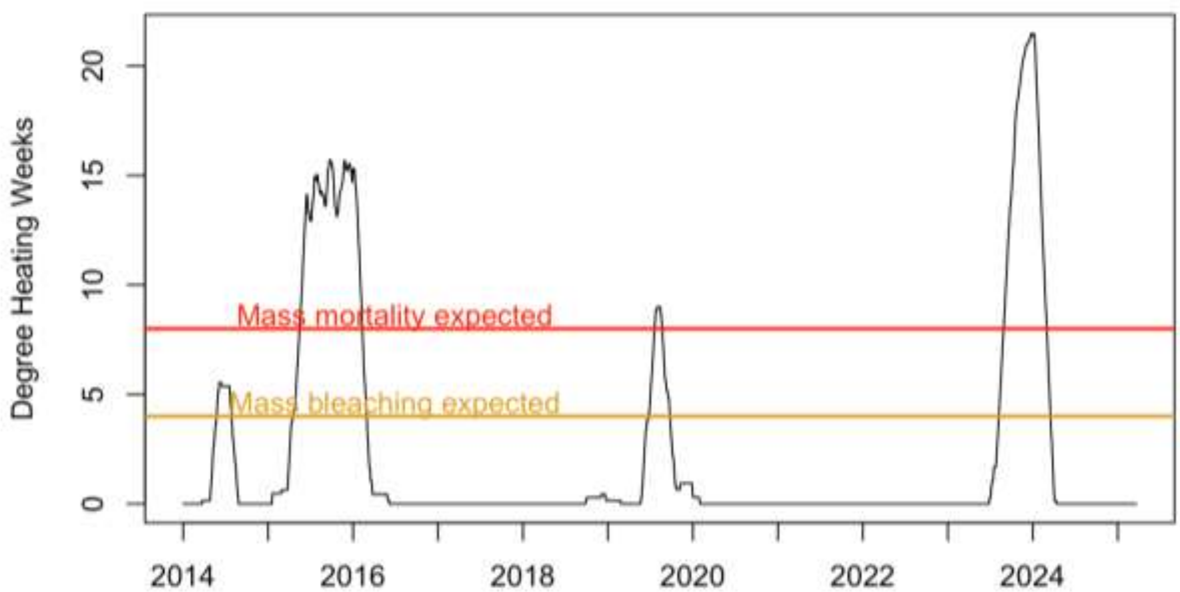

Figure 22. Coral Thermal Stress Exposure, Howland/Baker Virtual Station 2014–2024 (Coral Reef Watch Degree Heating Weeks)

2.4.3.8 Chlorophyll-*a* and Anomaly

Rationale: Chlorophyll-*a* (Chl-A) is one of the most directly observable measures we have for tracking increasing ocean productivity.

Status:

Pacific Remote Island Area: Annual mean Chl-A was 0.185 mg/m^3 in 2024. Over the period of record, annual Chl-A has shown a significant linear decrease at a rate of 0.00062 mg/m^3/year. Monthly Chl-A values in 2024 ranged from 0.163 – 0.212 mg/m^3, within the range of Chl-A concentrations seen (0.062 – 0.268 mg/m^3) over the previous years of the time series (1998-2023). The annual anomaly was 0.0019 mg/m^3 higher than the reference (1998-2009) climatological values, with stronger positive values in the southern boundary of the region.

Johnston Atoll: Annual mean Chl-A was 0.054 mg/m^3 in 2024. Over the period of record, annual Chl-A has shown a significant linear decrease at a rate of 0.00023 mg/m^3/year. Monthly Chl-A values in 2024 ranged from 0.047-0.065 mg/m^3, within the range of Chl-A concentrations seen (0.043 – 0.101 mg/m^3) over the previous years of the time series (1998-2023). The annual anomaly was 0.0061 mg/m^3 lower than the reference (1998-2009) climatological values.

Wake Atoll: Annual mean Chl-A was 0.043 mg/m^3 in 2024. Over the period of record, annual Chl-A has shown a significant linear decrease at a rate of 0.00025 mg/ m^3/year. Monthly Chl-A values in 2024 ranged from 0.040-0.048 mg/m^3, within the range of Chl-A concentrations seen (0.035 – 0.123 mg/m^3) over the previous years of the time series (1998-2023). The annual anomaly was 0.0074 mg/m^3 lower than the reference (1998-2009) climatological values.

Description: Chlorophyll-A Concentration from 1998–2024 was derived from the ESA Ocean Color Climate Change Initiative dataset, v6.0. A monthly climatology was generated across the entire period to provide an anomaly time series. An annual anomaly was generated in reference to the 1998-2009 climatology to provide a 2024 spatial anomaly.

ESA Ocean Color Climate Change Initiative dataset is a merged dataset, combining data from SeaWIFS, MODIS-Aqua, MERIS, and VIIRS to provide a homogeneous time-series of ocean color. Data was accessed from the OceanWatch Central Pacific portal.

Timeframe: 1998–2024, daily data available, monthly means shown.

Region/Location: Global.

Measurement Platform: SeaWIFS, MODIS-Aqua, MERIS, and VIIRS.

Sourced from: NOAA OceanWatch (2025b).

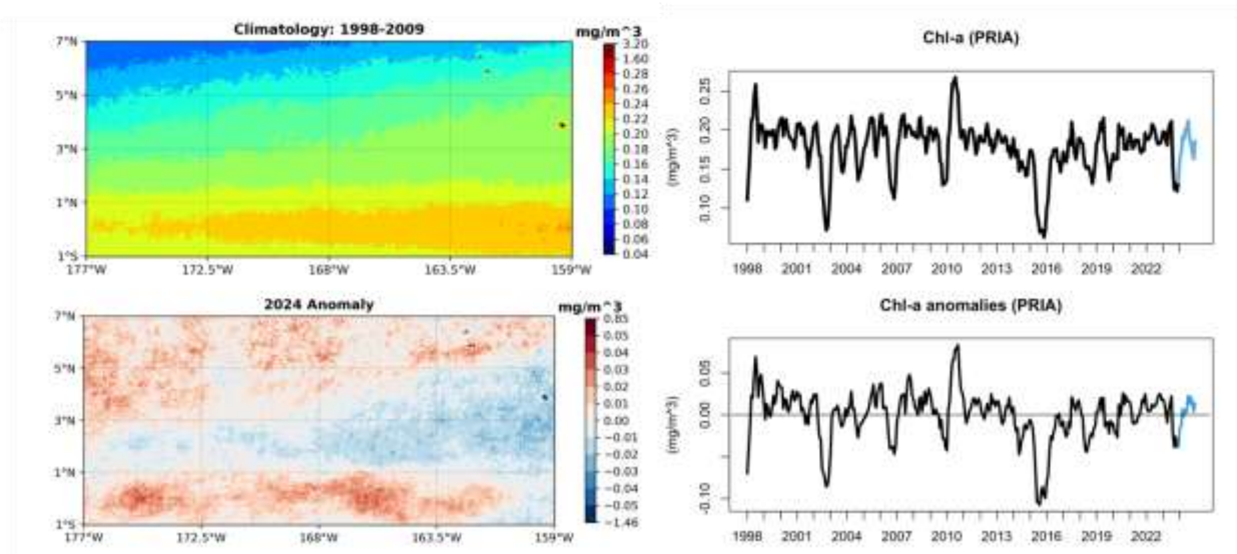

Figure 23. Chlorophyll-*a* and Chlorophyll-*a* Anomaly from the PRIA Grid

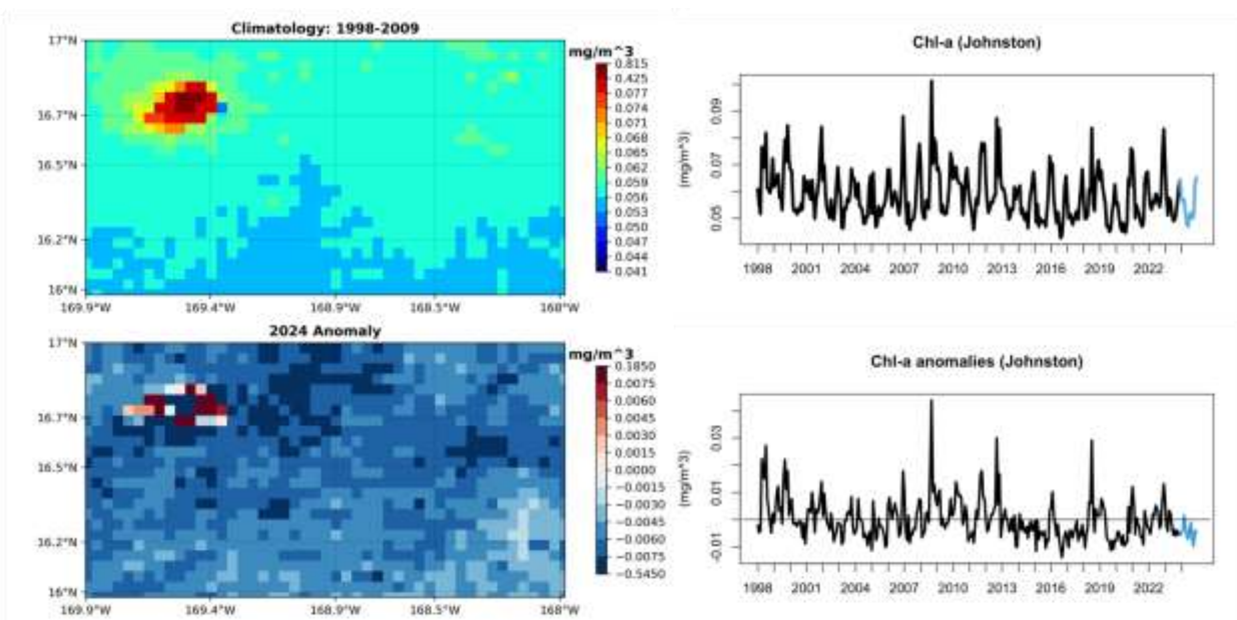

Figure 24. Chlorophyll-*a* and Chlorophyll-*a* Anomaly from the Johnston Atoll Grid

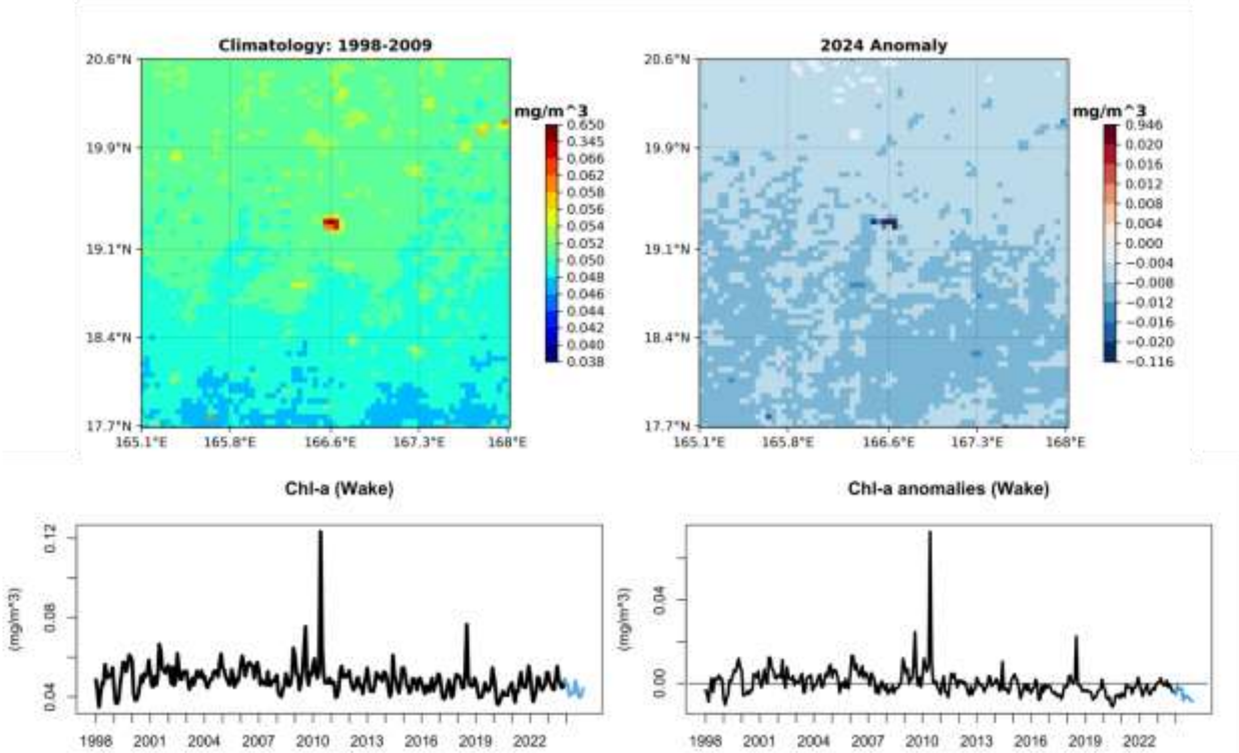

Figure 25. Chlorophyll-*a* and Chlorophyll-*a* Anomaly from the Wake Atoll Grid

2.4.3.9 Rainfall

Rationale: Rainfall may have substantive effects on the nearshore environment and is a potentially important co-variate with the landings of particular stocks.

Description: The CPC (Climate Prediction Center) Merged Analysis of Precipitation (CMAP) is a technique which produces pentad and monthly analyses of global precipitation in which observations from rain gauges are merged with precipitation estimates from several satellite-based algorithms (infrared and microwave; (NOAA 2002)). The analyses are on a 2.5 x 2.5-degree latitude/longitude grid and extend back to 1979. CMAP Precipitation data are provided by the NOAA Ocean and Atmospheric Research (OAR) Earth Sciences Research Laboratory (ESRL) Physical Sciences Division (PSD), Boulder, Colorado, USA, from their website at https://www.esrl.noaa.gov/psd/. These data are comparable (but should not be confused with) similarly combined analyses by the Global Precipitation Climatology Project which are described in Huffman et al. (1997).

It is important to note that the input data sources to make these analyses are not constant throughout the period of record. For example, SSM/I (passive microwave - scattering and emission) data became available in July of 1987; prior to that the only microwave-derived estimates available are from the MSU algorithm (Spencer 1993) which is emission-based thus precipitation estimates are available only over oceanic areas. Furthermore, high temporal resolution IR data from geostationary satellites (every 3-hr) became available during 1986; prior to that, estimates from the OPI technique (Xie and Arkin 1997) are used based on OLR from polar orbiting satellites.

The merging technique is thoroughly described in Xie and Arkin (1997). Briefly, the methodology is a two-step process. First, the random error is reduced by linearly combining the satellite estimates using the maximum likelihood method, in which case the linear combination coefficients are inversely proportional to the square of the local random error of the individual data sources. Over global land areas the random error is defined for each time period and grid location by comparing the data source with the rain gauge analysis over the surrounding area. Over oceans, the random error is defined by comparing the data sources with the rain gauge observations over the Pacific atolls. Bias is reduced when the data sources are blended in the second step using the blending technique of Reynolds (1988). Here the data output from step 1 is used to define the "shape" of the precipitation field and the rain gauge data are used to constrain the amplitude.

Timeframe: Monthly.

Region/Location: Global.

Measurement Platform: *In-situ* station gauges and satellite data.

Source: NOAA ESRL (2024).

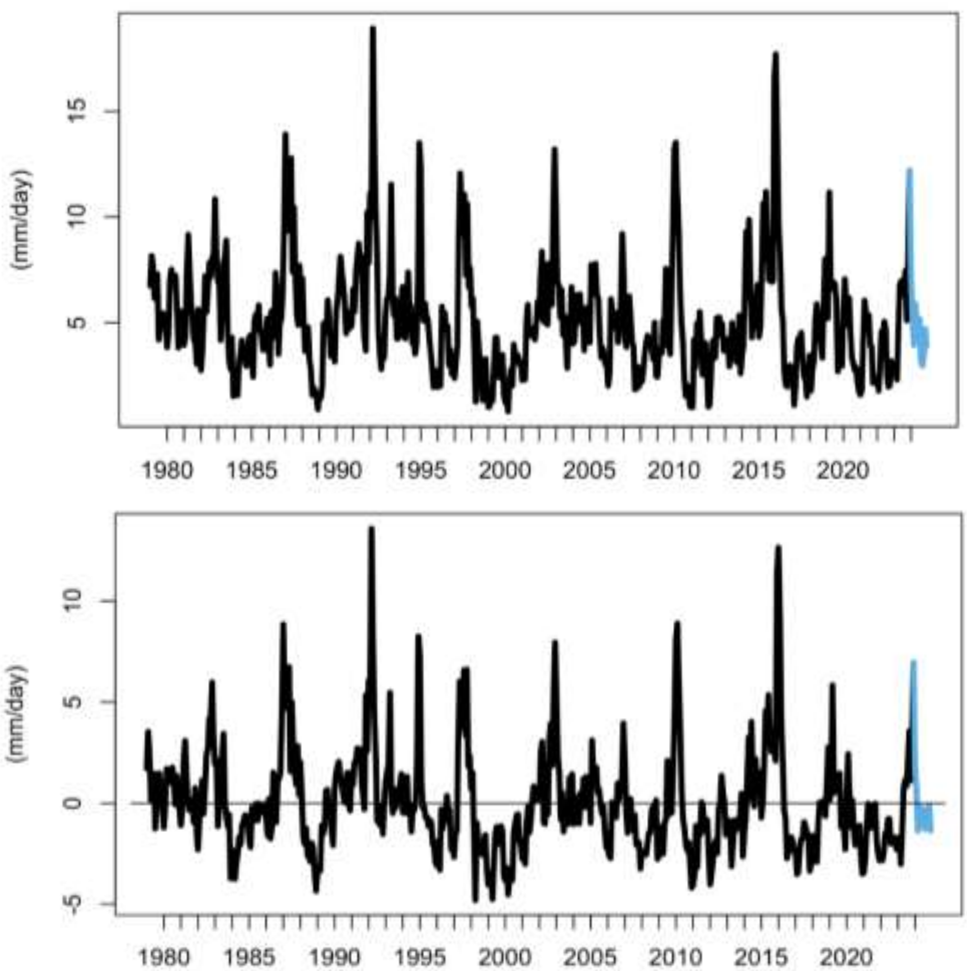

Figure 26. CMAP precipitation (top) and anomaly (bottom) across the PRIA Grid with 2024 values in blue

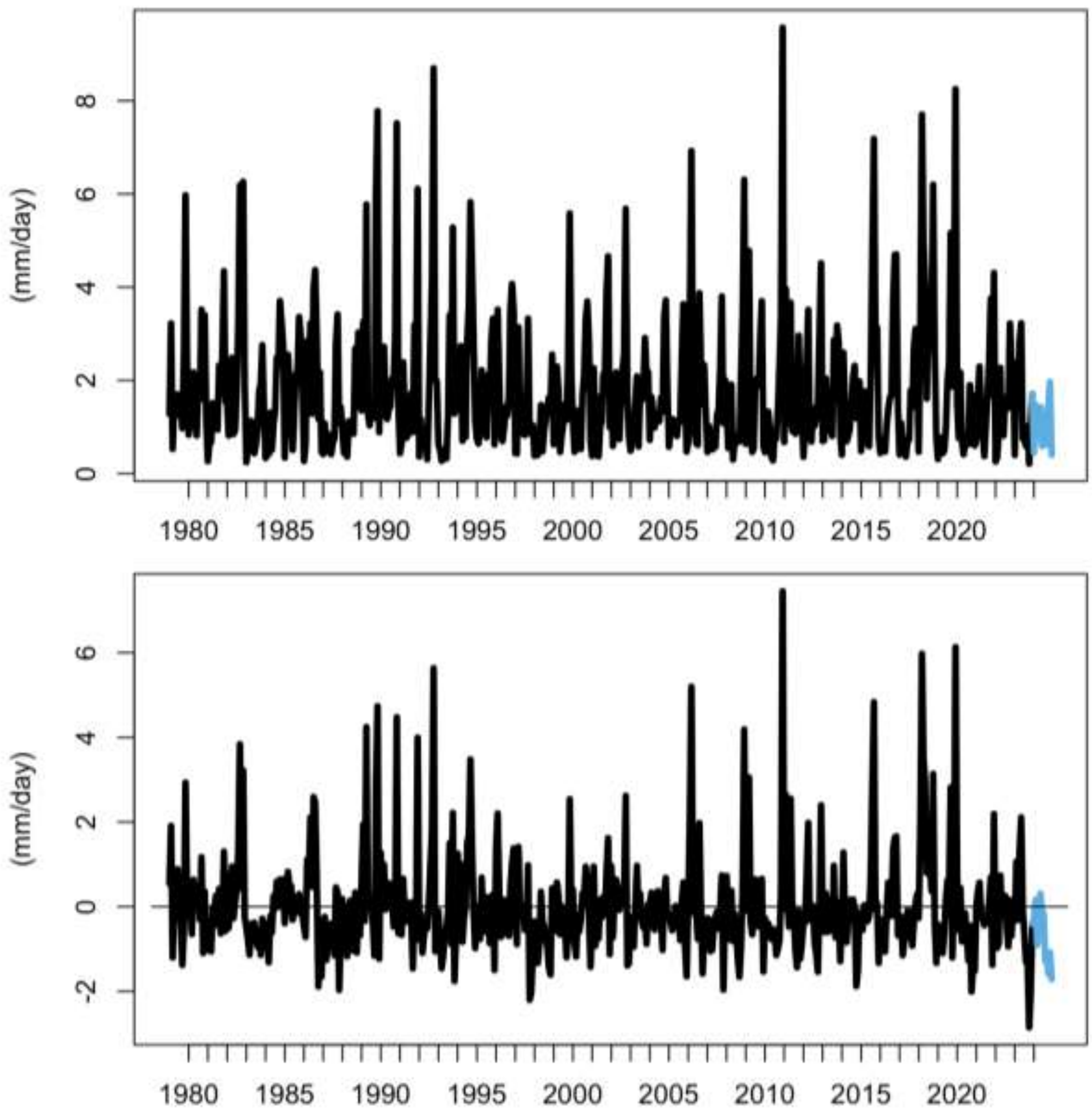

Figure 27. CMAP precipitation (top) and anomaly (bottom) across the Johnston Atoll Grid with 2024 values in blue

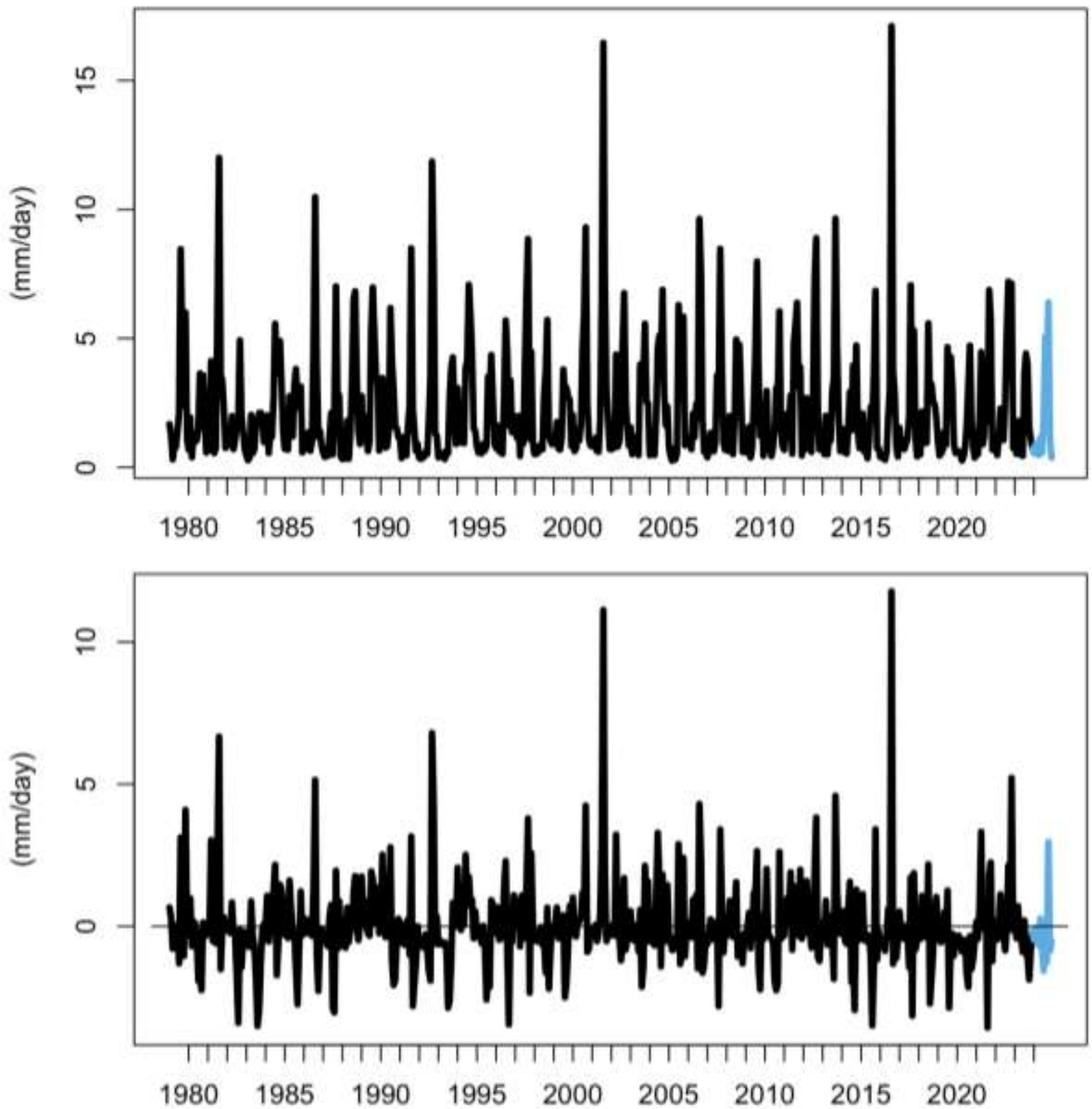

Figure 28. CMAP precipitation (top) and anomaly (bottom) across the Wake Atoll Grid with 2024 values in blue

2.4.3.10 Sea Level (Sea Surface Height and Anomaly)

Rationale: Rising coastal sea levels can result in a number of coastal impacts, including inundation of infrastructure, increased damage resulting from storm-driven waves and flooding, and saltwater intrusion into freshwater supplies.

Description: Monthly mean sea level time series of local and basin-wide sea surface height and sea surface height anomalies, including extremes.

Timeframe: Monthly.

Region/Location: Observations from selected sites across the Western Pacific.

Measurement Platform: Satellite and *in situ* tide gauges.

Source: Aviso (2024), NOAA CoastWatch (2024), and NOAA (2025d).

2.4.3.10.1 Basin-Wide Perspective

This image of the mean sea level anomaly for January 2024 compared to 1993-2020 climatology from satellite altimetry shows the peak of the 2024 El Niño conditions across the Pacific Basin. The image captures the fact that sea level is higher in the Eastern and Central Pacific and lower in the Western Pacific (this basin-wide perspective provides a context for the location-specific sea level/sea surface height images that follow).

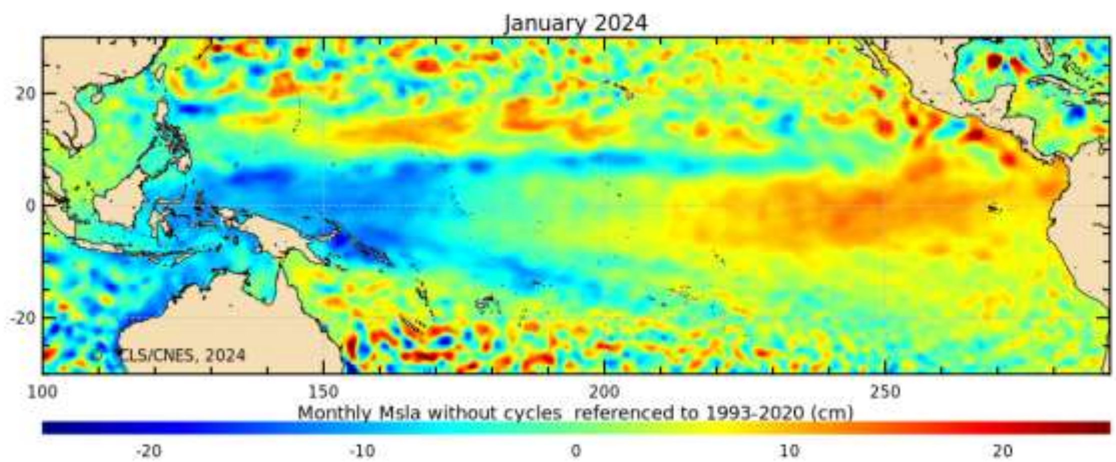

Figure 29a. Sea surface height and anomaly across the Pacific Ocean

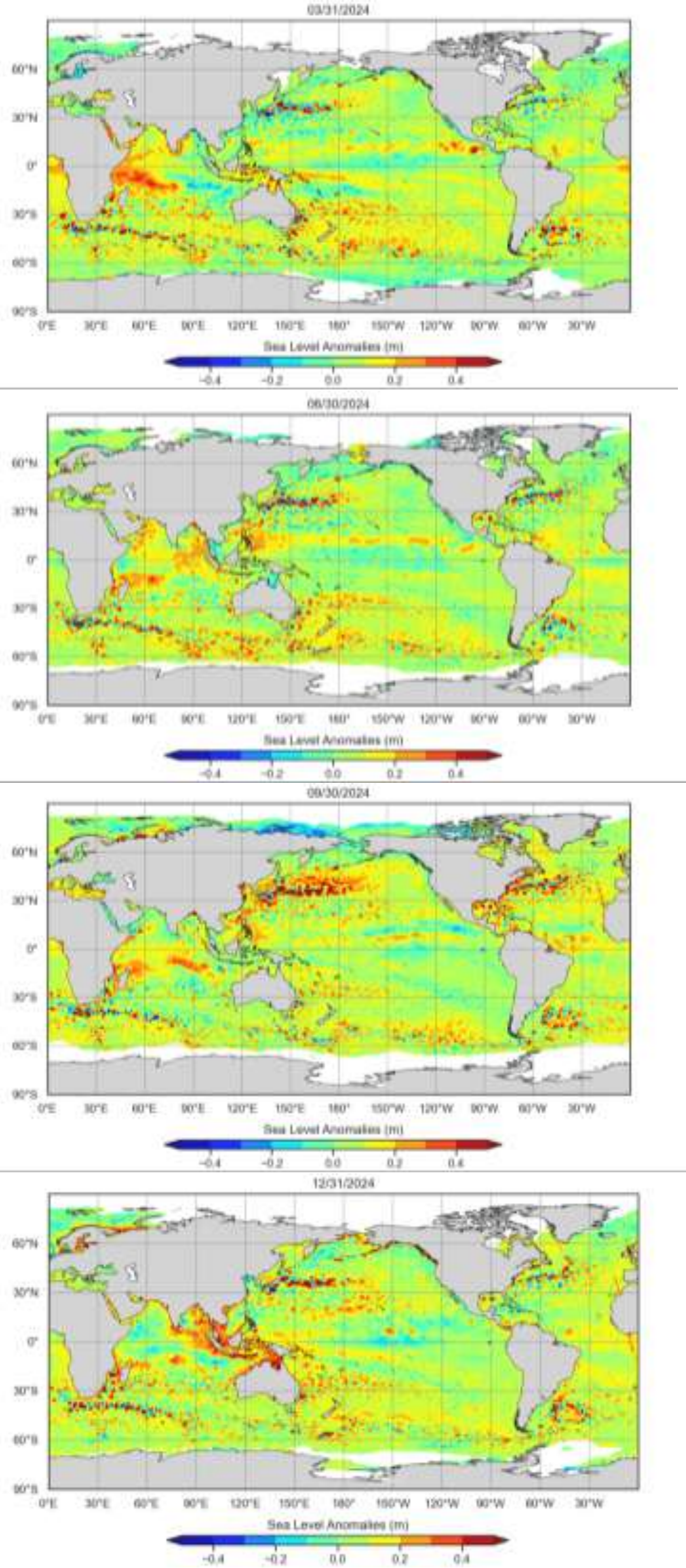

Figure 29b. Quarterly maps of mean sea level anomalies during 2024

Altimetry data are provided by the NOAA Laboratory for Satellite Altimetry, accessed from NOAA CoastWatch (2024).

2.4.3.10.2 Local Sea Level

These time-series from *in situ* tide gauges provide a perspective on sea level trends within each Archipelago (Tide Station Time Series from NOAA Center for Operational Oceanographic Products and Services, or CO-OPS).

The following figures and descriptive paragraphs were inserted from NOAA Tides and Currents website. Figure 30 shows the monthly mean sea level without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents. The long-term linear trend is also shown, including its 95% confidence interval. The plotted values are relative to the most recent Mean Sea Level datum established by CO-OPS. The calculated trends for all stations are available as a table in millimeters/year and in feet/century. If present, solid vertical lines indicate times of any major earthquakes in the vicinity of the station and dashed vertical lines bracket any periods of questionable data or datum shift.

The relative sea level trend is 2.06 millimeters/year with a 95% confidence interval of +/- 0.38 mm/yr based on monthly mean sea level data from 1950 to 2024, which is equivalent to a change of 0.68 feet in 100 years (Figure 30).

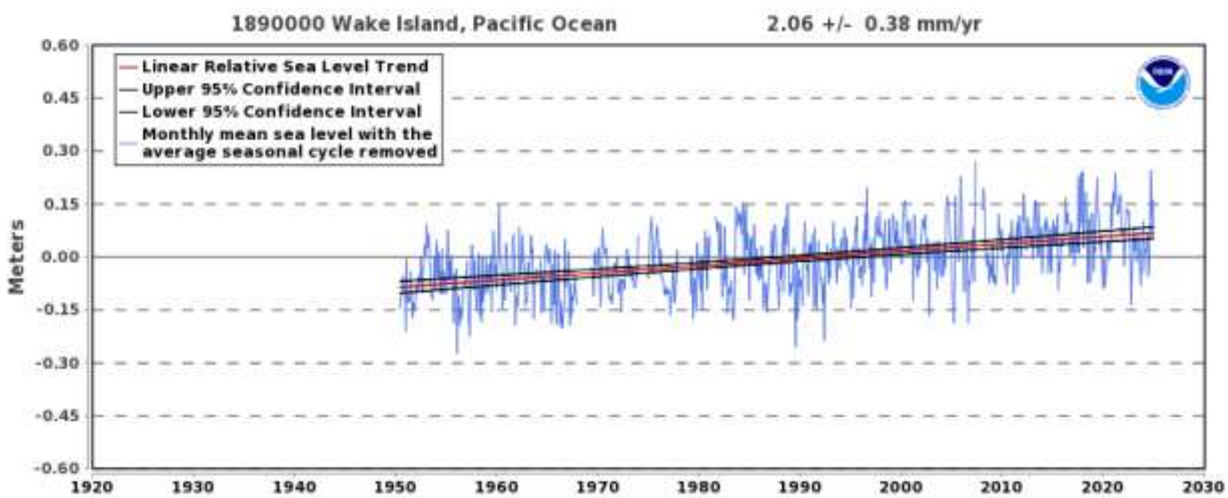

Figure 30. Monthly mean sea level without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents at Wake Island

2.5 ESSENTIAL FISH HABITAT

2.5.1 Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) includes provisions concerning the identification and conservation of essential fish habitat (EFH) and, under the EFH final rule, habitat areas of particular concern (HAPC) (50 Code of Federal Regulations [CFR] 600.815). The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." HAPC are those areas of EFH identified pursuant to 50 CFR 600.815(a)(8), and meeting one or more of the following considerations: (1) ecological function provided by the habitat is important; (2) habitat is sensitive to human-induced environmental degradation; (3) development activities are, or will be, stressing the habitat type; or (4) the habitat type is rare.

NMFS and the regional fishery management councils must describe and identify EFH in fishery management plans (FMPs) or FEPs minimize to the extent practicable the adverse effects of fishing on EFH and must identify other actions to encourage the conservation and enhancement of EFH. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH. Councils also have the authority to comment on Federal or state agency actions that would adversely affect the habitat, including EFH, of managed species. Fishery management actions need to be evaluated for effects on all EFH and HAPC in the action area of effect, and not just the EFH and HAPC for the fishery undergoing the management action.

The EFH Final Rule strongly recommends regional fishery management councils and NMFS to conduct a review and revision of the EFH components of FMPs every five years (600.815(a)(10)). The Council's FEPs state that new EFH information should be reviewed, as necessary, during preparation of the annual reports by the Plan Teams. Additionally, the EFH Final Rule states "Councils should report on their review of EFH information as part of the annual SAFE report prepared pursuant to §600.315(e)." The habitat portion of the annual SAFE report is designed to meet the FEP requirements and EFH Final Rule guidelines regarding EFH reviews.

National Standard 2 guidelines recommend that the annual SAFE report summarize the best scientific information available concerning the past, present, and possible future condition of EFH described by the FEPs.

2.5.1.1 EFH Information

The EFH components of FMPs include the description and identification of EFH, lists of prey species and locations for each managed species, and optionally, HAPC. Impact-oriented components of FMPs include federal fishing activities that may adversely affect EFH, non-federal fishing activities that may adversely affect EFH; non-fishing activities that may adversely affect EFH, conservation and enhancement recommendations, and a cumulative impacts analysis on EFH. The last two components include the research and information needs section, which feeds into the Council's Five-Year Research Priorities, and the EFH update procedure, which is described in the FEP but implemented in the annual SAFE report.

The Council has described EFH for five management unit species (MUS) under its management authority, some of which are no longer MUS: pelagic (PMUS), bottomfish (BMUS), crustaceans (CMUS), former coral reef ecosystem species (CREMUS), and precious corals (PCMUS).

EFH reviews of the biological components, including the description and identification of EFH, lists of prey species and locations, and HAPC, consist of three to four parts:

- Updated species descriptions, which can be found appended to previous SAFE reports and can be used to directly update the FEP;
- Updated EFH levels of information tables, which can be found in Section 2.5.5;
- Updated research and information needs, which can be found in Section 2.5.6 and can be used to directly update the FEP; and
- An analysis that distinguishes EFH from all potential habitats used by the species, which is the basis for an options paper for the Council and can be developed if enough information exists to refine EFH.

2.5.1.2 Habitat Objectives of FEP

The habitat objective of the FEP is to refine EFH and minimize impacts to EFH, with the following sub-objectives:

- Review EFH and HAPC designations every five years based on the best available scientific information and update such designations based on the best available scientific information, when available.
- Identify and prioritize research to assess adverse impacts to EFH and HAPC from fishing (including aquaculture) and non-fishing activities, including, but not limited to, activities that introduce land-based pollution into the marine environment.

The annual reports have reviewed the precious coral EFH components, crustacean EFH component, and non-fishing impacts components. The Council's support of non-fishing activities research is monitored through the program plan and Five-Year Research Priorities, not the annual report.

2.5.1.3 Response to Previous Council Recommendations

In 2024, the Council reaffirmed the importance of incorporating recent scientific data into EFH definitions for PRIA and committed to working closely with NMFS on upcoming habitat assessments. Specifically, the Council discussed integrating new data from updated remote sensing and environmental surveys into future EFH and HAPC revisions, ensuring management actions in PRIA reflect the best available scientific information and address current habitat conditions.

2.5.2 Habitat Use by MUS and Trends in Habitat Condition

The PRIA comprise the U.S. possessions of Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Wake Island, Palmyra Atoll, and Midway Atoll (Figure 31). However, because Midway is located in the Hawaiian archipelago, it is included in the Hawaii

Archipelago FEP[1]. Therefore, PRIA does not include Midway Atoll for the purpose of federal fisheries management.

Baker Island is part of the Phoenix Islands archipelago. It is located approximately 1,600 nautical miles (nm) to the southwest of Honolulu at 0° 13' N and 176° 38' W. Baker is a coral-topped seamount surrounded by a narrow-fringing reef that drops steeply very close to the shore. The total amount of emergent land area of Baker Island is 1.4 square kilometers.

Howland Island lies approximately 35 miles due north of Baker Island and is also part of the Phoenix Islands archipelago. The island, which is the emergent top of a seamount, is fringed by a relatively flat coral reef that drops off sharply. Howland Island is approximately 1.5 miles long and 0.5 miles wide. The island is flat and supports some grasses and small shrubs. The total land area is 1.6 square kilometers.

Jarvis Island, which is part of the Line Island archipelago, is located approximately 1,300 miles south of Honolulu and 1,000 miles east of Baker Island. It sits 23 miles south of the Equator at 160° 01' W. Jarvis Island is a relatively flat, sandy coral island with a 15–20-ft beach rise. Its total land area is 4.5 square kilometers. It experiences a very dry climate.

Palmyra Atoll is a low-lying coral atoll system comprised of approximately 52 islets surrounding three central lagoons. It is approximately 1,050 nm south of Honolulu and is located at 5° 53' N and 162° 05' W. It is situated about halfway between Hawaii and American Samoa. Palmyra Atoll is located in the intertropical convergence zone, an area of high rainfall.

Kingman Reef is located 33 nm northwest of Palmyra Atoll at 6° 23' N and 162° 24' W. Along with Palmyra, it is at the northern end of the Line Island archipelago. Kingman is a series of fringing reefs around a central lagoon with no emergent islets that support vegetation.

Wake Island is located at 19° 18' N and 166° 35' E and is the northernmost atoll of the Marshall Islands group, located approximately 2,100 miles west of Hawaii. Wake Island has a total land area of 6.5 square kilometers and comprises three islets: Wake, Peale, and Wilkes.

Johnston Atoll is located at 16° 44' N and 169° 31' W and is approximately 720 nm southwest of Honolulu. French Frigate Shoals in the NWHI, about 450 nm to the northwest, is the nearest land mass. Johnston Atoll is an egg-shaped coral reef and lagoon complex comprised of four small islands totaling 2.8 square kilometers. The complex resides on a relatively flat, shallow platform approximately 34 kilometers in circumference. Johnston Island, the largest and main island, is natural, but has been enlarged by dredge-and-fill operations. Sand Island is composed of a naturally formed island on its eastern portion and is connected by a narrow, man-made causeway to a dredged coral island at its western portion. The remaining two islands, North Island and East Island, are completely man-made from dredged coral.

All commercial activity is prohibited within the Pacific Remote Island Marine National Monument (PRIMNM), which is 50 nm surrounding Palmyra Atoll and Kingman Reef and Howland and Baker Islands, and the entire US EEZ surrounding Johnston Atoll, Wake, and Jarvis Island.

[1] Midway is not administered civilly by the State of Hawaii.

Essential fish habitat in the PRIA for the four MUS comprises all substrate from the shoreline to the 700 m isobath (Figure 32). The entire water column is described as EFH from the shoreline to the 700 m isobath, and the water column to a depth of 400 m is described as EFH from the 700 m isobath to the limit or boundary of the exclusive economic zone (EEZ). While the coral reef ecosystems surrounding the islands in the PRIA have been the subject of a comprehensive monitoring program through the PIFSC Coral Reef Ecosystem Division (CRED) biennially since 2002, surveys are focused on the nearshore environments surrounding the islands, atolls, and reefs. PIFSC CRED was replaced by the Coral Reef Ecosystem Program (CREP) within the PIFSC Ecosystem Sciences Division (ESD) before being shifted to the Archipelagic Research Program (ARP).

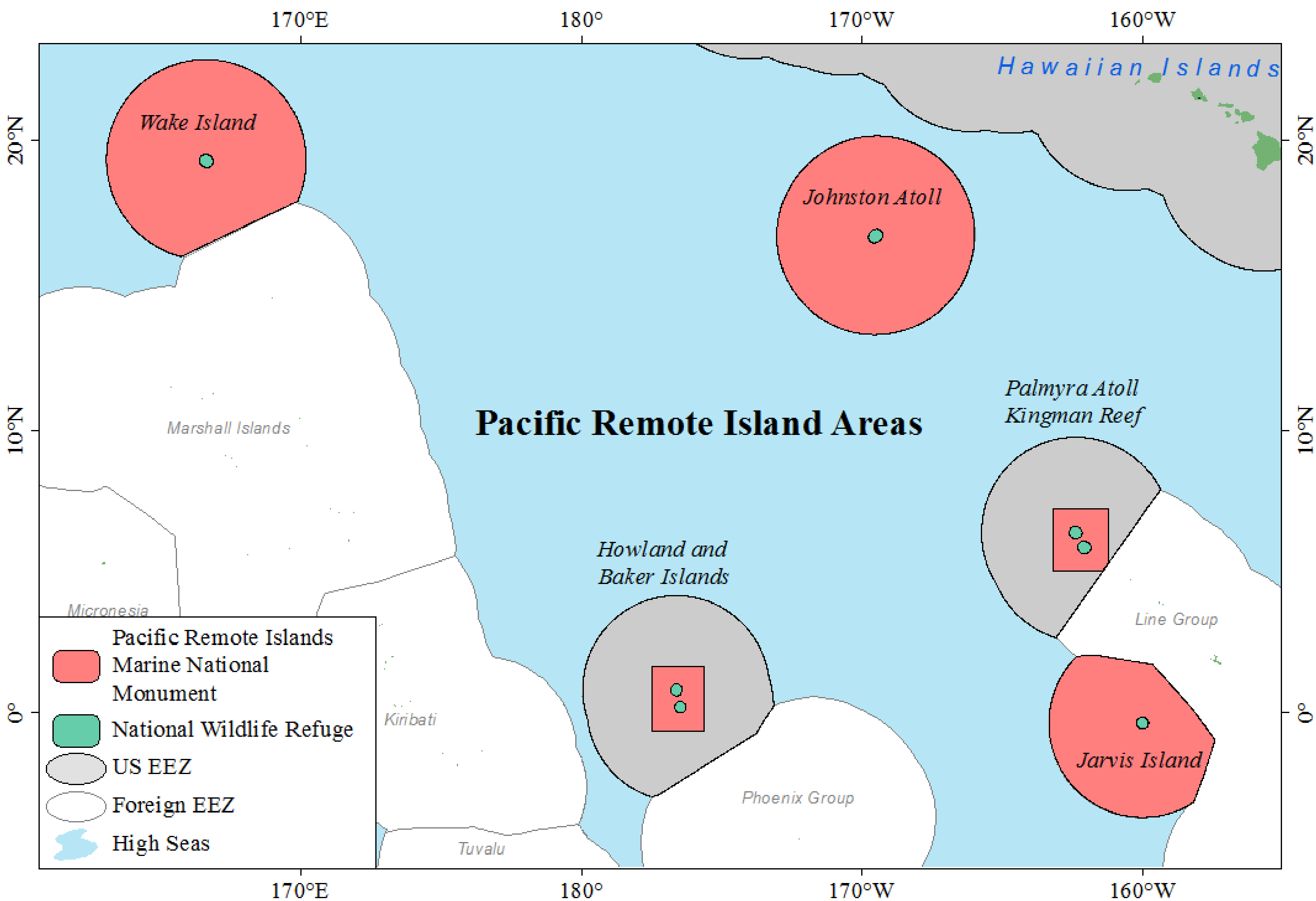

Figure 31. Pacific Remote Island Areas and the associated Pacific Remote Islands Marine National Monument

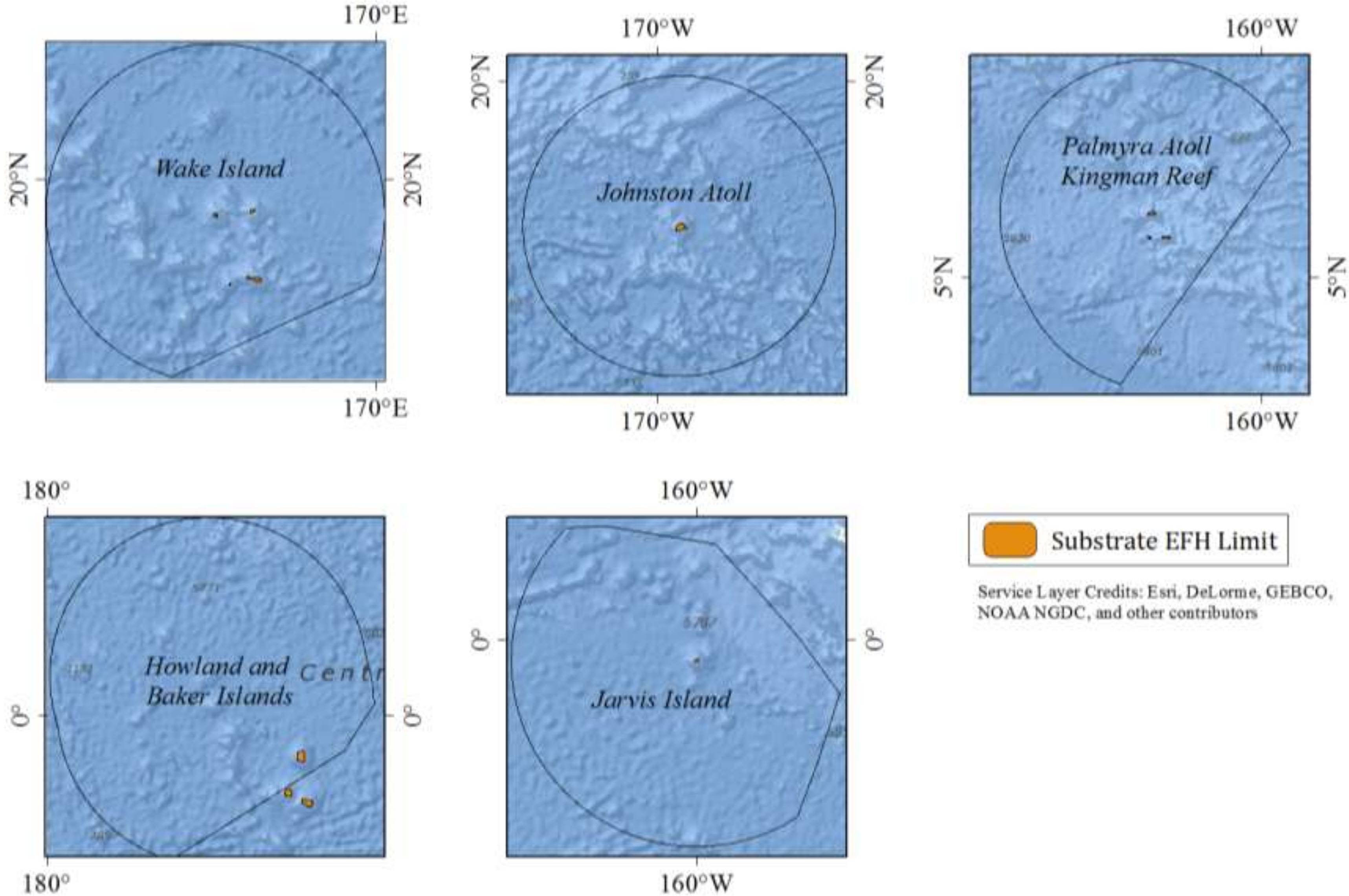

Figure 32. The substrate EFH limit and 700-meter isobath around the PRIA (Ryan et al. 2009)

2.5.2.1 Habitat Mapping

No new habitat mapping or field data collection occurred in the PRIA in 2024 that would support updates to habitat use by MUS or inform trends in habitat condition. Existing data from prior surveys remain the basis for current EFH assessments in the region.

2.5.2.2 Benthic Habitat

All benthic habitat is considered EFH for crustacean species (64 FR 19067, 19 April 1999). Juvenile and adult bottomfish EFH extends from the shoreline to the 400 m isobath (64 FR 19067, 19 April 1999), and juvenile and adult deepwater shrimp habitat extends from the 300 m isobath to the 700 m isobath (73 FR 70603, 21 November 2008).

2.5.2.2.1 NCRMP Indicators

Benthic percent cover of coral, macroalgae, and crustose coralline algae are surveyed as part of NOAA's National Coral Reef Monitoring Program (NCRMP), led by the PIFSC ESD. The NOAA PIFSC ARP conducted an NCRMP survey in 2023, generating a new stream of EFH-relevant data for the region through randomized, fishery-independent reef fish surveys in shallow waters from 0–30 m depth. No new NCRMP surveys were conducted in 2024; however, the 2023 dataset remains the most current source of benthic habitat information and continues to support ongoing EFH assessments and management planning.

2.5.2.3 Oceanography, Water Quality, and Other Environmental Data

Please see the Climate and Oceanic Indicators section (Section 2.4) for information related to oceanography and water quality. No substantial field-based oceanographic research was conducted in PRIA in 2024, but satellite and buoy data continued to be collected and archived. In 2024, PIFSC staff updated the Environmental Data Summary (EDS) tool to incorporate the most recent satellite-based datasets and environmental monitoring data available through 2024. The EDS, developed in R, provides users a consistent and accessible interface to NOAA CoastWatch and OceanWatch datasets via the ERDDAP server protocol, allowing for the download, filtering, and extraction of gridded and tabular data based on user-defined timeframes and geographic coordinates. This 2024 update expanded EDS functionality to include finer spatiotemporal scales and newly available gridded datasets for remote Pacific Island environments, including PRIA. The environmental data summarized at individual survey sites are critical for understanding how environmental variability affects marine resources. Previously, EDS outputs were summarized at the National Coral Reef Monitoring Program (NCRMP) Rapid Ecological Assessment (REA) site level from 2000 to 2020 across 57 islands. In 2024, PIFSC also initiated further development of EDS to support integration of additional environmental datasets—such as wave and wind fields, remote sensing imagery, and modeled data (e.g., Regional Ocean Modeling Systems)—as well as updated socioeconomic data layers, including human density where applicable, to improve habitat assessment for remote and data-limited areas like PRIA.

2.5.3 Report on Review of EFH Information

There were no EFH reviews completed in 2023 for the PRIA, however a review of the biological components of crustacean EFH in Guam and Hawaii was finalized in 2019. The non-fishing impacts and cumulative impacts components were reviewed in 2016 through 2017, which can be found in Minton (2017).

2.5.4 EFH Levels

NMFS guidelines codified at 50 C.F.R. § 600.815 recommend Councils organize data used to describe and identify EFH into the following four levels:

- Level 1: Distribution data are available for some or all portions of the geographic range of the species.
- Level 2: Habitat-related densities of the species are available.
- Level 3: Growth, reproduction, or survival rates within habitats are available.
- Level 4: Production rates by habitat are available.

The Council adopted a fifth level, denoted Level 0, for situations in which there is no information available about the geographic extent of a managed species' life stage. The existing level of data for individual MUS in each fishery are presented in tables per fishery. In subsequent SAFE reports, each fishery section will include the description of EFH method used to assess the value of the habitat to the species, description of data sources used if there was analysis, and description of method for analysis. Levels of EFH Information are presented in this section first with databases that include observations of multiple species, separated by depth, and then by current or former MUS grouping.

2.5.5 Precious Corals

EFH for precious corals was originally designated in Amendment 4 to the Precious Corals Fishery Management Plan (64 FR 19067, 19 April 1999) using the level of data found in Table 7. No new data relevant to precious corals EFH in the PRIA were collected in 2023 that would modify these levels of information.

Table 6. Level of EFH information available for the Western Pacific precious coral MUS

Species	Pelagic Phase (Larval Stage)	Benthic Phase	Source(s)
Pink Coral (*Corallium*)			
Pleurocorallium secundum (prev. *Corallium secundum*)	0	1	(Figueroa and Baco 2015); HURL database
Hemicorallium laauense (prev. *C. laauense)*	0	1	HURL database
Gold Coral			
Kulamanamana haumeaae (prev. *Gerardia* spp.)	0	1	(Sinniger et al. 2013); HURL database
Bamboo Coral			
Acanella spp.	0	1	HURL database
Black Coral			

Species	Pelagic Phase (Larval Stage)	Benthic Phase	Source(s)
Antipathes griggi (prev. *Antipathes dichotoma*)	0	1	(Opresko 2009); HURL database
A. grandis	0	1	HURL database
Myriopathes ulex (prev. *A. ulex*)	0	1	(Opresko 2009); HURL database

2.5.5.1 Bottomfish and Seamount Groundfish

EFH for bottomfish and seamount groundfish was originally designated in Amendment 6 to the Bottomfish and Seamount Groundfish FMP (64 FR 19067, 19 April 1999) using the level of data found in Table 8. To analyze the potential effects of a proposed fishery management action on EFH, one must consider all designated EFH, but research examining depth and habitat requirements for most species is generally lacking. The levels of information available for PRIA bottomfish did not change in 2023.

Table 7. Level of EFH information available for the Western Pacific BMUS and seamount groundfish MUS complex

Life History Stage	Eggs	Larvae	Juvenile	Adult
Aphareus rutilans (red snapper/silvermouth)	0	0	0	1
Aprion virescens (gray snapper/jobfish)	0	0	1	1
Caranx ignobilis (giant trevally/jack)	0	0	1	1
C. lugubris (black trevally/jack)	0	0	0	1
Hypothodus quernus (sea bass)	0	0	1	1
Etelis carbunculus (red snapper)	0	0	1	1
E. coruscans (red snapper)	0	0	1	1
Lethrinus rubrioperculatus (redgill emperor)	0	0	0	1
Lutjanus kasmira (blueline snapper)	0	0	1	1
Pristipomoides auricilla (yellowtail snapper)	0	0	0	1
P. filamentosus (pink snapper)	0	0	1	1
P. flavipinnis (yelloweye snapper)	0	0	0	1
P. sieboldii (pink snapper)	0	0	1	1
P. zonatus (snapper)	0	0	0	1
Variola louti (lunartail grouper)	0	0	0	1
Beryx splendens (alfonsin)	0	1	2	2
Hyperoglyphe japonica (ratfish/butterfish)	0	0	0	1
Pentaceros wheeleri (armorhead)	0	1	1	3

2.5.5.2 Crustaceans

EFH for crustaceans MUS was originally designated in Amendment 10 to the Crustaceans FMP (64 FR 19067, 19 April 1999) using the level of data found in Table 9. EFH definitions were also approved for deepwater shrimp through an amendment to the Crustaceans FMP in 2008 (73 FR 70603, 21 November 2008). No research efforts in 2024 provided data to modify these levels of information.

Table 8. Level of EFH information available for the Western Pacific CMUS complex

Life History Stage	Eggs	Larvae	Juvenile	Adult
Deepwater shrimp (*Heterocarpus* spp.)	2	0	1	2–3
Kona crab (*Ranina ranina*)	1	0	1	1–2

2.5.6 Research and Information Needs

The Council has identified the following scientific data needs to more effectively address the EFH provisions:

2.5.6.1 All FMP Fisheries

- Distribution of early life history stages (eggs and larvae) of management unit species by habitat.
- Juvenile habitat (including physical, chemical, and biological features that determine suitable juvenile habitat);
- Food habits (feeding depth, major prey species etc.).
- Habitat-related densities for all MUS life history stages.
- Growth, reproduction, and survival rates for MUS within habitats.

2.5.6.2 Bottomfish Fishery

- Inventory of marine habitats in the EEZ of the Western Pacific region.
- Data to obtain a better SPR estimate for American Samoa’s bottomfish complex.
- Baseline (virgin stock) parameters (catch per unit effort [CPUE], percent immature) for the Guam/CNMI deep-water and shallow water bottomfish complexes.
- High resolution maps of bottom topography/currents/water masses/primary productivity.
- Habitat utilization patterns for different life history stages and species.

2.5.6.3 Crustaceans Fishery

- Identification of post-larval settlement habitat of all CMUS.
- Identification of “source/sink” relationships in the NWHI and other regions (i.e., relationships between spawning sites settlement using circulation models, genetic techniques, etc.).
- Establish baseline parameters (e.g., CPUE) for the Guam and Northern Marinas crustacean populations.

- Research to determine habitat-related densities for all CMUS life history stages in American Samoa, Guam, Hawaii, and CNMI.
- High resolution mapping of bottom topography, bathymetry, currents, substrate types, algal beds, habitat relief.

2.5.6.4 Precious Corals Fishery

- Distribution, abundance, and status of precious corals in the PRIA.

2.6 MARINE PLANNING

2.6.1 Introduction

Marine planning is a science-based management tool being utilized regionally, nationally, and globally to identify and address issues of multiple human uses, ecosystem health and cumulative impacts in the coastal and ocean environment. The Council's efforts to formalize incorporation of marine planning in its actions began in response to Executive Order (EO) 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes*. EO 13158, *Marine Protected Areas*, proposes that agencies strengthen the management, protection, and conservation of existing MPAs, develop a national system of MPAs representing diverse ecosystems, and avoid causing harm to MPAs through federal activities. MPAs, or marine managed areas (MMAs) are one tool used in fisheries management and marine planning.

At its 165th meeting in March 2016, in Honolulu, Hawai`i, the Council approved the following objective for the FEPs: Consider the Implications of Spatial Management Arrangements in Council Decision-making. The following sub-objectives apply:

- Identify and prioritize research that examines the positive and negative consequences of areas that restrict or prohibit fishing to fisheries, fishery ecosystems, and fishermen, such as the Bottomfish Fishing Restricted Areas, military installations, NWHI restrictions, and Marine Life Conservation Districts.
- Establish effective spatially based fishing zones.
- Consider modifying or removing spatial-based fishing restrictions that are no longer necessary or effective in meeting their management objectives.
- As needed, periodically evaluate the management effectiveness of existing spatial-based fishing zones in federal waters.

To monitor implementation of this objective, this annual report includes the Council's spatially based fishing restrictions or MMAs, the goals associated with those, and the most recent evaluation. Council research needs are not tracked in this report.

To meet the EFH and National Environmental Policy Act (NEPA) mandates, this annual report tracks activities that occur in the ocean that are of interest to the Council, and incidents or facilities that may contribute to cumulative impact. NMFS is responsible for NEPA compliance, and the Council must assess the environmental effects of ocean activities for the EFH cumulative impacts section of the FEP.

2.6.1.1 Response to Previous Council Recommendations

There are no standing Council recommendations indicating review deadlines for PRIA MMAs.

At its 194th meeting in March 2023, regarding the process to designate a National Marine Sanctuary in the PRIA, the Council requested NOAA and all other involved agencies to consult with the U.S. Pacific Territories beyond the public comment opportunity on the proposed sanctuary. The Council also directed staff to invite the National Ocean Service (NOS) to provide a presentation on the proposed Pacific Remote Island Sanctuary to get a better understanding of the Council's responsibilities and role in the process. At the same meeting, the Council also directed staff to raft a letter to NOAA requesting NMFS and NOS meet with the Governors and staff of the Territories of American Samoa, Guam, and the CNMI and that NOS describe in detail the process that will be followed for President Biden's request for a National Marine Sanctuary in the PRIA, and a review of the process with the Council as soon as possible.

At its 195th meeting in June 2023, the Council directed staff to review the Council's current fishing regulations for the PRIA and Pacific Pelagic FEPs and other applicable laws to provide the Council with a determination of whether existing regulations meet the goals and objectives, proclamations, and National Marine Sanctuaries Act. The Council further directed staff to develop a range of options for fishing regulations in the proposed sanctuary including extending existing Pacific Remote Islands Marine National Monument (PRIMNM) regulations to the full spatial extent of the EEZ for Council consideration at its next meeting.

The Council requested NOAA, in its evaluation of the proposed Pacific Remote Islands (PRI) sanctuary, evaluate the holistic impacts of prohibiting tuna fishing 50 to 200 nm of the island areas, that that sector of the U.S. purse seine fleet and possibly the Hawaii Longline fleet that has historically fished in the PRIA EEZ around Howland and Baker and Palmyra and Kingman reef be considered a "community of practice" and be given prominence as an "affected community" along with the whole larger fishing community of American Samoa, and that resuming sustainable fishing be made an objective in the designation.

The Council requested NOAA conduct an economic study that considers the individual and cumulative effects, including multiplier effects, to American Samoa-based fishery on the proposed Effort Limit Area for Purse Seine (ELAPS) rulemaking, lack of acknowledgement of a distinct American Samoa fleet in international management, and effects of a proposed National Marine Sanctuary that may prohibit purse seine-based commercial fishing in the entire U.S. EEZ of the PRI.

The Council noted that, for the NWHI Monument Expansion Area (MEA), the NOAA Office of National Marine Sanctuaries' (ONMS) letter on May 31, 2023, rejecting the Council's cost-recovery provision in the permitting process, simply referred to its February 22, 2023 letter for disapproval rationale. However, the latter is unclear on exactly how the Council's recommendation is inconsistent with Goal 4 and Objectives 3, 5, and 6 because sale can be denied by NMFS after consultation with monument management partners. The Council directed staff to respond to ONMS requesting they provide a more detailed explanation of how the recommendation is inconsistent with each goal and objective.

The Council directed staff to prepare a letter to the President of the United States of America (POTUS), conveying its concerns about the proposed sanctuary in the Pacific Remote Islands and potential negative consequences to US Pacific Territories, and to request that ONMS and the Office of the White House respond to letters from US Pacific Territorial governors on the matter.

At its 196th meeting in September 2023, regarding fishing regulations for the proposed PRIA Sanctuary, the Council recognized that a goal of the proposed sanctuary is to support cultural heritage and fishing is central to the culture of Pacific Island communities. Data presented to the Council by NMFS PIFSC showed that the impacts of the existing fisheries as managed under current fisheries regulations are well below measurable and objective thresholds established by NOAA pursuant to requirements set forth under the MSA (i.e., no fish stocks are overfished or subject to overfishing, and no essential fish habitats are being adversely affected), ESA (i.e., no fisheries are jeopardizing species or destroying/adversely modifying critical habitat listed under the ESA) and other applicable laws. Further, the data also showed the importance of fishing to the culture of American Samoa and a reduction of fishing would represent a disproportionate socioeconomic burden to the Territory of American Samoa and the US longline and purse seine fleets. Therefore, the Council preliminarily found that the existing fishing regulations under the current structure may already meet the goals and objectives of the proposed sanctuary and directs staff to continue discussing the issue with NMFS and ONMS to determine if additional regulations may be necessary. The Council requested ONMS provide an opportunity for the Council to review a pre-draft Environmental Impact Statement (EIS) for the proposed PRINMS to ensure that the alternatives are aligned with the Council's fishing regulations.

The Council also directed staff to send a letter to the President to request modifying the PRINMS allow for US commercial longline and purse seine fishing around Jarvis Island and Johnston Atoll. The Council noted that Jarvis and Johnston have been historically more important for both US longline and US purse seine fisheries and can help the US mitigate climate change while providing equity and environmental justice to US fishing communities in the Western Pacific.

At its 197th meeting in December 2023, reiterated its findings in Appendix C of the options paper that show that the Council's existing regulations have established comprehensive protection since the 1980s and continues to provide for long-lasting conservation and management for the PRI fishery ecosystem and resources. The Council stressed the importance of the current pelagic fisheries in the PRI to the economy and culture of American Samoa and recognized that impacts to those fisheries would be devastating to *fa'a Samoa*. The fisheries provide for millions of dollars and thousands of jobs through direct and indirect contributions. The current pelagic fisheries in the PRI are conserved and managed pursuant to an adaptive, ecosystem-based approach both domestically and internationally and are neither overfished nor experiencing overfishing. Pelagic fishing occurs at or near the open ocean's surface and does not interact with benthic communities, so these activities do not jeopardize the benthic ecosystem or biodiversity. Should fishing for bottomfish, crustacean, precious coral or a coral reef ecosystem species be conducted in the PRI, Council regulations implementing the Pacific Remote Islands Fishery Ecosystem Plan would apply and continue to comprehensively conserve and manage these fisheries, the marine biodiversity, and ecosystem services they provide. This management plan has been in place for over 13 years to prevent negative impacts to fish stocks, habitat, bycatch, and protected species. Therefore, the Council determined that the existing fishing regulations under the current structure already meet the goals and objectives of the proposed sanctuary and recommends to ONMS that additional fishing regulations are not necessary to meet the proposed PRI National Marine Sanctuary goals and objectives. Further, the Council directed staff to provide the Council's recommendation to ONMS by December 20, 2023 and to include the rationale and justification for the Council's determination to ONMS by January 19, 2024.

2.6.1.2 MMAs established under FMPs

Council-established MMAs were compiled from 50 CFR § 665, Western Pacific Fisheries, the Federal Register, and Council amendment documents. All regulated fishing areas and large MMAs, including the PRIMNM, are shown in Figure 33.

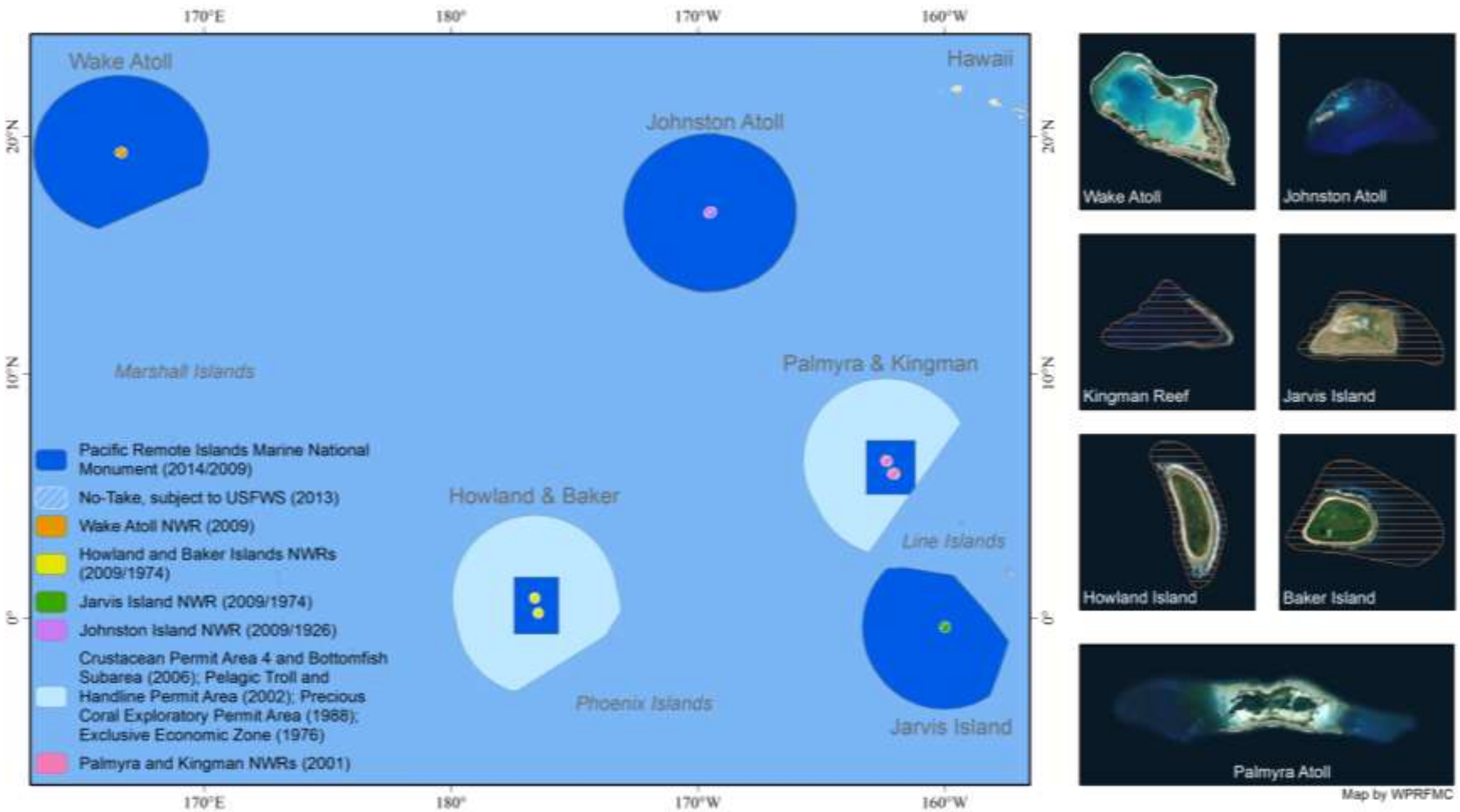

Figure 33. Regulated fishing areas of the PRIA

Table 9. MMAs established under FEPs from 50 CFR § 665

Name	FEP	Island	50 CFR /FR /Amendment Reference	Marine Area (km²)	Fishing Restriction	Goals	Most Recent Evaluation	Review Deadline
Howland Island No-Take MPA/PRIMNM	PRIA/ Pelagic	Howland Island	665.599 and 665.799(a)(1) 69 FR 8336 Coral Reef Ecosystem Fishery Management Plan (FMP) 78 FR 32996 PRIA FEP Am. 2	-	All Take Prohibited	Minimize adverse human impacts on coral reef resources; commercial fishing prohibited within 12 nm.	2013	-
Jarvis Island No-Take MPA/PRIMNM	PRIA/ Pelagic	Jarvis Island	665.599 and 665.799(a)(1) 69 FR 8336 Coral Reef Ecosystem FMP 78 FR 32996 PRIA FEP Am. 2	-	All Take Prohibited	Minimize adverse human impacts on coral reef resources; commercial fishing prohibited within 12 nm.	2013	-
Baker Island No-Take MPA/PRIMNM	PRIA/ Pelagic	Baker Island	665.599 and 665.799(a)(1) 69 FR 8336 Coral Reef Ecosystem FMP 78 FR 32996 PRIA FEP Am. 2	-	All Take Prohibited	Minimize adverse human impacts on coral reef resources; commercial fishing prohibited within 12 nm.	2013	-

Name	FEP	Island	50 CFR /FR /Amendment Reference	Marine Area (km^2)	Fishing Restriction	Goals	Most Recent Evaluation	Review Deadline
Kingman Reef No-Take MPA/PRIMNM	PRIA/ Pelagic	Kingman Reef	665.599 and 665.799(a)(1) 69 FR 8336 Coral Reef Ecosystem FMP 78 FR 32996 PRIA FEP Am. 2	-	All Take Prohibited	Minimize adverse human impacts on coral reef resources; all fishing prohibited within 12 nm.	2013	-
Johnston Atoll Low-Use MPA/ PRIMNM	PRIA/ Pelagic	Johnston Atoll	69 FR 8336 Coral Reef Ecosystem FMP 78 FR 32996 PRIA FEP Am. 2	-	Special Permit Only	Minimize adverse human impacts on coral reef resources; superseded by prohibiting fishing within 12 nm in Am. 2.	2013	-
Palmyra Atoll Low-Use MPAs/ PRIMNM	PRIA/ Pelagic	Palmyra Atoll	69 FR 8336 Coral Reef Ecosystem FMP 78 FR 32996 PRIA FEP Am. 2	-	Special Permit Only	Minimize adverse human impacts on coral reef resources; superseded by prohibiting fishing within 12 nm in Am. 2.	2013	-
Wake Island Low-Use MPA/ PRIMNM	PRIA/ Pelagic	Wake Island	69 FR 8336 Coral Reef Ecosystem FMP 78 FR 32996 PRIA FEP Am. 2	-	Special Permit Only	Minimize adverse human impacts on coral reef resources; superseded by prohibiting fishing within 12 nm in Am. 2.	2013	-

2.6.2 Activities and Facilities

There are no aquaculture facilities, alternative energy facilities, or military training and testing activities occurring in the US EEZ around the PRIA at this time. The Plan Team will add to this section as new facilities or activities are proposed and/or built.

2.6.3 Additional Considerations

2.6.3.1 Pacific Remote Islands National Marine Sanctuary Nomination

On March 11, 2023, the Pacific Remote Islands Coalition submitted a National Marine Sanctuary nomination to NOAA to protect US waters to the extent of the EEZ around the PRI. On March 21, 2023, President Biden issued a Presidential Memorandum directing the Secretary of Commerce to consider initiating the designation process for the PRINMS. The issuance was followed by the nomination by the Pacific Remote Islands Coalition. A Notice of Intent to conduct scoping in preparation to draft an EIS was issued on April 17, 2023, with scoping meetings held in American Samoa in September 2023 to gather additional information on impacts to American Samoa.

At its 197th meeting, the Council discussed the need for fishing regulations in the proposed national marine sanctuary and reiterated its previous findings that the existing regulations have established comprehensive protection since the 1980s and continues to provide for long-lasting conservation and management for the fishery ecosystem and resources. Therefore, the Council determined that the existing fishing regulation under the current structure already meet the goals and objectives of the proposed sanctuary and recommended to ONMS that additional fishing regulation are not necessary to meet the proposed PRINMS goals and objectives

3 DATA INTEGRATION

The purpose of this section ("Chapter 3") of the annual SAFE report is to identify and evaluate potential fishery ecosystem relationships between fishery parameters and ecosystem variables to assess how changes in the ecosystem can affect fisheries across the Western Pacific region. "Fishery ecosystem relationships" are those associations between various fishery-dependent data measures (e.g., catch, effort, or catch per unit effort), and other environmental attributes (e.g., temperature, precipitation, current velocity) that may contribute to observed trends or act as potential indicators of the status of prominent stocks in the fishery. Data integration analyses represent a first step in a sequence of exploratory analyses that will be utilized to inform new assessments of what factors may be useful going forward and were first incorporated in the 2017 versions of the annual SAFE reports.

To support the development of Chapter 3 of the annual SAFE report, staff from the Council, NMFS PIFSC and PIRO, and Triton Aquatics (consultants), held a SAFE Report Data Integration Workshop (hereafter, "the Workshop") on November 30, 2016 to identify potential fishery ecosystem relationships relevant to local policy in the Western Pacific region and determine appropriate methods to analyze them. The archipelagic fisheries group developed nearly 30 potential fishery ecosystem relationships to examine across bottomfish, coral reef, and crustacean fisheries based on data reliability, suitability of methodology, repeatability on an annual basis, and how well analyses could potentially inform management decisions (Table 10). It is important to note that these lists were developed before the ecosystem component FEP amendments were developed.

Table 10. List of brainstormed potential archipelagic island fishery relationships scored and ranked from highest to lowest priority

Relationships	FEP	Score	Rank
Bottomfish catch/effort/CPUE/species composition and benthos/substrate (i.e., depth, structure)	All	22	3
Bottomfish catch/effort/ CPUE /species composition and Pacific Decadal Oscillation	All	20	3
Coral reef fish/fishery/biomass and temperature-derived variable	All	20	3
Akule/opelu and precipitation (MHI and Guam)	HI	20	3
Bottomfish catchability and wind speed	All	19	3
Coral reef fish/fishery/biomass and chlorophyll-*a* (with phase lag)	All	19	3
Bottomfish Catch /CPUE and lunar cycle/moon phase	All	19	3
Bottomfish catch/effort/ CPUE /species composition and sea-level height (eddy feature)	All	18	2
Coral reef fish/fishery/biomass and Pacific Decadal Oscillation	All	18	2
Green/red spiny lobster catch/CPUE and vertical relief	HI	18	2
Green/red spiny lobster catch/CPUE and Pacific Decadal Oscillation	HI	18	2

Relationships	FEP	Score	Rank
Bottomfish catchability and fishing conditions (i.e., surface, subsurface current, speed, and direction)	All	17	2
Coral reef fish/fishery/biomass and moon phase	All	17	2
Coral reef fish/fishery/biomass and Oceanic Niño Index	All	17	2
Coral reef fish/fishery/biomass and sea-level height	All	17	2
Coral reef fish/fishery/biomass and pH	All	17	2
Bottomfish catch/effort/ CPUE /species composition and temperature-derived variable (e.g., temperature at depth)	All	16	2
Bottomfish catch/effort/ CPUE /species composition and chlorophyll-*a* (with phase lag)	All	16	2
Bottomfish catch/effort/ CPUE /species composition and precipitation	All	16	2
Coral reef fish/fishery/biomass and structural complexity /benthic habitat	All	16	2
Bottomfish catch/effort/ CPUE /species composition and dissolved oxygen	All	15	2
Coral reef fish/fishery/biomass and precipitation	All	14	2
Bottomfish catch/effort/ CPUE /species composition and pH	All	13	2
Bottomfish catch/effort/ CPUE /species composition and predator abundance	All	12	2
Coral reef fish/fishery/biomass and salinity	All	12	2
Coral reef fish/fishery/biomass and dissolved oxygen	All	12	2
Bottomfish catch/effort/ CPUE /species composition and salinity	All	10	1

The data integration chapter of this report is not fully developed due to the absence of consistent fisheries data in the PRIA. The archipelagic data integration chapter is meant to explore the potential association between fishery parameters and ecologically associated variables that may be able to explain a portion of the variance in fishery-dependent data. The Workshop produced a long list of fishery and ecosystem variable combinations that comprise a significant workload that the participants could not take on without sufficient data coverage. Though a contractor completed exploratory evaluations for the MHI, Guam, CNMI, and American Samoa in 2017 for inclusion in the 2017 Annual SAFE Reports, no explicit analyses were conducted for the PRIA.

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APPENDIX A: LIST OF MANAGEMENT UNIT SPECIES

The PRIA species list and Fish Stock Sustainability Index (FSSI) status will be made available in subsequent reports as resources allow. Please see the PRIA FEP and implementing regulations for the list of managed species.

APPENDIX B: LIST OF PROTECTED SPECIES AND DESIGNATED CRITICAL HABITAT

Table B-1. Protected species found or reasonably believed to be found near or in PRIA waters

Common Name	Scientific Name	ESA Listing Status	MMPA Status	Occurrence	References
Seabirds					
Audubon's Shearwater	*Puffinus lherminieri*	Not Listed	N/A	Breeding	Sala et al. 2014
Band-Rumped Storm-Petrel	*Oceanodroma castro*	Not Listed	N/A	Visitor	Sala et al. 2014
Black Noddy	*Anous minutus*	Not Listed	N/A	Breeding	Sala et al. 2014
Black-Footed Albatross	*Phoebastria nigripes*	Not Listed	N/A	Breeding	Sala et al. 2014
Black-Naped Tern	*Sterna sumatrana*	Not Listed	N/A	Visitor	Sala et al. 2014
Black-Winged Petrel	*Pterodroma nigripennis*	Not Listed	N/A	Visitor	Sala et al. 2014
Blue-Gray Noddy	*Procelsterna cerulea*	Not Listed	N/A	Breeding	Sala et al. 2014
Bonin Petrel	*Pterodroma hypoleuca*	Not Listed	N/A	Visitor	Sala et al. 2014
Bridled Tern	*Onychoprion anaethetus*	Not Listed	N/A	Visitor	Sala et al. 2014
Brown Booby	*Sula leucogaster*	Not Listed	N/A	Breeding	Sala et al. 2014
Brown Noddy	*Anous stolidus*	Not Listed	N/A	Breeding	Sala et al. 2014
Bulwer's Petrel	*Bulweria bulwerii*	Not Listed	N/A	Breeding	Sala et al. 2014
Christmas Shearwater	*Puffinus nativitatis*	Not Listed	N/A	Breeding	Sala et al. 2014
Fairy Tern	*Sternula nereis*	Not Listed	N/A	Breeding	Sala et al. 2014
Flesh-Footed Shearwater	*Ardenna carneipes*	Not Listed	N/A	Visitor	Sala et al. 2014
Gould's Petrel	*Pterodroma leucoptera*	Not Listed	N/A	Visitor	Sala et al. 2014
Great Crested Tern	*Thalasseus bergii*	Not Listed	N/A	Visitor	Sala et al. 2014
Great Frigatebird	*Fregata minor*	Not Listed	N/A	Breeding	Sala et al. 2014
Gray-Backed Tern	*Onychoprion lunatus*	Not Listed	N/A	Breeding	Sala et al. 2014
Hawaiian Petrel	*Pterodroma sandwichensis (Pterodroma phaeopygia sandwichensis)*	Endangered	N/A	Visitor	32 FR 4001, Sala et al. 2014
Herald Petrel	*Pterodroma heraldica*	Not Listed	N/A	Visitor	Sala et al. 2014
Kermadec Petrel	*Pterodroma neglecta*	Not Listed	N/A	Visitor	Sala et al. 2014
Laysan Albatross	*Phoebastria immutabilis*	Not Listed	N/A	Breeding	Sala et al. 2014

Common Name	Scientific Name	ESA Listing Status	MMPA Status	Occurrence	References
Lesser Frigatebird	*Fregata ariel*	Not Listed	N/A	Breeding	Sala et al. 2014
Little Shearwater	*Puffinus assimilis*	Not Listed	N/A	Visitor	Sala et al. 2014
Masked Booby	*Sula dactylatra*	Not Listed	N/A	Breeding	Sala et al. 2014
Murphy's Petrel	*Pterodroma ultima*	Not Listed	N/A	Visitor	Sala et al. 2014
Newell's Shearwater	*Puffinus newelli (Puffinus auricularis newelli)*	Threatened	N/A	Visitor	40 FR 44149, Sala et al. 2014
Phoenix Petrel	*Pterodroma alba*	Not Listed	N/A	Former breeder	Sala et al. 2014
Polynesian Storm-Petrel	*Nesofregetta fuliginosa*	Not Listed	N/A	Visitor	Sala et al. 2014
Northern Fulmar	*Fulmarus glacialis*	Not Listed	N/A	Breed and range across North Pacific Ocean.	Hatch & Nettleship 2012
Sooty Shearwater	*Ardenna grisea*	Not Listed	N/A	Breed in the southern hemisphere and migrate to the northern hemisphere.	BirdLife International 2017
Short-Tailed Albatross	*Phoebastria albatrus*	Endangered	N/A	Breed in Japan and NWHI, and range across the North Pacific Ocean.	35 FR 8495, 65 FR 46643, BirdLife International 2017
Sea turtles					
Green Sea Turtle	*Chelonia mydas*	Endangered (Central South Pacific DPS)	N/A	Occur at Wake Island and Palmyra Atoll. Few sightings around Howland, Baker, Jarvis, and Kingman reef.	43 FR 32800, 81 FR 20057, Balazs 1982
Green Sea Turtle	*Chelonia mydas*	Threatened (Central North Pacific DPS)	N/A	Forage around Johnston Atoll.	43 FR 32800, 81 FR 20057, Balazs 1985
Loggerhead Sea Turtle	*Caretta caretta*	Endangered (North Pacific DPS)	N/A	No known sightings. Found worldwide along continental shelves, bays, estuaries, and lagoons of tropical, subtropical, and temperate waters.	43 FR 32800, 76 FR 58868, Dodd 1990, NMFS & USFWS 1998
Loggerhead Sea Turtle	*Caretta caretta*	Endangered (South Pacific DPS)	N/A	No known sightings. Found worldwide along continental shelves, bays, estuaries, and lagoons of tropical, subtropical, and temperate waters.	43 FR 32800, 76 FR 58868, Dodd 1990, NMFS & USFWS 1998
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	Threatened (Entire species, except for endangered	N/A	No known sightings. Occur worldwide in tropical and warm temperate ocean waters.	43 FR 32800, Pitman 1990, Balacz 1982

Common Name	Scientific Name	ESA Listing Status	MMPA Status	Occurrence	References
		breeding population on the Pacific coast of Mexico).			
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered[a]	N/A	No known sightings. Occur worldwide in tropical and subtropical waters.	35 FR 8491, Baillie & Groombridge 1996
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered[a]	N/A	No known sightings. Occur worldwide in tropical, subtropical, and subpolar waters.	35 FR 8491, Eckert et al. 2012
Marine mammals					
Bryde's Whale	*Balaenoptera edeni*	Not Listed	Non-strategic	Distributed widely across tropical and warm-temperate Pacific Ocean.	Leatherwood et al. 1982
Blue Whale	*Balaenoptera musculus*	Endangered	Strategic	Extremely rare. Distributed worldwide in tropical and warm-temperate waters.	35 FR 18319, McDonald et al. 2006, Stafford et al. 2001, Bradford et al. 2013, Northrop et al. 1971, Thompson & Friedl 1982
Fin Whale	*Balaenoptera physalus*	Endangered	Strategic	Found worldwide.	35 FR 18319, Hamilton et al. 2009
Humpback Whale	*Megaptera novaeangliae*	Delisted Due to Recovery (Hawaii DPS)	Strategic	Breed in waters around MHI during the winter.	35 FR 18319, 81 FR 62259, Childerhouse et al. 2008, Rice & Wolman 1978, Wolman & Jurasz 1976, Herman & Antinoja 1977,
Humpback Whale	*Megaptera novaeangliae*	Delisted Due to Recovery (Oceania DPS)	Strategic	Breed in Oceania waters during the winter.	35 FR 18319, 81 FR 62259, Guarrige et al. 2007, SPWRC 2008
Humpback Whale	*Megaptera novaeangliae*	Endangered (Western North Pacific DPS)	Strategic	Small population of about 1,000 that breeds in Asian waters during the winter.	35 FR 18319, 81 FR 62259, Eldredge et al. 2003; Barlow et al. 2011; Calambokidis et al. 2001, 2008
Sei Whale	*Balaenoptera borealis*	Endangered	Strategic	Generally found in offshore temperate waters.	35 FR 18319, Barlow 2003, Bradford et al. 2013

Common Name	Scientific Name	ESA Listing Status	MMPA Status	Occurrence	References
Bottlenose Dolphin	*Tursiops truncatus*	Not Listed	Non-strategic	Distributed worldwide in tropical and warm-temperate waters.	Perrin et al. 2009
False Killer Whale	*Pseudorca crassidens*	Not Listed	Non-strategic	Two stocks found in or near PRIA waters: 1) Palmyra Atoll stock found within US EEZ waters around Palmyra Atoll, and 2) Hawaii pelagic stock which includes animals in waters more than 40 km from the MHI. Little known about these stocks. Found worldwide in tropical and warm-temperate waters.	Barlow et al. 2008, Bradford & Forney 2013, Stacey et al. 1994, Chivers et al. 2010
Pygmy Killer Whale	*Feresa attenuata*	Not Listed	Non-strategic	Found in tropical and subtropical waters worldwide.	Ross & Leatherwood 1994
Risso's Dolphin	*Grampus griseus*	Not Listed	Non-strategic	Found in tropical to warm-temperate waters worldwide.	Perrin et al. 2009
Rough-Toothed Dolphin	*Steno bredanensis*	Not Listed	Non-strategic	Found in tropical to warm-temperate waters worldwide.	Perrin et al. 2009
Common Dolphin	*Delphinus delphis*	Not Listed	Non-strategic	Found worldwide in temperate and subtropical seas.	Perrin et al. 2009
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	Not Listed	Non-strategic	Found in tropical to warm-temperate waters worldwide. Found in waters around Johnston and Palmyra Atolls.	Shallenberger 1981, Baird et al. 2013, Bradford et al. 2013
Spinner Dolphin	*Stenella longirostris*	Not Listed	Non-strategic	Found worldwide in tropical and warm-temperate waters. Occur in shallow protected bays during the day, feed offshore at night.	Norris and Dohl 1980, Norris et al. 1994, Hill et al. 2010, Andews et al. 2010, Karczmarski 2005, Perrin et al. 2009
Spotted Dolphin	*Stenella attenuata*	Not Listed	Non-strategic	Found in tropical and subtropical waters worldwide. Sighted in waters around Palmyra and Johnston atolls.	Perrin et al. 2009, NMFS PIR unpub. Data
Striped Dolphin	*Stenella coeruleoalba*	Not Listed	Non-strategic	Found in tropical to warm-temperate waters throughout the world.	Perrin et al. 2009

Common Name	Scientific Name	ESA Listing Status	MMPA Status	Occurrence	References
Guadalupe Fur Seal	*Arctocephalus townsendi*	Threatened	Strategic	No known sightings. Little known about their pelagic distribution. Breed mainly on Isla Guadalupe, Mexico.	50 FR 51252, Gallo-Reynoso et al. 2008, Fleischer 1987
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Endangered[a]	Strategic	Endemic tropical seal. Occurs throughout the Hawaiian archipelago. Occasional sightings on Johnston atoll.	41 FR 51611, Antonelis et al. 2006
Northern Elephant Seal	*Mirounga angustirostris*	Not Listed	Non-strategic	Females migrate to central North Pacific to feed on pelagic prey.	Le Beouf et al. 2000
Sperm Whale	*Physeter macrocephalus*	Endangered	Strategic	Found in tropical to polar waters worldwide, most abundant cetaceans in the region.	35 FR 18319, Rice 1960, Lee 1993, Barlow 2006, Mobley et al. 2000, Shallenberger 1981
Blainville's Beaked Whale	*Mesoplodon densirostris*	Not Listed	Non-strategic	Found worldwide in tropical and temperate waters.	Mead 1989
Cuvier's Beaked Whale	*Ziphius cavirostris*	Not Listed	Non-strategic	Occur worldwide.	Heyning 1989
Sharks					
Giant manta ray	*Manta birostris*	Threatened	N/A	Found worldwide in tropical, subtropical, and temperate waters. Commonly found in upwelling zones, oceanic island groups, offshore pinnacles and seamounts, and on shallow reefs.	Dewar et al. 2008, Marshall et al. 2009, Marshall et al. 2011.
Oceanic whitetip	*Carcharhinus longimanus*	Threatened	N/A	Found worldwide in open ocean waters from the surface to 152 m depth. It is most commonly found in waters > 20°C	Bonfil et al. 2008, Backus et al, 1956, Strasburg 1958, Compagno 1984
Scalloped hammerhead	*Sphyrna lewini*	Endangered (Eastern Pacific DPS)	N/A	Found in coastal areas from southern California to Peru.	Compagno 1984, Baum et al. 2007, Bester 2011
Scalloped hammerhead	*Sphyrna lewini*	Threatened (Indo-West Pacific DPS)	N/A	Occur over continental and insular shelves, and adjacent deep waters, but rarely found in waters < 22°C. Range from the intertidal and surface to depths up to 450–512 m.	Compagno 1984, Schulze-Haugen & Kohler 2003, Sanches 1991, Klimley 1993
Corals					

Common Name	Scientific Name	ESA Listing Status	MMPA Status	Occurrence	References
N/A	*Acropora globiceps*	Threatened	N/A	Occur on upper reef slopes, reef flats, and adjacent habitats in depths ranging from 0 to 8 m	Veron 2014
N/A	*Acropora retusa*	Threatened	N/A	Occur in shallow reef slope and back-reef areas, such as upper reef slopes, reef flats, and shallow lagoons, and depth range is 1 to 5 m.	Veron 2014
N/A	*Acropora speciosa*	Threatened	N/A	Found in protected environments with clear water and high diversity of Acropora and steep slopes or deep, shaded waters. Depth range is 12 to 40 meters and have been found in mesophotic habitat (40-150 m).	Veron 2014

[a] These species have critical habitat designated under the ESA. See Table B-2.

Table B-2. ESA-listed species' critical habitat in the Pacific Ocean[a].

Common Name	Scientific Name	ESA Listing Status	Critical Habitat	References
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	None in the Pacific Ocean.	63 FR 46693
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Approximately 16,910 square miles (43,798 square km) stretching along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour; and 25,004 square miles (64,760 square km) stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 meter depth contour.	77 FR 4170
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Endangered	Ten areas in the Northwestern Hawaiian Islands (NWHI) and six in the main Hawaiian Islands (MHI). These areas contain one or a combination of habitat types: Preferred pupping and nursing areas, significant haul-out areas, and/or marine foraging areas, that will support conservation for the species.	53 FR 18988, 51 FR 16047, 80 FR 50925
North Pacific Right Whale	*Eubalaena japonica*	Endangered	Two specific areas are designated, one in the Gulf of Alaska and another in the Bering Sea, comprising a total of approximately 95,200 square kilometers (36,750 square miles) of marine habitat.	73 FR 19000, 71 FR 38277

[a] For maps of critical habitat, see http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm.

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