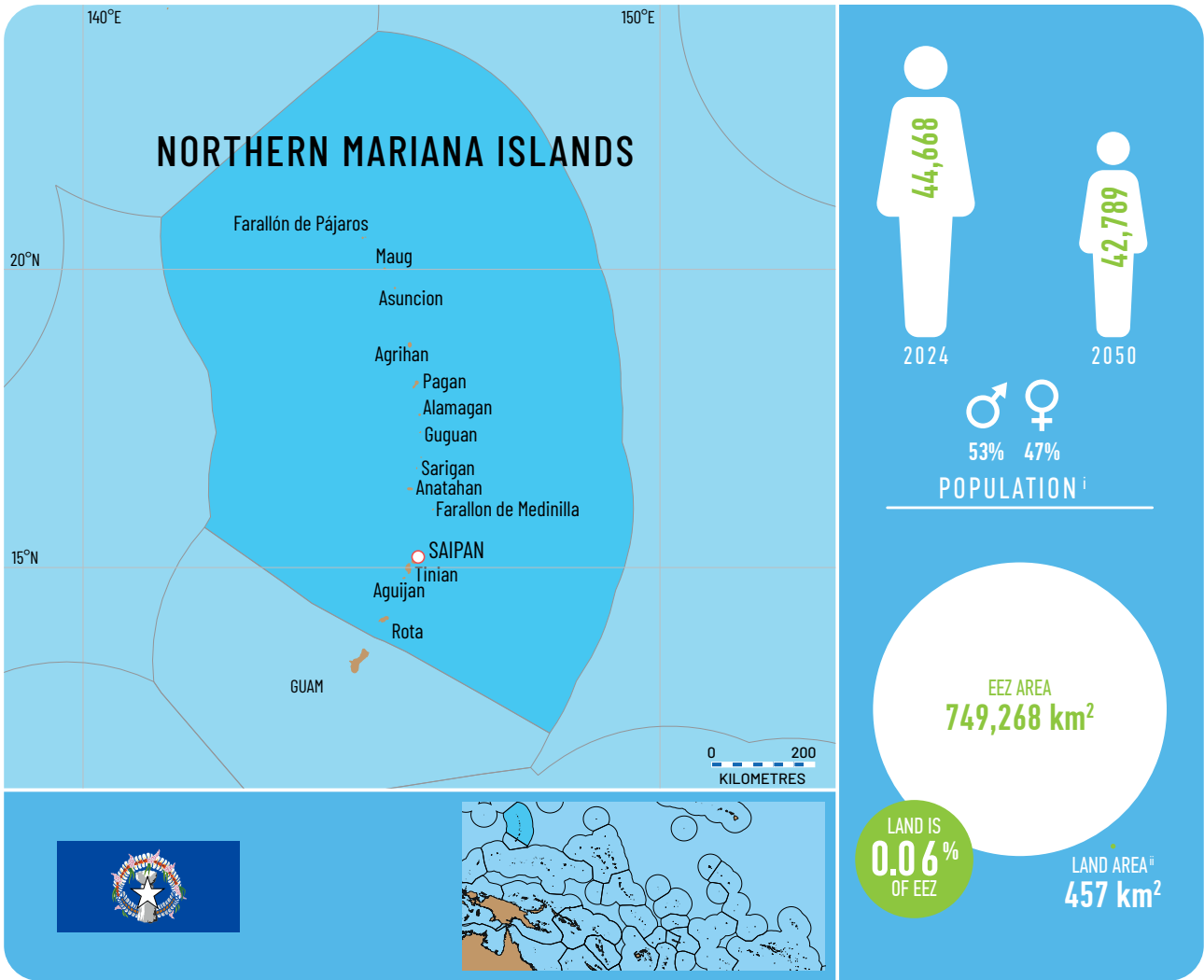


NORTHERN MARIANA ISLANDS



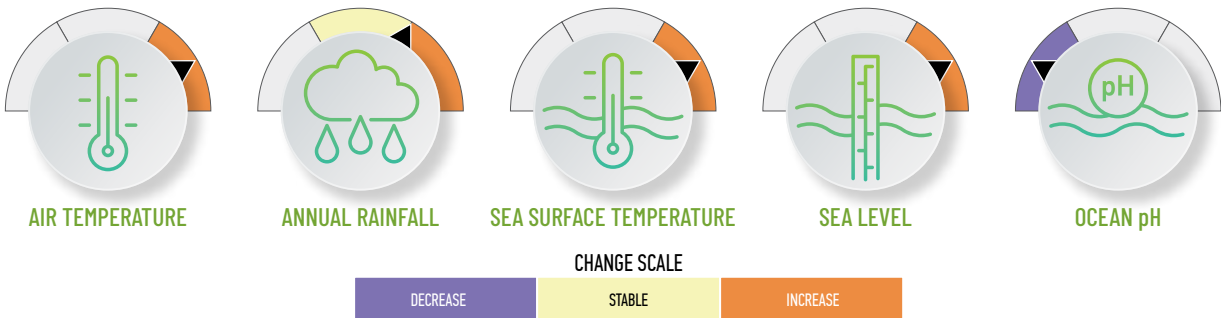
NORTHERN MARIANA ISLANDS



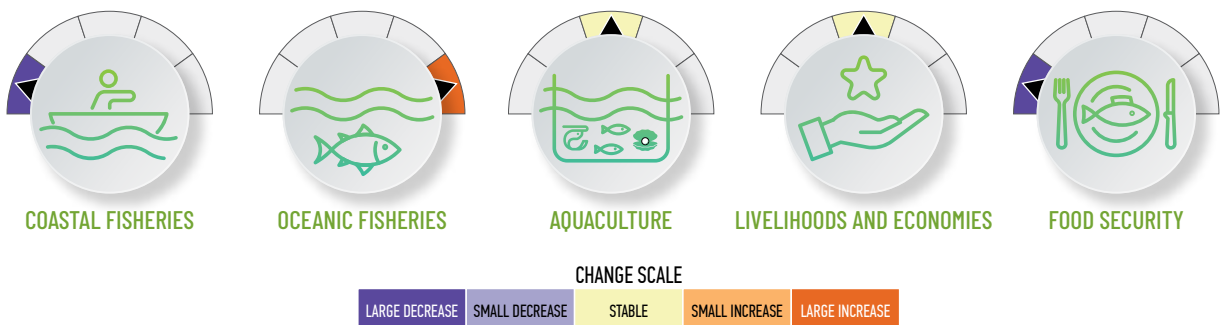
* Annual average using 2014–2024 data

SUMMARY OF CLIMATE CHANGE PROJECTIONS

2050



SUMMARY OF CLIMATE CHANGE IMPLICATIONSⁱⁱⁱ



ⁱ Data source: SPC Pacific Data Hub <https://pacificdata.org/population-dashboard>

ⁱⁱ Data source: SPC Statistics for Development Division <https://sdd.spc.int>

ⁱⁱⁱ Relative to the Reference Periods 2010–2020 for coastal fisheries and 1980–2010 for oceanic fisheries.

RECOMMENDED ADAPTATION ACTIONS

These recommended adaptations are based on the key vulnerabilities and implications of climate change for fisheries and aquaculture (further details in Chapter 10) and should be initiated or strengthened. A range of supporting policies are provided in Table 10.1 for decision-makers to select those that are most appropriate to their context and priorities. Central to all future adaptation are the following principles:

1. Strengthen data collection by improving (or establishing) national fisheries and aquaculture monitoring systems linked to management decision-making.
2. Integrate local knowledge to inform adaptation actions for coastal and freshwater ecosystems, food security, and cultural heritage. Equity - especially gender equity – and social inclusion need to be a key focus.
3. Implement effective governance, including through community-based management and scaling-up of successful initiatives, to ensure adaptation actions reflect local needs and priorities.
4. Diversify and secure funding to support national- and community-level actions, alongside capacity building to sustain adaptation initiatives.



Food and nutrition security

Recommended adaptations

Food and Nutrition 1: Implement sustainable ecosystem-based approach to fisheries management

Food and Nutrition 2: Sustain the production of coastal fish and invertebrates through context-specific management

Food and Nutrition 4: Diversify blue food production systems

Food and Nutrition 5: Promote the use of oceanic catches to fill the gap in aquatic resources needed for food and nutrition security

Food and Nutrition 7: Promote education and awareness on the importance of protecting aquatic habitats, species and the foods they supply



Sustainable livelihoods

Recommended adaptations

Livelihoods 2: Apply innovative technologies and climate-smart tools for pond aquaculture and mariculture

Livelihoods 4: Improve technical and business viability of fisheries



Economies and government revenue

Recommended adaptations

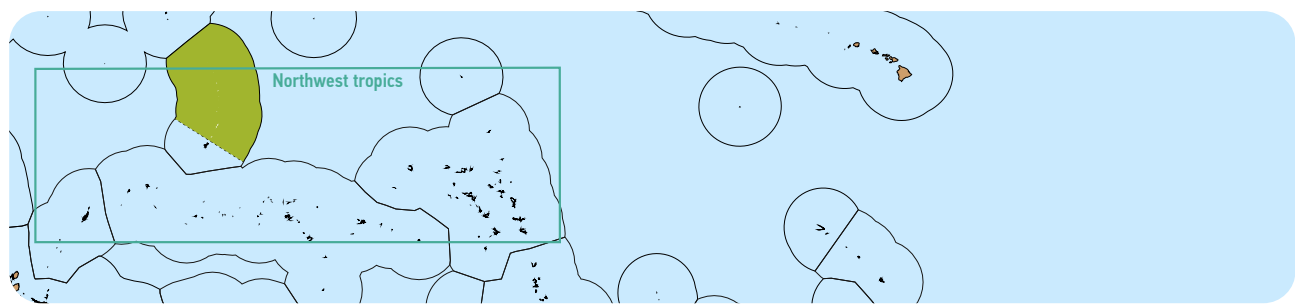
Economic Revenue 2: Develop policies and strategies that integrate climate change implications into fisheries and aquaculture management

Economic Revenue 3: Implement energy efficiency programs for fisheries and aquaculture

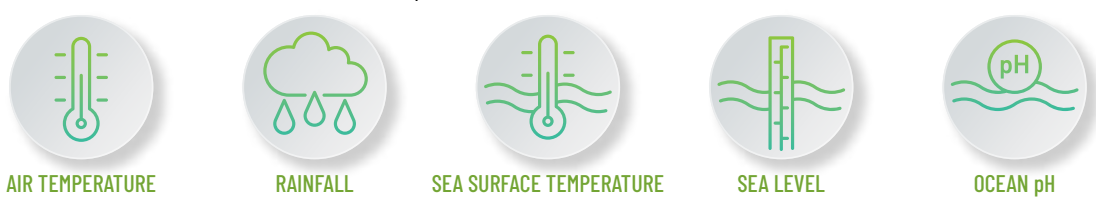
Economic Revenue 4: Promote improved safety at sea

Economic Revenue 6: Climate-proof infrastructure

Projected changes in atmospheric and oceanic climate



The Northern Mariana Islands are in the Northwest Tropical Pacific climate zone and are expected to experience the following climate changes by 2050 under a medium greenhouse gas emissions scenario (SSP2-4.5) and a high emissions scenario (SSP5-8.5)^{iv}, relative to 1995–2014 baseline (further details in Chapter 2).



	AIR TEMPERATURE	RAINFALL	SEA SURFACE TEMPERATURE	SEA LEVEL	OCEAN pH
MEDIUM EMISSIONS (SSP2-4.5)	+0.7 to +1.1 °C	-2.3 to +5.5 %	+0.6 to +1.1 °C	+0.1 to +0.3 m	-0.1
HIGH EMISSIONS (SSP5-8.5)	+0.9 to +1.6 °C	-2.8 to +6.4 %	+0.8 to +1.5 °C	+0.2 to +0.4 m	-0.1
CONFIDENCE ^v	HIGH	MEDIUM	HIGH	HIGH	HIGH

The Northern Mariana Islands are also expected to experience the following changes to regional climate processes by 2090 under a medium and high greenhouse gas emissions scenario, relative to 1995–2014 baseline.



	TROPICAL CYCLONES	EL NIÑO SOUTHERN OSCILLATION (ENSO)	MARINE HEATWAVES
MEDIUM EMISSIONS (SSP2-4.5)	Decrease in frequency; Increase in intensity	ENSO will continue as a source of interannual variability; La Niña and El Niño extremes are projected to increase	2–9 times more frequent (global projection)
HIGH EMISSIONS (SSP5-8.5)			3–15 times more frequent (global projection)
CONFIDENCE ^v	LOW TO MEDIUM	LOW	N/A



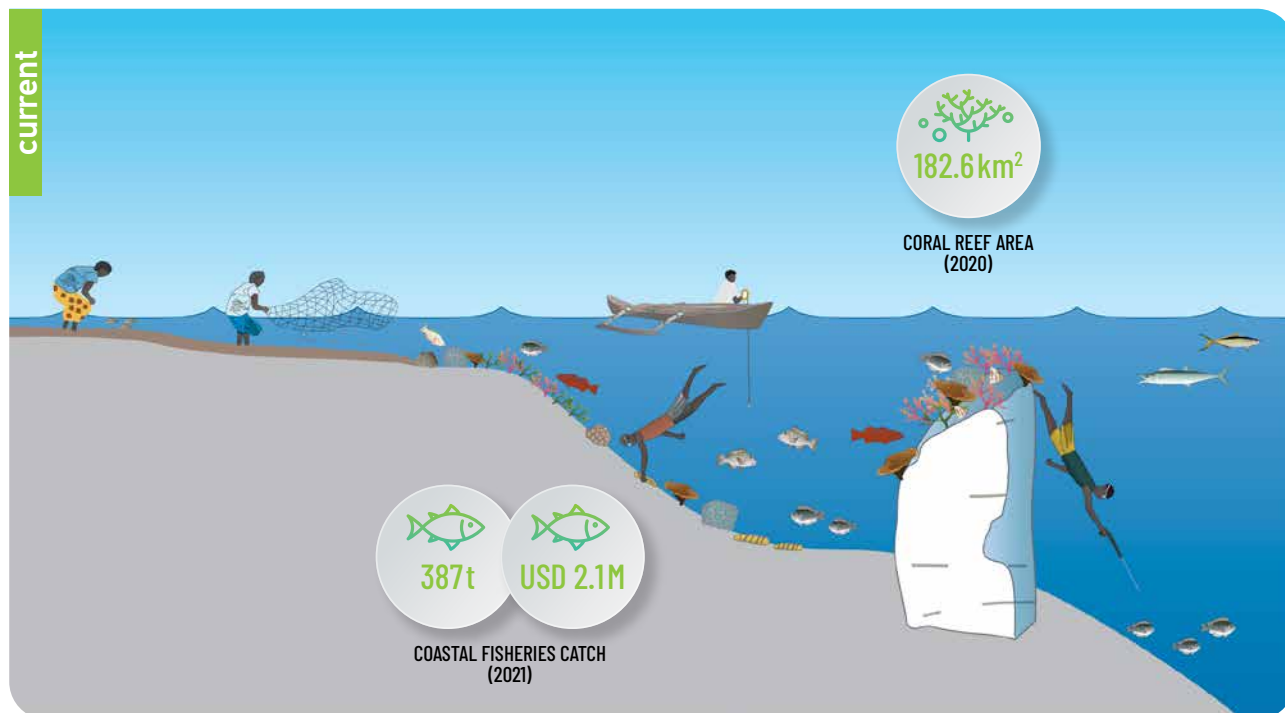
	OCEAN CIRCULATION	OCEAN STRATIFICATION	OCEAN OXYGEN CONTENT	NITRATE CONCENTRATION
MEDIUM EMISSIONS (SSP2-4.5)	Intensification and poleward extension of northern and southern hemisphere subtropical gyres	+0.58 kg/m ³ (between 0 and 200 m); Mixed layer depth shoals by 19.5 m (global)	-6.6 %	-0.60 mmol/m ³
HIGH EMISSIONS (SSP5-8.5)			-11.2 %	-1.00 mmol/m ³
CONFIDENCE ^v	MEDIUM	VERY HIGH	HIGH	N/A



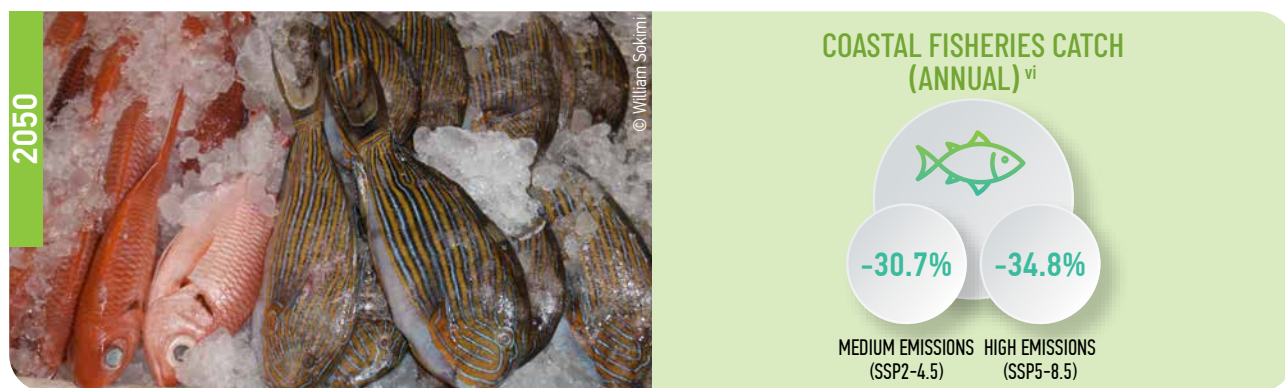
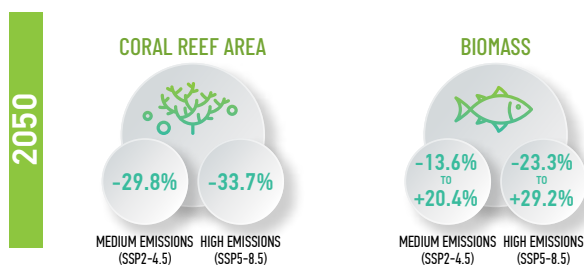
^{iv} The shared socioeconomic pathways (SSP) represent plausible futures of how society's choices might affect greenhouse gas emissions, and how those choices might influence climate change.
^v Confidence levels reflect uncertainty in attribution of the observed impact to climate change.

Coastal fisheries

Coastal fisheries in the Northern Mariana Islands target demersal fish (including surgeonfish, parrotfish, groupers and wrasses), invertebrates for export (e.g. lobster) and gleaned from intertidal habitats, and nearshore pelagic fish (including tuna and mahi mahi) a range of fishing methods. These species are important for food, local livelihoods and jobs (further details in Chapter 3).



Coastal fish and invertebrates are expected to be directly impacted by increasing sea surface temperature, ocean acidification (declining pH), and changing rainfall patterns, and indirectly impacted by declines in coastal habitats (coral reefs, seagrass meadows and mangroves) by 2050. This will drive changes in habitat area, fish biomass and coastal fisheries catches.

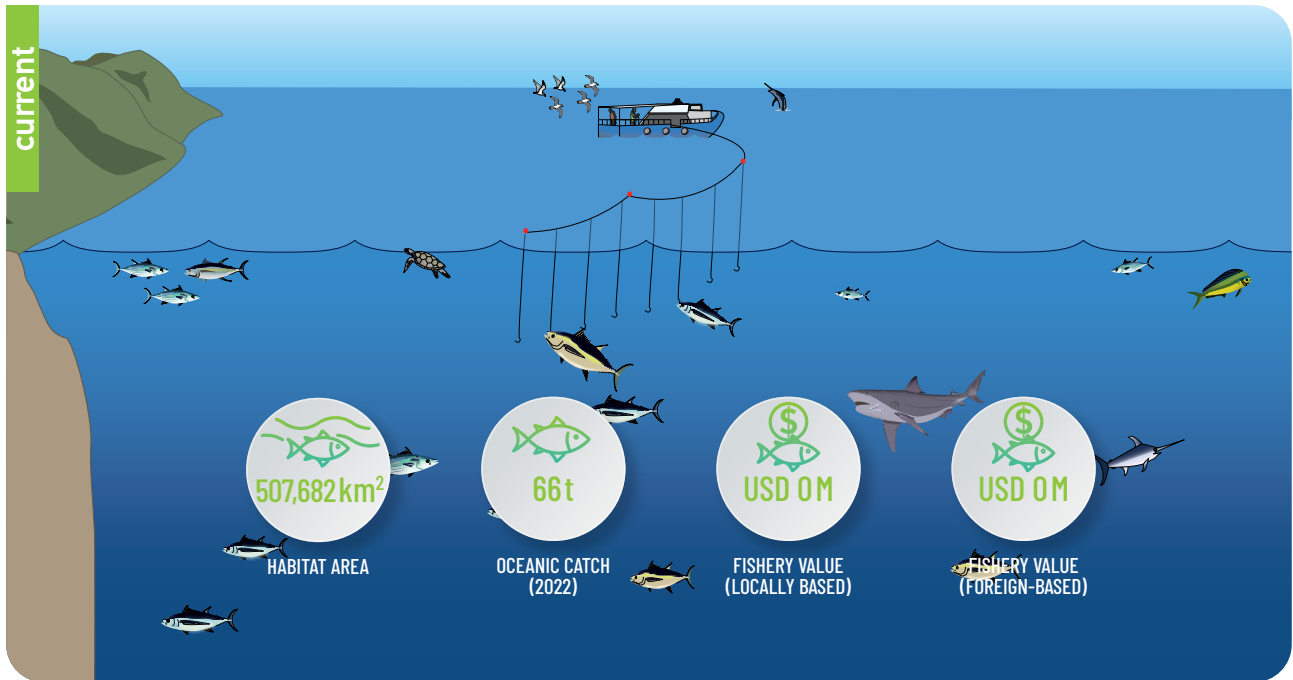


There is evidence that some stocks may be overfished and/or fishing rates are too high. Better stock assessments are needed.

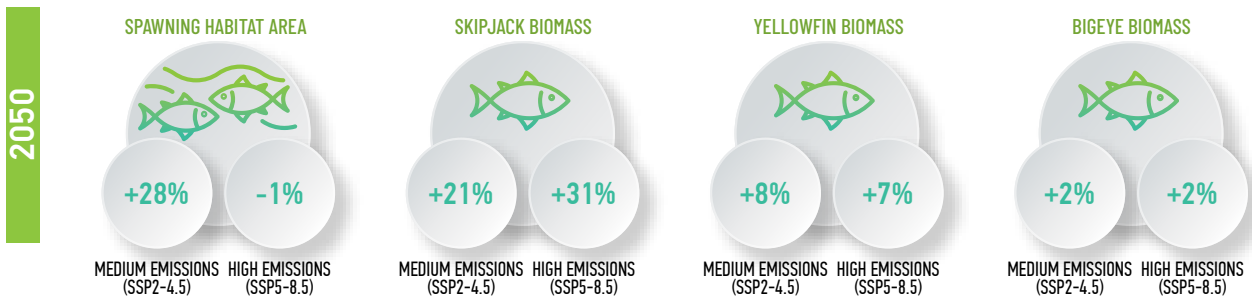
^{vi} Relative to the Reference Period 2010–2020.

Oceanic fisheries

There has not been any locally based offshore fishing in the Northern Mariana Islands' exclusive economic zone (EEZ) since 2008, and there is no authorised foreign fishing^{vii}. There is some locally based trolling in nearshore habitats for bigeye tuna.



PROJECTED BIOMASS (WITHOUT FISHING) RELATIVE TO 2001–2010 REFERENCE PERIOD

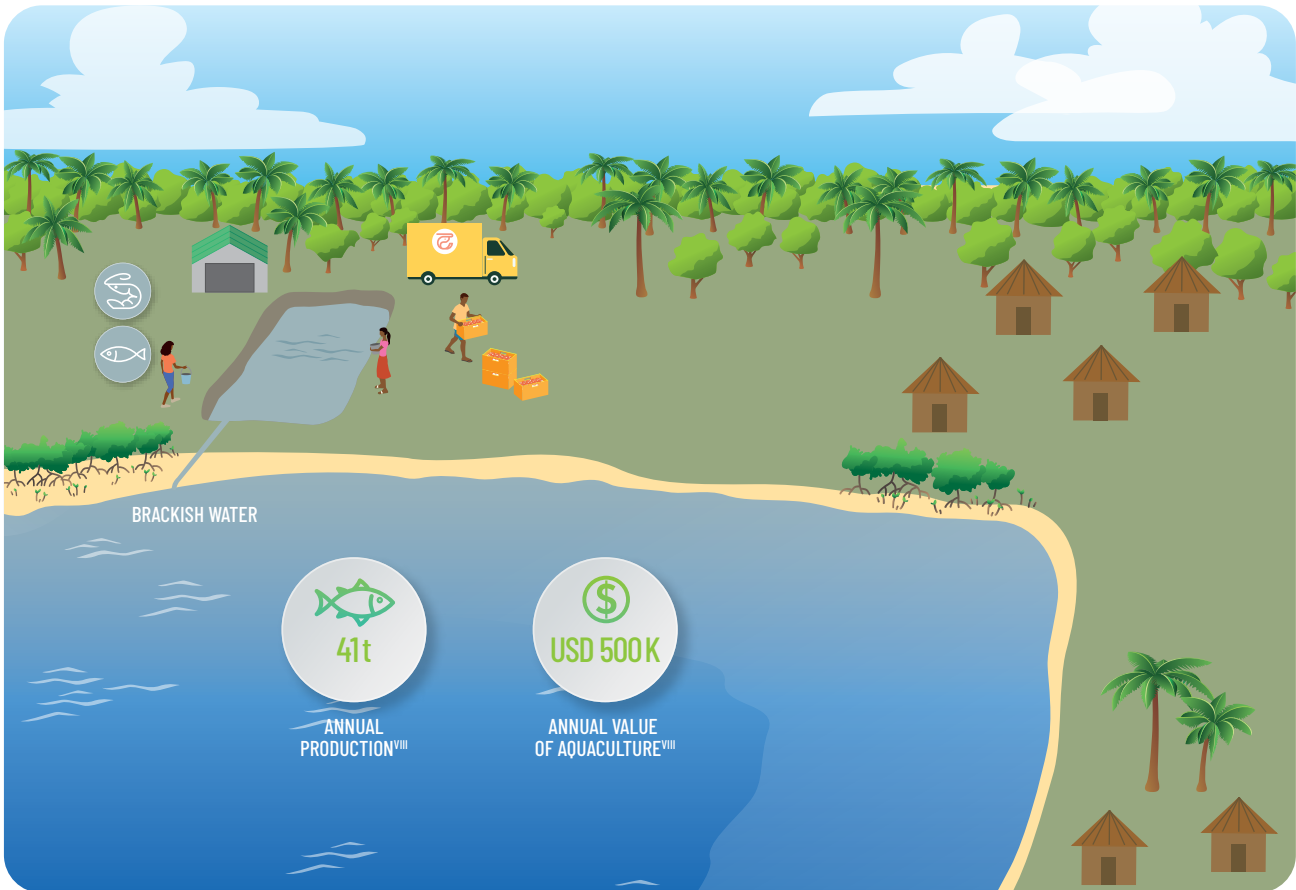


Freshwater and estuarine fisheries

There is currently no freshwater production, but future opportunities may exist.

Aquaculture

The main commodities farmed in the Northern Mariana Islands are tilapia and marine shrimp, which provide food, local livelihoods, jobs, and government revenue (further details in Chapter 6).

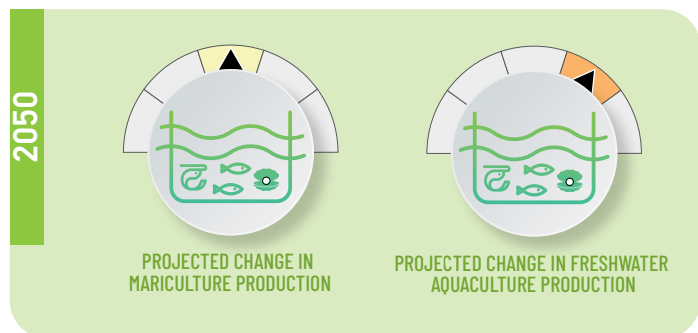


Marine shrimp (penaeid)

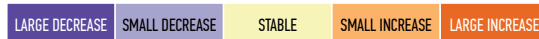
Tilapia

Mariculture is expected to be directly impacted by increasing sea surface temperature, ocean acidification (declining pH), and more intense storms.

Freshwater pond aquaculture is expected to benefit from increases in freshwater habitat but be impacted by increasing temperatures and disease, changing rainfall, storms and sea-level rise. This will have implications for aquaculture production by 2050.



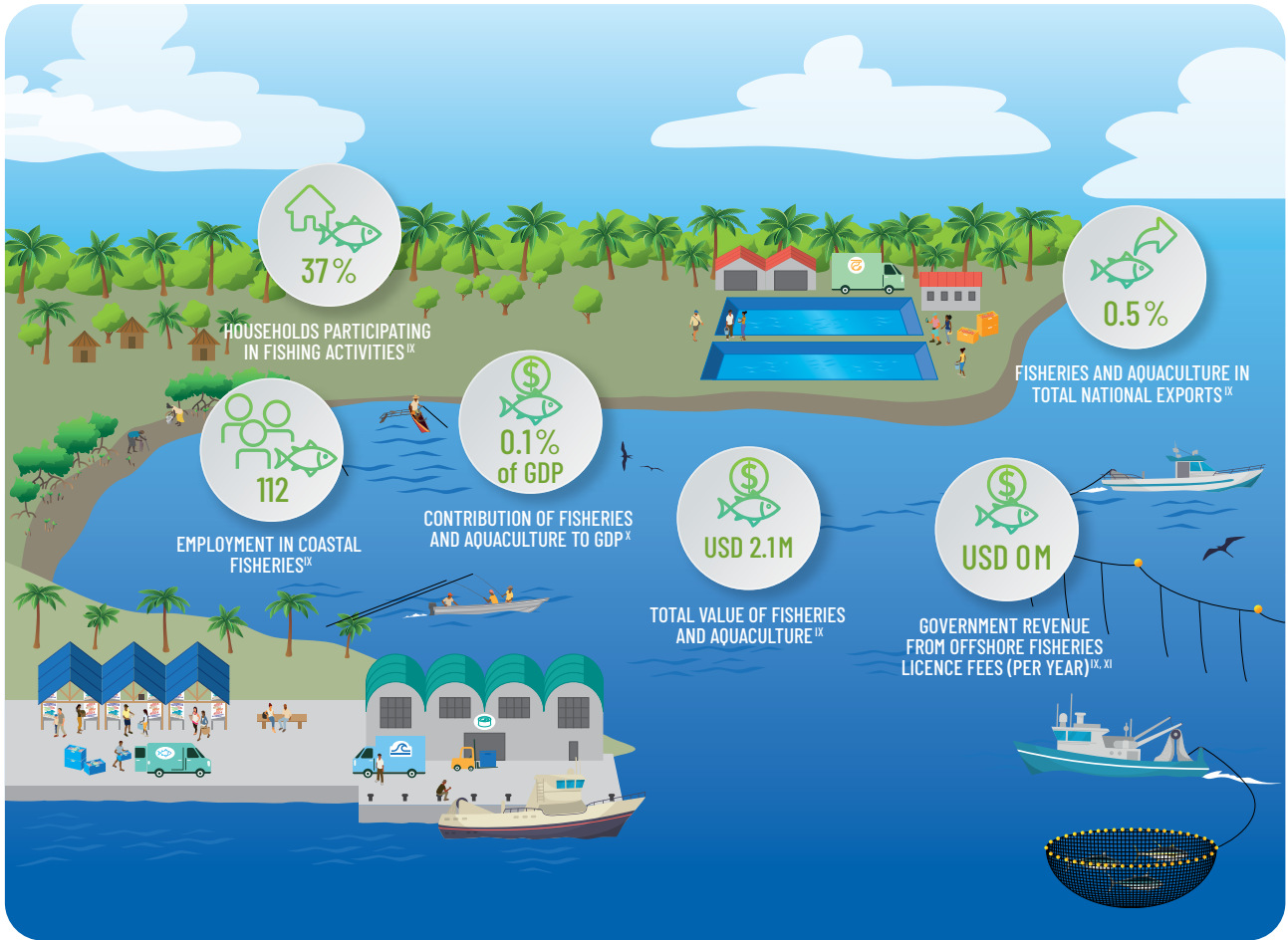
CHANGE SCALE



viii Data source: Gillett R., Fong M. (2023) Fisheries in the economies of Pacific Island countries and territories (Benefish Study 4). Pacific Community (SPC), Noumea, New Caledonia.

Livelihoods and economies

Fisheries and aquaculture are important for local culture and trade, and providing household income, jobs and government revenue in the Northern Mariana Islands (further details in Chapter 7).



No significant impacts are expected on livelihoods or GDP due to the low relative contribution of fisheries and aquaculture. No significant impact is expected on government revenue because no purse-seine fishing is likely in the EEZ.



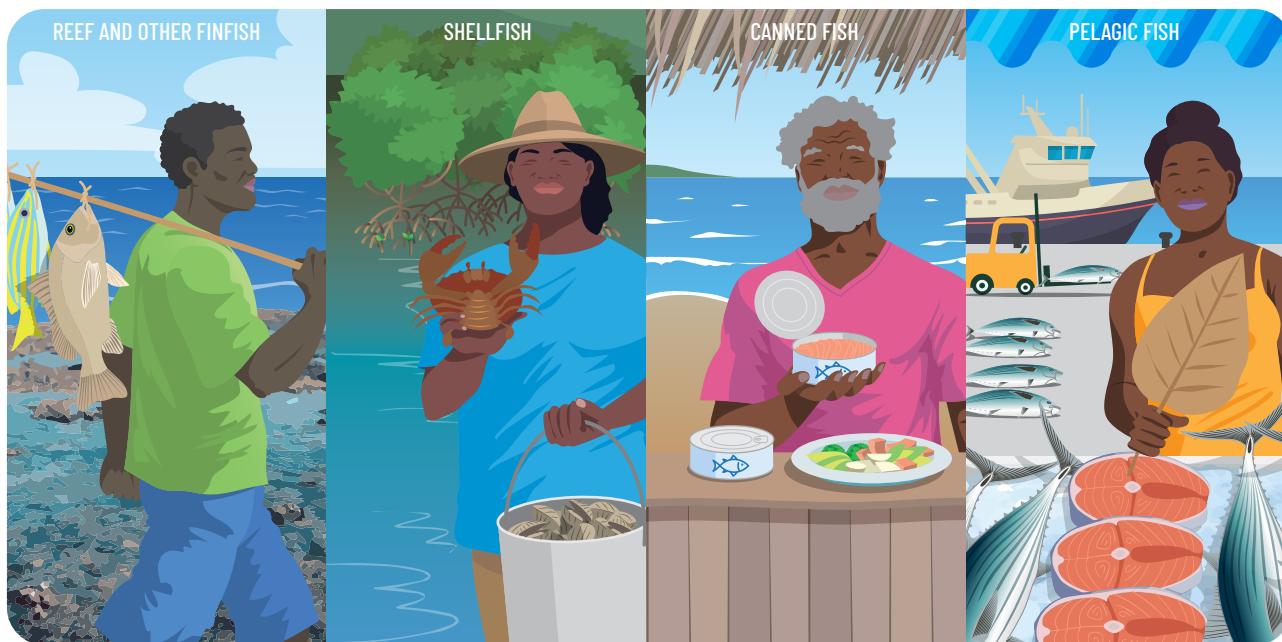
ix Data source: Gillett R., Fong M. (2023) Fisheries in the economies of Pacific Island countries and territories (Benefish Study 4). Pacific Community (SPC), Noumea, New Caledonia.

x National GDP in 2020.

xi Average value 2017-2021

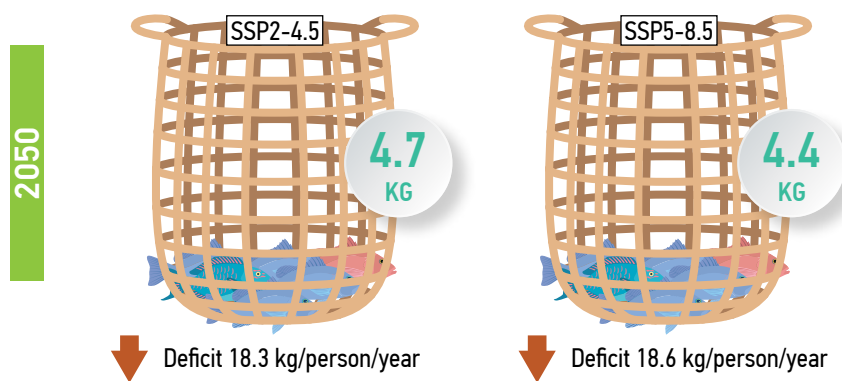
Aquatic food security

Aquatic (blue) foods provide an important source of nutrition in the Northern Mariana Islands, and current consumption is 23 kg/person/year, including locally and imported reef and other finfish, shellfish, canned fish and pelagic fish (further details in Chapter 8)^{xii}.

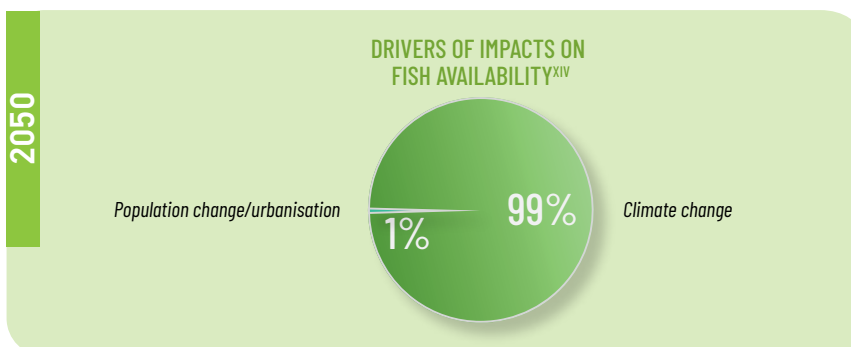


The Northern Mariana Islands is projected to experience a deficit in fish supply by 2050 based on current fisheries catch rates and average consumption. This will be driven by climate change impacts on coastal fisheries. There is expected to be a decline in available whole fish by 2050^{xiii} and the likely possibility of insufficient access to aquatic foods, resulting in **high vulnerability**.

HOW MUCH FISH WILL BE AVAILABLE PER PERSON IN 2050?



To meet the future needs of a growing population and address declining catches for local consumption under climate change, sustainable coastal and estuarine fisheries management is essential. A greater contribution from pelagic fish, canned fish and aquaculture, and other protein sources (e.g. agriculture), will also be required to support food security and good nutrition. Any adaptations should consider environmental and social safeguards and avoid maladaptation.



^{xii} Data estimated for whole fish from: Sharp M.K., Andrew N.L. (2024) Aquatic food consumption in the Pacific region. Food Systems Brief No. 22. Pacific Community, Noumea, New Caledonia. Note that reef and other finfish include freshwater and estuarine fish.

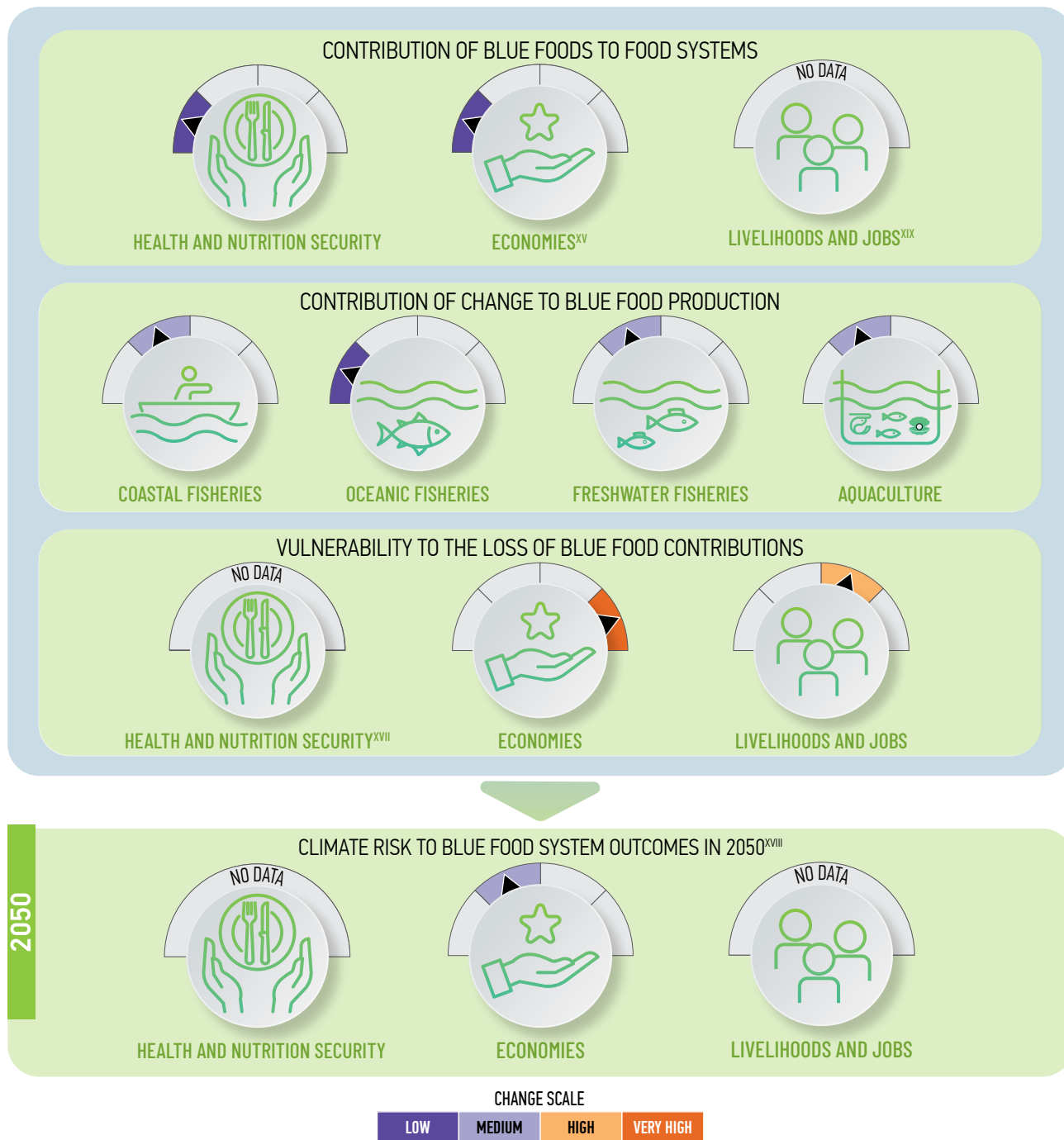
^{xiii} Based on projected coastal, estuarine and freshwater fisheries catches by 2050 from Chapters 3 and 5.

^{xiv} Based on current aquatic food consumption levels. Note that agriculture can also provide additional protein sources to supplement a decline in aquatic foods, however any adaptations should consider environmental and social safeguards and avoid maladaptation.

Blue food production systems

In the Pacific Islands region, blue foods contribute significantly to nutrition security and health, economies, livelihoods and jobs. By comparing contributions, climate impacts, and vulnerabilities across these outcomes, priority climate actions can be identified for sustaining their role in sustainable development under climate change (further details in Chapter 9).

In the Northern Mariana Islands, blue foods make relatively few contributions to sustainable development outcomes. Compared to other Pacific islands, projected climate impacts to blue food production by 2050 are medium to high. Socioeconomic conditions make Northern Mariana Islands' sustainable development highly vulnerable to climate-induced losses.



Altogether, blue foods contributions to sustainable development in the Northern Mariana Islands face medium levels of climate risk, though data gaps in nutrition and livelihoods hamper a holistic assessment. Priority climate actions can focus on reducing vulnerability through broader sustainable development and economic diversification.

^{xv} Including variables such as total fisheries production value and foreign access fees.

^{xvi} Including variables such as total number of jobs across supply chains, share of households for which fishing is the main source of income and gender equity considerations.

^{xvii} Including nutrition-related health outcomes such as nutrient deficiencies and noncommunicable diseases.

^{xviii} Risk is shown for a high-emissions scenario (SSP5-8.5). Rapid emissions reduction would reduce climate risk.

