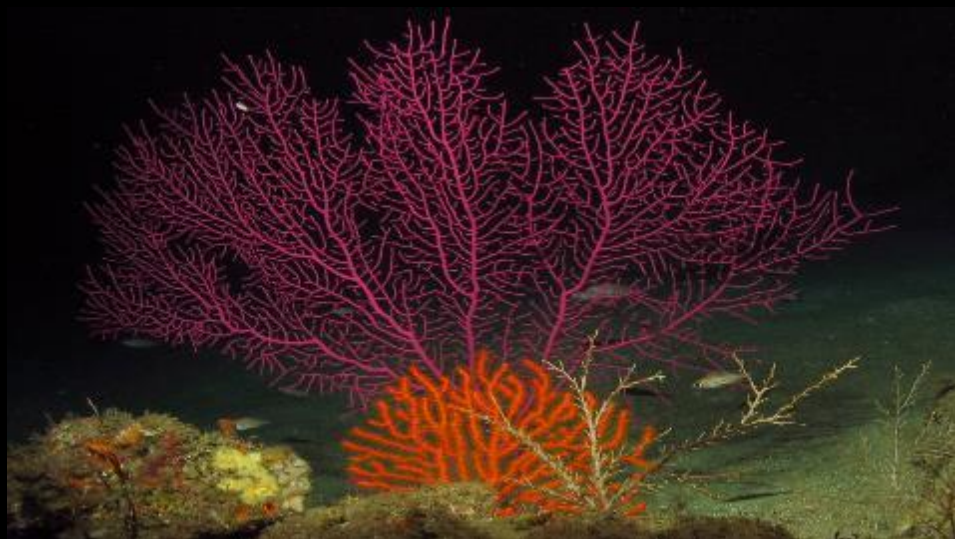


A Win-Win For Deep Sea Corals and Fishing:

Increasing Seafloor Protections While Restoring Fishing Opportunities Off the US West Coast



**Geoffrey Shester, Ben Enticknap, Brianne Mecum,
Ashley Blacow, Tara Brock, and Susan Murray**



**7th INTERNATIONAL SYMPOSIUM
DEEP-SEA CORALS**
July 29-August 2, 2019 | Cartagena, Colombia

 **frontiers**
in Marine Science

 **OCEANA** Protecting the
World's Oceans

CORALS provide important habitat



to many fish and deep sea
marine life.



OCEANA



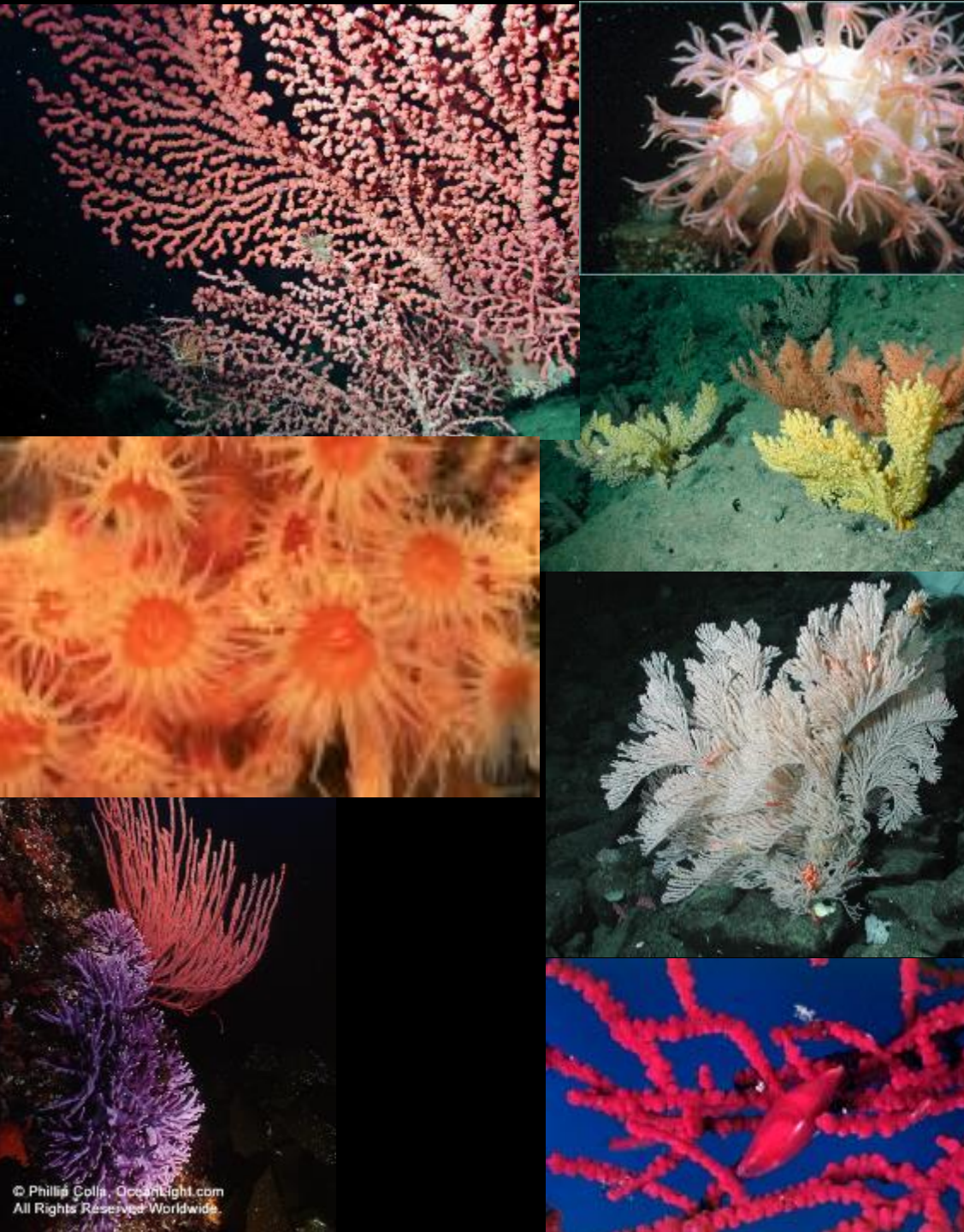
DID YOU KNOW?

There are
at least

101

different
species
of corals
off the

**U.S.
WEST
COAST**
alone.



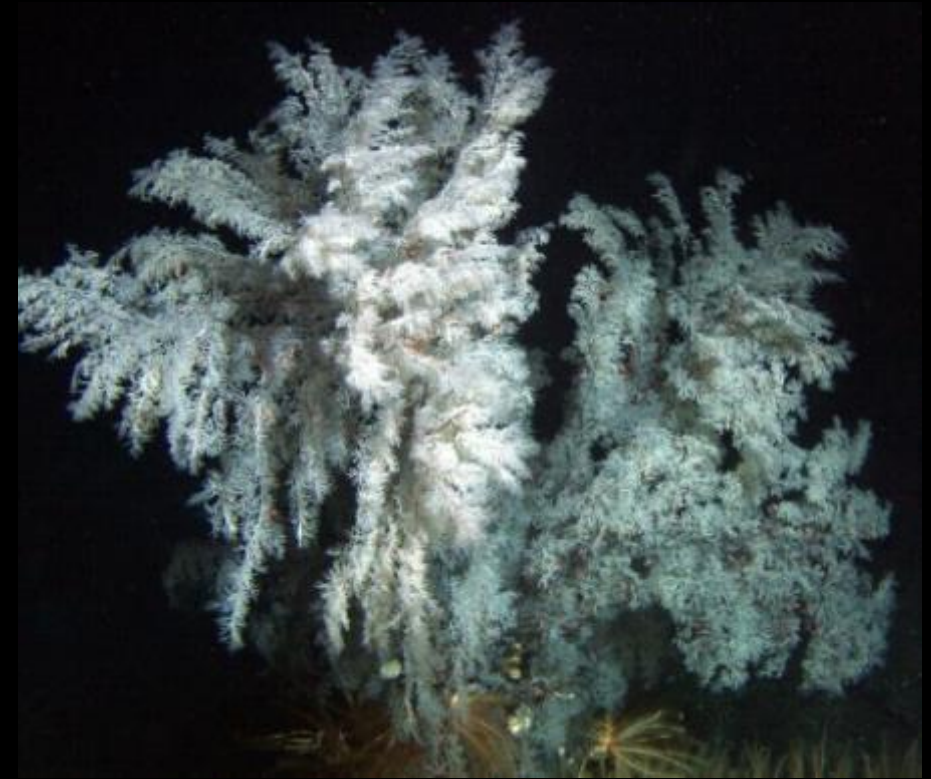
Oldest animals on Earth...



4,265 years old!

Roark et al. 2009: "Extreme longevity in proteinaceous deep sea corals"
Hawaiian black coral (*Leiopathes glaberrima*)

New species to science



New black coral species discovered off
California in 2005:

Christmas tree coral: Antipathes dendrochristos

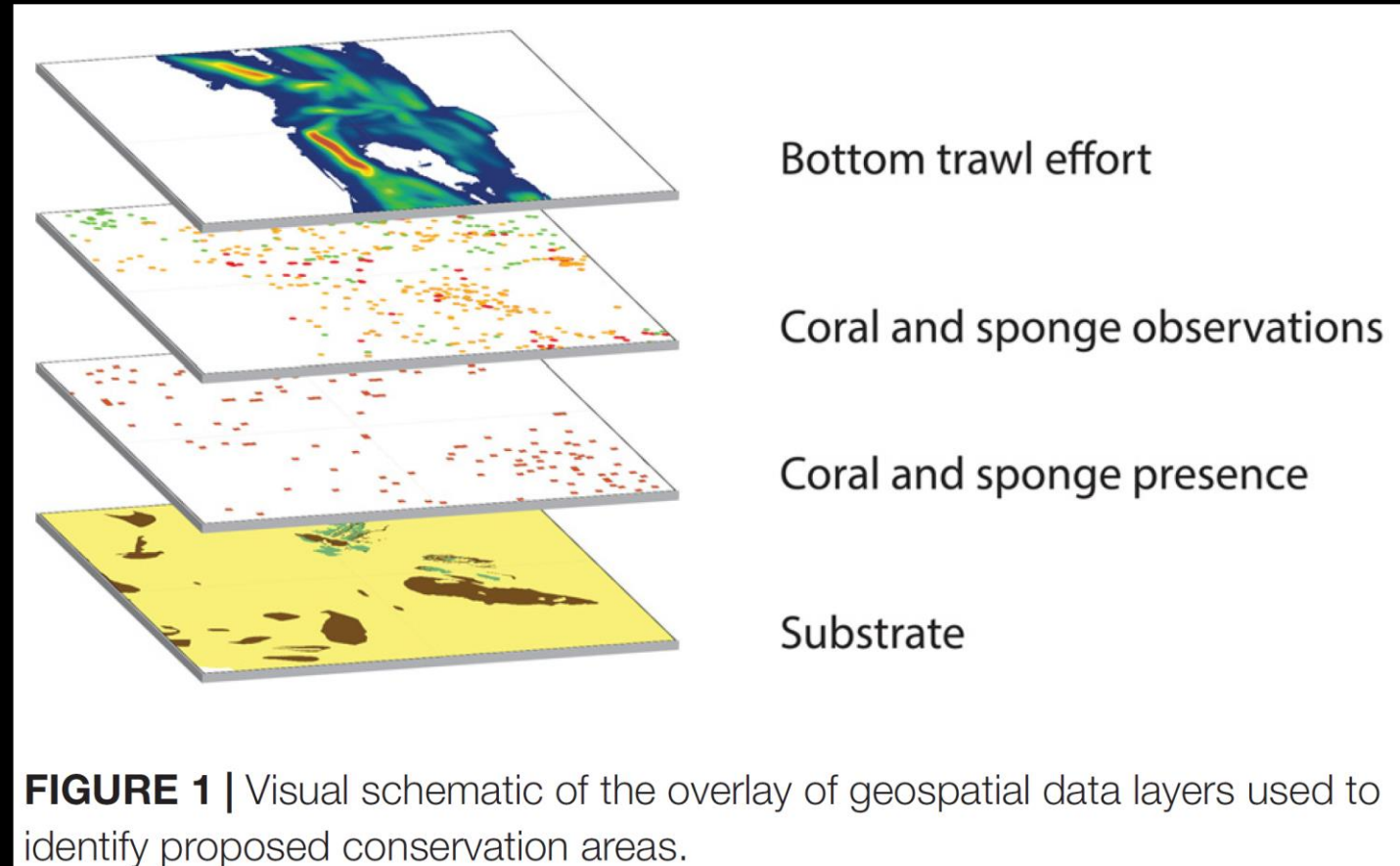
2006 U.S. West Coast Protections (the “Baseline”)

- 350,000 km² of habitat protected from bottom trawling (45% of EEZ): EFH, state waters closures
- Rockfish Conservation Areas (temporary)
- 14% of prior bottom trawling effort displaced

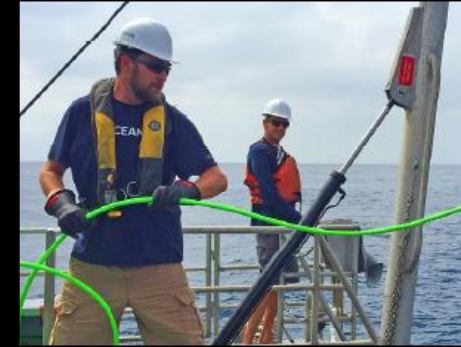
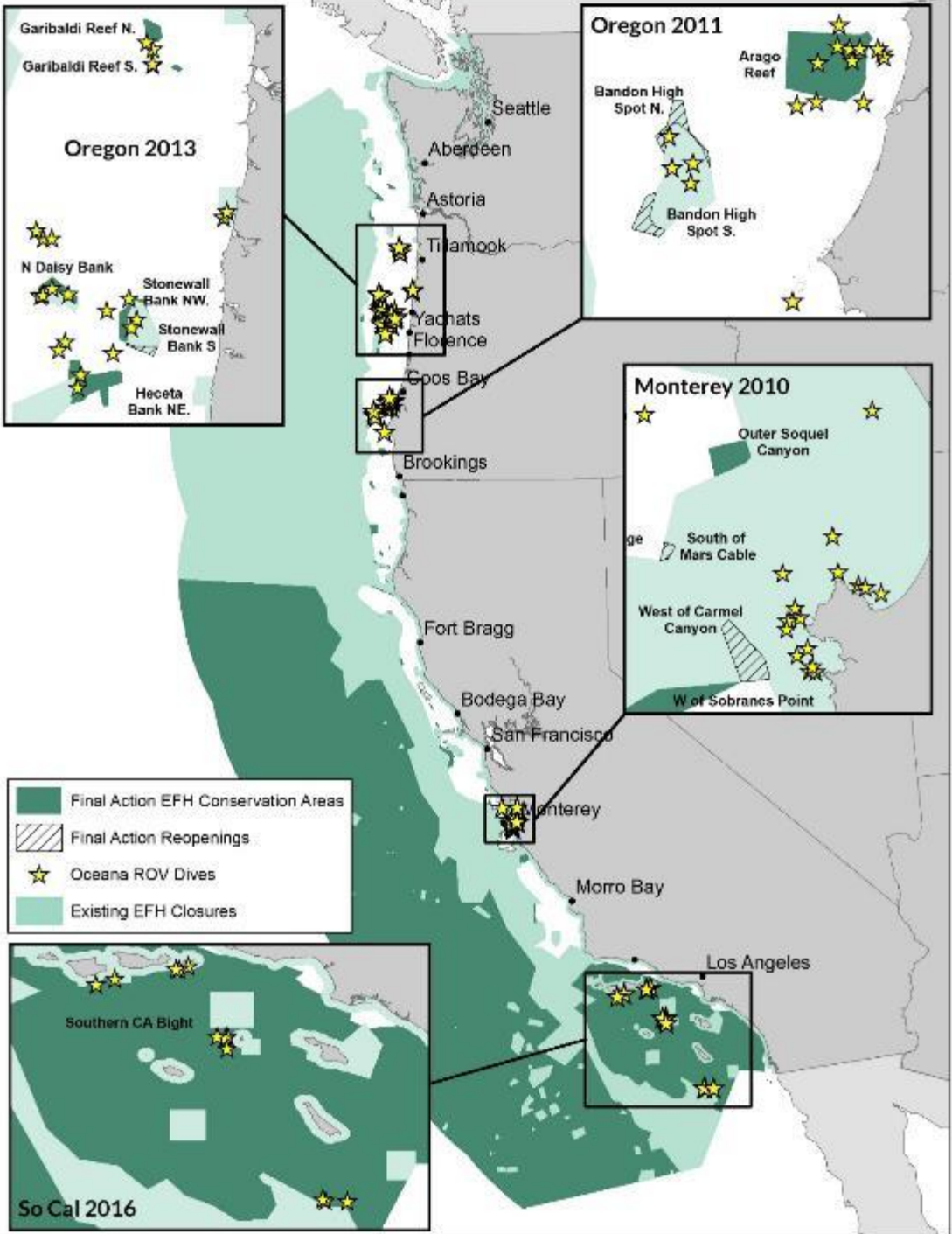


2010-2018: EFH Review & Proposal Development – An Iterative Process

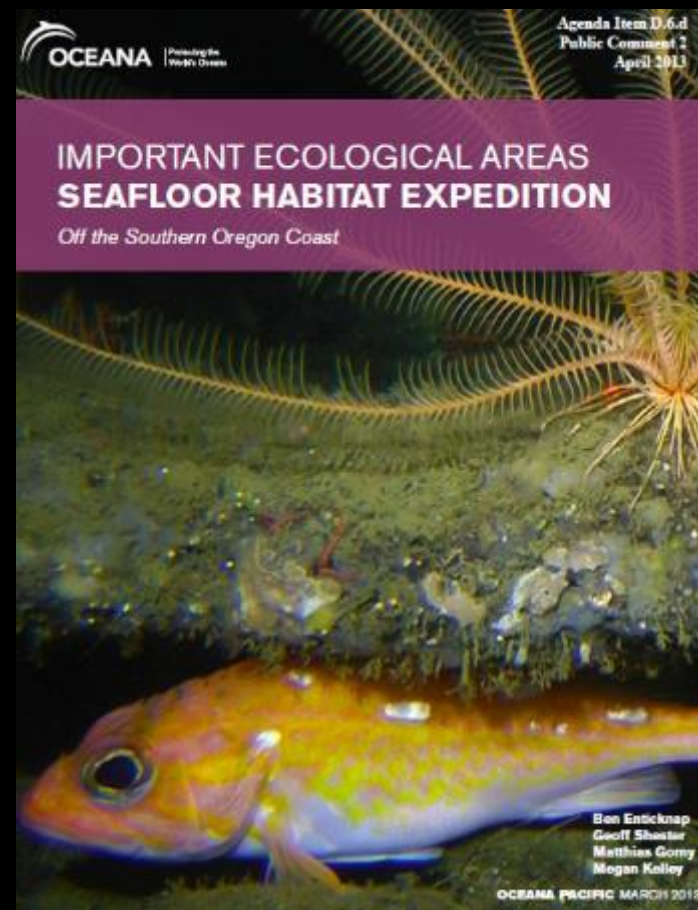
- EFH Review and Synthesis
- Tribal Outreach
- Industry meetings
- National Marine Sanctuaries
- GIS mapping overlays
- Collaborative proposal process
- Analysis of proposal
- Public Outreach



Oceana US West Coast Expeditions



Exploring the Living Seafloor: Southern California Bight Expedition

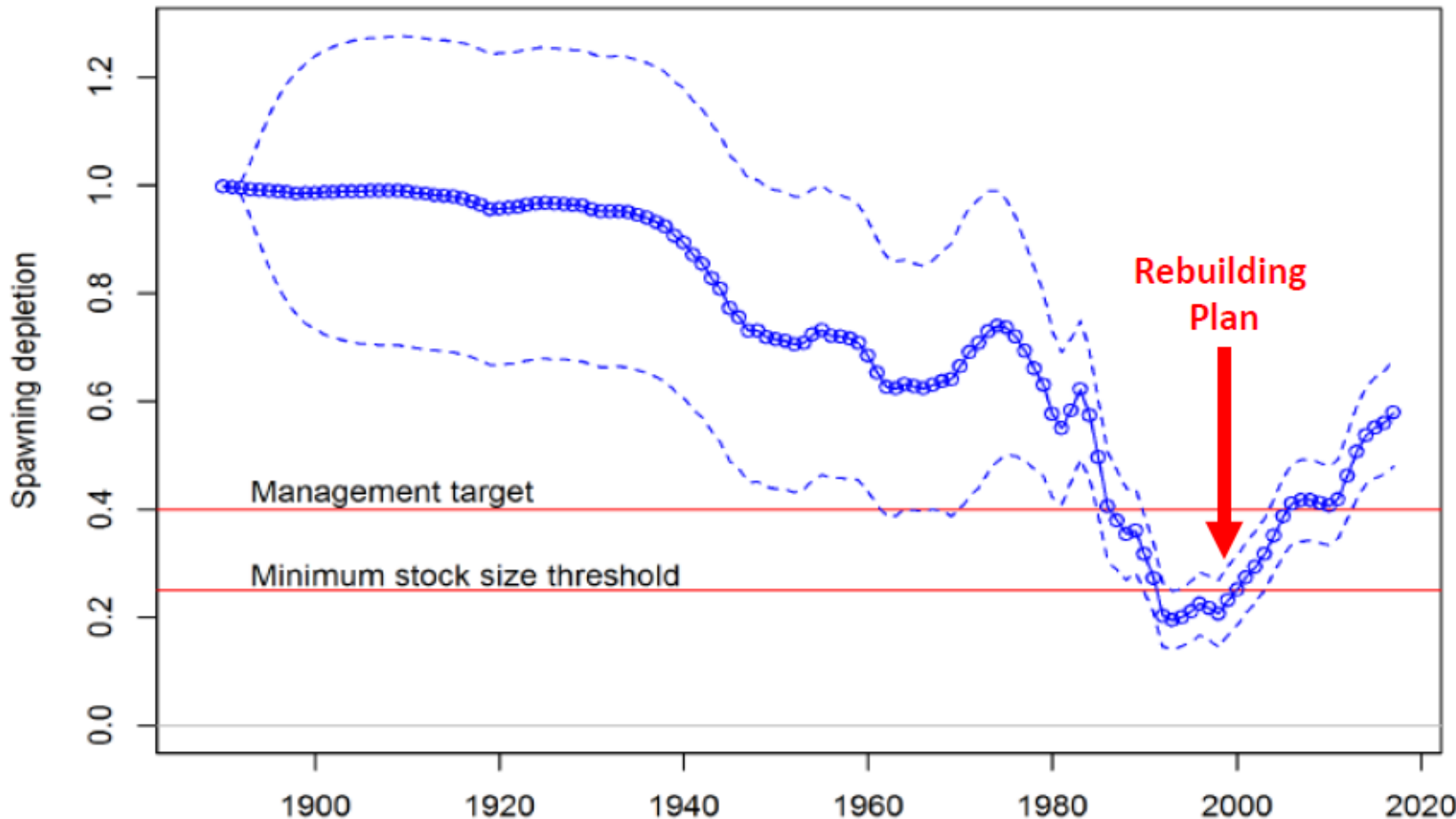


- New coral gardens discovered in multiple locations open to bottom trawling
- 31 commercial fish species co-occurred with corals and sponges

Dramatic Recovery of Overfished Species

2017 Lingcod Assessment

Population Size (relative to unfished levels)



Lingcod (*Ophiodon elongatus*)

**Combine RCA reopening
with new EFH
conservation areas**

Unanimous 2018 PFMC Decision

- 140,353 mi² (363,513 km²) of new protections
- 53 new EFH Conservation Areas closed to bottom trawling (45,136 km²); 638 km² reopened
- Deep Sea Ecosystem Conservation's Area closed to all bottom contact fishing (319,015 km²)
- 63% of trawl Rockfish Conservation Areas reopened (7,902 km²)
- 90% of US West Coast EEZ closed to bottom trawling

Business | Environment | Food & Drink | Local Business | Local News | Northwest | Puget Sound | Science

Conservationists, West Coast bottom fishermen embrace 'grand bargain'

The Seattle Times

Originally published April 14, 2018 at 2:07 pm | Updated April 16, 2018 at 4:24 pm

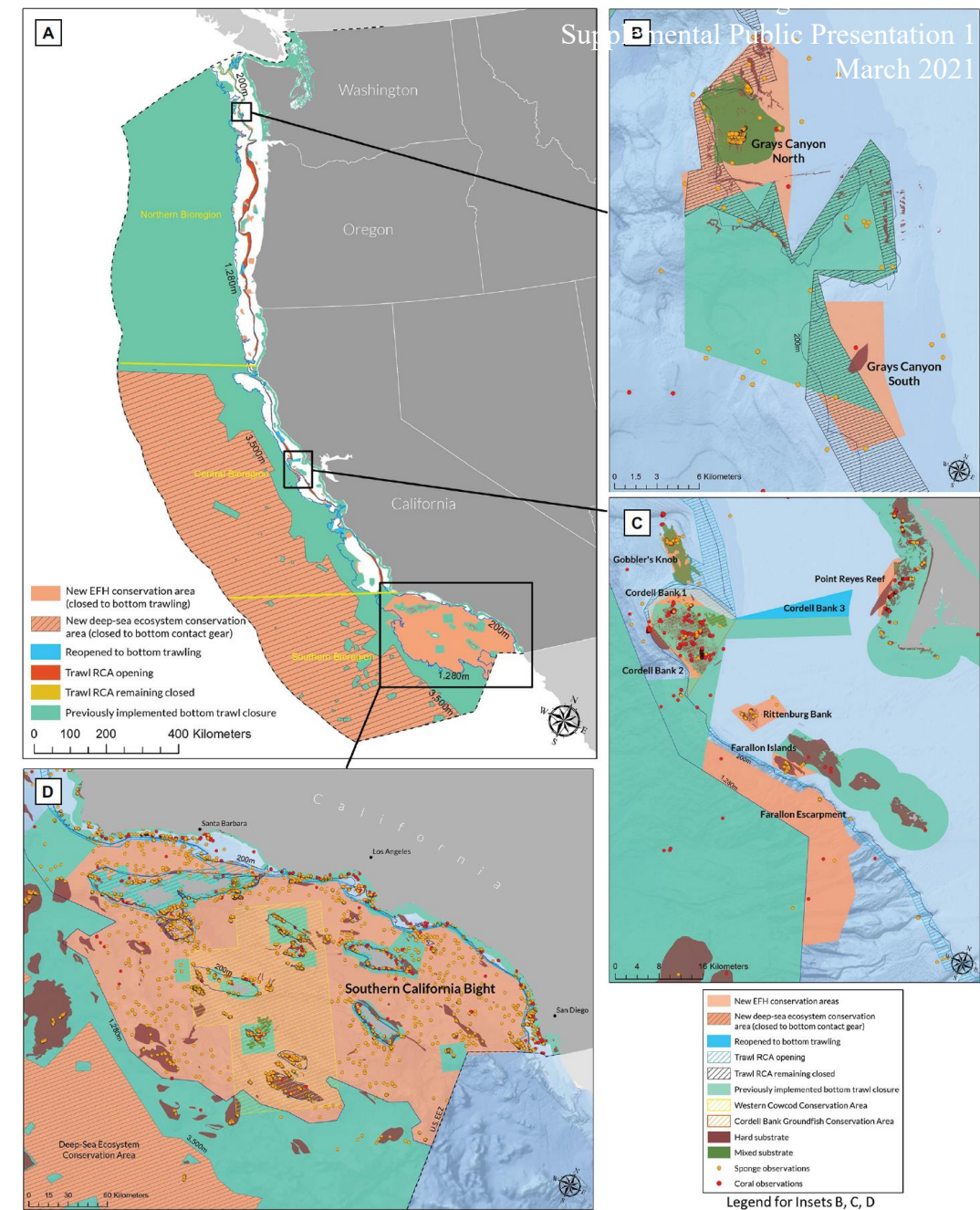
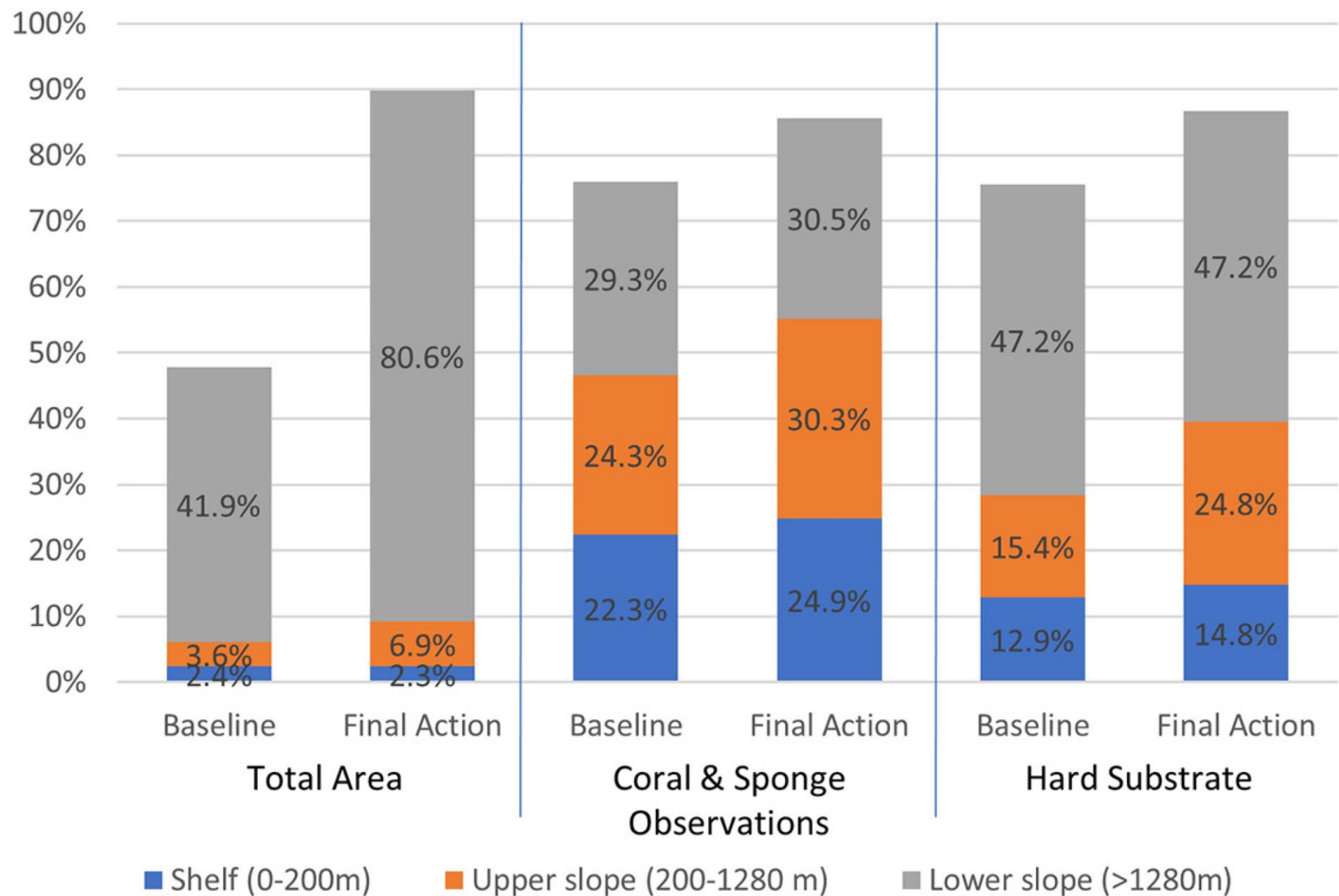


FIGURE 2 | (A) Map of United States West Coast EEZ showing changes to bottom contact fishing regulations resulting from Amendment 28 final action. (B) (Upper Inset) Grays Canyon region. (C) (Center Inset) Farallon Islands/Cordell Bank Region (D) (Lower Inset) Southern California Bight.

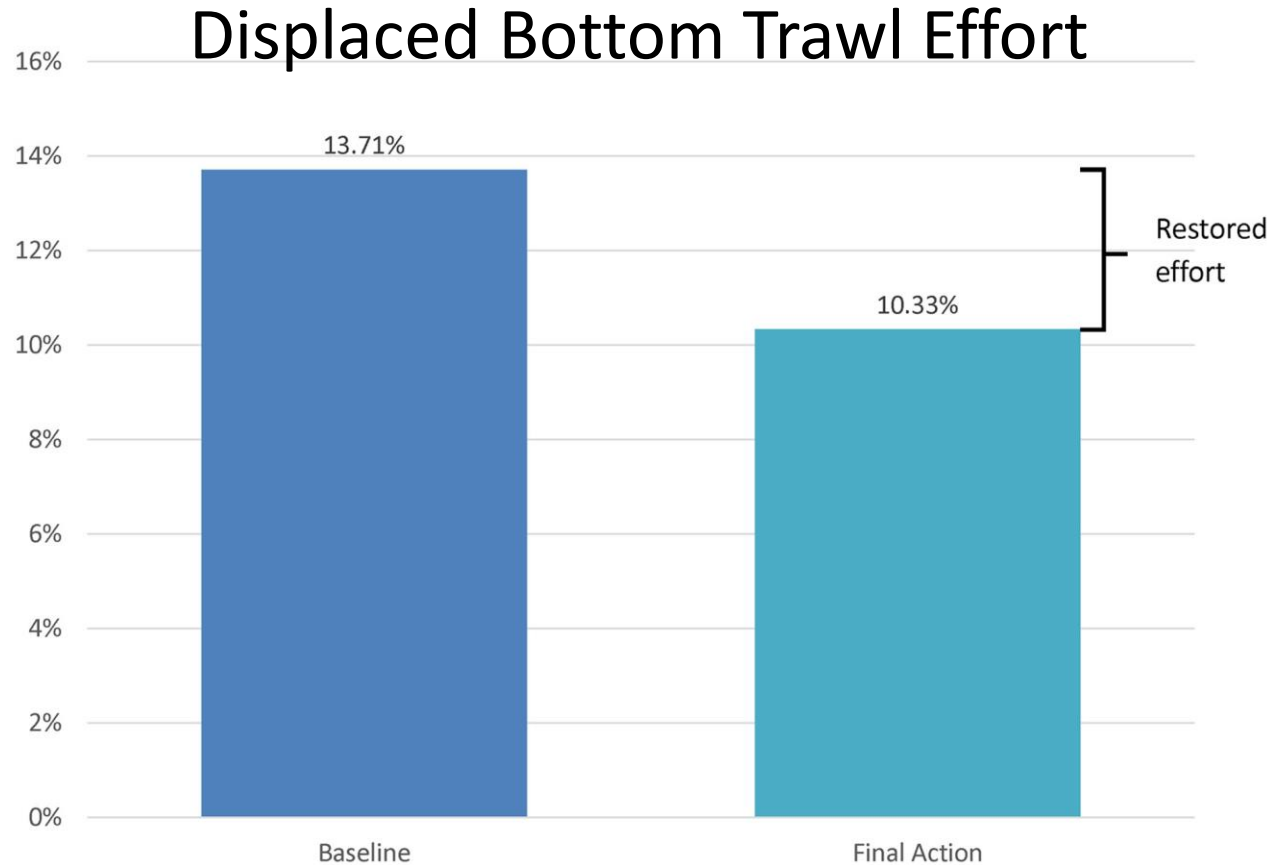
Coastwide Increases in Protections Across Depths



Net Change in Protections by Biogeographic Region

Geographic Area	Area (km ²)		Coral and Sponge Observations (#)		Hard substrate (km ²)	
	Baseline	Final Action	Baseline	Final Action	Baseline	Final Action
United States West Coast EEZ (shore to 370 km)		823,509		320,804		15,994.7
Inside bottom trawl closure	394,134	739,491	243,493	274,815	12,077.8	13,878.4
Outside	429,375	84,018	77,311	45,989	3,916.9	2,116.3
Northern Bioregion - Upper Slope		30,153		44,003		174.4
Inside bottom trawl closure	5,742	3,431	19,805	32,040	74.3	55.4
Outside	24,411	26,722	24,198	11,963	100.2	119.1
Northern Bioregion - Shelf		33,985		21,783		1,639.9
Inside bottom trawl closure	6,420	6,363	482	4,159	660.7	891.6
Outside	27,565	27,622	21,301	17,624	979.1	748.2
Central Bioregion - Upper Slope		23,872		16,879		2,605.1
Inside bottom trawl closure	7,281	6,897	12,436	14,735	1,366.8	1,489.9
Outside	16,591	16,975	4,443	2,144	1,238.3	1,115.2
Central Bioregion - Shelf		17,132		56,273		1,051.7
Inside bottom trawl closure	7,246	6,952	50,553	55,074	945.7	1,014.2
Outside	9,886	10,180	5,720	1,199	106.0	37.5
Southern Bioregion - Upper Slope		46,747		52,289		2,422.4
Inside bottom trawl closure	16,885	46,146	45,697	50,441	1,023.7	2,414.8
Outside	29,862	601	6,592	1,848	1,398.7	7.6
Southern Bioregion - Shelf		7,761		28,344		521.3
Inside bottom trawl closure	5,916	5,932	20,647	20,646	457.2	463.8
Outside	1,845	1,829	7,697	7,698	64.1	57.5

Restoring Fishing Opportunities



“...coastwide, the combined set of actions restored 24.6% of the historic fishing effort that was previously displaced”

FIGURE 6 | Proportion of 2002-2006 bottom trawl fishing effort displaced under the baseline set of closed areas (2006-2019) and under the Amendment 28 final action regulatory closures. Restored fishing effort is the difference in displaced effort between the baseline and final action.

TABLE 3 | Bottom trawl effort.

Geographic Area	Total	Baseline	Final Action	Change	% Change	% Restored
EEZ + Territorial Sea (shore to 370 km)	99,429,040	85,795,466	89,155,460	3,359,994	3.4%	24.6%
North Bioregion - Upper Slope	39,678,313	35,583,019	37,737,154	2,154,135	5.4%	52.6%
North Bioregion - Shelf	25,865,827	24,282,738	24,664,664	381,927	1.5%	24.1%
Cent. Bioregion - Upper Slope	17,204,171	16,139,906	16,818,382	678,476	3.9%	63.8%
Cent. Bioregion - Shelf	10,761,297	5,723,381	5,860,234	136,852	1.3%	2.7%
South Bioregion - Upper Slope	118,703	85,475	88,146	2,671	2.3%	8.0%
South Bioregion - Shelf	4,624,098	3,976,592	3,979,835	3,243	0.1%	0.5%
Greater Farallones NMS	4,883,565	4,189,485	4,293,262	103,777	2.1%	15.0%
Cordell Bank NMS	1,182,324	958,285	1,044,707	86,422	7.3%	38.6%
Monterey Bay NMS	10,344,230	6,137,276	6,449,378	312,102	3.0%	7.4%
Channel Islands NMS	10,489	3,581	3,581	0	0.0%	0.0%
Rockfish Conservation Area	5,526,097	0	3,730,186	3,730,186	67.5%	67.5%

Summed bottom trawl intensity that took place from 2002 to 2006 NOAA (2015) where values represent the sum of cell values in the raster dataset in km/km² where each cell represents the total length of all towlines intersecting a standard area. Values of Total are based on the sum of the trawl intensity scores within each geographic area. Values of Baseline and Final Action are the amount of 2002-2006 effort in areas remaining open to bottom trawling under each scenario. Change is the difference in trawl intensity score between Baseline and Final Action. % Change is Change/Total. % restored is Change/(Total-Baseline).

Enabling a Win-Win Outcome

- Transparent public process, stakeholder collaboration, and robust analysis
- Deep sea coral science justifies precaution
- Combining RCA and EFH changes
- Create incentives for transparency and research
- Adaptive management can allow for win-wins if initial protections are strong



FIGURE 7 | Year-round closures to bottom trawl fishing gear along the western coast of North America from California to the United States Arctic as of January 1, 2020. In total, bottom trawl closures now cover 71% of the Exclusive Economic Zones off United States Alaska, British Columbia, Canada and the United States West Coast. Hawaii and Exclusive Economic Zones off Mexico, Russia, and Canadian Arctic are not shown.

Thank you PFMC, GAP, GMT, SSC, Habitat Committee, Council and NMFS Staff, NMFS West Coast Region, NOAA Deep Sea Coral Research and Technology Program, West Coast fishermen and processors, CDFW, ODFW, WDFW, Tribes, conservation NGOs, MARE, R/V Miss Linda



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