

# Deep Sea Coral & Research Technology Program (DSCRTP) Alaska Initiative (AKCSI) 2020-2023 4-year plan



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# Deep Sea Coral Research & Technology Program (DSCRTP)

- Congressionally Mandated Program: Magnuson-Stevens Fisheries Conservation and Management Act 2007 (sec 408 and 303.b.2)
- Involvement from NOS, NMFS, OAR, & NESDIS

## MSA SEC. 408(a)

1. Identify existing research and known locations of DSCs
2. Locate and map DSCs
3. Monitor activity where DSCs are known or likely to occur
4. Conduct research, including cooperative research, on DSCs & related species, & survey methods
5. Develop technologies or methods to reduce interactions between fishing gear & DSCs
6. Prioritize areas where DSCs occur, & where modeling or other methods predict presence



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# National DSCRTP Implementation

## Rotating funds through regions

- SE Region (2009-2011)
- West Coast (2010-2012) & (2018-2021)
- Alaska (2012-2014) & (2020-2023)
- NE Region (2013-2015)
- US Pacific Islands (2015-2017)
- Caribbean & Gulf of Mexico (2016-2019)

## 2020-2023 AKCSI

- 2020-Workshop & Science Plan (\$200K)
- 2021-Research (\$1M)
- 2022-Research (\$1M)
- 2023-Finalize Report & Wrap-up (\$100K)



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# AKCSI-DSCRTP Steering Committee

Gerald Hoff	NOAA Fisheries - AFSC Seattle (CO-PI)
Pat Malecha	NOAA Fisheries - AFSC Juneau (CO-PI)
Pam Goddard	NOAA Fisheries (Affiliates) - AFSC Seattle
Vanessa Lowe	NOAA Fisheries (Affiliates) - AFSC Seattle
Heather Coleman	NOAA DSCRTP
Tom Hourigan	NOAA DSCRTP
John Olson	NOAA Fisheries - AK Regional Office
Bryan Costa	NOAA NCCOS
Caitlin Adams	NOAA OER
Jennifer Le	NOAA OER
Chris Rooper	DFO Fisheries and Oceans Canada

## Prior members

Amanda Netburn	NOAA OER
Carol Ladd	NOAA PMEL
Rachel Wilborn	NOAA Fisheries (Affiliate) – AFSC Seattle



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# AKCSI Workshop Participants (59 people/~29 entities)

NAME	AFFILIATION
Abi Powell	NOAA Fisheries - NWFSC
Adrienne Copeland	NOAA OER
<b>Amanda Netburn</b>	NOAA OER
Anna Simeon	International Pacific Halibut Commission
Arliss Winship	NOAA NCCOS
Austin Estabrooks	At Sea Processors (Industry)
Ben Williams	NOAA Fisheries - AFSC Seattle
Bob McConnaghey	NOAA Fisheries - AFSC
<b>Bryan Costa</b>	NOAA NCCOS
<b>Caitlin Adams</b>	NOAA- OER
<b>Carol Ladd</b>	NOAA PMEL
Cathy Coon	DOI BOEM
Chris Caldwell	NOAA - National Marine Sanctuaries
<b>Chris Rooper</b>	Fisheries and Oceans Canada
Christina Conrath	NOAA Fisheries - AFSC Kodiak
Christopher Oliver	Alaska Seafood Cooperative (Industry)
Darren Pilcher	NOAA PMEL
Duane Stevenson	NOAA Fisheries - AFSC Seattle
Erica Fruh	NOAA Fisheries - NWFSC
Gary Greene	California State University
Gretchen Harrington	NOAA Fisheries - AK Regional Office
<b>*Heather Coleman</b>	NOAA DSCRTP
Jay Orr	NOAA Fisheries - AFSC Seattle
Jennifer Le	NOAA Fisheries - SE Regional Office
Jennifer Reynolds	University of Alaska Fairbanks
<b>Jerry Hoff</b>	NOAA Fisheries - AFSC Seattle Co-lead
Jessica Cross	NOAA PMEL
Jim Thorson	NOAA Fisheries - AFSC Seattle
Jodi Pirtle	NOAA Fisheries - AK Regional Office
John Gauvin	Alaska Seafood Cooperative (Industry)

NAME	AFFILIATION
<b>John Olson</b>	NOAA Fisheries - AK Regional Office
Jon Warrenchuk	Oceana (NGO)
Julie Bonney	Alaska Groundfish Data Bank (Industry)
Katrin Iken	University of Alaska Fairbanks
Kresimir Williams	NOAA Fisheries - AFSC Seattle
Lauren Divine	Aleut Community of St. Paul Island Tribal Government
Lauri Sadorus	International Pacific Halibut Commission
*Liz Clarke	NOAA Fisheries - NWFSC
Mark Mueller	DOI BOEM
Matt Baker	North Pacific Research Board
Meredith Everett	NOAA Fisheries - NWFSC
*Mike Sigler	NOAA Fisheries - AFSC Teaching Faculty, Shoals Marine Lab
Ned Laman	NOAA Fisheries - AFSC Seattle
Norm McCarthy	NOAA DSCRTP student
<b>Pam Goddard</b>	NOAA Fisheries - AFSC Seattle
<b>Pat Malecha</b>	NOAA Fisheries - AFSC Juneau
Peter Etnoyer	NOAA Fisheries - SEFSC
Rachel Medley	NOAA OER
<b>Rachel Wilborn</b>	NOAA Fisheries - AFSC Seattle
Rhian Waller	University of Maine
Robert Foy	NOAA Fisheries - Regional Office
Robert P. McGuinn	Northern Gulf Institute, NOAA Cooperative Institute
Sean Burrill	DOI BOEM
Sean Rooney	NOAA Fisheries - AFSC Kodiak
Stephanie Madsen	Pacific Seafood Processors (Industry)
Steve MacLean	NOAA - NPFMC Representative
Susan Pultz	NOAA Habitat Protection Deputy Chief
Susanne McDermott	NOAA Fisheries - AFSC Seattle
Todd Miller	NOAA Fisheries - AFSC Juneau
<b>Tom Hourigan</b>	NOAA DSCRTP
Wes Larson	NOAA Fisheries - AFSC Juneau

\* Breakout Lead  
 Bold-Steering Committee member



# Workshop Research Projects (34 projects)

## Research Topics (Breakout Group Themes)

## Project Title

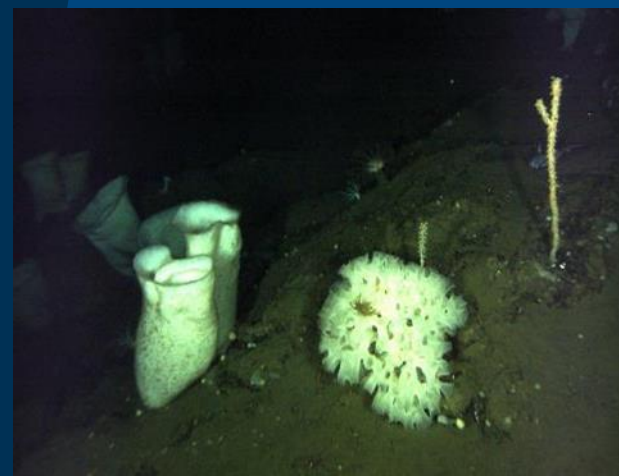
- 1) Distribution, Climate change, Fishing impacts
- 2) Distribution, Diversity/Genetics
- 3) Fishing impacts
- 4) Distribution
- 5) Distribution
- 6) Distribution
- 7) Distribution
- 8) Distribution
- 9) Distribution
- 10) Distribution
- 11) Distribution
- 12) Distribution
- 13) Distribution
- 14) Population dynamics
- 15) Population dynamics, Fishing impacts
- 16) Population dynamics
- 17) Population dynamics
- 18) Population dynamics
- 19) Diversity/ Genetics
- 20) Distribution, Diversity/Genetics
- 21) Distribution, Diversity/Genetics
- 22) Diversity/ Genetics
- 23) Climate change, Distribution, Fishery impacts
- 24) Climate change, Distribution, Diversity/Genetics
- 25) Climate change
- 26) Climate change
- 27) Climate change
- 28) Fishery impacts
- 29) Fishery impacts
- 30) Fishery impacts
- 31) Fishery impacts
- 32) Fishery impacts, Seafloor mapping
- 33) Seafloor mapping, Distribution
- 34) Seafloor mapping

- Validation (stereo camera) survey of the Gulf of Alaska
- Model existing data for Chukchi and Beaufort seas
- Strengthen existing models by collecting new visual survey data
- Strengthen existing models by improving available covariate data
- Incorporate dynamic variables into models
- Collect spatially explicit biological data
- Strengthen existing models by routine data updates
- Explore hierarchical modeling approaches for substrate data
- Explore new model types (e.g. joint species distribution models)
- Conduct routine monitoring through existing data streams
- Conduct routine monitoring through spatial population dynamics approach
- Develop cooperative survey design with industry to sample corals and sponges
- Reconnaissance studies to identify regional hotspots
- Biology and life history
- Recovery rates and impact susceptibility
- Fish and crab associations with coral and sponge
- Coral and sponge function for fish and crab life history and productivity
- Coral and sponge recruitment estimates
- Coastwide identification guide
- eDNA collection during existing surveys
- Improve species ID/morphological groupings
- Determine population connectivity
- Risk analysis of climate change effects for coral and sponge
- Monitor 1-2 coral concentrations
- Reconstruct historic climate events from coral samples
- Lab experiments directed at ocean acidification and warming
- Regional Ocean Models
- Update and validate fishing effects model
- Risk analysis, fishing effects
- Assess impacts of longline and pot gear
- Assess effectiveness of current fishing closures
- Data mining
- Explore hierarchical modeling approaches for substrate data; suturing new data on old
- Establish priorities for new data collection, e.g., Okeanos Explorer summer 2022

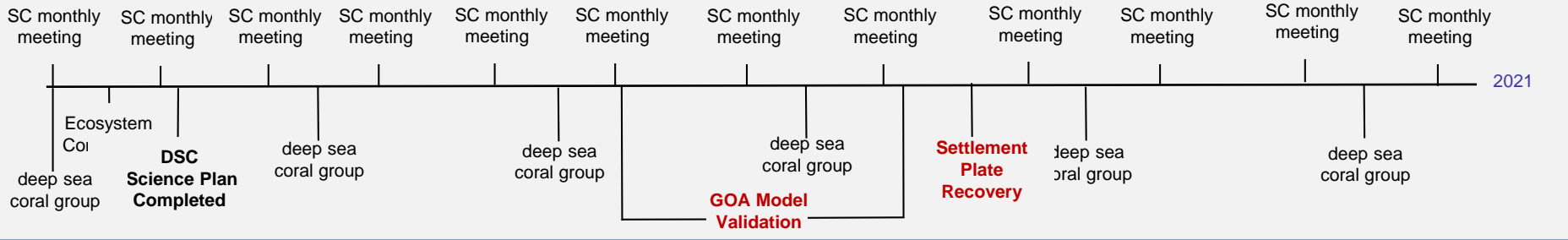
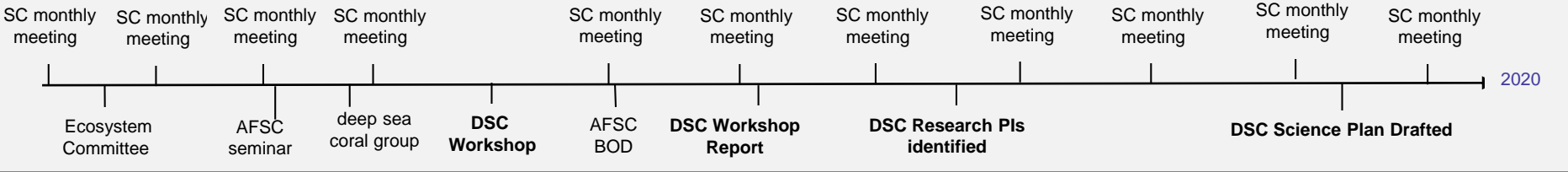
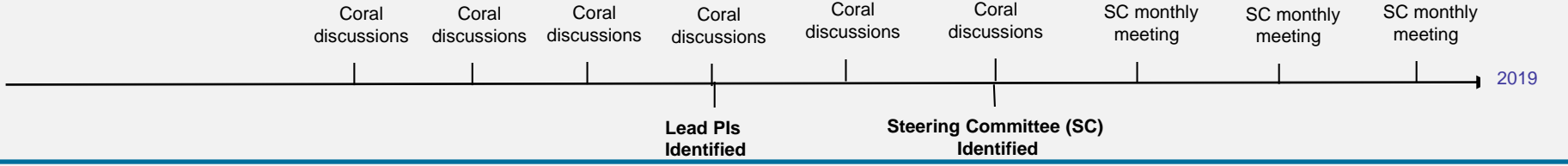
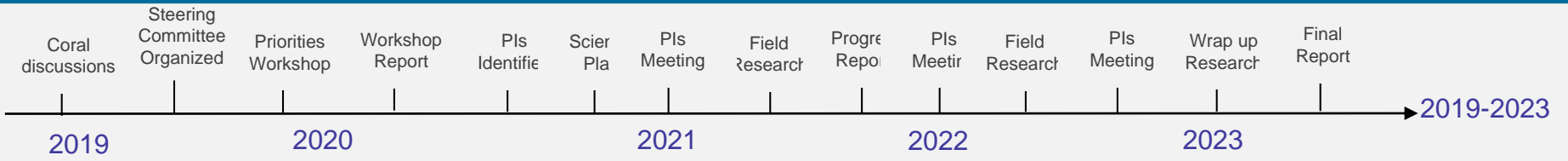


# AKCSI-Science Plan Process

P.I.s & Steering Committee selected	February 2019
Workshop to discuss research priorities	May 2020
Research projects solicited from P.I.s	June 2020
Projects ranked & selected	October 2020
Science plan finalized	January 2021
Field research planning	Current



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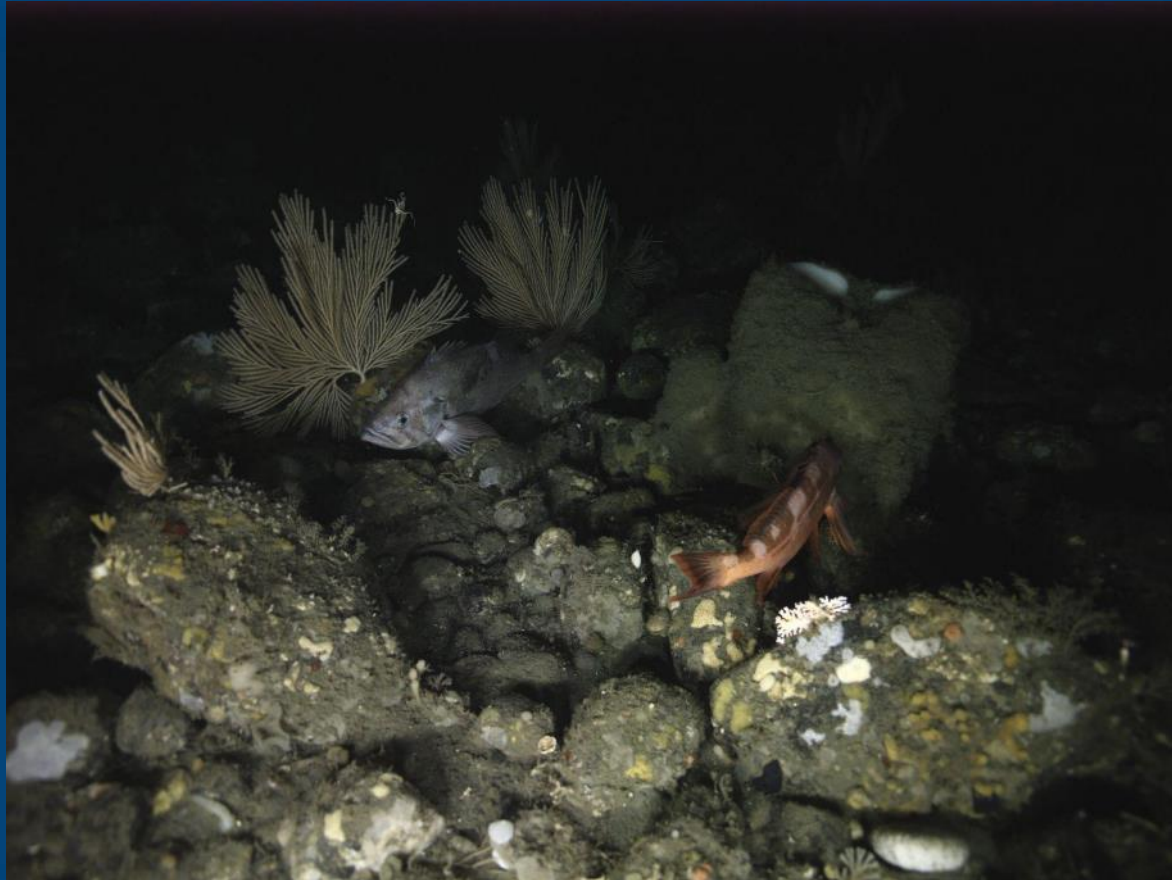


Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec



# Science Plan: AKCSI: 2020-2023

January 2021



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# AKCSI 2020-2023 Objectives

- 1) Support research that contributes to the conservation and protection of DSCS and addresses management needs throughout the waters of Alaska. Specifically, the research will address the priorities identified in the AKCSI priorities workshop report.
- 2) Focus on field research and collection of new information on DSCS taxonomy, distribution, diversity, and life history, as well as natural and induced habitat changes.



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# AKCSI –Project Themes

## Genetics Taxonomy Biodiversity

1. Genetic & eDNA work to support studies in taxonomy, species identification, distribution, & connectivity in DSCS
2. Genetic eDNA collections for identifying fish associations with coral & sponge
3. Sponge identification & genetics in the GOA and AI
4. Developing a sponge & coral field guide for the Northeastern Pacific deep-sea
5. Analyzing Alaska deep-sea green sponge samples for the discovery of potentially new pancreatic medicines

## Habitat Distribution Exploration

1. Validation of Coral & Sponge Distribution Modeling in the Gulf of Alaska
2. Joint Canada-USA seamount exploration in the Eastern North Pacific Ocean
3. DSC Habitat Exploration OER OKEANOS EXPLORER
4. The influence of DSCSE on the life history parameter of FMP species in Alaska
5. Recruitment, reproduction & larval supply of Alaska Deep-Sea corals
6. Investigating the influence of edge effects on deep-sea coral communities

## Fishing Effects Recovery

1. Assessing the effectiveness of area closures for maintaining healthy Deep-Sea coral & sponge communities
2. Refine estimates of longline & pot gear footprints & interactions with corals & sponges
3. Risk assessment of the impacts of commercial fishing on corals & sponges in Alaska
4. Incorporate validated coral & sponge covariates into fishing effects model



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# AKCSI –Projects-P.I.s & Partners

## Genetics Taxonomy Biodiversity

Alaska Fisheries Science Center-Auke Bay Lab-NOAA  
Alaska Fisheries Science Center-Kodiak Lab-NOAA  
Northwest Fisheries Science Center-NOAA  
Fisheries & Oceans Canada-DFO  
Hollings Scholar-University of Wisconsin Madison Wisconsin  
Biomedical Sciences & Public Health Charleston South Carolina

## Habitat Distribution Exploration

Alaska Fisheries Science Center-Auke Bay Lab-NOAA  
Alaska Fisheries Science Center-Kodiak Lab-NOAA  
Fisheries & Oceans Canada-DFO  
Ocean Exploration & Research –NOAA  
School of Marine Sciences University of Maine Darling Marine Center  
Hollings Scholar Department of Environmental Science and Policy, George Mason University

## Fishing Effects Recovery

Alaska Fisheries Science Center-Auke Bay Lab-NOAA  
Alaska Regional Office – Anchorage Alaska-NOAA  
Northwest Fisheries Science Center-NOAA  
Fisheries & Oceans Canada-DFO



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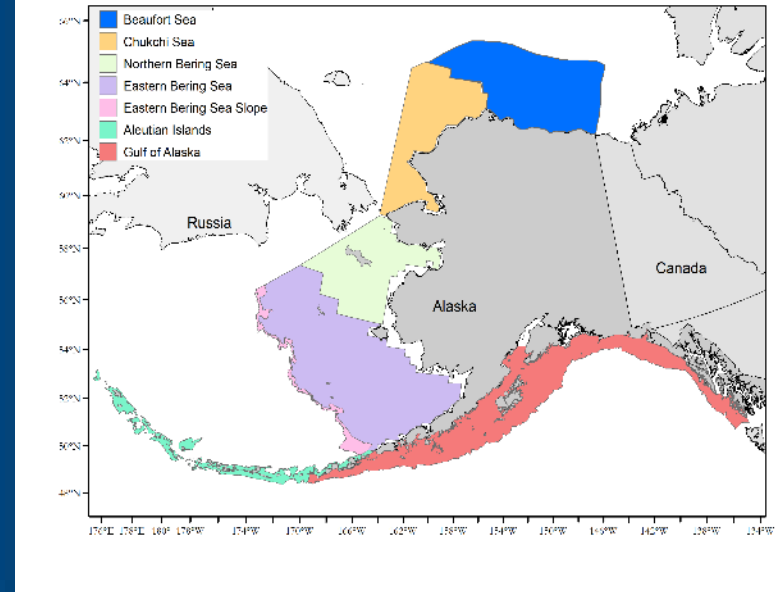
# Validation of Coral & Sponge Distribution Modeling in the Gulf of Alaska

(Summer 2021)

Pat Malecha, Jerry Hoff, Chris Rooper, Kresimir Williams,  
Pam Goddard, Rachel Wilborn, John Olson, Sean Rooney

Visual surveys will be conducted at 300 randomly selected stations in the Gulf of Alaska to validate a previously completed predictive model of coral and sponge distribution. At each station, we will deploy a stereo camera system and collect 15 minutes of on-bottom imagery from a random starting point, drifting with the prevailing current.

- 1) the survey design will be stratified by depth, trawlability of the seafloor, and model predictions of species presence and will occur from ~30 to ~900 m.
- 2) images will be analyzed collecting data on benthic invertebrates and fishes for determining the presence or absence of sponge and coral, species identifications, abundance, and size.
- 3) images will be analyzed collecting seafloor substrate type, ES60 data (acoustic data), seafloor characteristics, water temperature, vessel trackline, bottom depth and position data.
- 4) water samples will be collected *in situ* to be used for eDNA analyses that will be compared with the visual observations of coral, sponge, and fish.



# Recruitment, Reproduction and Larval Supply of Alaskan Deep-Water Corals

(Summer 2021, 2022, 2023)

Rhian Waller, Peter Etnoyer, Bryan Costa

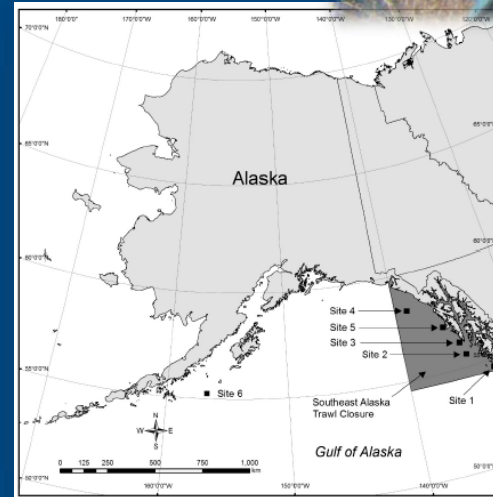
Settlement plates that were deployed during the last cycle of the Deep Sea coral Program in Alaska will be retrieved using a small ROV. The plates will be examined for coral and sponge to determine recruitment processes.

1) recruitment plates will be analyzed for community composition (differences and similarities between plates and areas) and growth of corals present.

2) small sprigs of *P. pacifica* colonies will be collected in the vicinity and transported live to the Darling Marine Center where they will be induced to spawn so that fertilization and larval dynamics can be investigated.

3) live stylasterid corals will be collected for husbandry and laboratory experiments by placing into long-term incubators at differing ocean acidification environments. Potential analyses will include skeletal density, growth and reproductive effects.

4) plates will be recovered in each of the 3 years focusing on different areas and plates will be returned to recover in future years



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# Joint Canada USA Seamount Exploration in the Eastern North Pacific

(Summer 2022)

Chris Rooper, Janelle Curtis, Tammy Norgard, Cherisse Dupreez, Jerry Hoff, Pat Malecha

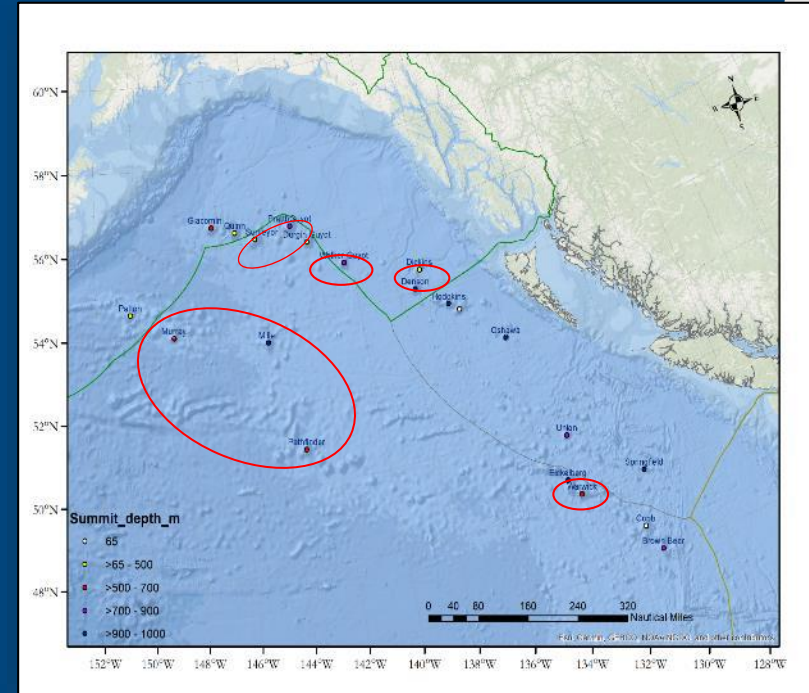
This fieldwork is proposed as a collaboration between Canada and the USA, with each potentially providing support for the research. The fieldwork will provide an assessment of the distribution of coral and sponge on a region-wide scale for seamounts of the North Pacific Ocean using visual survey tools in areas that have been previously unexplored. The visual survey will be designed in a robust statistically sound method so that inferences about the deep-sea coral and sponge communities on seamounts can be made and will allow the development of a distribution model for these seamounts using existing data sources derived from both Alaska and Canada.

1) objective of this work will be to conduct a visual survey of eight seamounts (Figure 4) in the SGaan-Kinghlas (4) and Cobb (4) seamount chains

2) determine the density, size, species composition and diversity of deep-sea corals and sponges on the seamounts

3) collect data on associated fish and invertebrate species and observe any damage to coral and sponge communities by historical fishing

4) water samples will be collected *in situ* to be used for eDNA analyses that will be compared with the visual observations of coral, sponge, and fish.



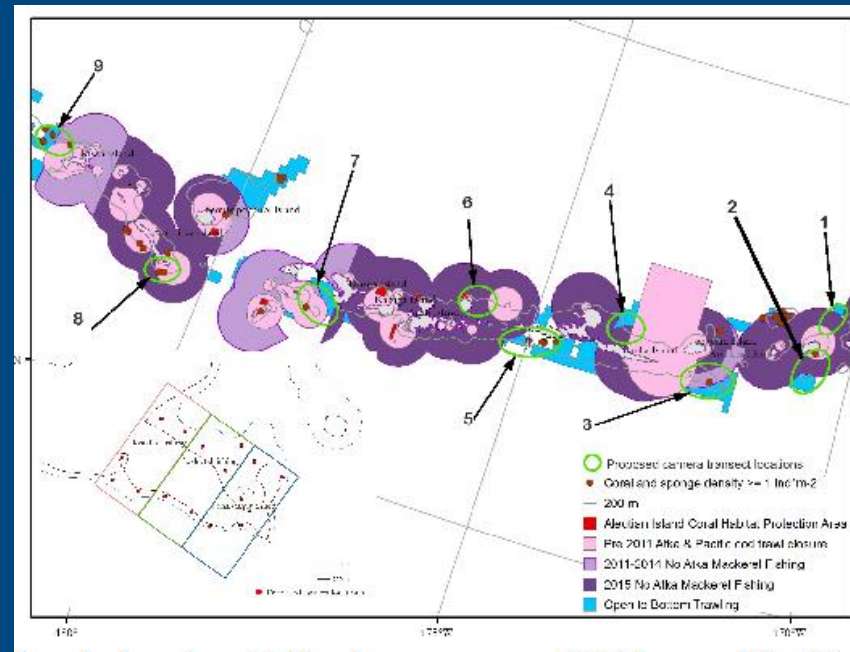
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# Assessing the effectiveness of Area Closures for Maintaining Healthy Deep-Sea Coral & Sponge Communities (Summer 2022)

Jerry Hoff, Pat Malecha, Chris Rooper, Kresimir Williams

The objectives of this project are to evaluate 2005 fisheries closures to protect benthic habitat and the effectiveness at protecting deep-sea coral resources in the Aleutian Islands and western Gulf of Alaska.

- 1) compare densities of coral and sponge in areas that were closed to mobile bottom contact gear to adjacent open areas where mobile bottom contact fishing has occurred
- 2) compare size structure of coral and sponge in closed and open areas
- 3) compare rates of damaged corals and sponges observed in closed and open areas and examine evidence of fishing in these areas
- 4) examine patterns in fishing effort from VMS data and compare these to terrain metrics such as slope, depth and ruggedness to determine common habitat features among fished areas
- 5) use available size data and estimates of growth rates from the literature to make the first estimate of sustainable harvest rates for corals in the Aleutian Islands



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# Challenges & Future Opportunities

- Obtaining ship time extremely challenging & costly
- Alaska has short weather window (2-3 months field work)
- Large area-5 marine ecosystems
- At AFSC no robust habitat infrastructure or program/integrate into existing programs
- COVID19



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# Questions AKCSI

## PI Contacts

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Pat Malecha [pat.malecha@noaa.gov](mailto:pat.malecha@noaa.gov)

Link to Deep-Sea Coral Webpage  
to track the Alaska Initiative

<https://deepseacoraldata.noaa.gov/fieldwork-studies/ak-fieldwork-fy-20-23>



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