



**NOAA**  
**FISHERIES**  
PIFSC

# Ecosystem Sciences Division recent evolution

NOAA Pacific Islands Fisheries Science Center  
**Frank Parrish Ph.D**  
**ESD Director**

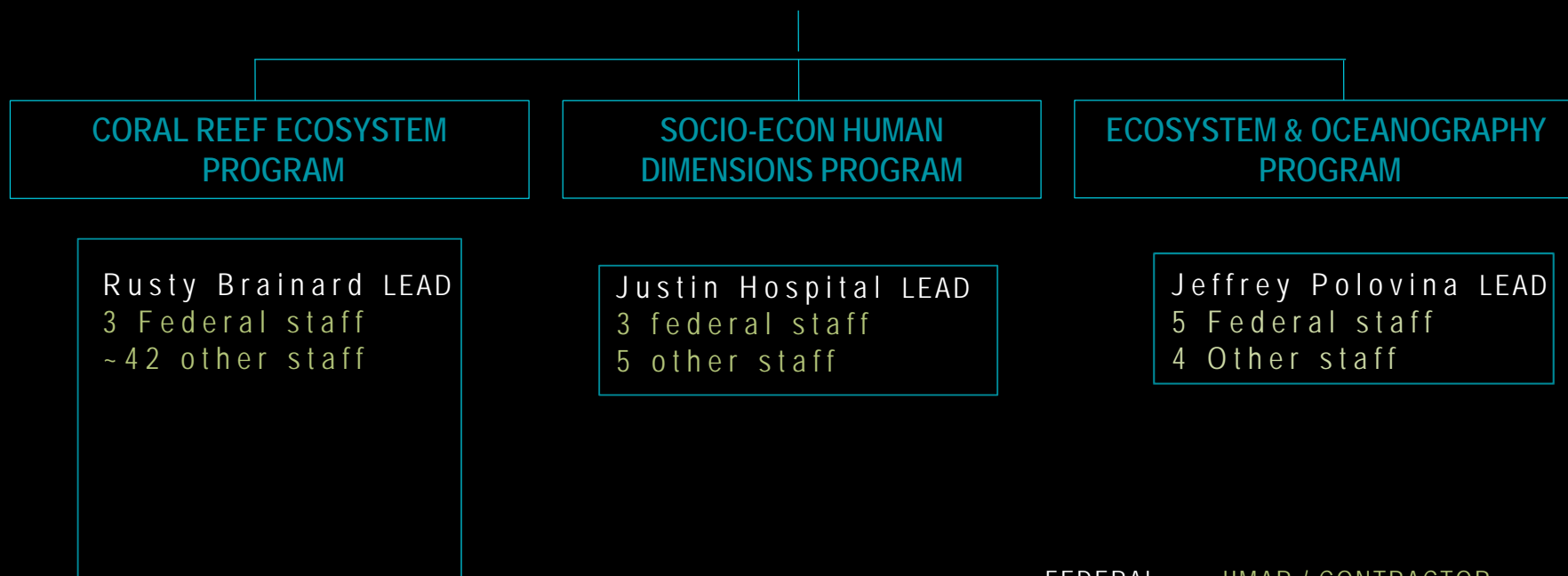
August 2, 2017

# ECOSYSTEM SCIENCES DIVISION - formed 2015

- Combined 3 programs as one division

## ECOSYSTEM SCIENCES DIVISION

DIVISION DIRECTOR



FEDERAL

JIMAR / CONTRACTOR

## 2016 – National Ecosystem Review

- Only ecosystem/oceanography and coral reef components reviewed

### Findings

- High quality work
- Stronger integration was needed across the division
- Mismatch between PIRO info needs and PIFSC research activities
- Need to address temporary funding of projects in coral program
- Need to assess the monitoring data for utility and optimal efficiency

### Action

- Restructure to provide greater collaboration within and across divisions

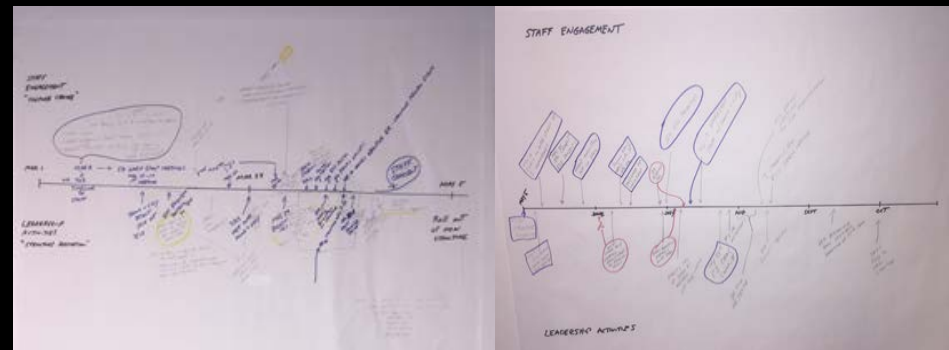


2017 - Parrish selected as division director

- Center continues the transition to a new ESD structure.

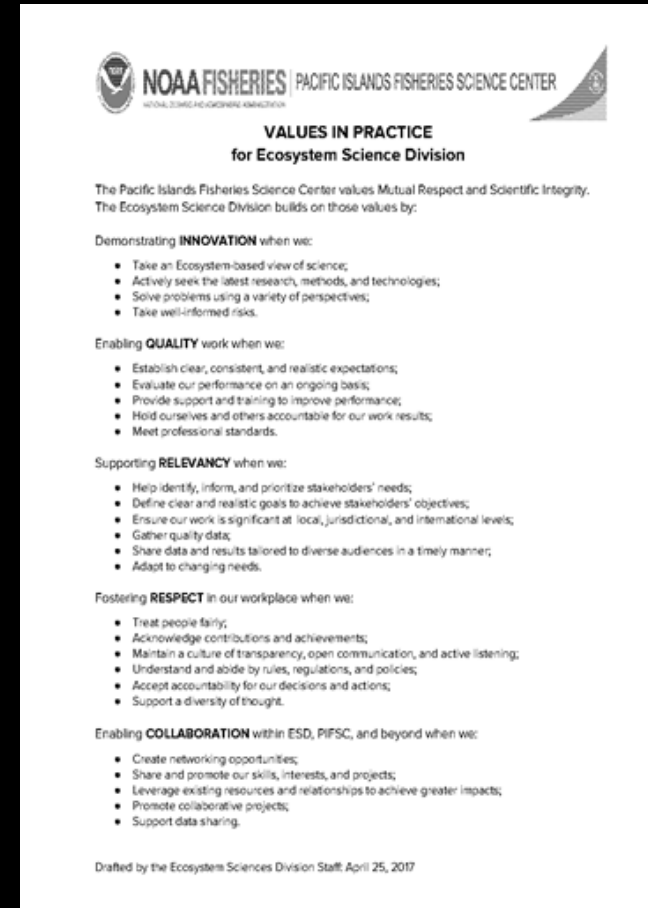
Challenges for a changing ESD - supervisory roles, logistics, institutional inertia, program identity, organizational culture.

- Actions
- Create a process for leadership and staff to redesign ESD
  - Seek external expertise to help foster shared vision
  - Train many staff as facilitators to guide the process



## Actions cont.

- Have staff workshops to identify values
- Have staff take the lead of workgroups to generate products
  - > Values in practice
  - > Vision, goals objectives, actions
  - > Human capital
  - > Procedure for RFPs
  - > Evaluation of data streams
  - > Comments on ESD structure



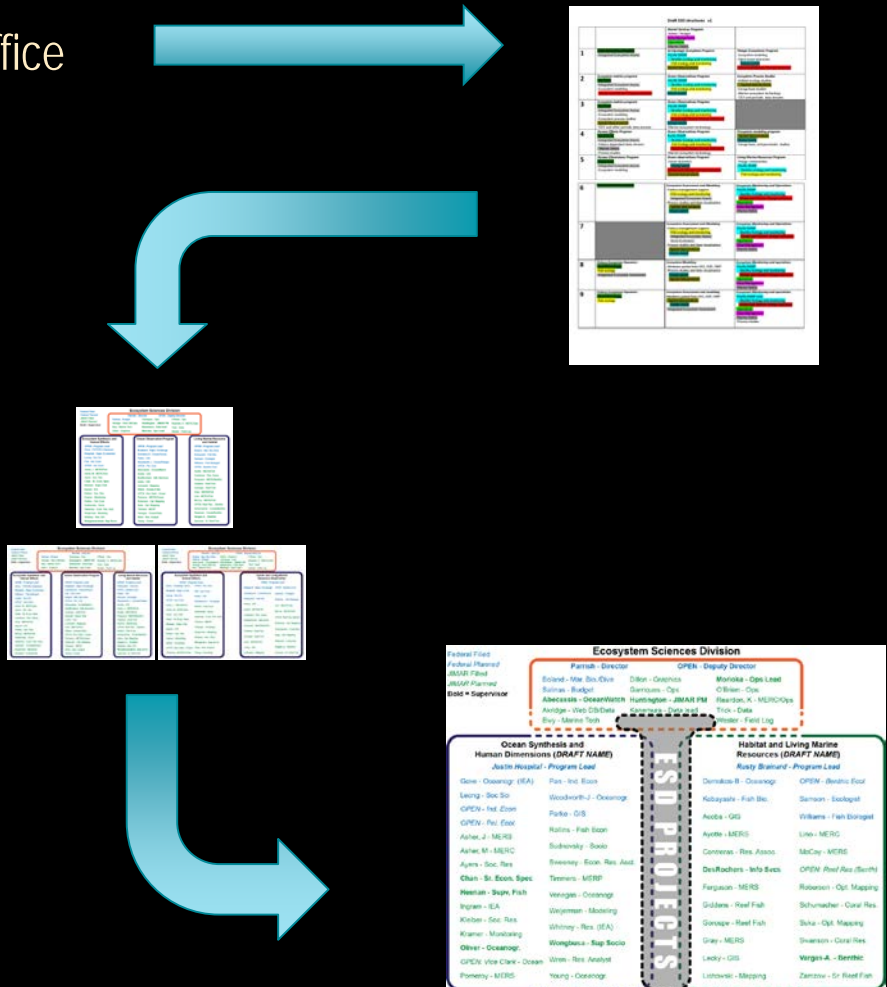
## SELECTING A STRUCTURE

- Program leads provide options to Directors office

- Directors office modifies a few options

- Staff review and provide comment

-New ESD structure selected



Federal Filled  
 Federal Planned  
 JIMAR Filled  
 JIMAR Planned  
**Bold = Supervisor**

## Ecosystem Sciences Division

### Parrish - Director

### OPEN - Deputy Director

Boland - Mar. Bio./Dive

Dillon - Graphics

**Morioka - Ops Lead**

Salinas - Budget

Garriques - Ops

O'Brien - Ops

**Abecassis - OceanWatch**

**Huntington - JIMAR PM**

Reardon, K - MERC/Ops

Akridge - Web DB/Data

Kanemura - Data lead

Trick - Data

Bwy - Marine Tech

Wester - Field Log

### Ocean Synthesis and Human Dimensions (*DRAFT NAME*)

*Justin Hospital - Program Lead*

Gove - Oceanogr. (IEA)

Pan - Ind. Econ

Leong - Soc Sci

Woodworth-J - Oceanogr.

*OPEN - Ind. Econ*

Parke - GIS

*OPEN - Pel. Ecol.*

Rollins - Fish Econ

Asher, J - MERS

Sudnovsky - Socio

Asher, M - MERC

Sweeney - Econ. Res. Asst.

Ayers - Soc. Res

**Chan - Sr. Econ. Spec**

Timmers - MERP

**Heenan - Supv. Fish**

Venegas - Oceanogr.

Ingram - IEA

Weijerman - Modeling

Kleiber - Soc. Res.

Whitney - Res. (IEA)

Kramer - Monitoring

**Wongbusa - Sup Socio**

**Oliver - Oceanogr.**

Wren - Res. Analyst

*OPEN: Vice Clark - Ocean*

Young - Oceanogr.

Pomeroy - MERS

### Habitat and Living Marine Resources (*DRAFT NAME*)

*Rusty Brainard - Program Lead*

Domokos-B - Oceanogr.

*OPEN - Benthic Ecol.*

Kobayashi - Fish Bio.

Samson - Ecologist

Acoba - GIS

Williams - Fish Biologist

Ayotte - MERS

Lino - MERC

Contreras - Res. Assoc.

McCoy - MERS

**DesRochers - Info Svcs**

*OPEN: Reef Res (Benth)*

Ferguson - MERS

Roberson - Opt. Mapping

Giddens - Reef Fish

Schumacher - Coral Res.

Gorospe - Reef Fish

Suka - Opt. Mapping

Gray - MERS

Swanson - Coral Res.

Lecky - GIS

**Vargas-A. - Benthic**

Lichowski - Mapping

Zamzow - Sr. Reef Fish

ESD PROJECTS



NOAA FISHERIES



# NOAA FISHERIES PACIFIC ISLANDS FISHERIES SCIENCE CENTER

## ESD

30-71-0008

FRANK PARRISH  
ZP-408-5  
Director

VACANT  
ZP-408-4  
Deputy Director

RAYMOND BOLAND  
ZP-401-3  
Marine Biologist

LUIS SALINAS  
ZP-560-3  
Budget Analyst

## JIMAR

ABECASSIS, MELANIE  
OCEAN WATCH MGR

GARRIGUES, JOAO  
FIELD LOGISTICS

O'BRIEN, KEVIN  
OPS

AKRIDGE, MICHAEL  
WEB ADMIN/DATA

HUNTINGTON, BRITTAN  
JIMAR PROG MGR

REARDON, KERRY  
MERC/OPS

BWY, KEVIN  
MARINE TECH

KAMEMURA, TROY  
DATA LEAD

TRICK, KEVIN  
DATA

DILLON, AMANDA  
SCI GRAPHICS/PLSS

MORIOKA, JAMES  
OPS LEAD

WESTER, TATE  
FIELD LOGISTICS SPEC

## OCEAN SYNTHESIS AND HUMAN DIMENSIONS

JUSTIN HOSPITAL  
ZP-101-4  
Sup Economist

JAMISON GOVE  
ZP-1360-3  
Res Oceanographer

WINLING PAN  
ZP-110-4  
Industrial Economist

KRISTEN LEONG  
ZP-101-3/4  
Social Scientist

PROSSER, MICHAEL  
ZP-1360-3  
Res Oceanographer

MICHAEL PARKE  
ZP-482-4  
Res Fishery Biologist

VACANT  
ZP-101-3/4  
Economist (Industrial)

VACANT  
ZP-1360-3/4  
Ecologist (pelagic)

## HABITAT AND LIVING MARINE RESOURCES

RUSSELL BRAUNARD  
ZP-1360-4  
Sup Oceanographer

REKA DOMOKOS-BOYER  
ZP-1360-3  
Res Oceanographer

DONALD KOBAYASHI  
ZP-482-4  
Res Fish Biologist

JENNIFER SAMSON  
ZP-408-4  
Res Ecologist

IVOR WILLIAMS  
ZP-482-3  
Res Fish Biologist

VACANT  
ZP-408-3/4  
Ecologist (benthic)

## JIMAR

ASHER, JACOB  
MERS

KRAMER, KATHERINE  
CORAL REEF HAB &  
MONITORING TECH

VENEGAS, ROBERTO  
RES OCEANOGRAPHER

ASHER, MEGAN  
MERC

OLIVER, TOM  
QA PROGRAM MGR

WELJERMAN, MARIKA  
ECOSYS MODEL RES

AYERS, ADAM  
SOCIAL RES PROJ MGR

POMEROY, NOAH  
MERS

WHITNEY, JONATHAN  
IEA RES TECH

CHAN, HINGLING  
ZP-101-3/4

ROLLINS, EMILY  
FISHERIES ECON SPEC

WONGBUKURASUM, S  
SOC SCI & INTL PROJ

HEENAN, ADEL  
SUPV REEF FISH RES

SUDOVSKY, MAX  
MARINE ECO OPS

WREN, JOHANNA  
RES ANALYST

INGRAM, REBECCA  
IEA RES SPECIALIST

SWEENEY, JONATHAN  
ECON RES ASST

YOUNG, CHARLES  
Oceanographer

KLEISER, DANIKA  
SOCIAL RES PROJ MGR

TIMMERS, MOLLY  
MERC

VACANT—VICE CLARK  
OCEANOGRAPHER

## JIMAR

ACOSA, TOMOKO  
GIS

GOROSPE, KELVIN  
REEF FISH RES

ROBERSON, LIANA  
OPTICAL MAPPING

AYOTTE, PAULA  
MERS

GRAY, ANDREW  
MERS

SCHUMACHER, BRETT  
CORAL REEF RES

CONTRERAS, EMILY  
RES ASSOC

LECKY, JOEY  
GIS

SUKA, RHONDA  
OPTICAL MAP SPEC

DESROCHERS, ANNETT  
INFO SVCS  
Economist

LIKHOMSKI, FRANCES  
SEALED MAP SPEC

SWANSON, DIONE  
SUPV CORAL REEF  
RES

FERGUSON, MARIE  
MERS

LINO, KEVIN  
MERC

VARGAS-ANGEL, D  
CORAL ECOLOG RES

GIDDENS, JONATHAN  
REEF FISH RES

MCCOY, KATLYN  
MERS

ZAMZOW, JILL  
SR REEF FISH RES

VACANT  
REEF RES (BENTHIC)



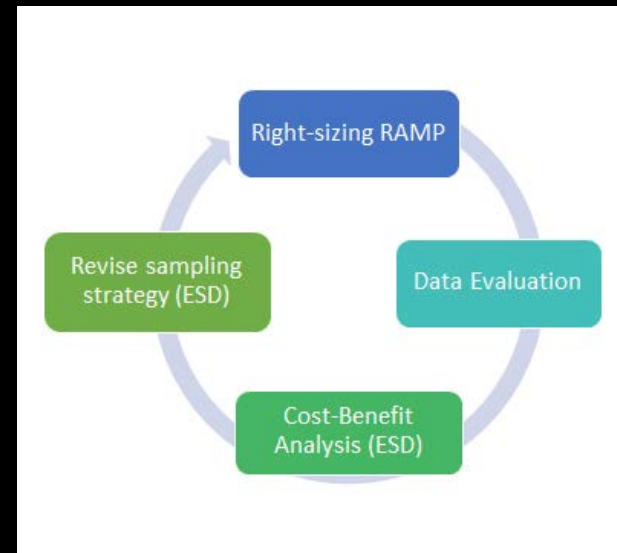


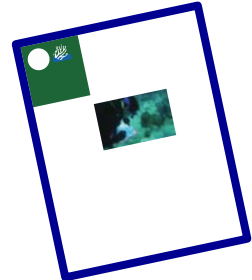
## New way of working for 2018

- Shift from program-based operations to project-based operations
- Supervisory and administrative structure a backdrop to a functional structure that can adapt as needed.
- Point of contact (POC) identified for end to end objectives
- Socio Econ a consideration across all activities

## Initial steps









- Implemented standing meetings with PIRO
- Pacific "Coral Knoll" meeting held for priorities
- Performance evaluation for Pac. NCRMP data
- Highlight relevance to people

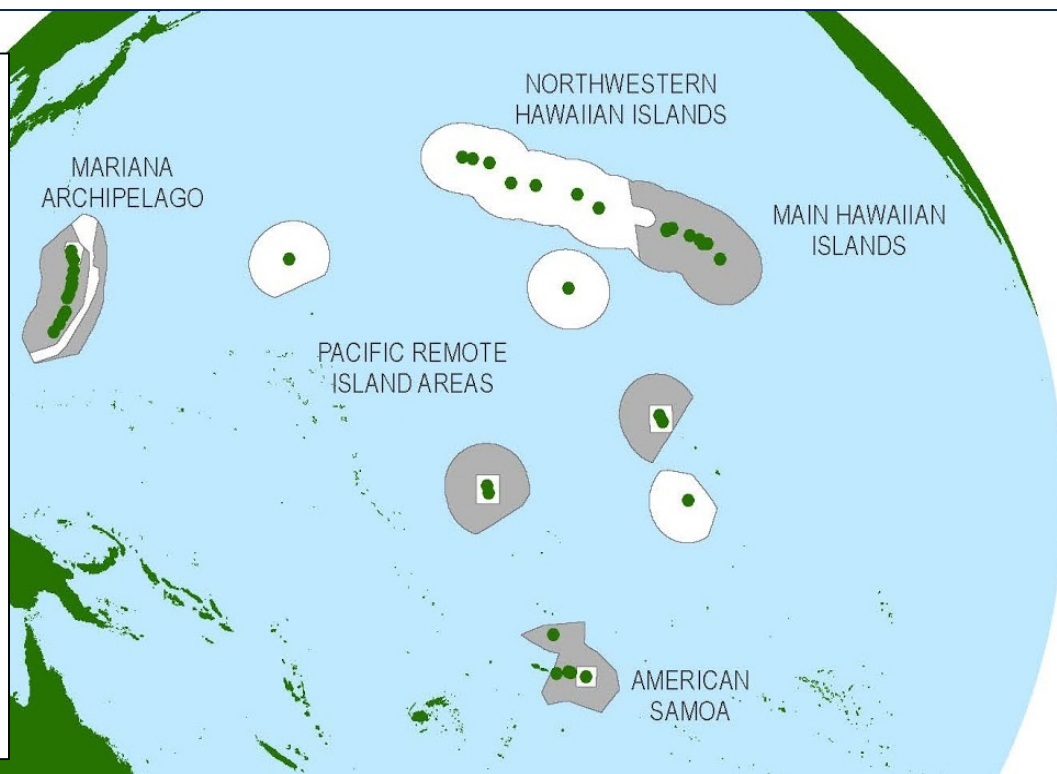







# NCRMP

## *Pacific Reef Assessment and Monitoring Program (Pacific RAMP)*

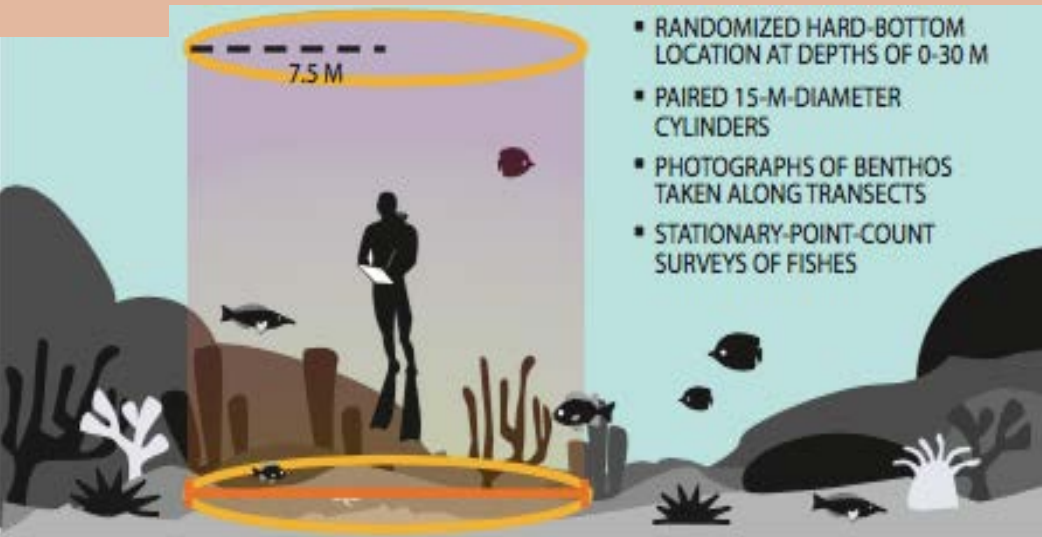
-  Long-term interdisciplinary ecosystem monitoring of abundance, distribution, **diversity**, condition of:
  -  reef fishes
  -  corals
  -  invertebrates
  -  algae
  -  microbes
  -  meroplankton (2016-)
-  Ocean acidification & warming



-  'Wide-but-thin' approach to monitor Nation's shallow (<30m) coral reef ecosystems
-  Stratified-random survey designs for robust change detection at 'island scale'
-  Consistent, repeatable, comparable methods across gradients of biogeography, environmental conditions, & human impacts

# Methods

## Reef Fish Surveys – Stationary Point Count (SPC)

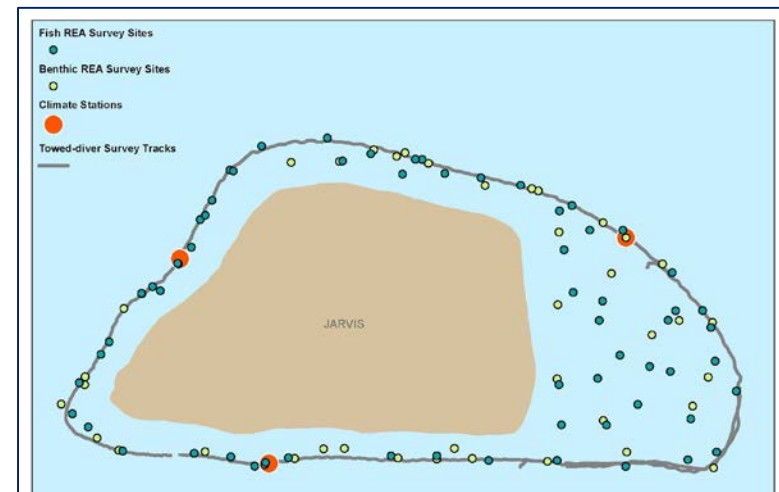
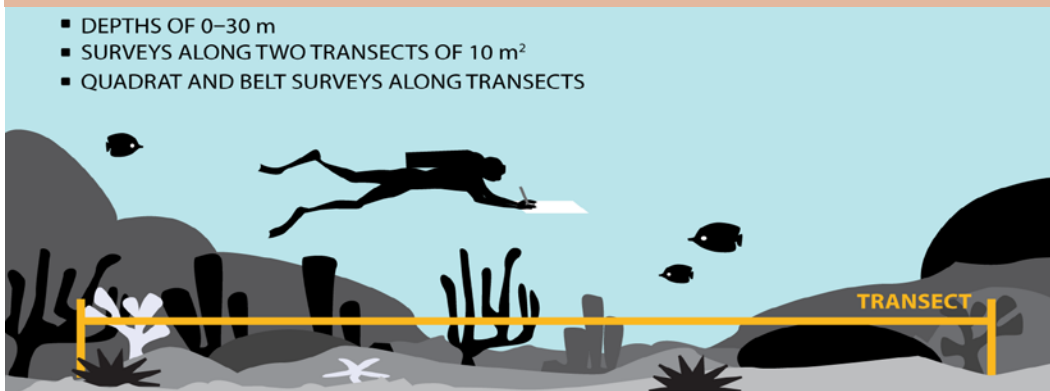


## Autonomous Reef Monitoring Structures (ARMS)



## Benthic Surveys

- DEPTHS OF 0-30 m
- SURVEYS ALONG TWO TRANSECTS OF 10 m<sup>2</sup>
- QUADRAT AND BELT SURVEYS ALONG TRANSECTS





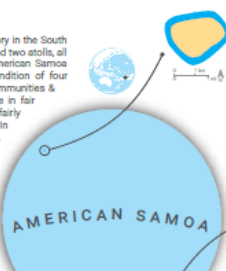
# NCRMP Coral Reef Condition Report Cards

## AMERICAN SAMOA CORAL REEFS ARE IN **FAIR** CONDITION

### AMERICAN SAMOA



American Samoa is an unincorporated United States Territory in the South Pacific. The Territory consists of five volcanic islands and two atolls, all of which are surrounded by fringing coral reefs. American Samoa was divided into six sub-regions to evaluate condition of four categories—corals & algae, fish, climate, and communities & management. American Samoa coral reefs are in fair condition overall. Although benthic cover is fairly impacted, coral populations are doing well. In contrast, fish are moderately to very impacted. Sharks and other predators are considered depleted throughout the world and American Samoa is no exception. Climate is also a factor negatively affecting coral reefs. Temperature stress that leads to coral bleaching and ocean acidification are global problems seen locally in American Samoa. Despite these problems, communities are engaged and informed about management actions to protect reefs. These conditions show that American Samoa's remote islands are lightly to moderately impacted, but overall the Territory is struggling against threats, such as pollution, overfishing, and global climate change.



### SWAINS ISLAND

Swains Island is approximately 1.5 mi in diameter with a maximum elevation of 6 feet above sea level. Only a few people lived on Swains in the past, and it has been completely uninhabited for the last 5-10 years, leaving it largely untouched. Swains Island's coral reefs are doing well and scored the highest out of the six regions.



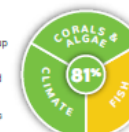
### MULIA (ROSE ATOLL)

Rose Atoll is the easternmost Samoan island and the southernmost point of the United States. One of the smallest atolls in the world, Rose Atoll consists of about 0.03 square miles of land, 2.5 square miles of lagoon, and a narrow barrier reef. Rose Atoll's coral reefs are doing well, and are similar to Swains Island.



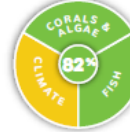
### TA'U

Ta'u is one island of the Manu'a group of islands in American Samoa and has a population of approximately 1,000. Part of the island is preserved as the National Park of American Samoa. Ta'u's reefs are lightly impacted, but didn't score as well as Rose Atoll and Swains Island.



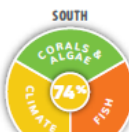
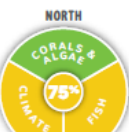
### OFU & OLOSEGA

Ofu & Olosega are the two other islands in the Manu'a group of islands in American Samoa and have a combined population of approximately 400. Corals & algae are lightly impacted and scored the highest for corals & algae in American Samoa.



### NORTH & SOUTH TUTUILA

The island of Tutuila is the Territory's administrative center and is by far the largest and most populated island of American Samoa. The island was divided into northern and southern regions based on natural geography and data resolution. North and South Tutuila's reefs are moderately impacted and are the only reefs in American Samoa that received a poor score. North Tutuila's reefs scored the worst of the six regions for corals & algae.



### What do the scores mean?

- 90-100% Excellent**  
All or almost all ecosystems and communities indicators meet desired levels. Conditions in these locations are unimpacted or minimally impacted.
- 80-90% Good**  
Most ecosystems and communities indicators meet desired levels. Conditions in these locations are lightly impacted.
- 70-80% Fair**  
Some ecosystems and communities indicators meet desired levels. Conditions in these locations are moderately impacted.
- 60-70% Poor**  
Few ecosystems and communities indicators meet desired levels. Conditions in these locations are very impacted.
- 0-60% Very poor**  
Very few or no ecosystems and communities indicators meet desired levels. Conditions in these locations are severely impacted.
- Insufficient data**

### CORALS & ALGAE

Corals & algae make up the base of the coral reef ecosystem, providing habitat and shelter for fish, invertebrates, and marine mammals. They are also important economic and tourism resources. The five indicators for corals & algae are:

- Coral reef cover**, which includes corals, sponges, and crustacean corals.
- Coral populations**, a measure of the populations' ability to reproduce and sustain reefs.
- Herbivores**, a measure of the level of grazing pressure by fish on corals and algae.
- Mortality**, which measures the amount of recently dead coral.
- Diversity**, a measure of the number of different types, or species, of coral present.

The coral-eating crown-of-thorns sea star (COTS) has a serious impact on Indo-Pacific reefs. American Samoa reefs have experienced repeated COTS infestations in the recent past, with corals at Swains and Tutuila reefs sustaining most of the impacts.

A National Park of American Samoa diver spots a COTS with no life, a natural substance that kills the creature but does no harm to the reef. Photo: National Park Service.

### FISH

Coral reefs serve as habitat and food for many fish species. These fish are important to the ecology of the reef, fisheries and global economies, and the livelihoods of local villagers. The four indicators chosen for fish are:

- Reef fish**, a measure of the amount of fish present.
- Biodiversity**, which indicates if the fish are of different species.
- Sharks and other predators**, a measure of the amount of fish that eat other fish.
- Diversity**, a measure of the number of different types, or species, of fish present.

Sharks are important to the ecological function of coral reefs. Their removal can adversely affect the entire coral reef food web. Shark populations in American Samoa today are only 4-8% of historical populations. Other large reef fish such as Brown snappers and groupers are also being overfished and are likely to be locally extinct in the near future. Local management actions such as banning SCUBA spearfishing and banning the take of large reef fish species, if properly supported and enforced, will hopefully help these fish populations recover.

Sharks, such as this schooling grey hammerhead, are a critical component of coral reef food webs. Photo: NOAA.

### PEOPLE

Coral reef management agencies in American Samoa work to protect coral reef resources through management planning, educating the public, and actively involving local citizens and communities in managing their resources. The four indicators for people are:

- Awareness**, an indicator of residents' familiarity with threats to and importance of reefs.
- Support for management actions**, an indicator of support for reef management activities.
- Management in place**, an indicator of geographic extent and strength of protection.
- Pro-environmental behavior**, an indicator of residents' participation in activities to protect the environment.

The majority of residents participate in fishing, swimming, and beach recreation. Fishing is largely for subsistence rather than commercial or recreational purposes. American Samoans believe that coral reef resources are important and this is reflected in their support for management efforts. Residents were asked if they agreed or disagreed with a list of local management efforts:

NOAA's National Marine Sanctuary (NMS) in Marine Protected Areas

### CLIMATE

Climate effects all components of a reef system, from the building blocks of coral to the reproductive success of fish. Climate change and ocean acidification influence reefs around the world. These indicators describe how climate impacts individual reefs. The three climate indicators are:

- Temperature stress**, which measures the frequency and severity of high temperature events.
- Ocean acidification**, indicating if the water chemistry is suitable for coral growth.
- Reef growth**, which directly measures coral growth in relation to water chemistry.

Reefs in American Samoa were hit hard by high temperature stress, bleaching, and mortality in 2015. Severe bleaching and mortality occurred on shallow inshore and regional reefs along southern Tutuila. These shallow habitats have heated water circulation, which worsens the effects of high temperature stress. Higher survival occurred on fringing reefs in deeper waters throughout American Samoa.

Photo: Before (December 2014) and during bleaching (February 2015) at the Pioneer Plot, southern Tutuila. Photo by Dr. Caitlin Weaver-Sayer.

The use of and care for the reefs of American Samoa will preserve them for current and future generations. Photo by Alice Lawrence.

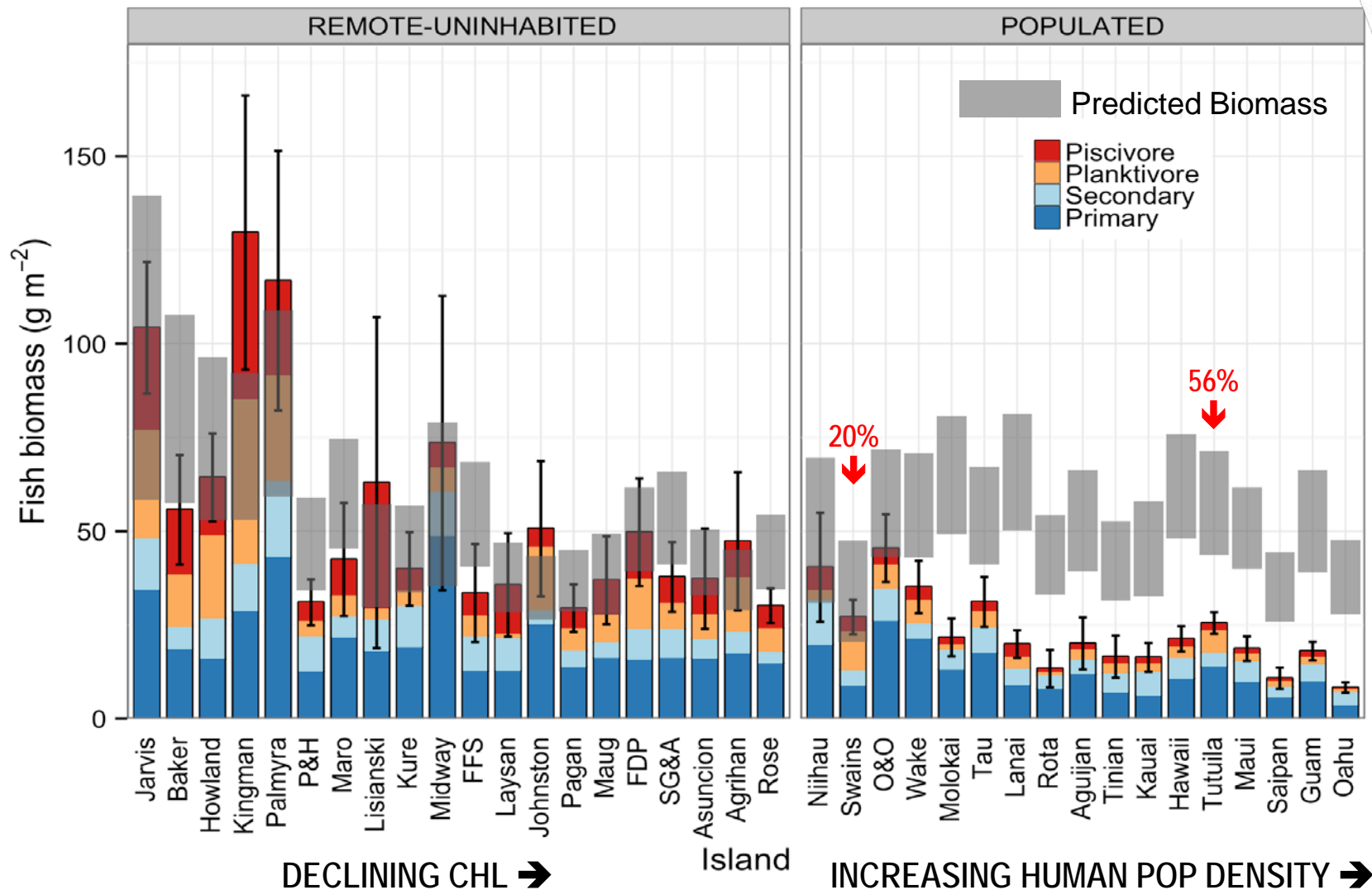
- Data calls for each indicator theme and each jurisdiction
  - Guam
  - Hawaiian Islands
  - CNMI
  - Pacific Remote Islands



# Observed & Predicted Reef Reef Biomass



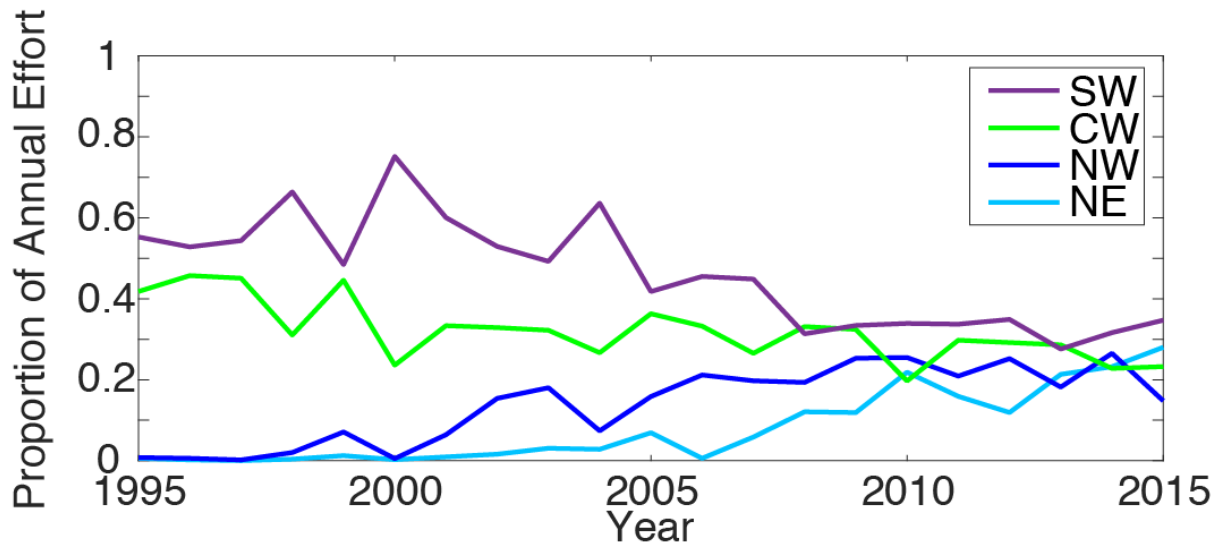
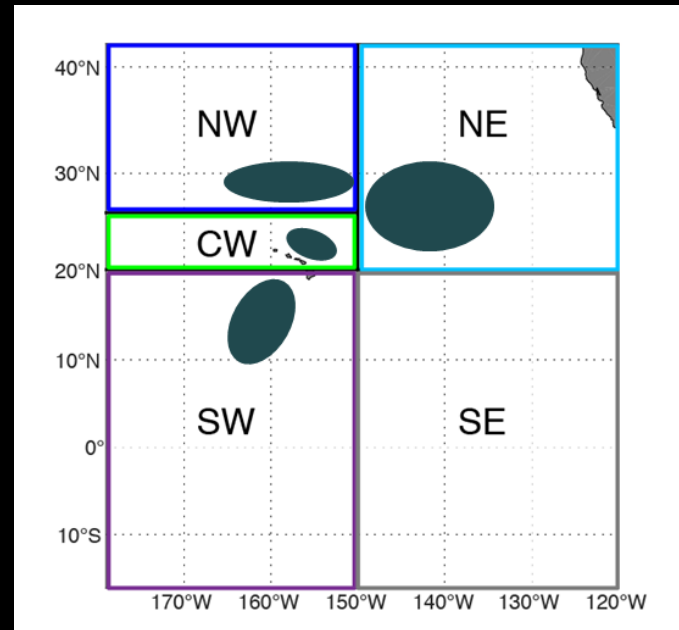
Williams,  
Baum, Heenan,  
Hanson,  
Nadon,  
Brainard (2015)  
PLOS One



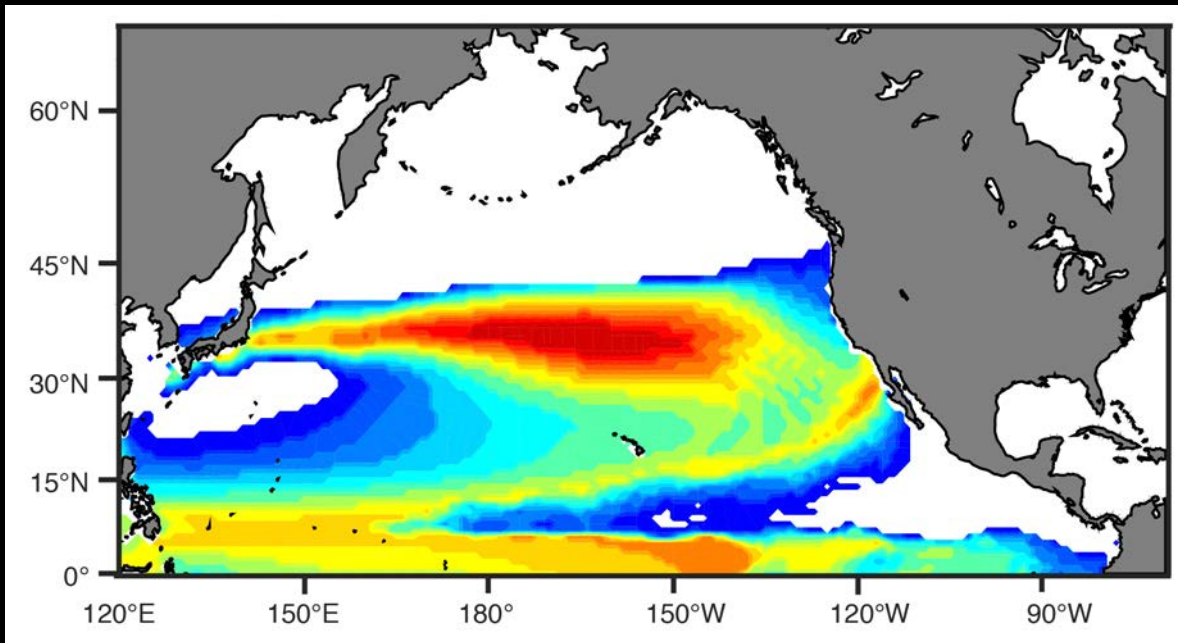
# Longline Fishery Expansion

The spatial footprint of the bigeye fishery has changed

*What are the socioeconomic implications of this change?*

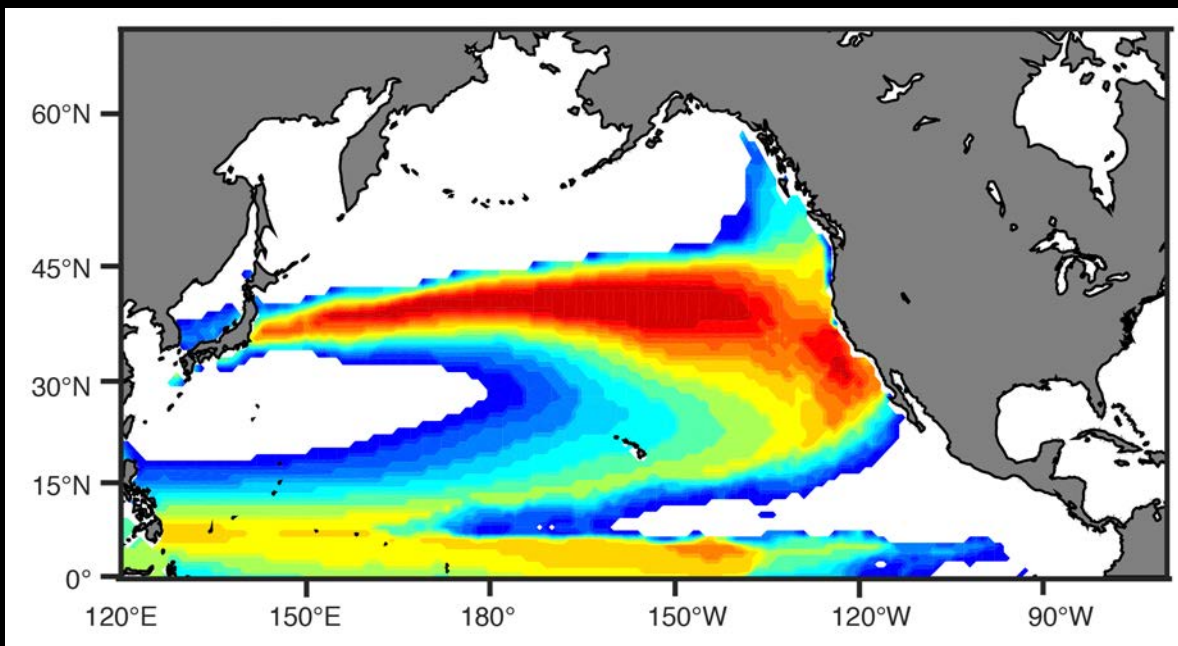


SW: -23%  
CW: -20%  
NW: +16%  
NE: +26%



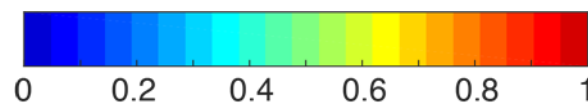
## Climate Change

Will likely force  
Hawaii's leading  
fishery farther away  
from Honolulu



*How will fishermen  
respond?*

Proportion of fished depths  
hospitable to bigeye tuna

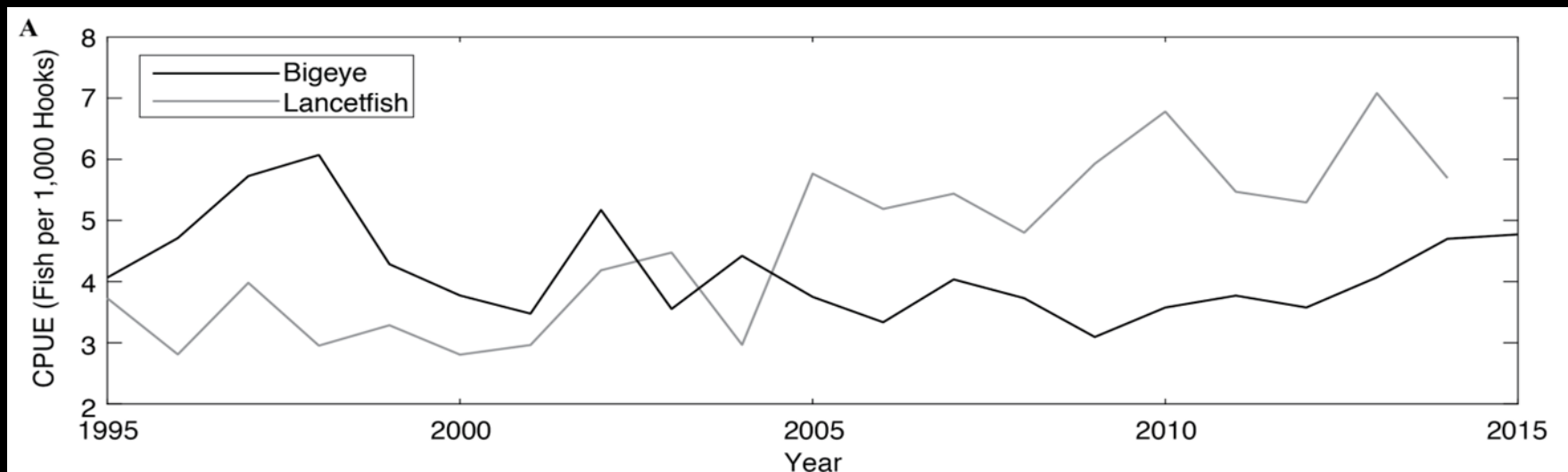
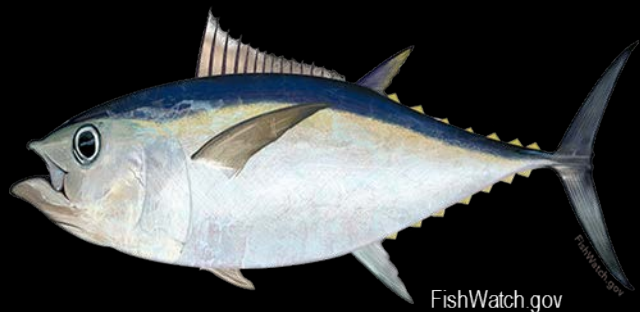




# Changes in catch composition

Non-commercial lancetfish catch now exceeds bigeye catch

*What, if any, are the costs associated with this bycatch?*

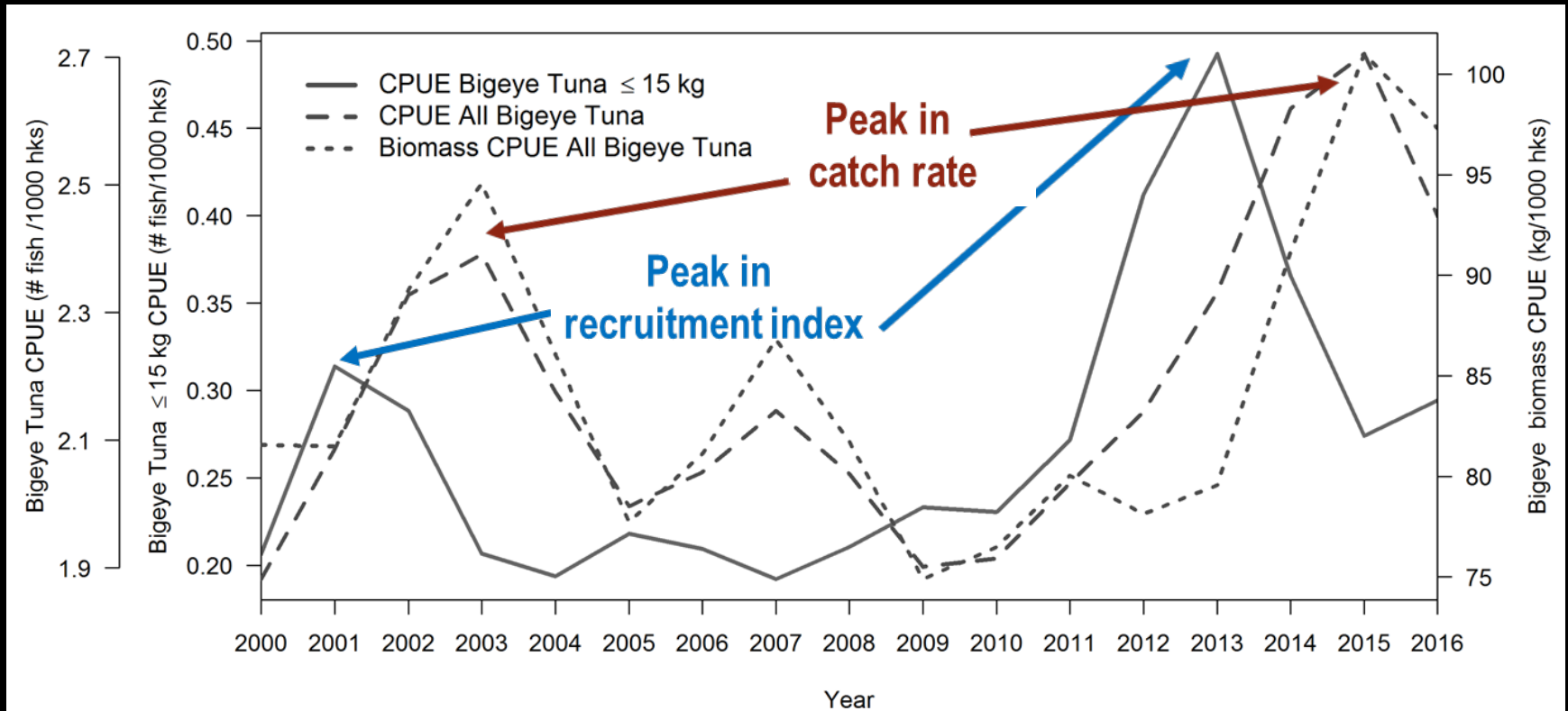




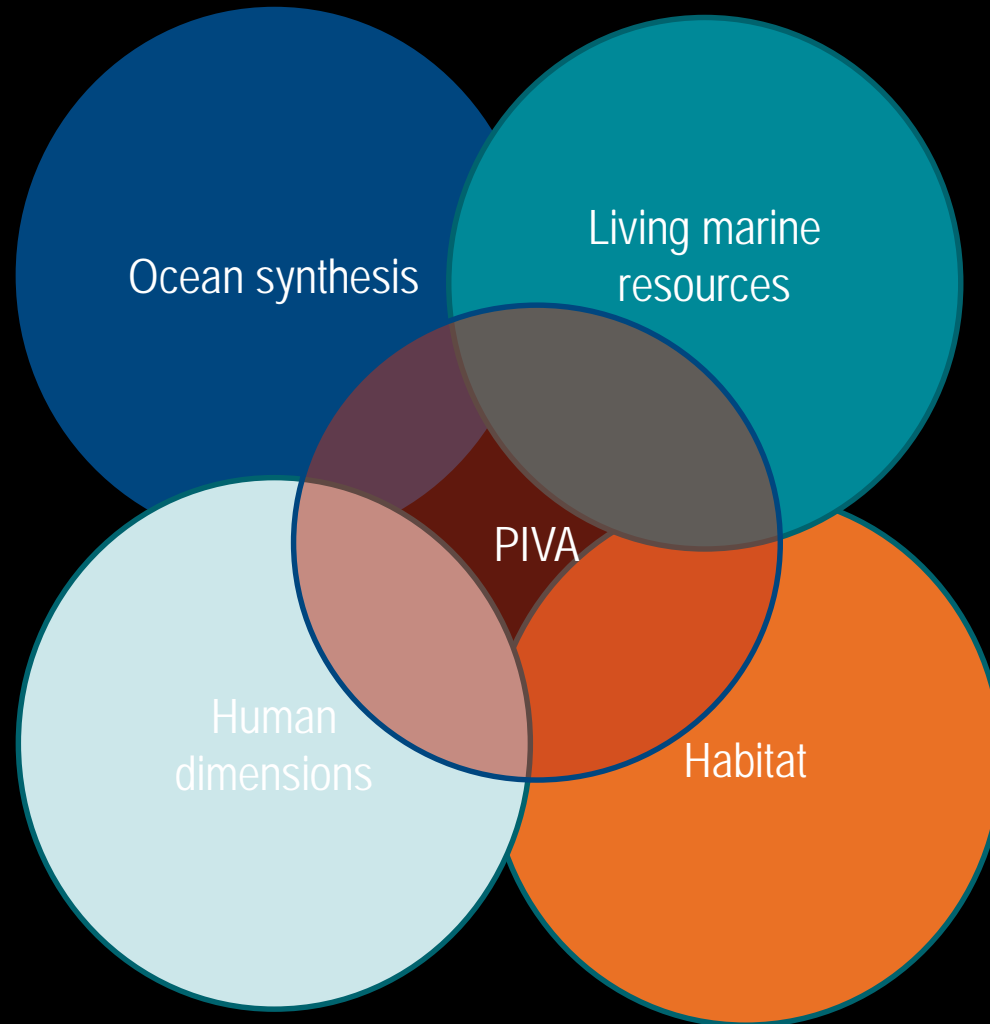
# Predicting bigeye recruitment

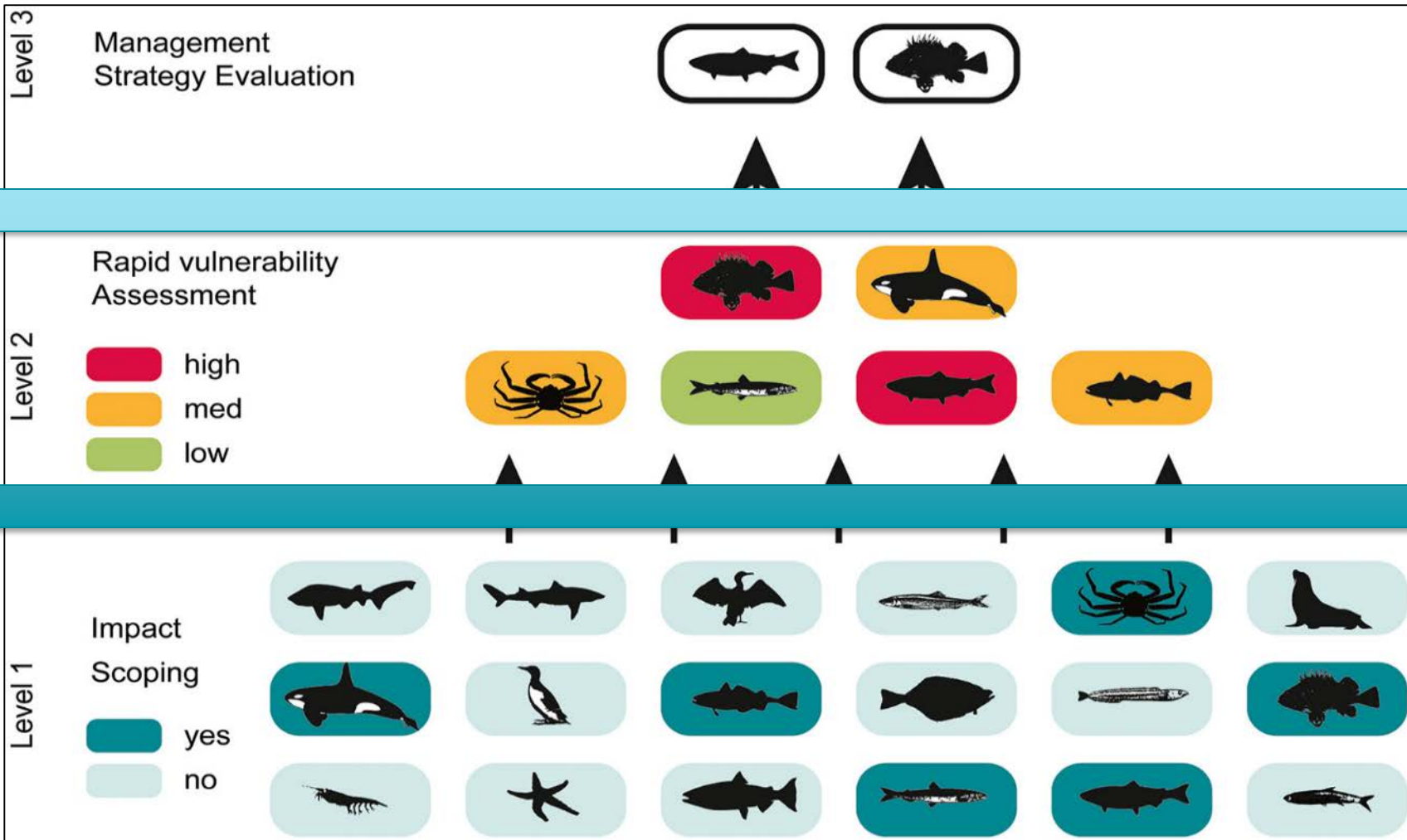
Promising bigeye recruitment indices are being developed

*What scale(s) of prediction are most beneficial?*



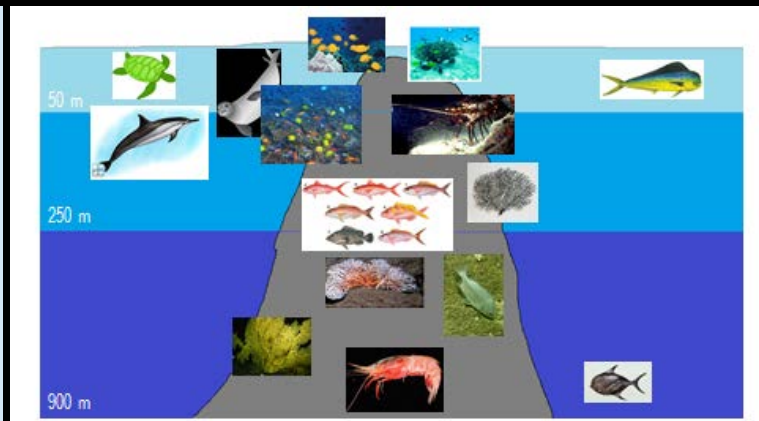
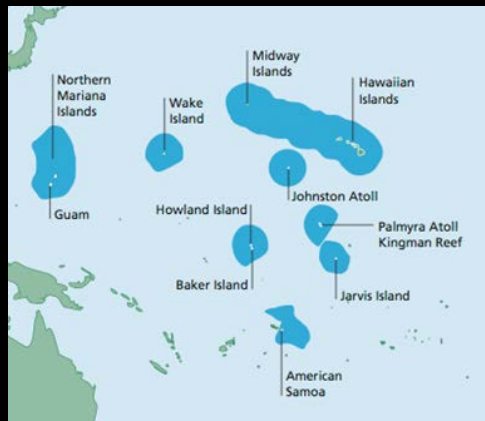
# Assessing vulnerability of living marine resources in the US PACIFIC ISLANDS REGION



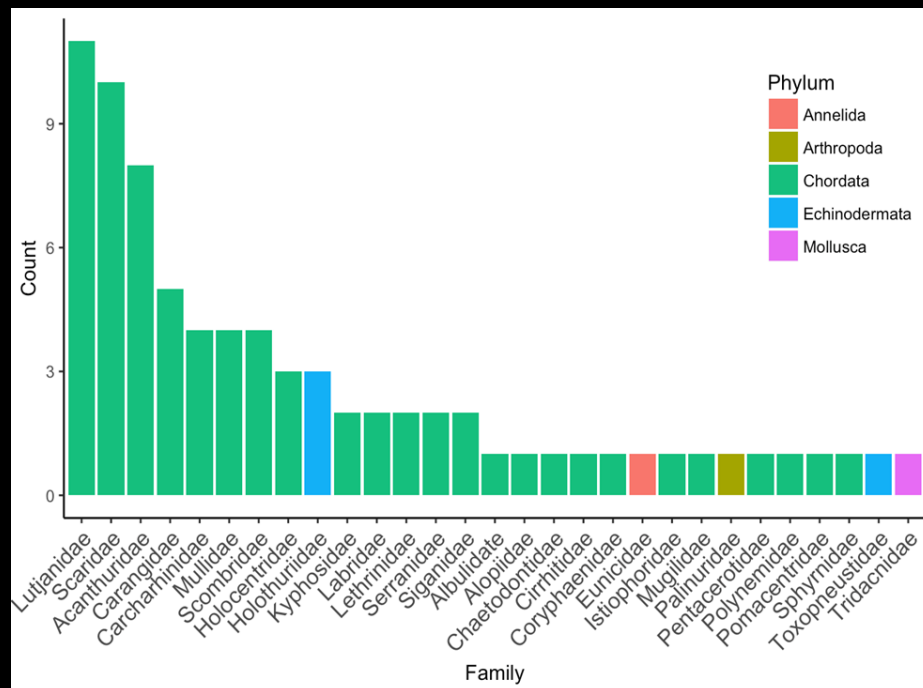


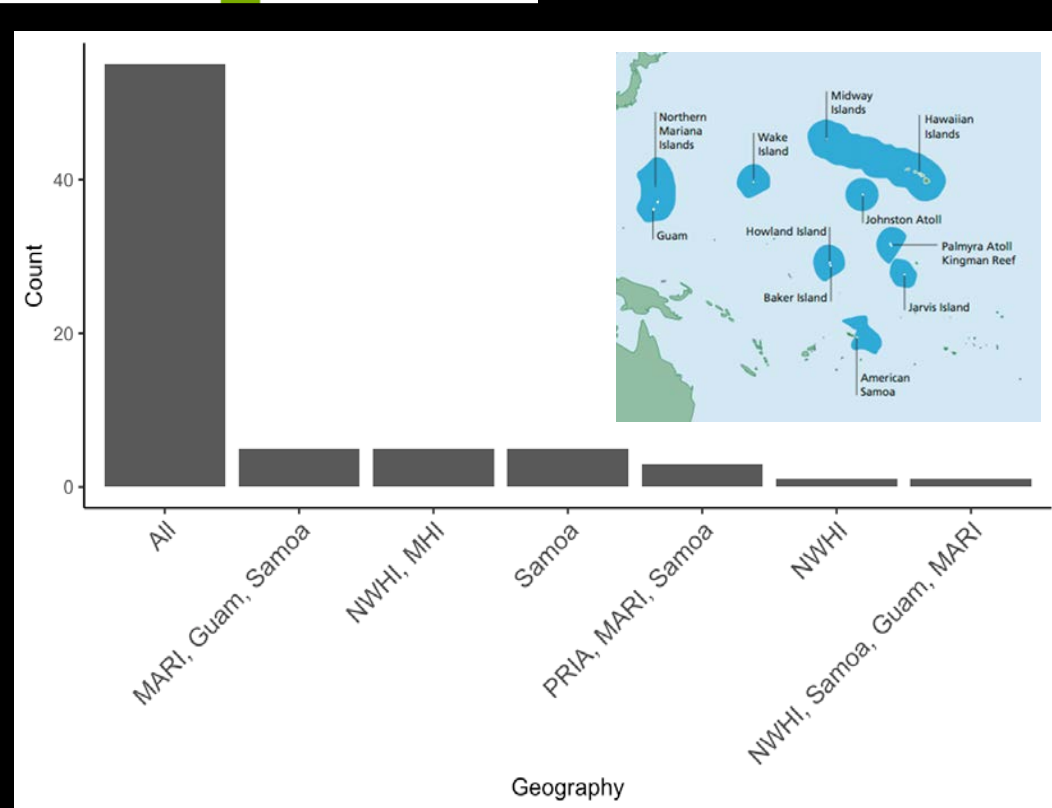
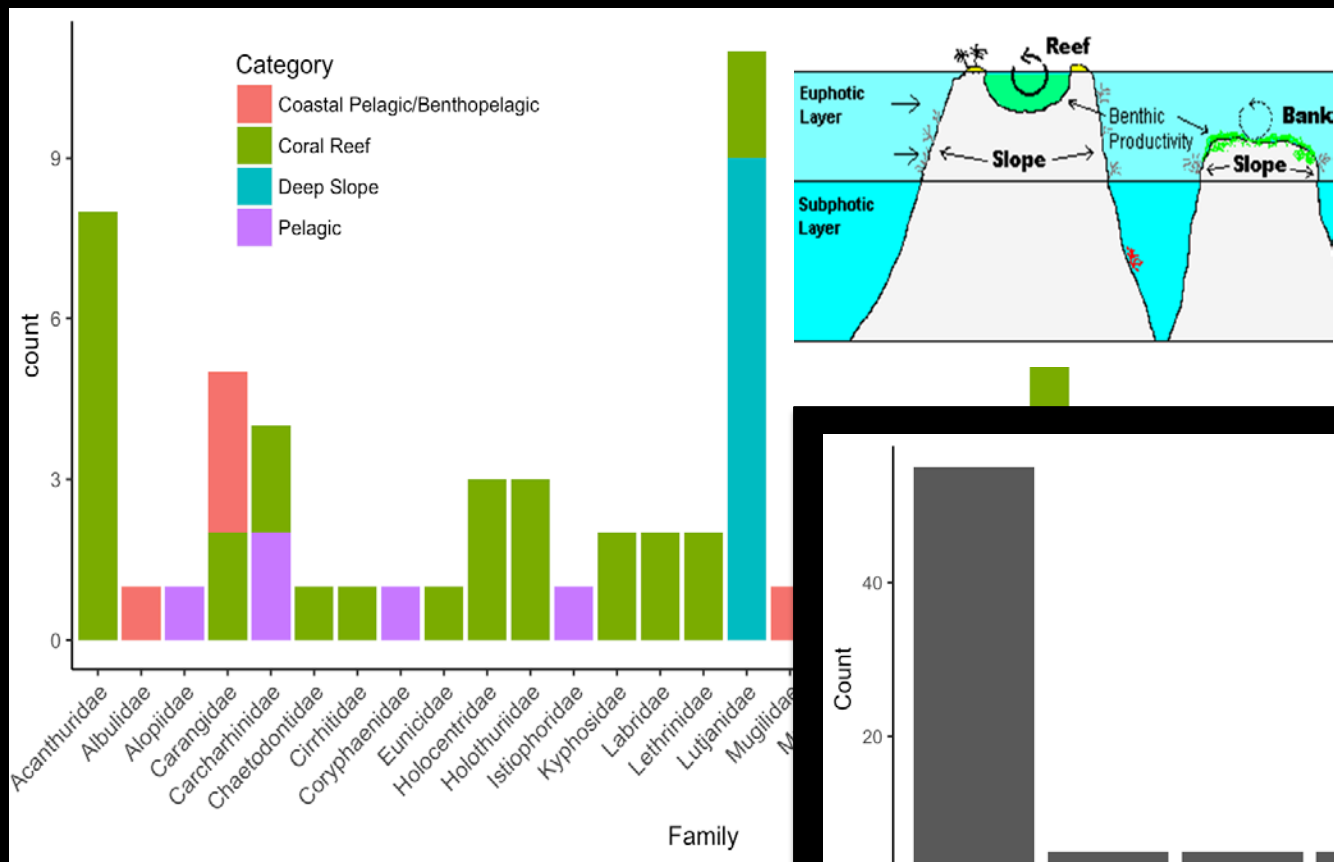
# PACIFIC ISLANDS REGION – Wide and deep!

1.8 M nmi<sup>2</sup> of Ocean  
Tropics and subtropics  
North and southern  
hemisphere



Wide use by Pacific Islanders  
Conservatively 77 species  
identified as important to  
people



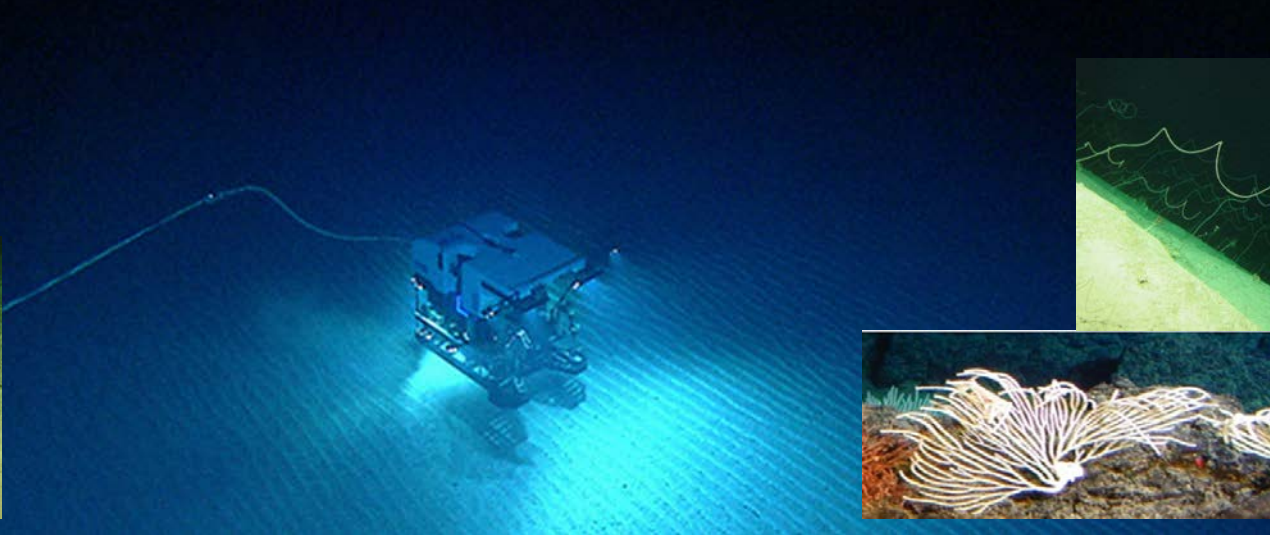


-Diverse taxa from a range in habitats (reef to abyssal) across the Pacific.

-Consequently the vulnerability can vary across communities.



# PACIFIC ISLANDS EXPLORATION "CAPSTONE"



# Public engagement



- Exploration command center @ IRC
- Center participation in all dives
  - School groups
  - Walk ins



- Real time web stream broadcast
- Adaptable venues