

# NOAA DEEP SEA CORAL

Research & Technology Program

## *A Decade of Research for Deep-Sea Conservation*

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Heather Coleman<sup>1</sup>

Robert McGuinn<sup>2</sup>

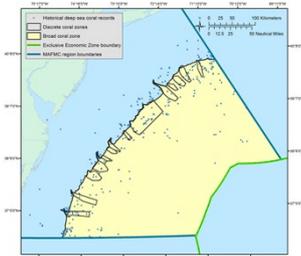
Christopher D. Kelley<sup>3</sup>

Christopher N. Rooper<sup>4</sup>

1. NOAA Fisheries
2. NOAA National Centers for Environmental Information
3. U. Hawai'i, Hawai'i Undersea Research Laboratory
4. Fisheries and Oceans Canada



# NOAA's Deep Sea Coral Research & Technology Program



- Major Program Components
  - Regional Field Initiatives
  - Targeted Small Projects
  - Centralized Data Management
- Regional Examples
  - Pacific Islands Initiative (2015-17)
  - Alaska Initiative (2012-14)
- Big Picture from a Small Program

# Mission: Sound science to conserve and manage vulnerable deepwater biogenic ecosystems



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# Partnerships



Ocean Exploration and Research



NATIONAL MARINE SANCTUARIES



New England Fishery Management Council



Museum of Comparative Zoology HARVARD



Smithsonian



Fisheries and Oceans Canada



MARINE APPLIED RESEARCH & EXPLORATION



OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM



NOAA FISHERIES

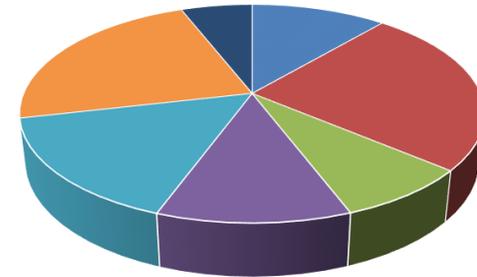
# Regional Field Research Initiatives



# Targeted Small Projects

- Data Mining & Analysis
- Fishing Intensity
- Coral Genetics
- Bycatch
- Fieldwork
- Modeling
- Other

Targeted Small Projects 2009-17

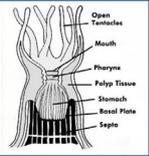


**A tutorial to assist observers in the field identification of corals**

This short presentation is designed to assist groundfish observers in identifying corals to the order level in the field. It is essentially a more detailed version of the two-page coral guide provided as part of the observer identification manual. Representative specimens are on display in the glass case near the observer training room.

Corals are primarily colonial organisms classified in the phylum Cnidaria, along with jellyfishes, sea anemones, hydroids, and others. A coral colony usually consists of hundreds of individual polyps, variously arranged on a hard or soft skeleton. This guide includes the six major groups of corals commonly encountered as bycatch in the groundfish fisheries of Alaska. Although many of the corals of Alaska are quite distinctive at this level, more specific identification can be quite difficult in the field. In addition, some other groups of benthic invertebrates, including bryozoans and sponges, can sometimes be difficult to distinguish from corals.

If possible, identify all corals in your sample to the appropriate order. If you are unsure, the "coral unidentified" code (22) is still available. As with fishes, photographs are always helpful (see example), and representative specimens should be labeled and collected whenever possible.



Structure of a coral polyp



NMFS, Alaska Fisheries Science Center, Seattle, WA – December 2013

Marine Policy 36 (2012) 1054–1063

Contents lists available at SciVerse ScienceDirect

**Marine Policy**

journal homepage: [www.elsevier.com/locate/marpol](http://www.elsevier.com/locate/marpol)

**Effort changes around a marine reserve: The case of the California Rockfish Conservation Area**

Janet Mason<sup>a</sup>, Rosemary Kosaka<sup>b</sup>, Aaron Mamula<sup>b</sup>, Cameron Speir<sup>b,\*</sup>

<sup>a</sup> NOAA, National Marine Fisheries Service, Southwest Fisheries Science Center, Environmental Research Division, 1352 Lighthouse Avenue, Pacific Grove, California 93950, USA  
<sup>b</sup> NOAA, National Marine Fisheries Service, Southwest Fisheries Science Center, Fisheries Ecology Division, 110 Shaffer Road, Santa Cruz, CA 95060, USA

**PLOS ONE**

RESEARCH ARTICLE

**Large-Scale Genotyping-by-Sequencing Indicates High Levels of Gene Flow in the Deep-Sea Octocoral *Swiftia simplex* (Nutting 1909) on the West Coast of the United States**

Meredith V. Everett<sup>1\*</sup>, Linda K. Park<sup>2</sup>, Ewann A. Bemtson<sup>2</sup>, Anna E. Elz<sup>2</sup>, Curt E. Whitmore<sup>3</sup>, Aimee A. Keller<sup>3</sup>, M. Elizabeth Clarke<sup>4</sup>

**PLOS ONE**

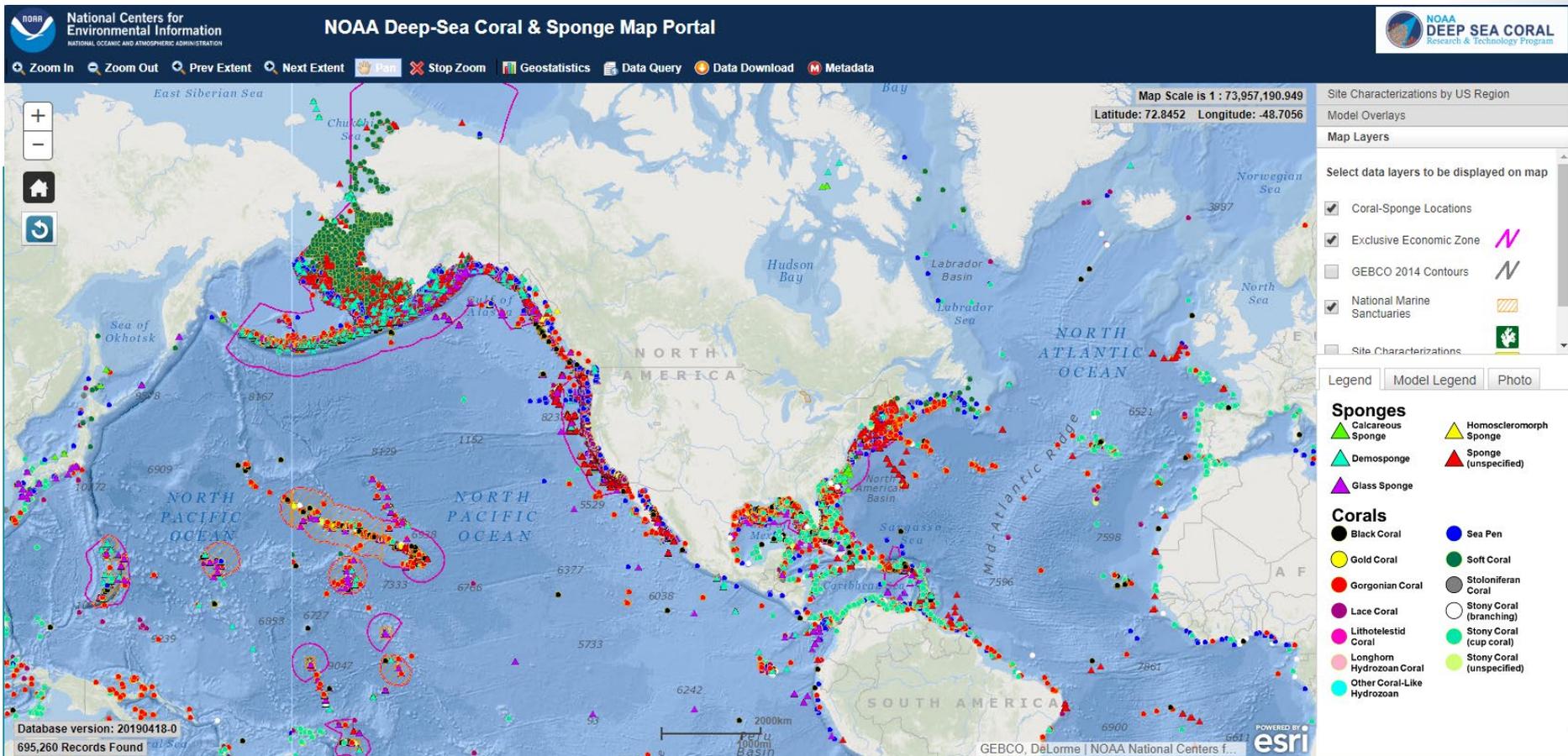
**Predicted Deep-Sea Coral Habitat Suitability for the U.S. West Coast**

John M. Guinotte<sup>1\*</sup>, Andrew J. Davies<sup>2</sup>

<sup>1</sup> Marine Conservation Institute, Seattle, Washington, United States of America, <sup>2</sup> School of Ocean Sciences, Bangor University, Menai Bridge, Anglesey, United Kingdom

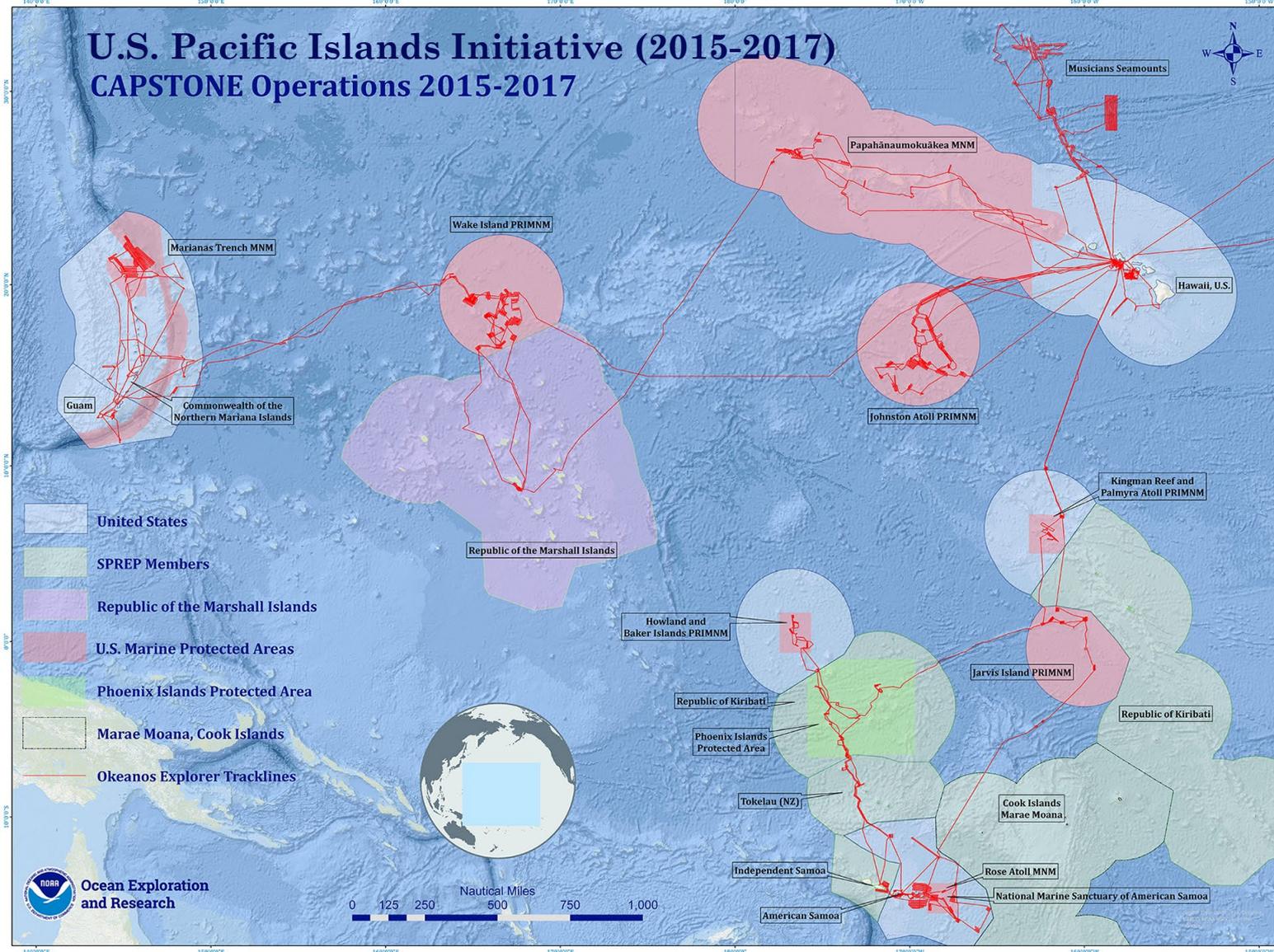


# Centralized data management & dissemination



# U.S. Pacific Islands Initiative (2015-2017)

## CAPSTONE Operations 2015-2017



188 ROV Dives from  
240m to 6,000m



Ocean Exploration  
and Research

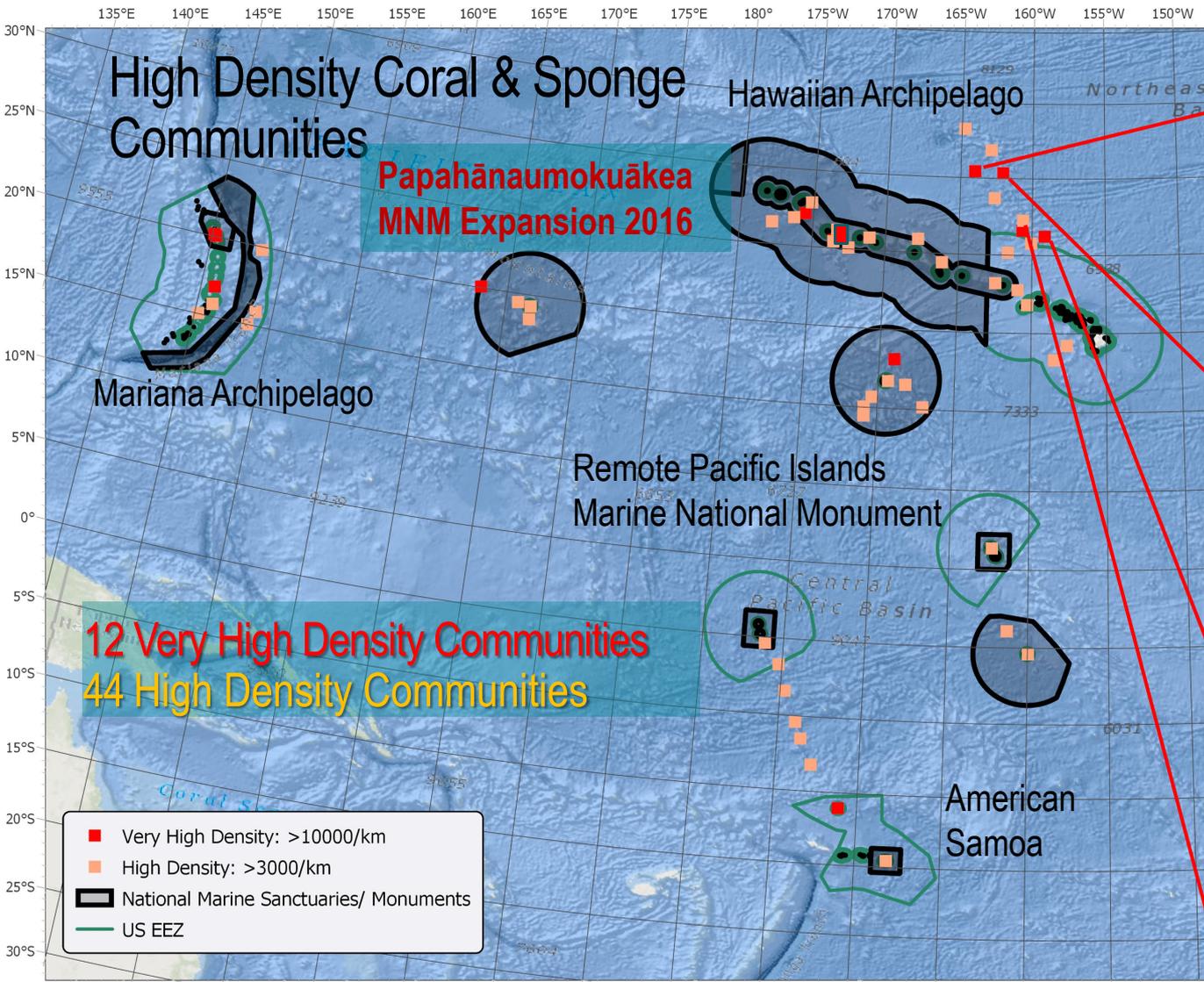


PAPAHĀNAUMOKUĀKEA  
Marine National Monument



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Mussorgsky Seamount  
2020m



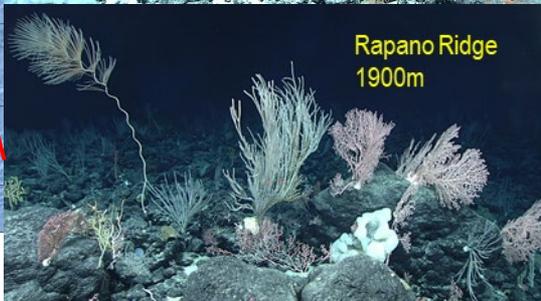
Debussy Seamount  
2465m



Beethoven Ridge  
2300m



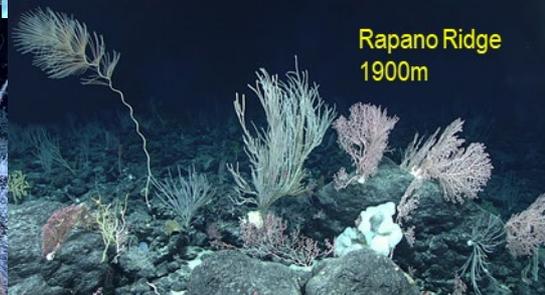
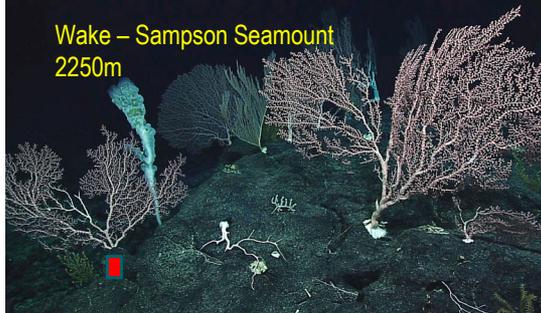
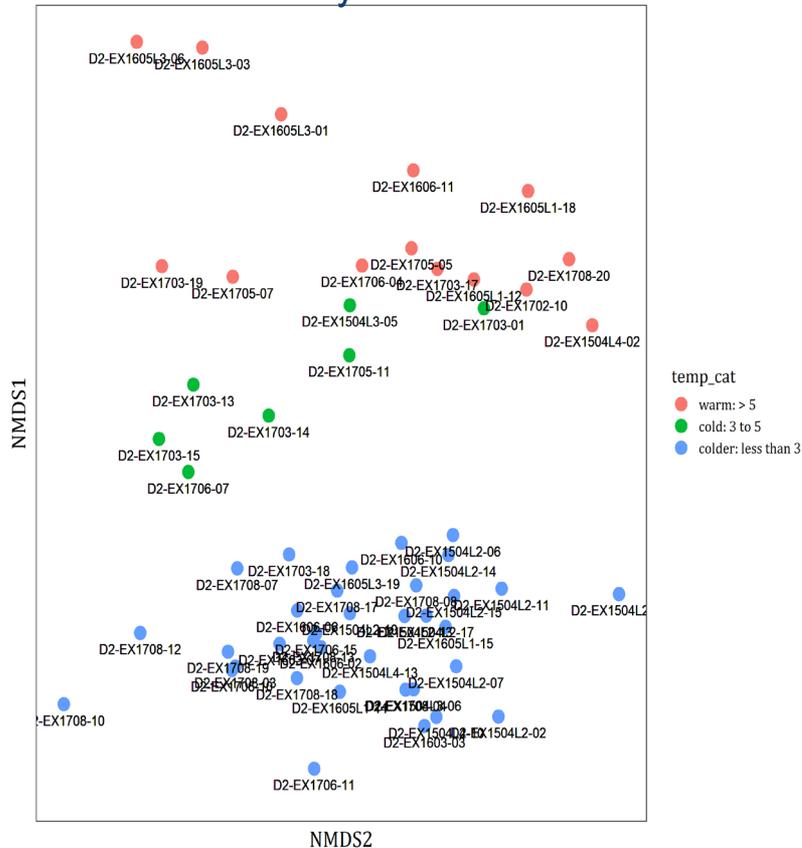
Rapano Ridge  
1900m

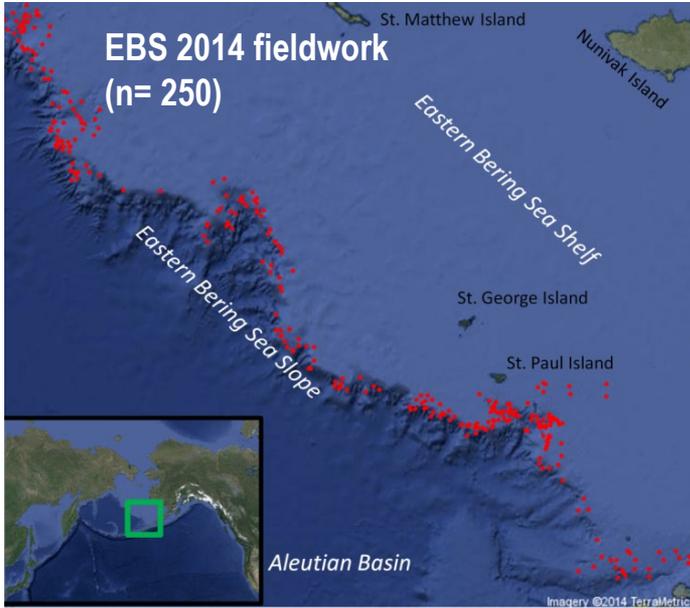


# High Density Coral & Sponge Communities

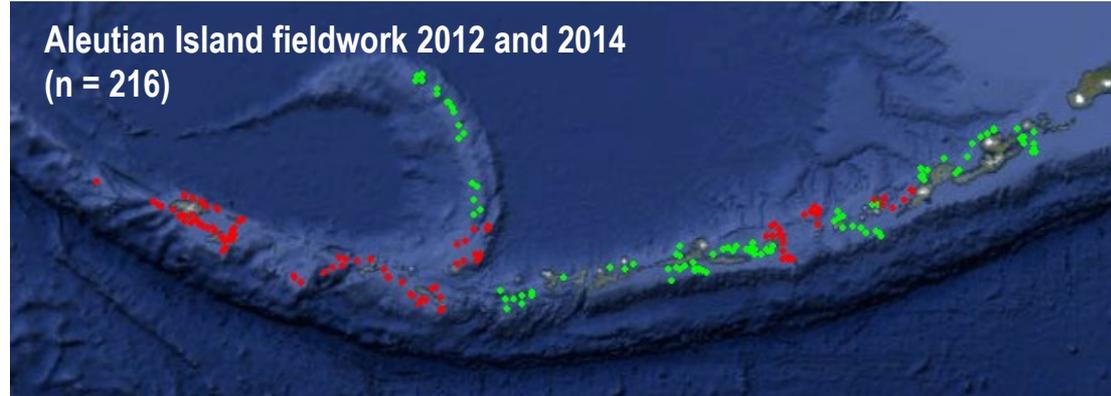
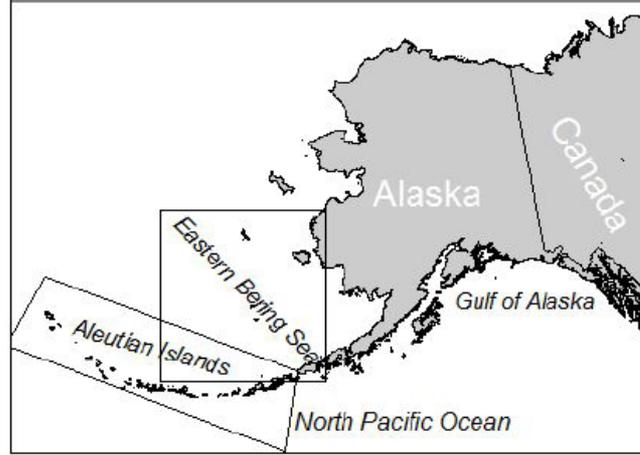
Taxon Richness: 10-48

Shannon Diversity: 2.0 – 3.4

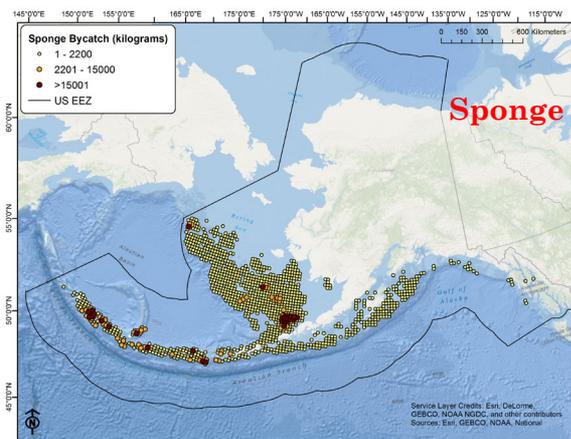
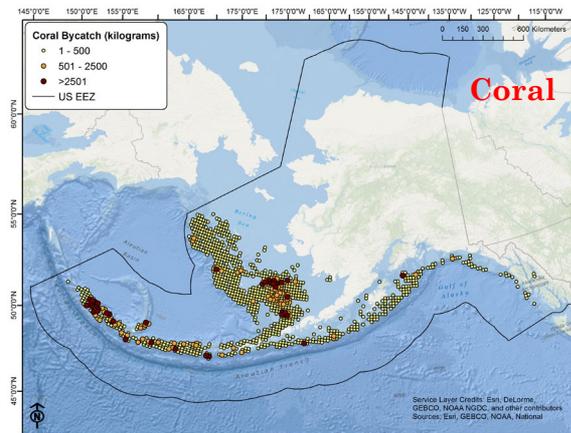




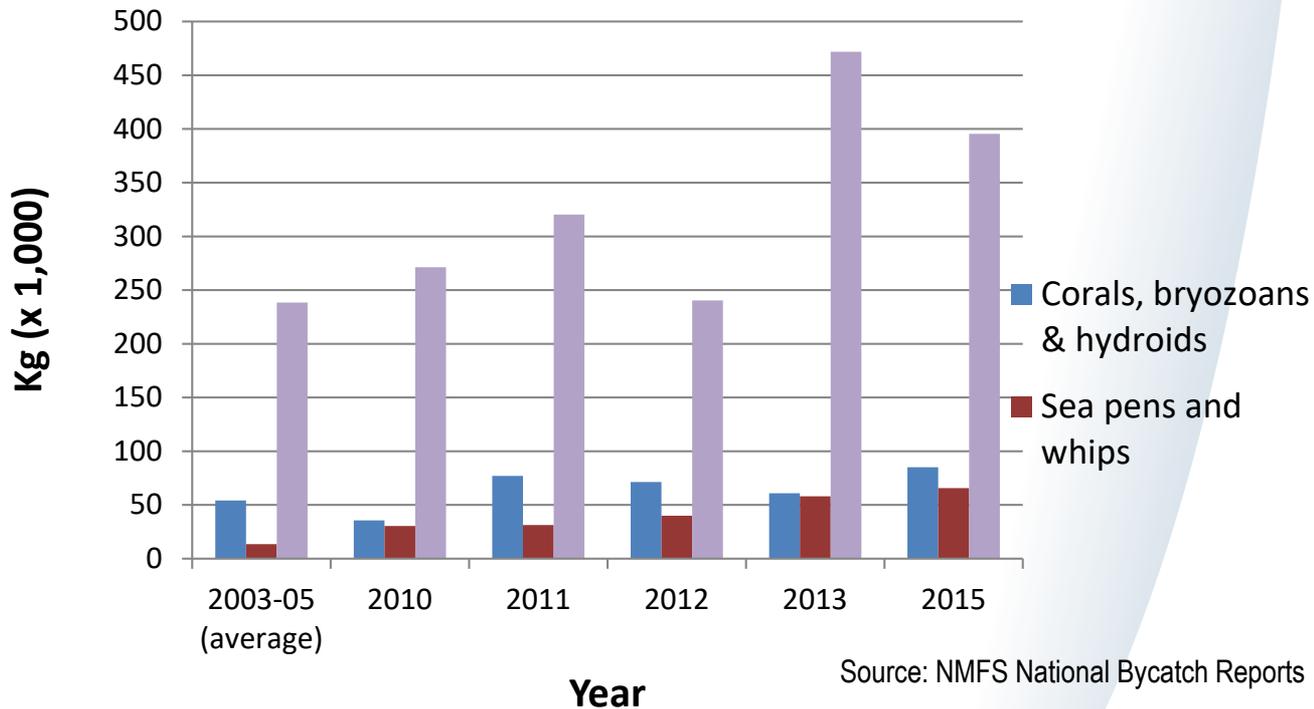
# Alaska (2012-2014)



# Alaska – Fisheries Impact Key Habitats



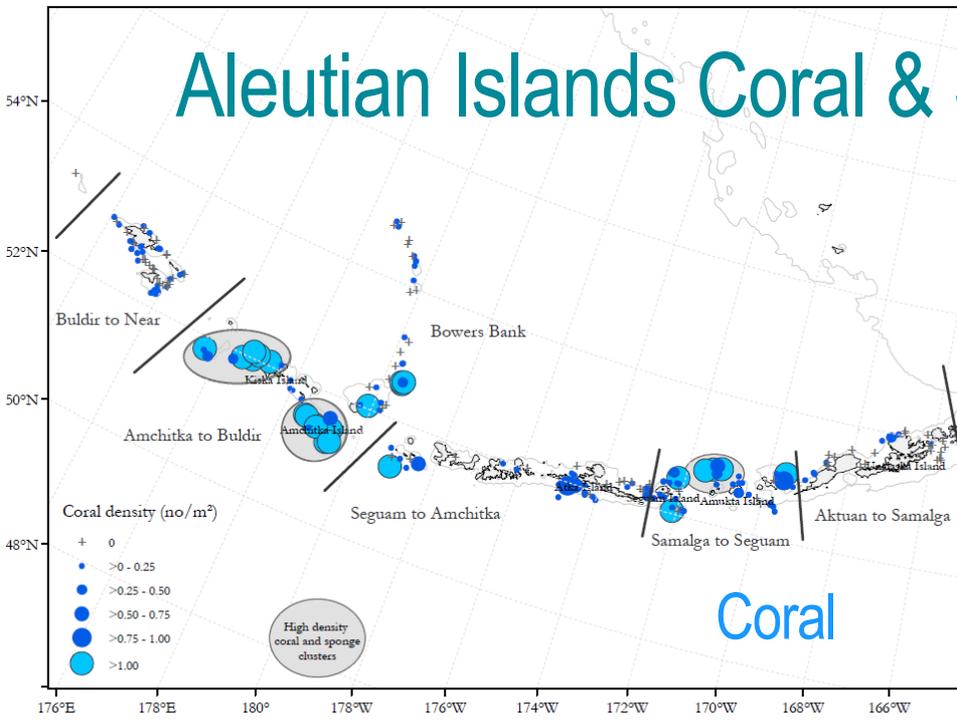
## ALASKA FISHERIES BYCATCH



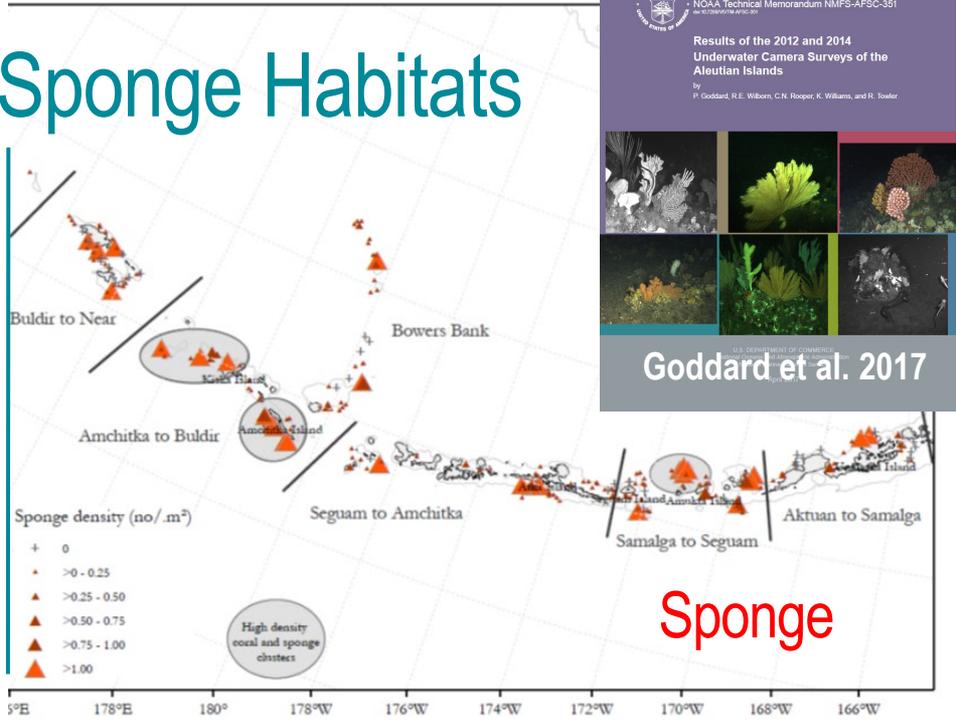


Goddard et al. 2017

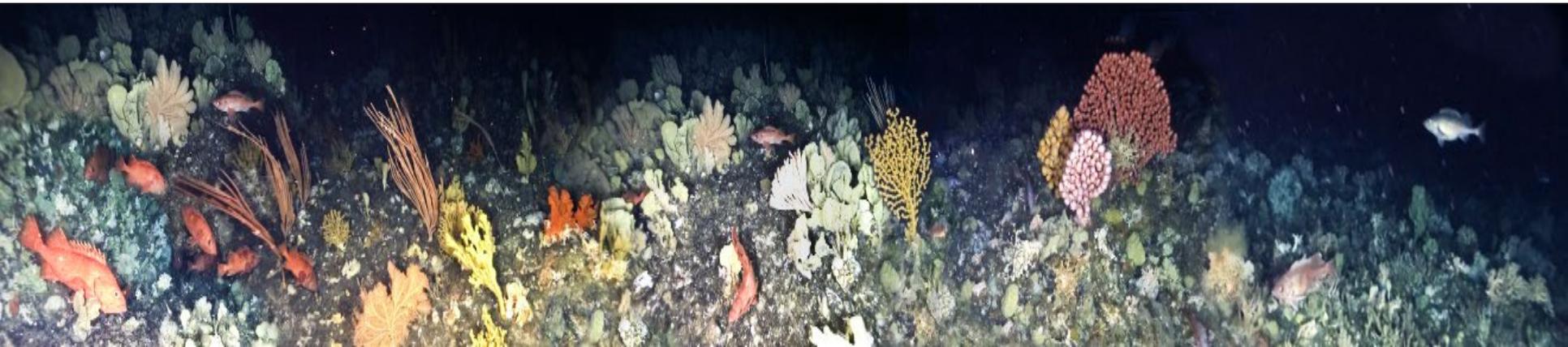
# Aleutian Islands Coral & Sponge Habitats



Coral



Sponge



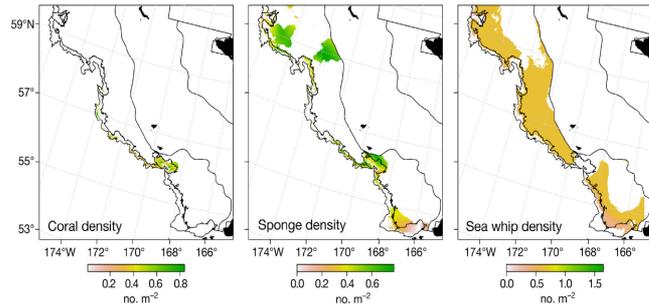
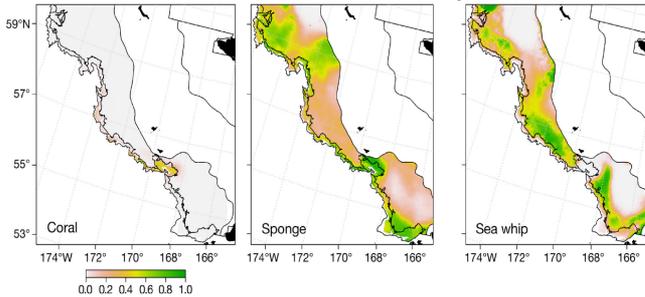
# Alaska: Models & Fieldwork Advance Understanding

## Independent Model validation

## Eastern Bering Sea

## Aleutian Islands

Predicted presence –  
Trawl survey



Predicted density –  
Camera survey

Vol. 526: 21–40, 2015  
doi: 10.3354/meps11201

MARINE ECOLOGY PROGRESS SERIES  
Mar Ecol Prog Ser

Published April 22

FREE ACCESS

**Faunal features of submarine canyons on the eastern Bering Sea slope**

Michael F. Sigler<sup>1\*</sup>, Christopher N. Rooper<sup>2</sup>, Gerald R. Hoff<sup>2</sup>, Robert P. Stone<sup>1</sup>, Robert A. McConnaughey<sup>2</sup>, Thomas K. Wilderbuer<sup>2</sup>

Vol. 551: 117–130, 2016  
doi: 10.3354/meps11703

MARINE ECOLOGY PROGRESS SERIES  
Mar Ecol Prog Ser

Published June 9

**Validation and improvement of species distribution models for structure-forming invertebrates in the eastern Bering Sea with an invertebrate survey**

Christopher N. Rooper<sup>1\*</sup>, Michael F. Sigler<sup>2</sup>, Pam Goddard<sup>1</sup>, Pat Malecha<sup>3</sup>, Rick Towler<sup>3</sup>, Kresimir Williams<sup>1</sup>, Rachel Wilborn<sup>1</sup>, Mark Zimmermann<sup>1</sup>

frontiers  
in Marine Science

PERSPECTIVE  
published: 12 May 2017  
doi: 10.3389/fmars.2017.00142

**Corals, Canyons, and Conservation: Science Based Fisheries Management Decisions in the Eastern Bering Sea**

Steve A. MacLean<sup>1\*</sup>, Christopher N. Rooper<sup>2</sup> and Michael F. Sigler<sup>3</sup>

ICES Journal of  
Marine Science

ICES  
CIEM

ICES Journal of Marine Science (2018), 75(1), 199–209. doi:10.1093/icesjms/fts087

Original Article

**Validation of deep-sea coral and sponge distribution models in the Aleutian Islands, Alaska**

Christopher N. Rooper,<sup>1\*</sup> Rachel Wilborn,<sup>1</sup> Pamela Goddard,<sup>1</sup> Kresimir Williams,<sup>1</sup> Richard Towler,<sup>1</sup> and Gerald R. Hoff<sup>2</sup>

Hydrobiologia  
<https://doi.org/10.1007/s10750-017-3492-9>

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PRIMARY RESEARCH PAPER

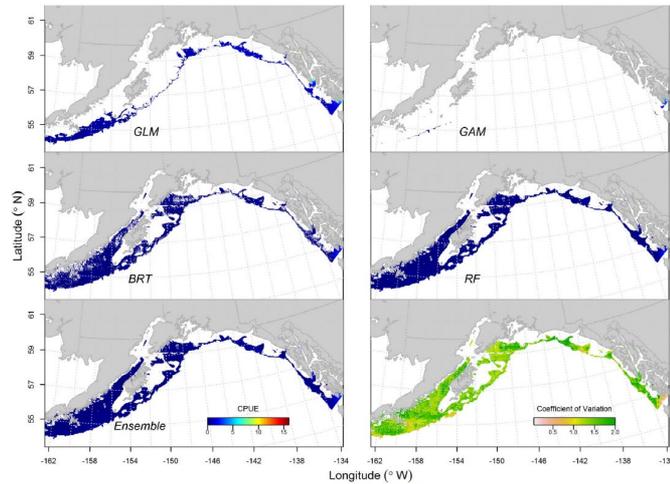
**The potential effects of substrate type, currents, depth and fishing pressure on distribution, abundance, diversity, and height of cold-water corals and sponges in temperate, marine waters**

Rachel Wilborn · Christopher N. Rooper · Pam Goddard · Lingbo Li · Kresimir Williams · Rick Towler

## Modeling Density, Diversity & Size



# Alaska: Models & Fieldwork Advance Understanding



## Gulf of Alaska

## Comparing Models

Deep-Sea Research Part I 126 (2017) 148–161

Contents lists available at ScienceDirect

ELSEVIER

journal homepage: [www.elsevier.com/locate/dsr1](http://www.elsevier.com/locate/dsr1)

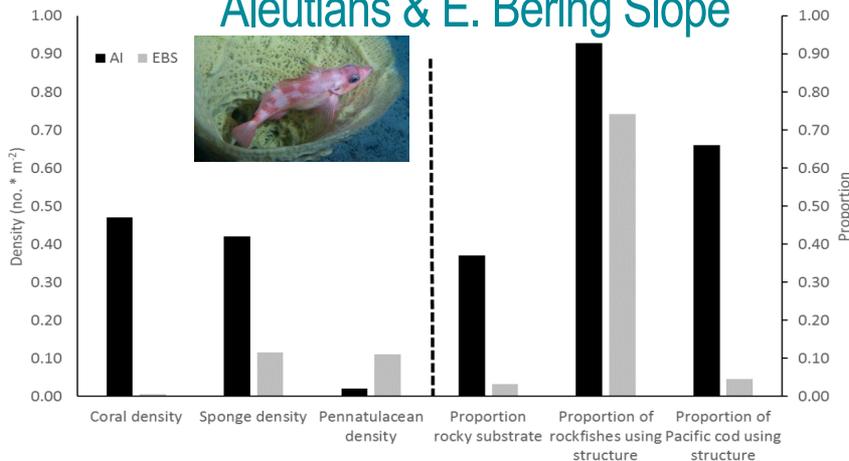
Deep-Sea Research Part I

Comparison of modeling methods to predict the spatial distribution of deep-sea coral and sponge in the Gulf of Alaska

Christopher N. Rooper<sup>a,\*</sup>, Mark Zimmermann<sup>a</sup>, Megan M. Prescott<sup>b</sup>

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## Aleutians & E. Bering Slope



## Fish Associations with Corals & Sponges

Canadian Journal of Fisheries and Aquatic Sciences

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Home > Journals > Canadian Journal of Fisheries and Aquatic Sciences > List of Issues > Volume 0, Number ja, > Are fish associations with corals and sponges

Article

Are fish associations with corals and sponges more than an affinity to structure: Evidence across two widely divergent ecosystems?

Christopher N Rooper, Pamela Goddard, Rachel Wilborn;

Published on the web 19 March 2019.  
Received July 04, 2018.

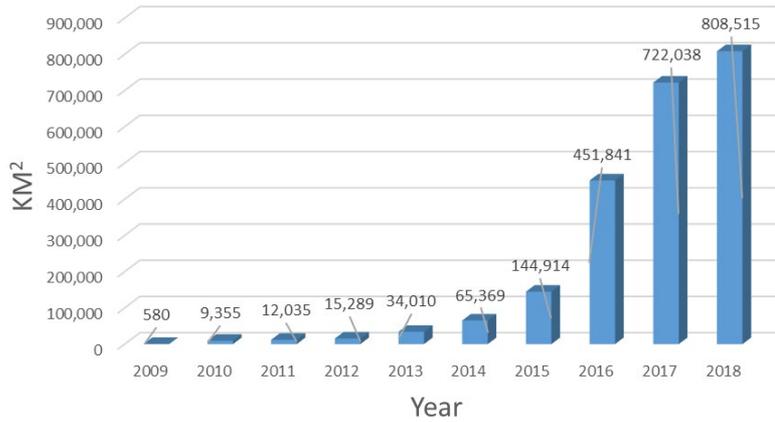
PDF (1600 K)  
PDF-Plus (897 K)

Browse the journal

» List of issues

Canadian Journal of Fisheries and Aquatic Sciences, <https://doi.org/10.1139/cjfas-2018-0264>

Cumulative Area Mapped

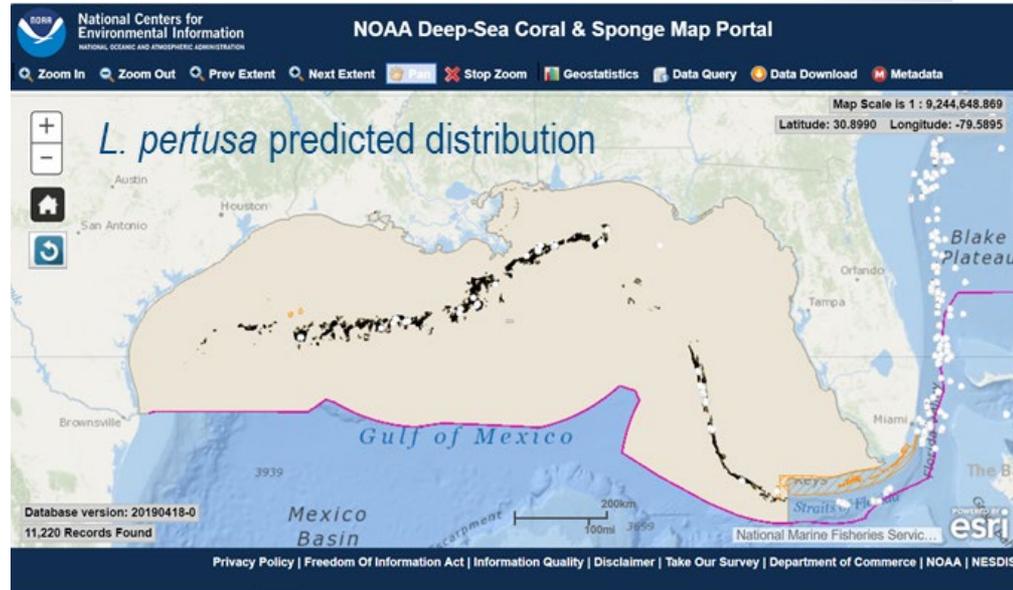
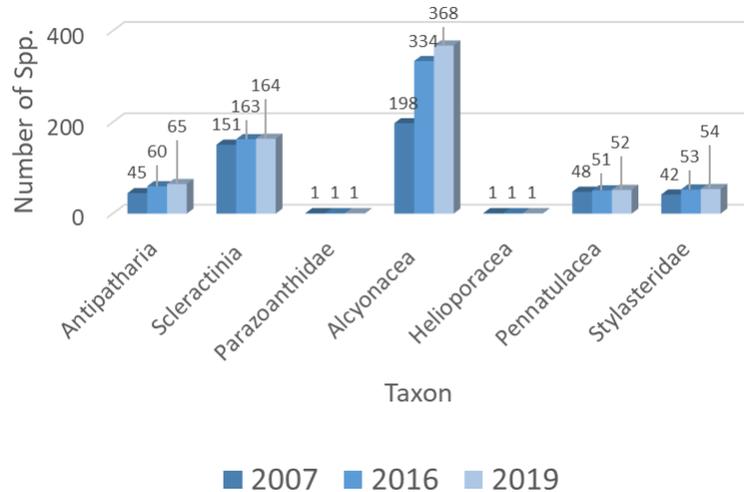


# Advancing Understanding

*With our partners:*

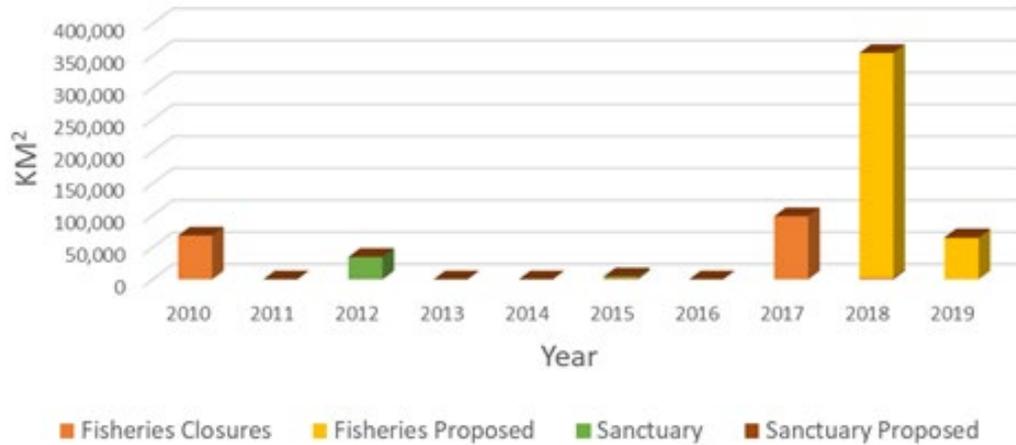
- Expanded mapping, characterization and understanding
- Developed new tools

Deepwater (>50m) Coral Species in U.S. Waters

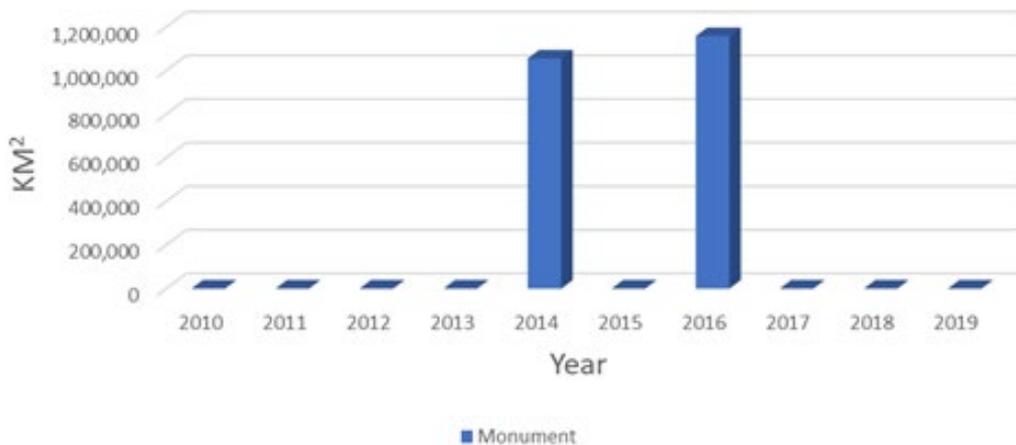


# Supporting Deepwater Conservation

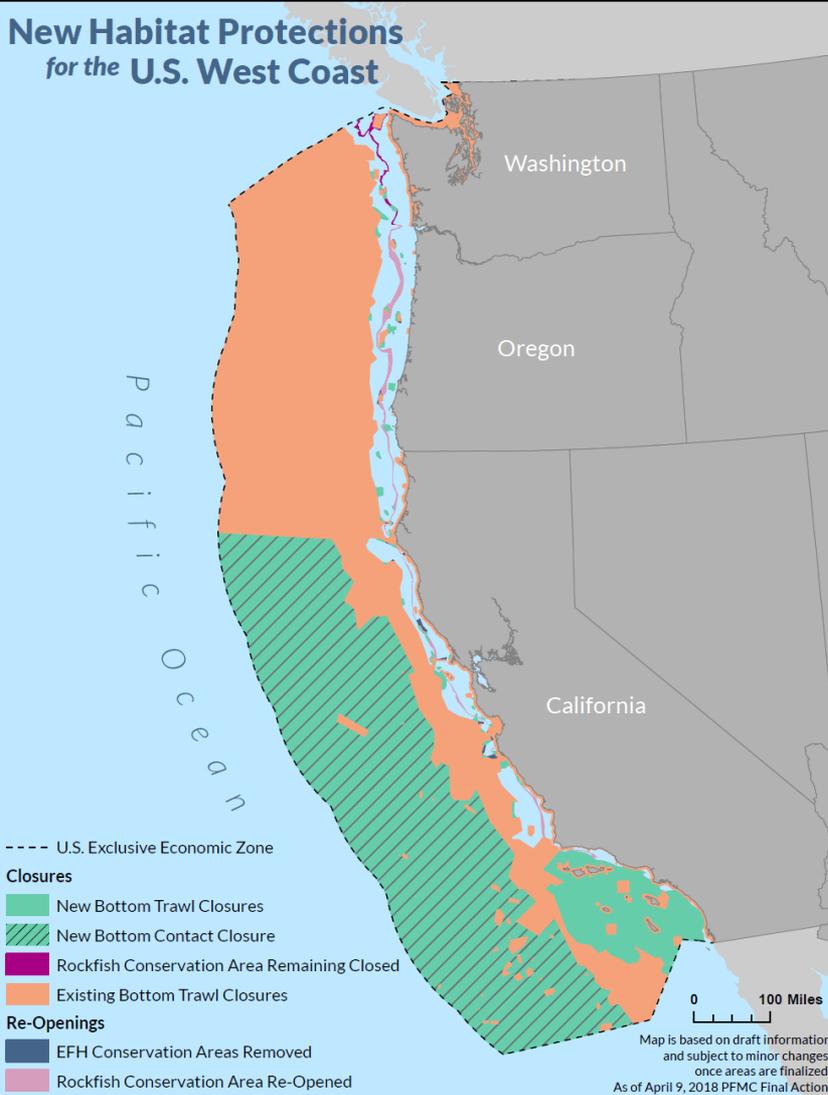
## U.S. Deepwater Habitat Protections



## New & Expanded Marine National Monuments

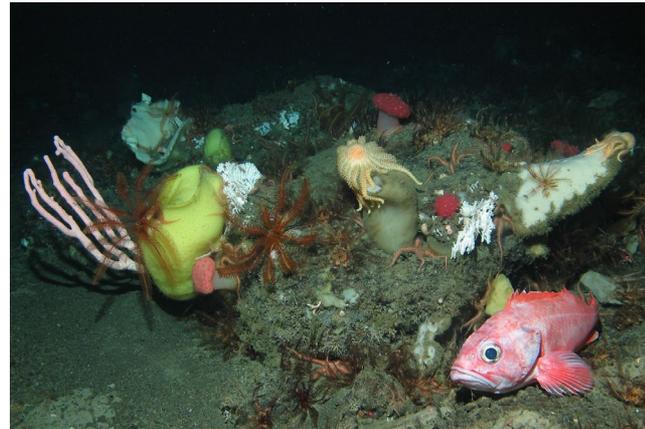


## New Habitat Protections for the U.S. West Coast



# Recent Deep-Sea Habitat & Coral Protections

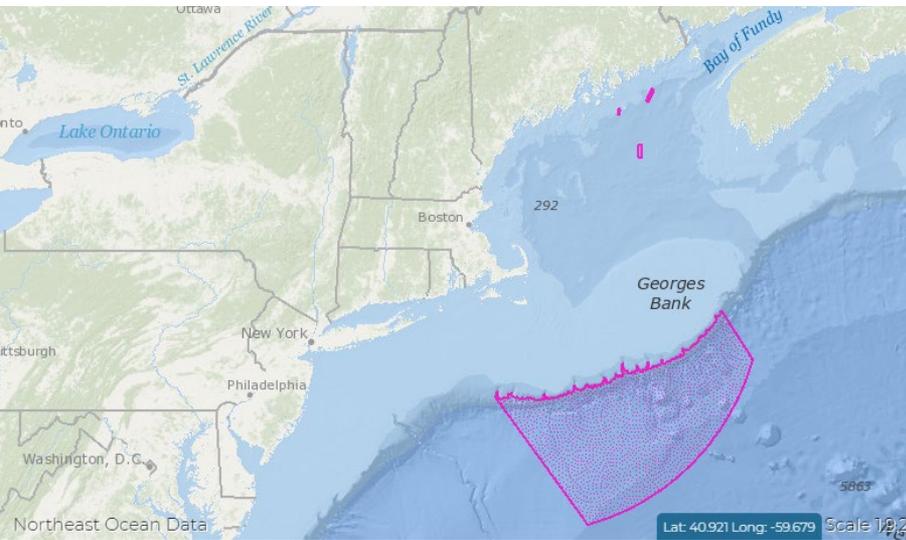
- Pacific Council Groundfish Amendment 28 – effective Jan 1, 2020
- Protects 319,000 km<sup>2</sup> from bottom trawling



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# Recent Deep-Sea Coral Protections

- New England Council Deep-Sea Coral Omnibus Amendment Approved Nov. 20, 2019
- Protects > 65,000 km<sup>2</sup>
  - Canyons and slopes
  - Coral gardens in the Gulf of Maine





- Partnerships
- Understanding
- Conservation