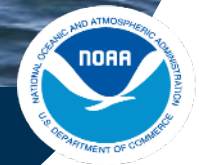
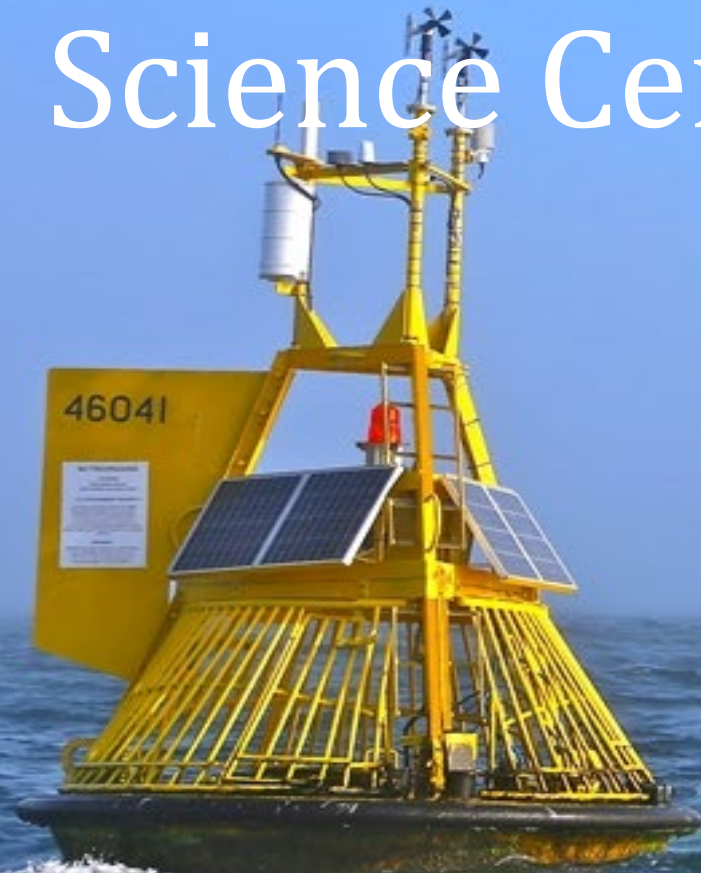


NOAA Fisheries Science Center Update



NOAA
FISHERIES

Outline

1. State of the Ecosystem

- a. Marine heatwave from Alaska to California

2. Science Center Work and Initiatives

- a. Southwest
- b. Northwest
- c. Alaska

3. State of the Science Centers

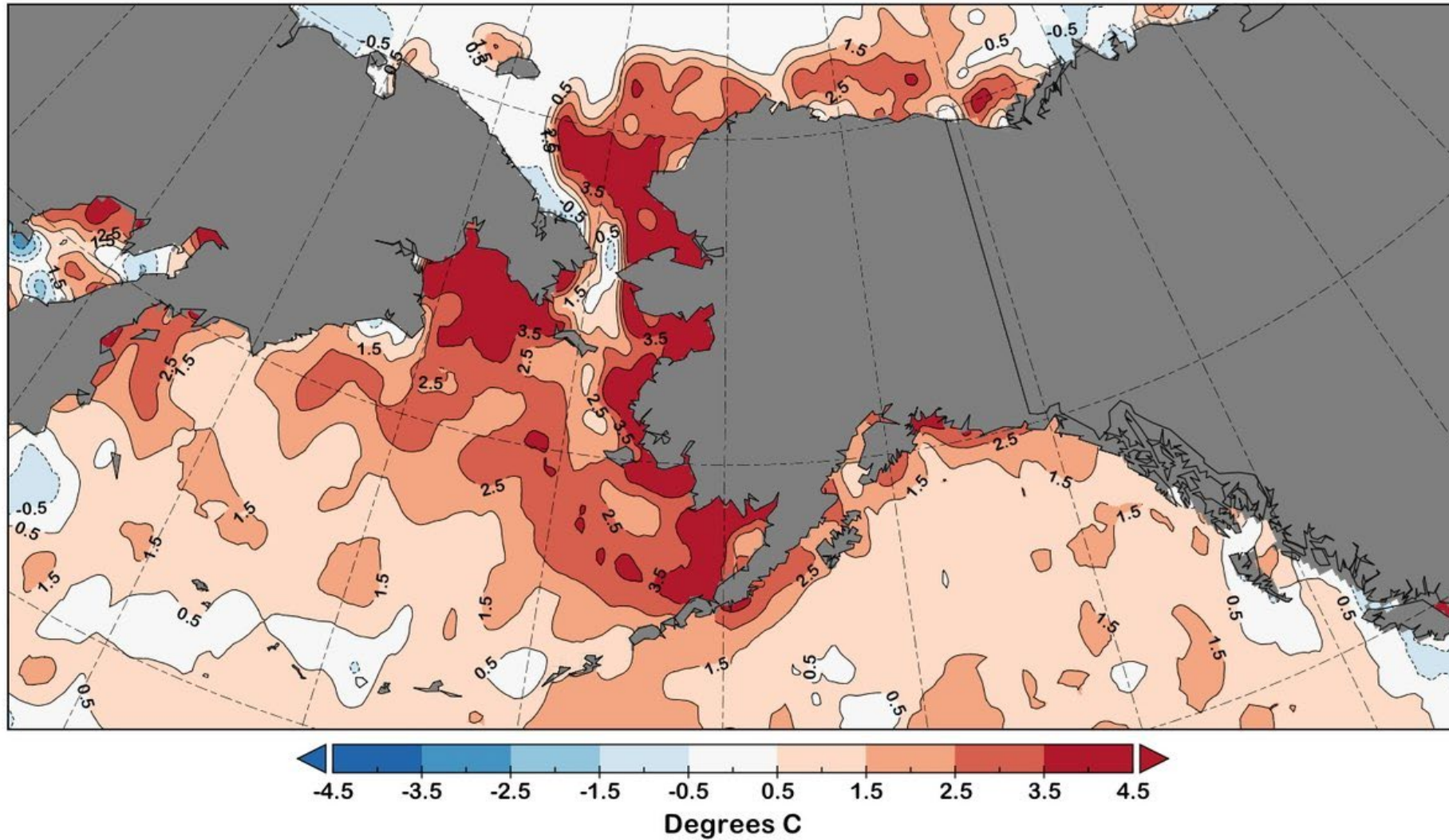
- a. Budget
- b. Surveys



NOAA
FISHERIES

Sea Surface Temperature Departures from Normal

June 10-11, 2019



Graphic by @AlaskaWx

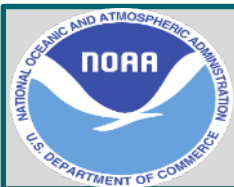
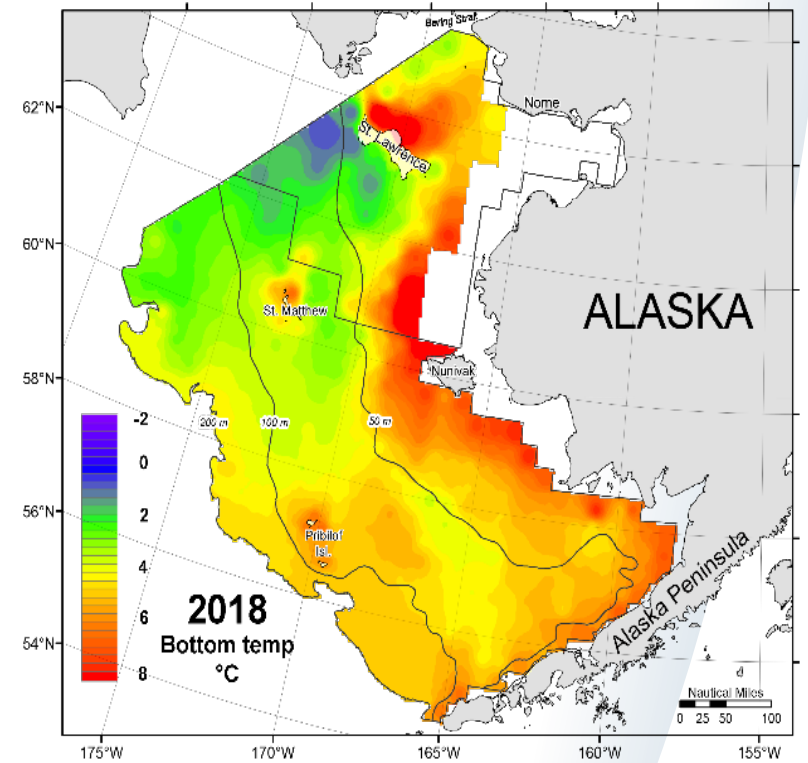
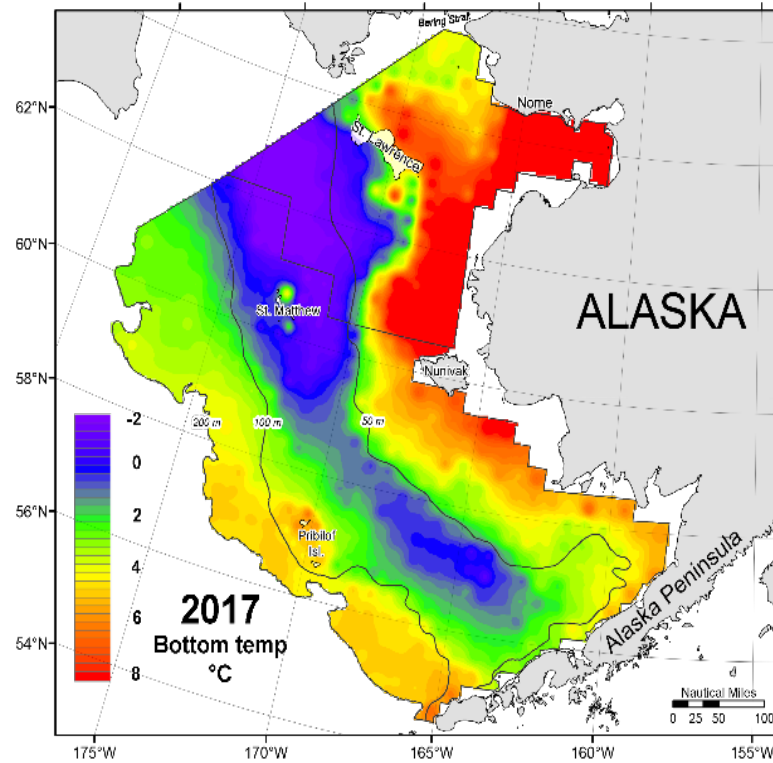
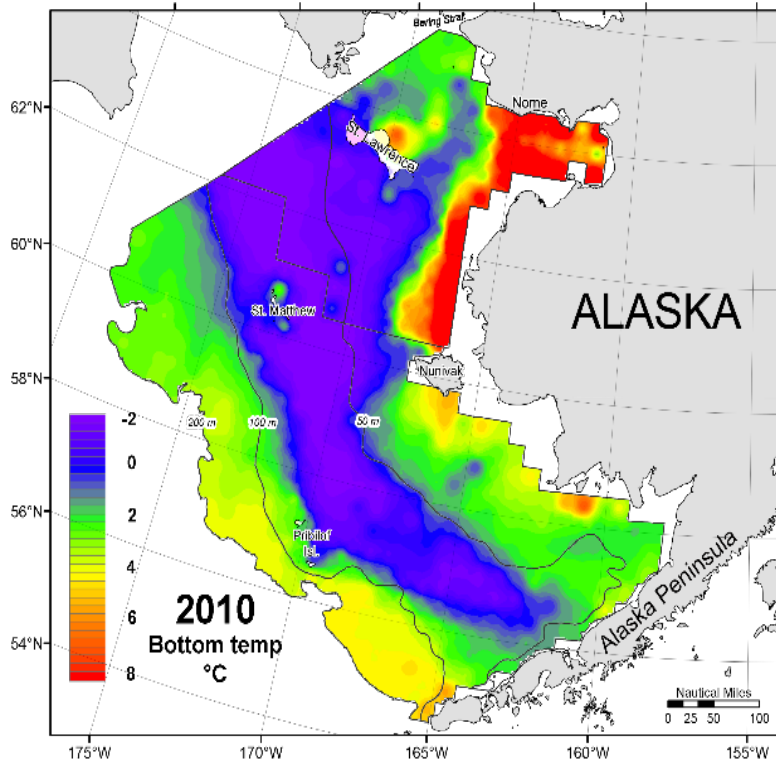
OISSTv2 data courtesy NOAA/PSD/ESRL



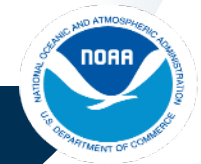
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NEBS & SEBS

Seafloor (Bottom) Temperature



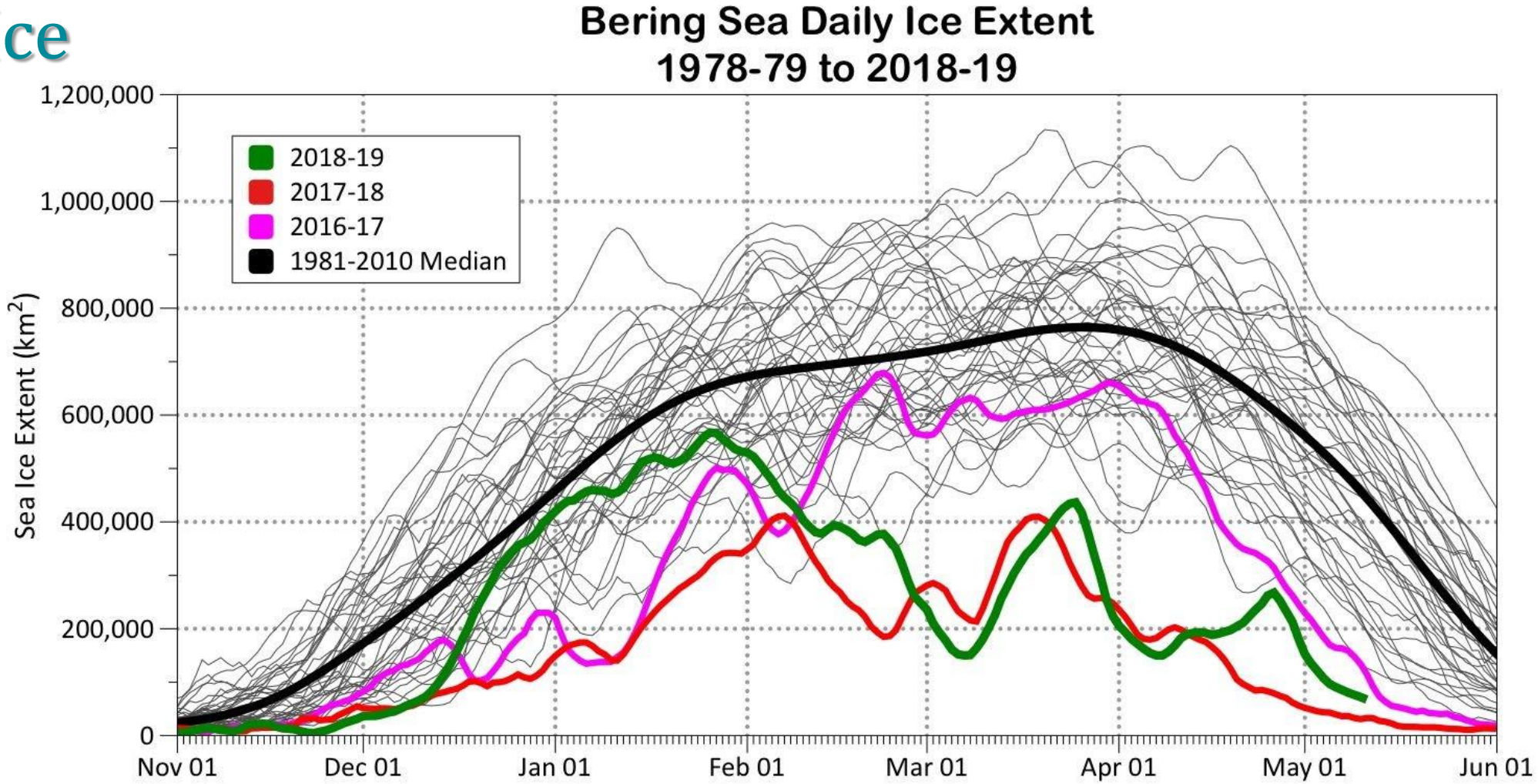
ALASKA FISHERIES SCIENCE CENTER
RESOURCE ASSESSMENT AND CONSERVATION ENGINEERING DIVISION
GROUNDFISH ASSESSMENT PROGRAM



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FISHERIES

Loss of Sea Ice

- Residual heat in the system
- Persistent high pressure system
- Anomalous winds from the south

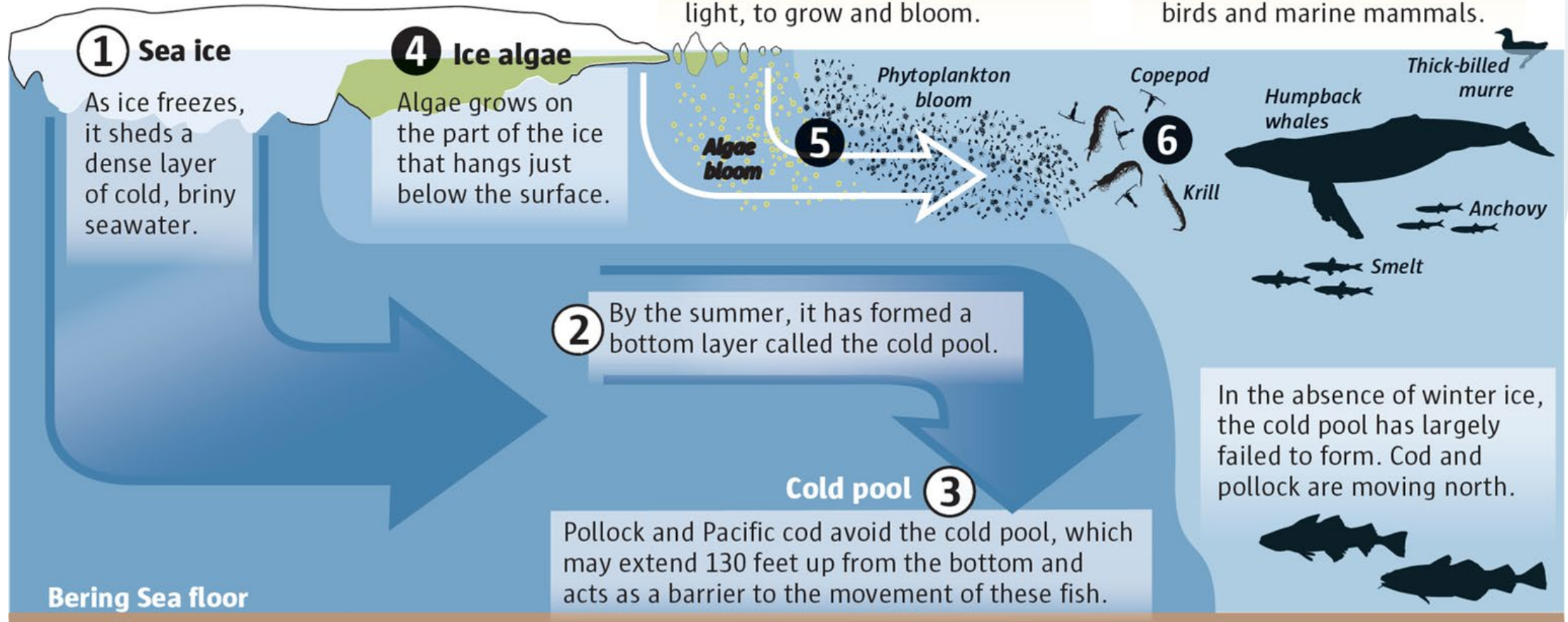


Data source: NSIDC Sea Ice Index, Version 3
Graphic by Rick Thoman, @AlaskaWx
Updated through May 11, 2019



Ice and the Bering Sea food chain

The annual cycle of sea ice forming and melting has helped sustain marine life.



Source: Aug. 23, 2019, presentation by Janet Duffy-Anderson, NOAA/Alaska Fisheries Science Center

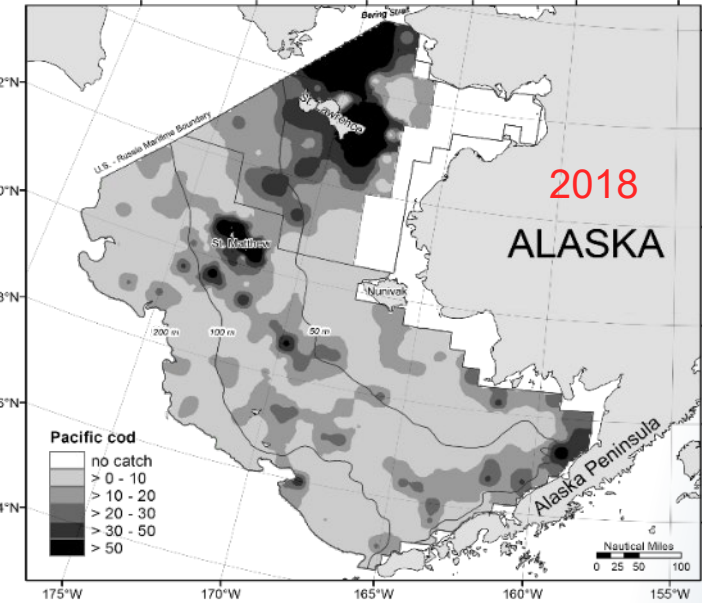
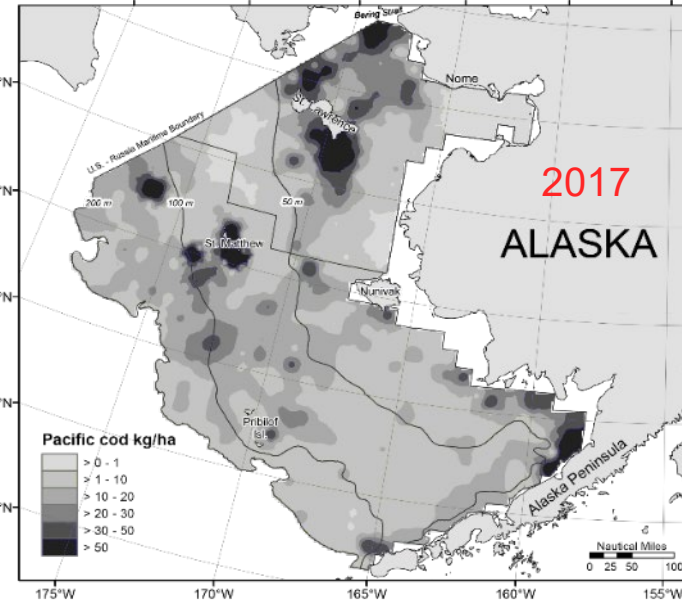
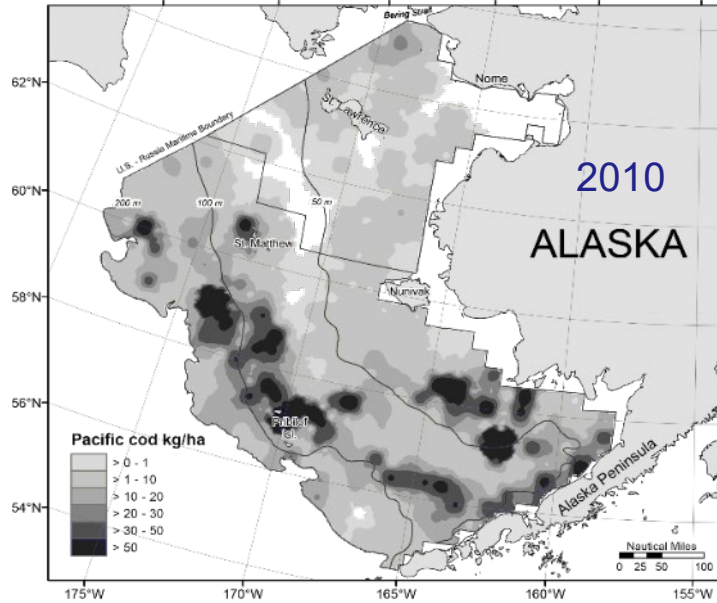
MARK NOWLIN / SEATTLE TIMES



NOAA
FISHERIES



Changes in Distribution-Pacific Cod



NEBS Biomass (Estimate of Total Weight of All Pacific Cod in the Area) in Metric Tons

26,140 mt

289,264 mt
+907%

564,684 mt
+2,060%



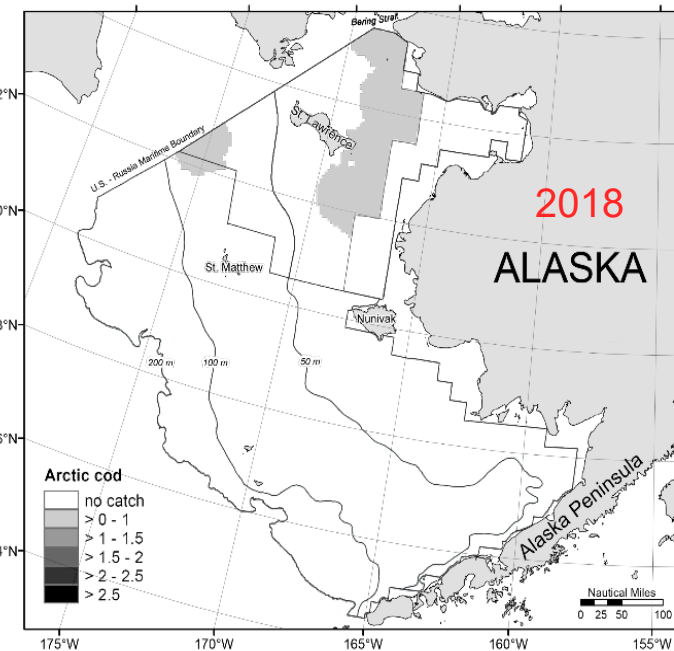
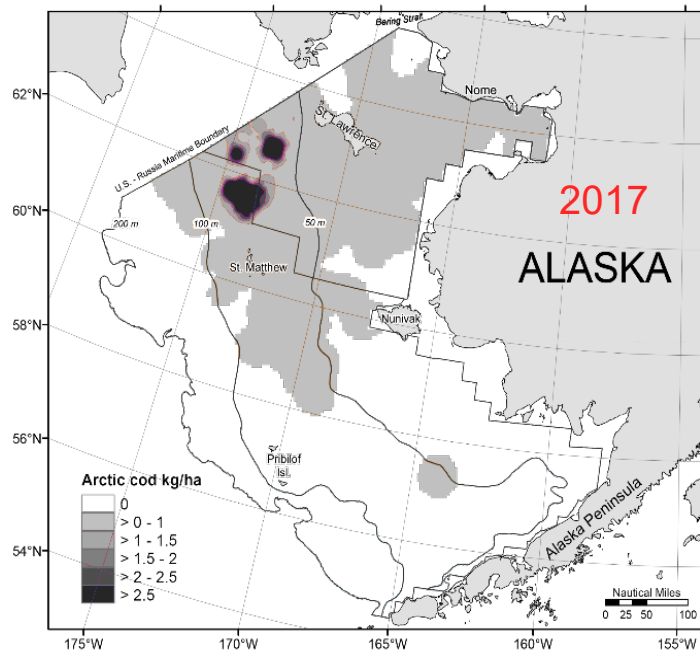
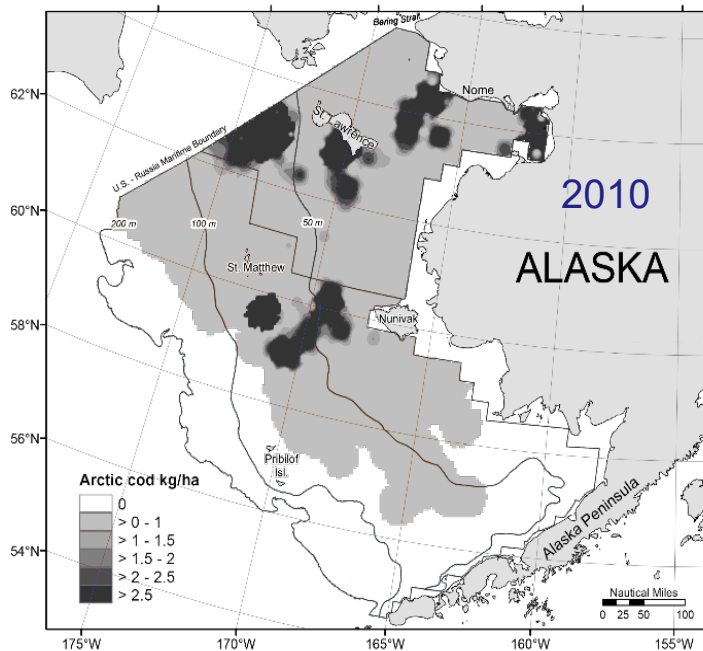
ALASKA FISHERIES SCIENCE CENTER
RESOURCE ASSESSMENT AND CONSERVATION ENGINEERING DIVISION
GROUNDFISH ASSESSMENT PROGRAM



NOAA
FISHERIES



Changes in Distribution-Arctic Cod



NEBS Biomass (Estimate of Total Weight of All Pacific Cod in the Area) in Metric Tons

34,239 mt

4,085 mt
-88%

11 mt
-100%



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RESOURCE ASSESSMENT AND CONSERVATION ENGINEERING DIVISION
GROUNDFISH ASSESSMENT PROGRAM



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First Look: 2019 Bottom Trawl Survey Results

EBS

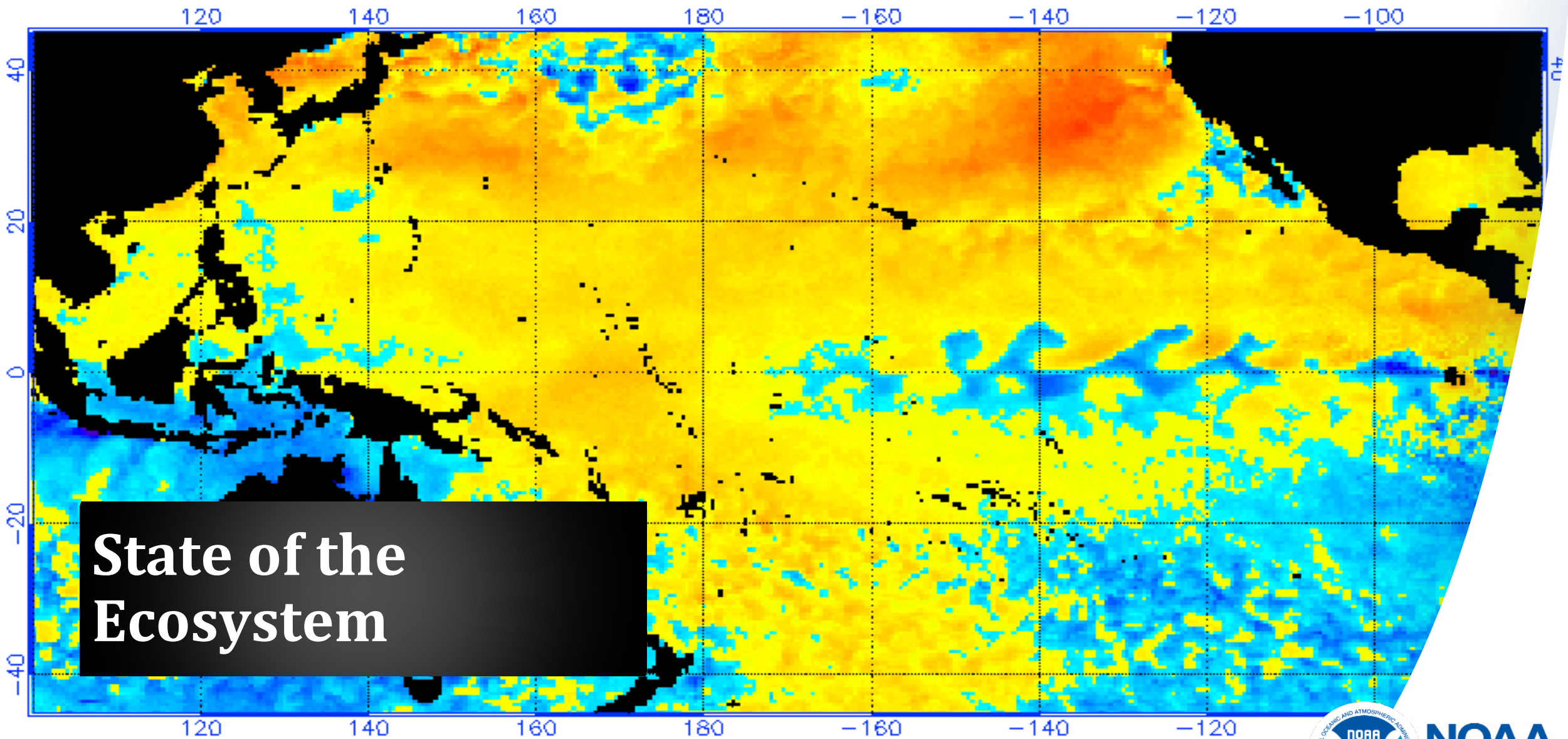
Taxon	Year	Biomass mt	Abundance x1000
Arrowtooth fl.	2018	511,192	1,086,953
	2019	578,390	1,014,099
Kamchatka fl.	2018	44,000	93,721
	2019	44,870	78,749
Greenland turbot	2018	18,017	7,361
	2019	16,053	5,101
Pacifichalibut	2018	125,957	50,502
	2019	113,855	74,459
Flathead sole	2018	492,623	2,329,667
	2019	611,483	2,217,216
Bering fl.	2018	12,995	61,152
	2019	8,269	35,805
Alaska plaice	2018	419,509	569,754
	2019	368,787	499,174
Alaska skate	2018	545,994	126,778
	2019	491,109	102,980
Arctic cod	2018	-	-
	2019	2	31
Saffron cod	2018	295	10,395
	2019	1,370	13,931

NBS

Year	Biomass mt	Abundance x1000
2017	-	-
2019	1,443	1,425
2017	91	86
2019	61	84
2017	58	93
2019	424	220
2017	18,115	5,064
2019	25,814	7,914
2017	76	166
2019	463	2,407
2017	20,782	241,155
2019	18,573	122,547
2017	324,264	496,025
2019	322,565	535,232
2017	81,295	17,803
2019	95,466	22,541
2017	4,140	133,418
2019	47	1,610
2017	76,341	1,442,498
2019	82,408	1,301,086



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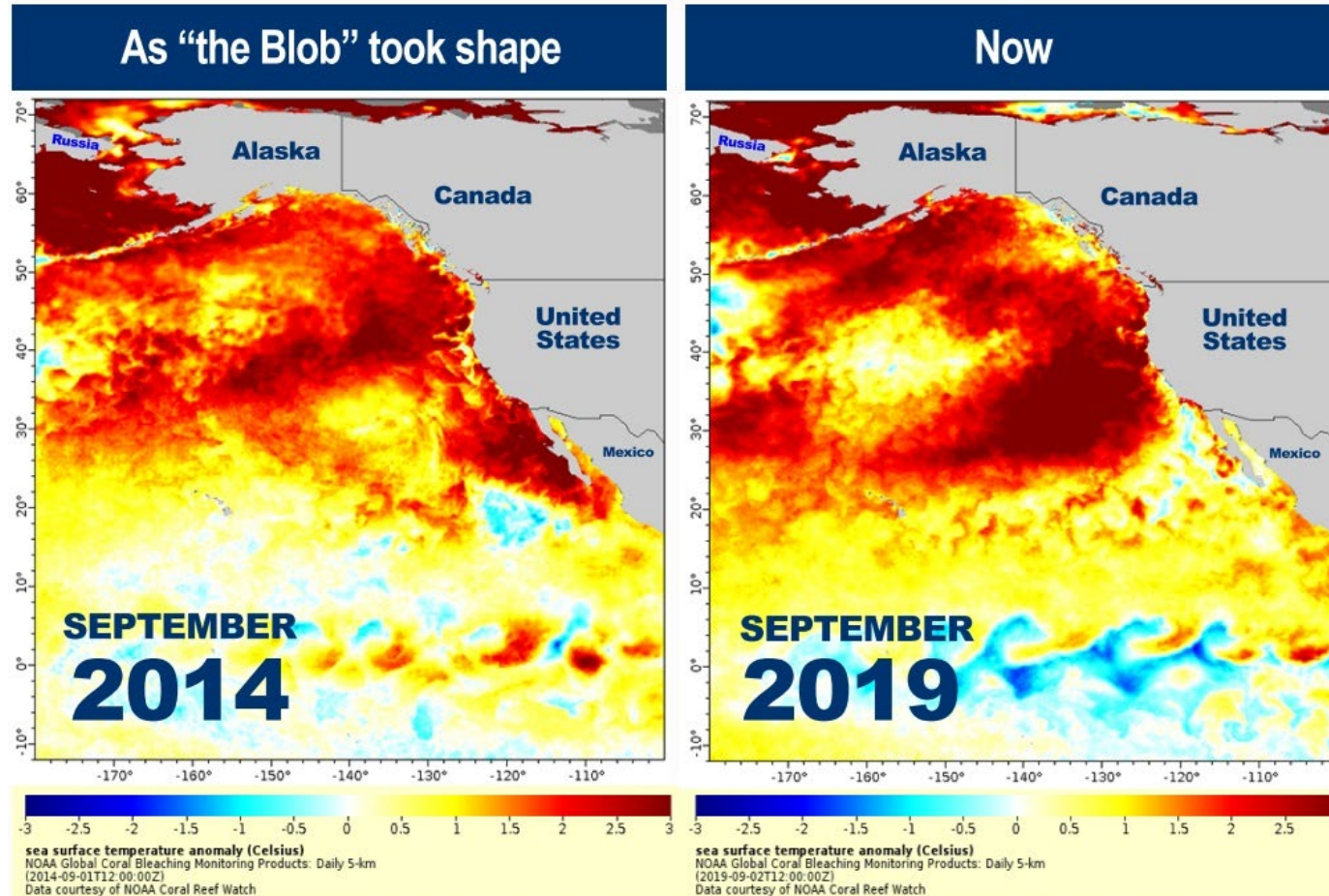


State of the Ecosystem



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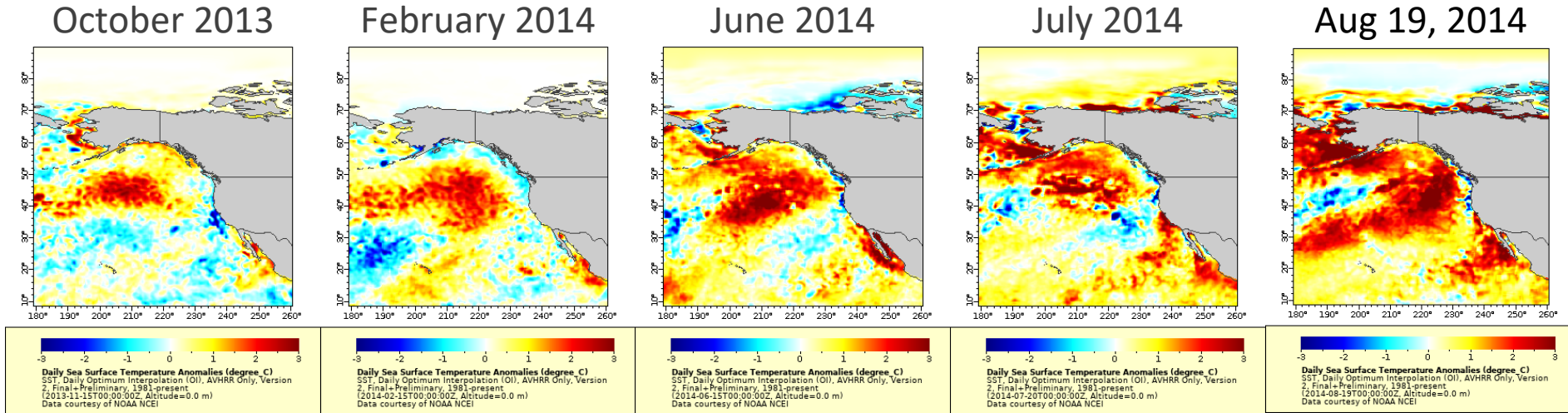
A New Marine Heatwave



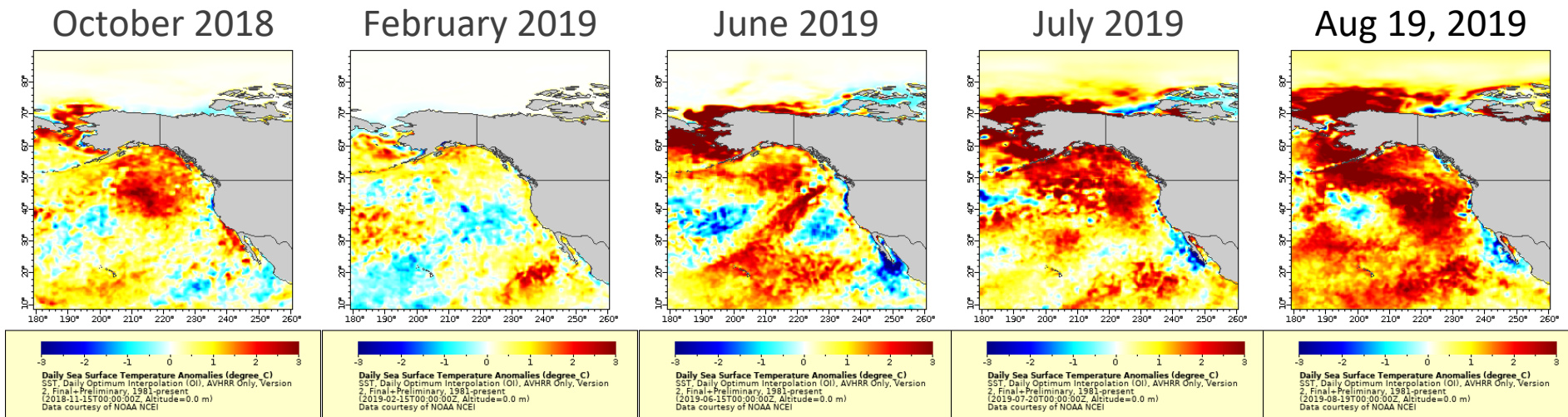
The northeast Pacific has been experiencing a new marine heatwave since mid-June 2019, with similarities to "The Blob" of 2013-2016.

Currently, this marine heatwave ranks as the second largest on record for the area.

The Blob

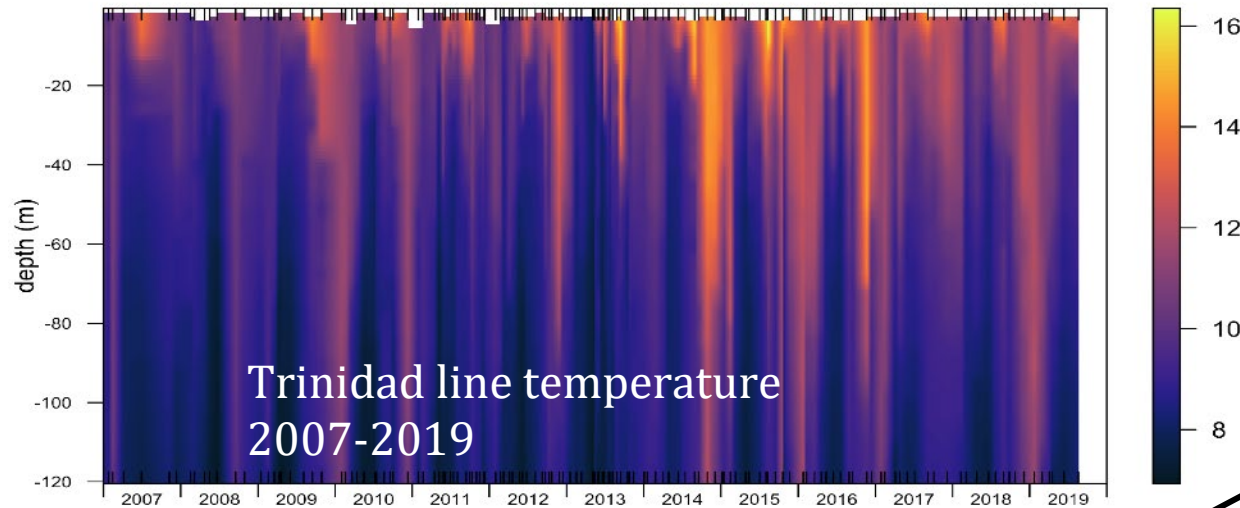


Current MHW

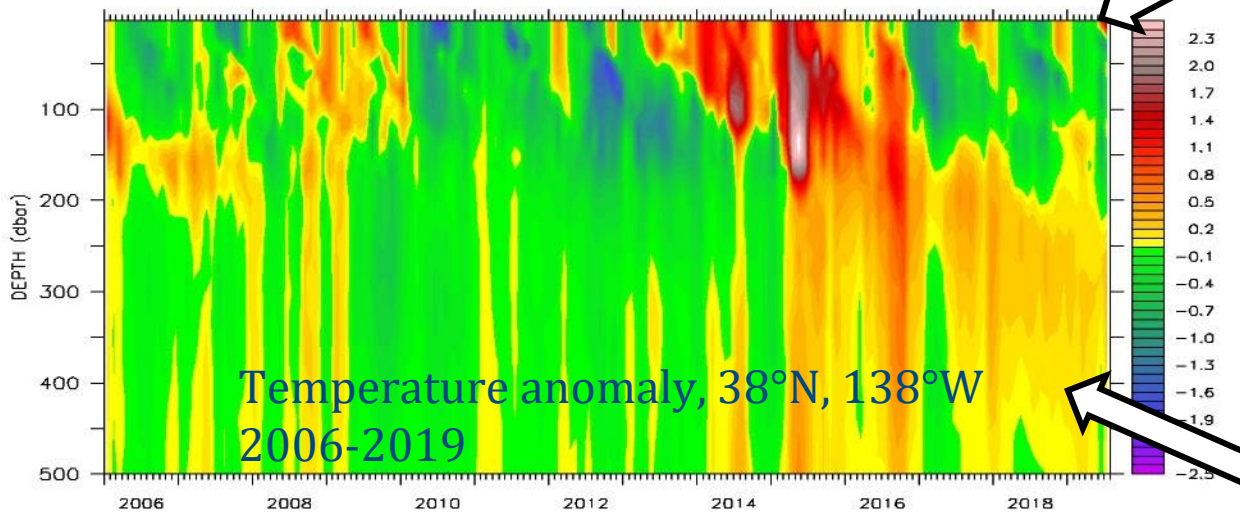


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Water temperature at depth



MHW (heat still at surface)



Residual heat at depth from the
Blob/El Niño



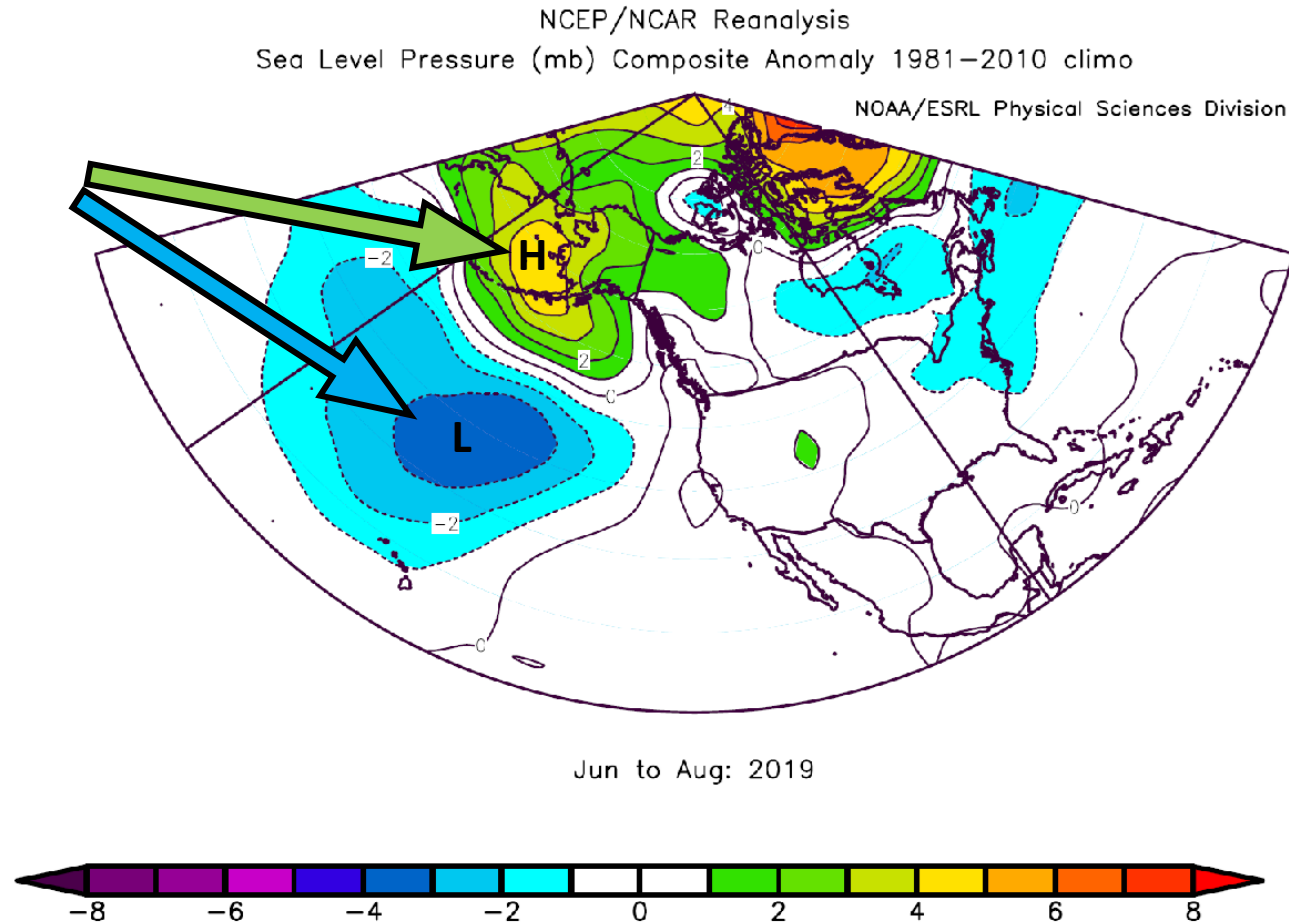
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FISHERIES

What's causing these conditions?

Persistent high pressure over Gulf of Alaska and low pressure in Northeast Pacific in summer of 2019.

This combination has reduced winds over last several months that would otherwise extract heat and mix the surface waters with cooler waters below.

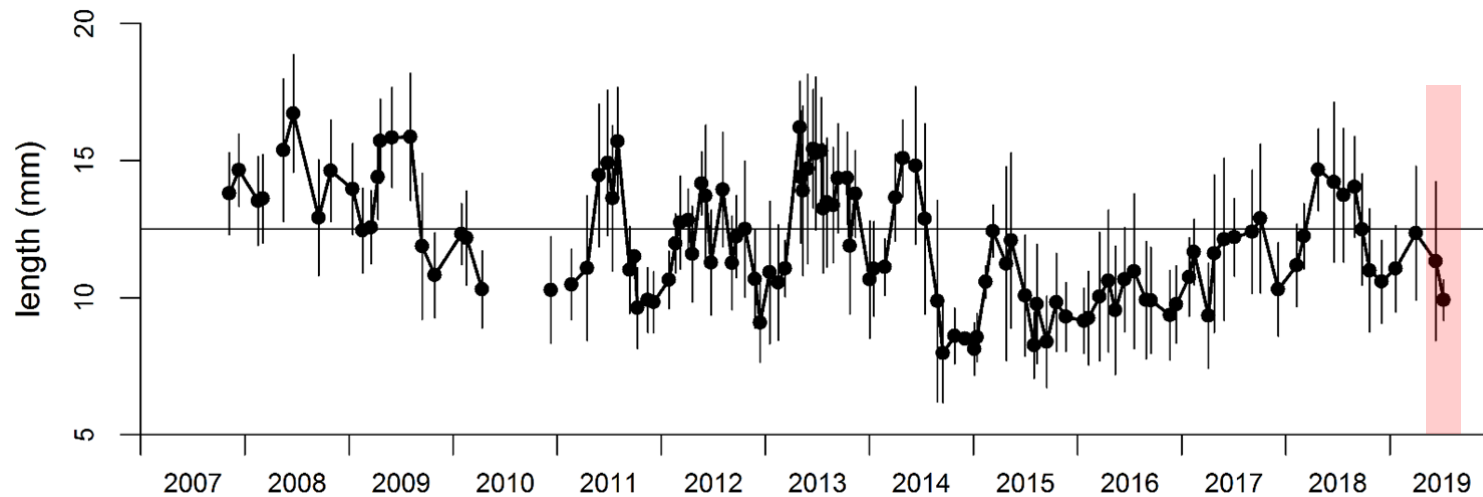
Consequence: rapid warming of surface waters in NE Pacific.



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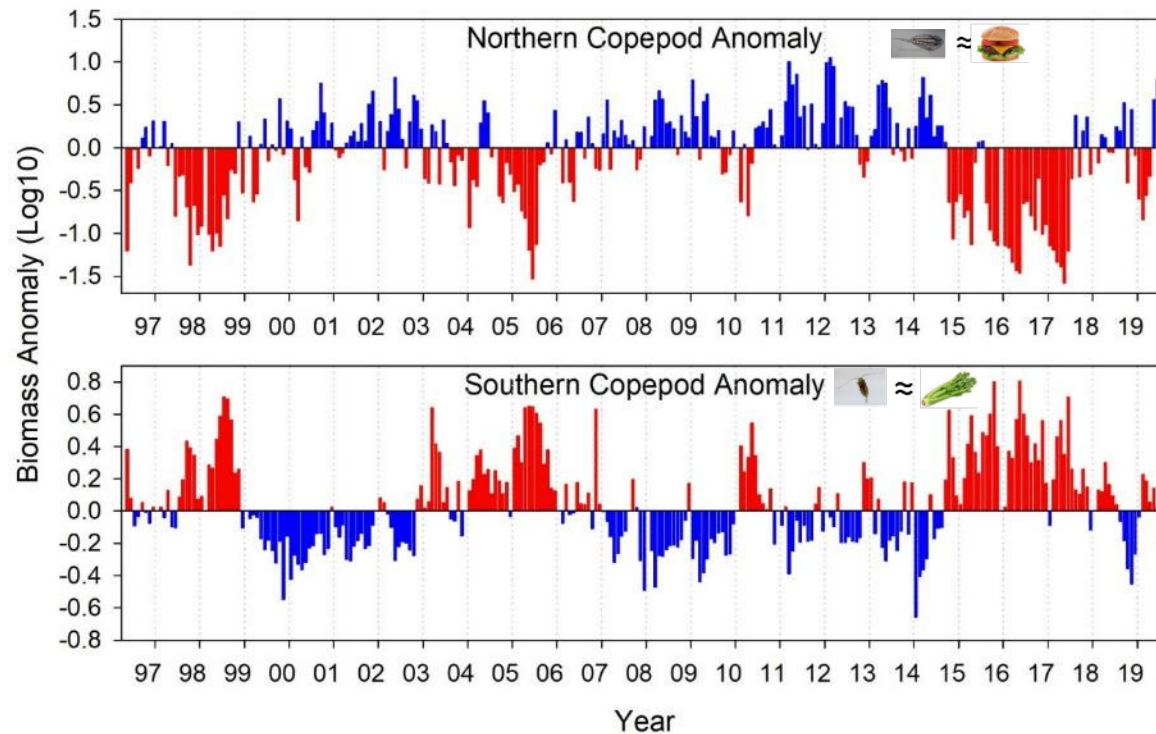
How is the ecosystem responding?

- Albacore are much closer to shore in northern California Current.
- Harmful algal blooms have recently closed shellfish fishing on Washington outer coast.
- Krill off Trinidad Head, CA are smaller than normal (although that is also related to unusually warm coastal conditions last winter).



How is the ecosystem responding? (continued)

- Cool-water, lipid-rich northern copepods (“cheeseburger” copepods) still dominate off of Newport, OR, where water temperature remains normal for now.



Copepod taxa collected 5 nautical miles off Newport have positive biomass anomaly for the northern, cold water, lipid-rich species and negative anomaly for southern species through August 25, 2019



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How is the ecosystem responding? (continued)

Salmon returns this year most likely influenced by conditions prior to 2019 MHW (though ocean fisheries have likely been influenced by this year's warmth).



Bottom Line: It's too early to assign cause-and-effect impacts to the MHW at this point, but its size, intensity and proximity are concerning.



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What's next?

NOAA and partners will continue to closely monitor conditions.

- Physical conditions and characteristics of MHW
- Physics, chemistry and plankton off Newport every 2 weeks
- Physics, chemistry and plankton off Trinidad Head every 4 weeks
- Overwinter growth and survival of CA sea lion pups at San Miguel Island
- Partners in states will monitor domoic acid and other HAB-related indicators
- Coastwide network of partners will monitor bird strandings on beaches

Some key questions to answer in the upcoming months:

- Will pressure patterns change and break up the MHW before it has major impacts?
- Will the MHW come ashore when upwelling subsides in the fall?
- Will major HABs occur in the spring when upwelling resumes?

We will provide further updates to the PFMC in November, in the IEA report in March 2020, through NOAA websites, and as needed.



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Southwest Fisheries Science Center



West Coast Small Pelagics Survey - Summer 2019

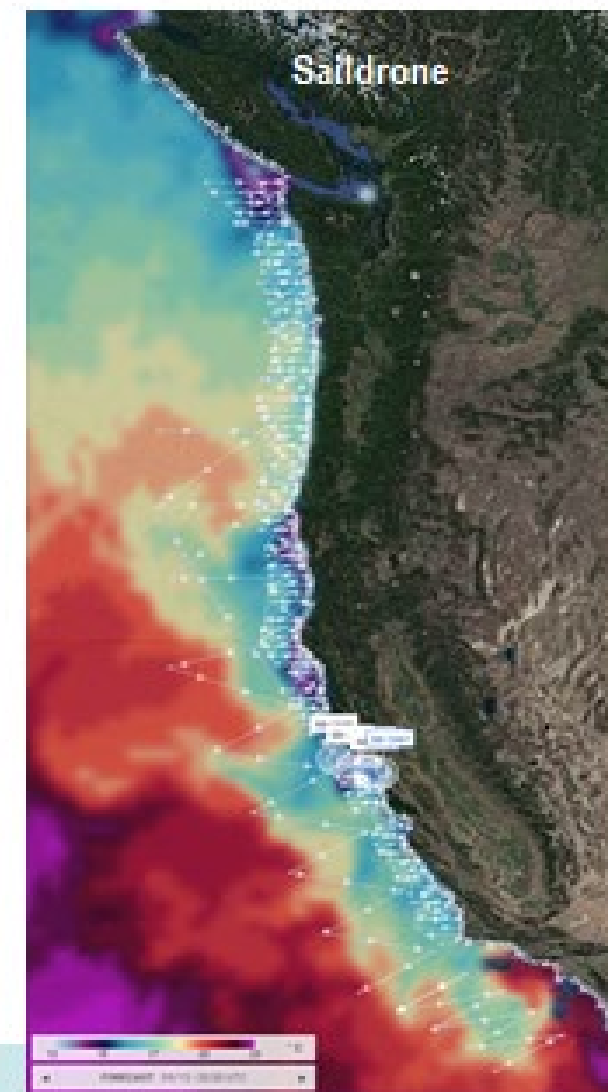
Summer 2019 California Current Ecosystem Survey Plan

LASKER



Saildrone

- *Lasker* - West Coast, VI to San Diego, adaptive (red)
- *Saildrone* - Nearshore and replicate *Shimada*, WA to Pt. Conception; Offshore, central OR to San Diego



West Coast Small Pelagics Survey - Summer 2019

Summer 2019 California Current Ecosystem Survey Accomplishments

LASKER



W COAST

LISA MARIE

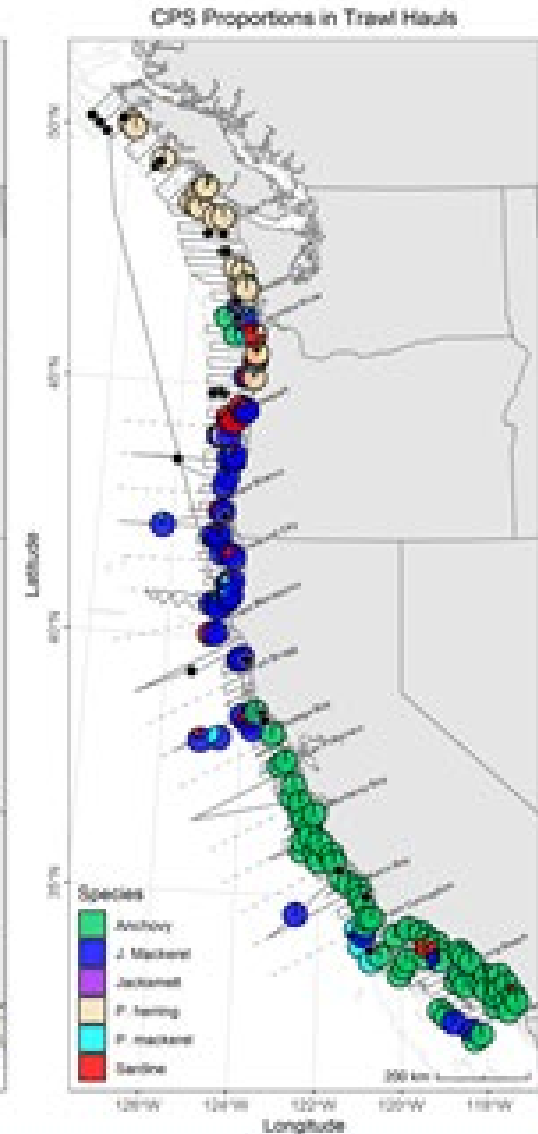
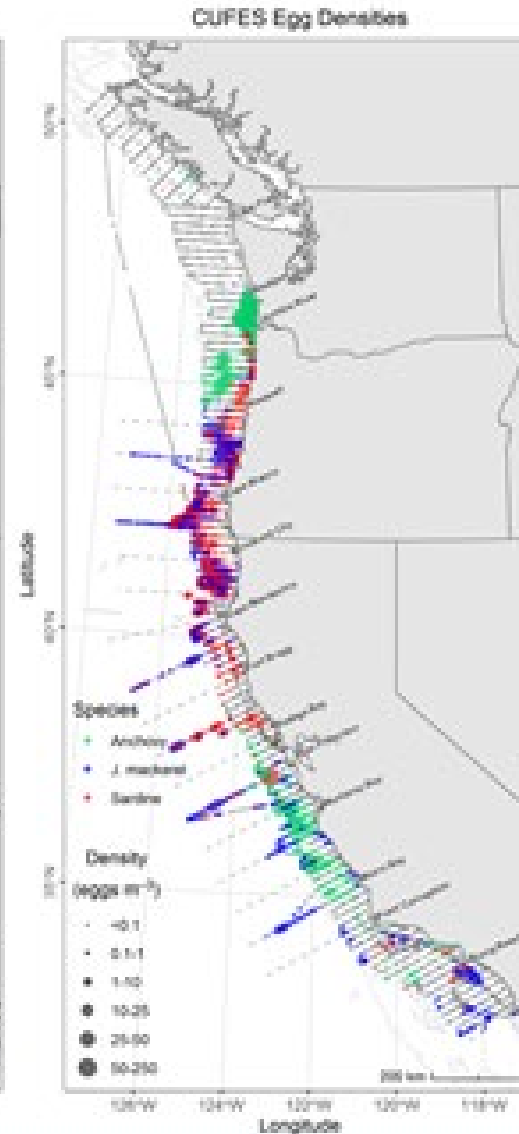
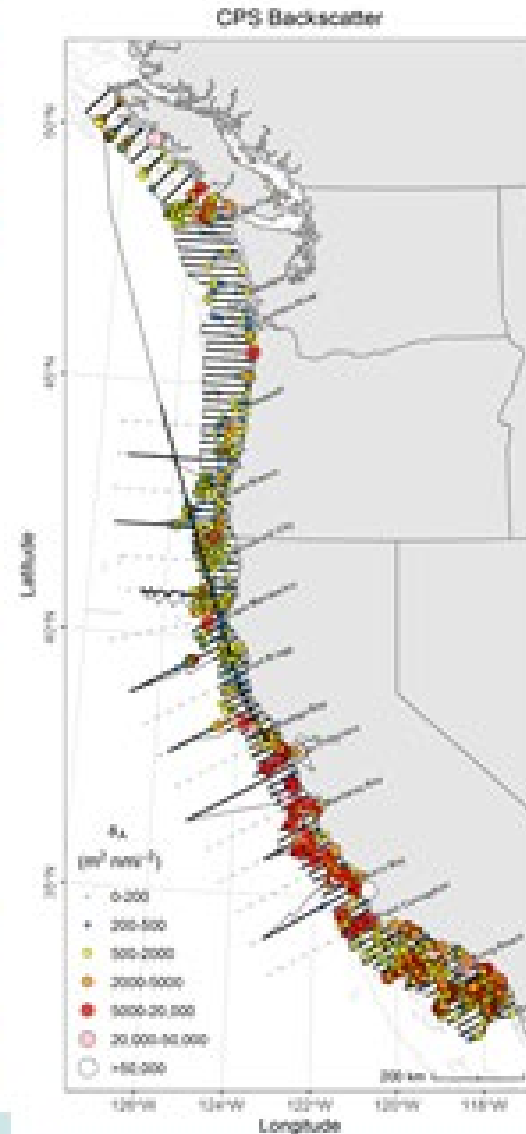


OR & WA

LB CARNAGE



So CA Bight



West Coast HMS Data and PSMFC

- HMS data management and reporting efforts at SWFSC and WCR now rely on landings data from PacFIN and additional data sets that are more difficult access from outside the PacFIN warehouse (coast guard, national permit system, state vessel reg. date, etc.)
- PSMFC has database administration, programming, and other resources that they are willing to provide to HMS data managers. This results in a far more cost effective approach than traditional, isolated data management business practices that have been the norm in agency offices.
- Data integration efforts have led to improved communication and sharing of resources between west coast offices. This has in turn led to improved data accessibility and data products



Increased Collaboration

- The increased collaboration between west coast regional offices, PSFMC, and state partners led to the development of national HMS Professional Specialty Group sponsored by Fisheries Information System at NOAA Fisheries Headquarters. This in turn led to the creation of an Eastern Pacific subgroup (EP PSG) that focuses on west coast HMS data issues

VISION

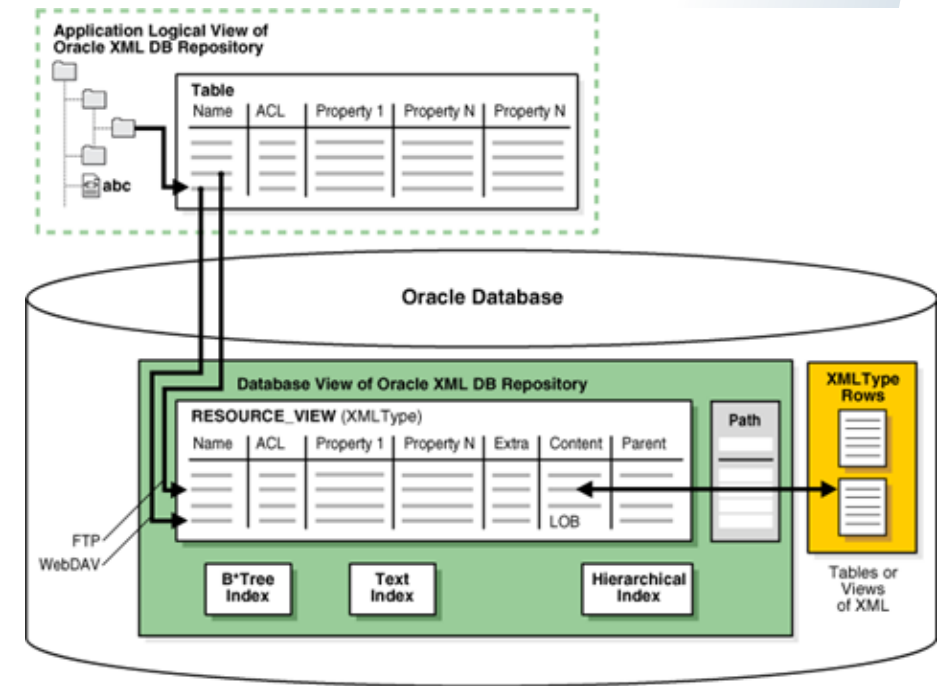
Continuously improve the provision of holistic fishery information management services to customers and stakeholders, from data collection, through integration, to reporting services.



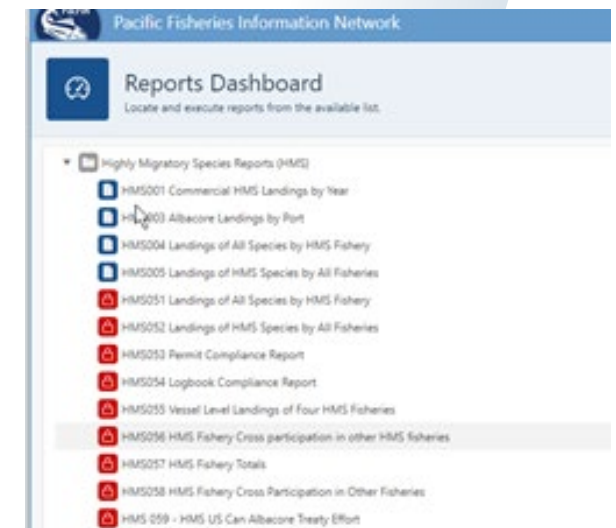
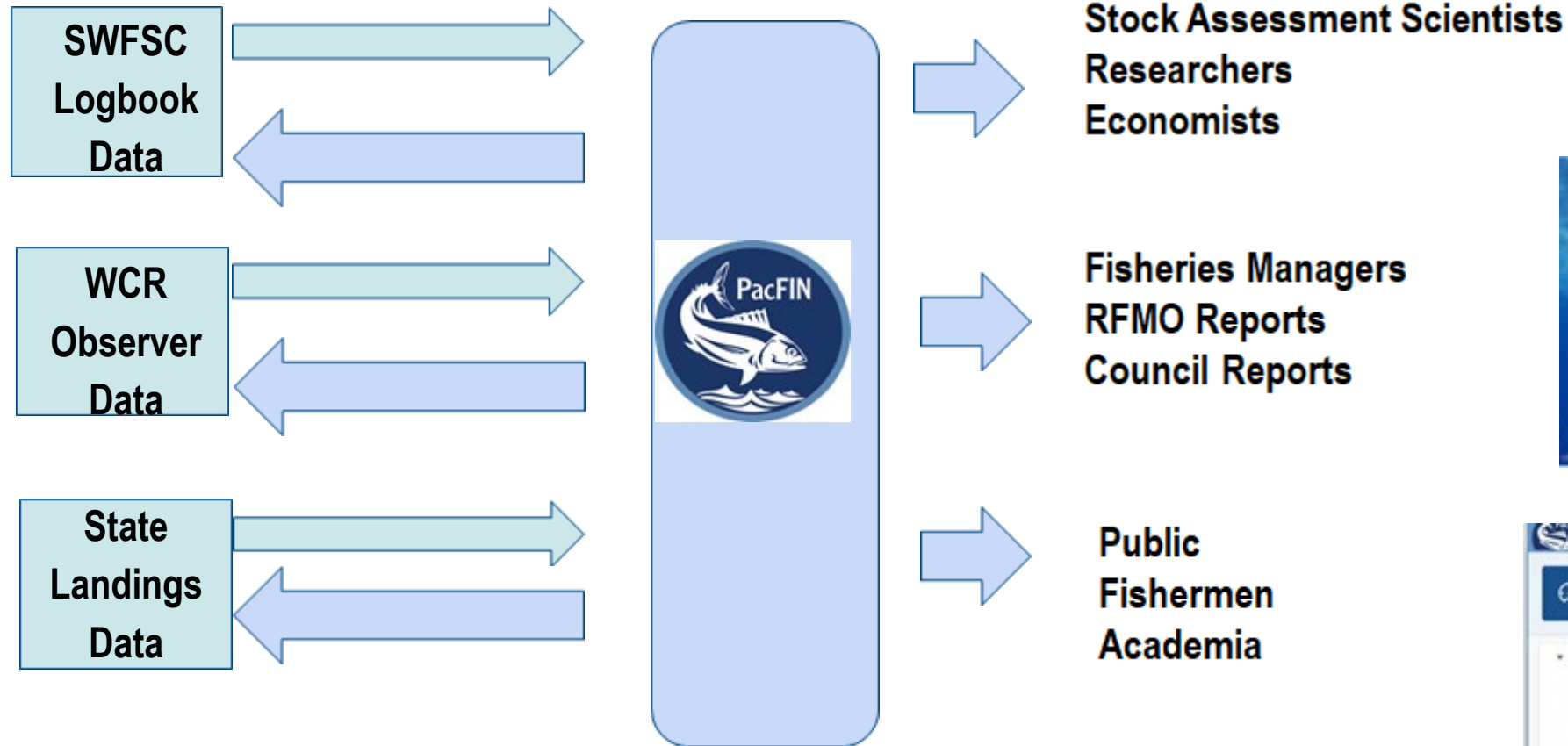
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Current HMS Projects

- Ongoing development of an HMS database for HMS fisheries vessel, logbook, landings, and size sampling information with associated web applications and summary reporting procedures
- Comparison of VMS data tracks with logbook and observer data. Identifying key vessel movements that indicate fishing effort.
- Integration of multiple data sets: Permits (federal and state), Coast Guard vessel attributes information, observer, biological data, landings, etc.
- Automated, standard federal and international reporting that follow standard business rules.
- Direct access for end users to views that combine historical data with current data



Integration to Dissemination



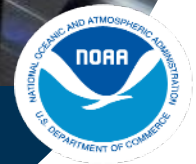
Northwest Fisheries Science Center

'Omics Strategic Initiative
Saildrone
Data



NOAA
FISHERIES

NMFS Genomics Strategic Initiative: Overview & FY19 Update



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'Omics Strategic Initiative Overview and FY 19 Update

NMFS Strategic Initiative looking at:

1. eDNA
2. Population genomics
3. Metagenomics
4. Bioinformatics

Cross-NOAA interdisciplinary team established by the NOAA Research Council working on:

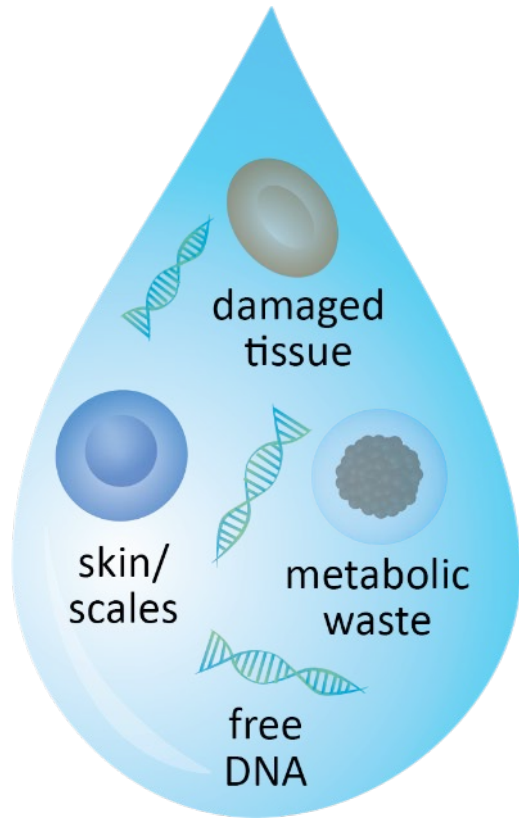
- Analyze NOAA's 'Omics portfolio.
- Create a "roadmap".
 - Identify priorities
 - Foster integration and communication
 - Formulate solutions to implementation challenges



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1. Environmental DNA and stock assessment

How do metrics from eDNA correlate to traditional measures of species abundance?



- FY19: hake & 2nd year of Skagit chinook (NWFSC), coastal pelagic species (SWFSC), ECOMON plankton and groundfish surveys (NEFSC)
- Sharing & coordination on sampling protocols, laboratory assays, evaluating traditional vs. eDNA approaches
- Exploring autonomous sampling devices for eDNA



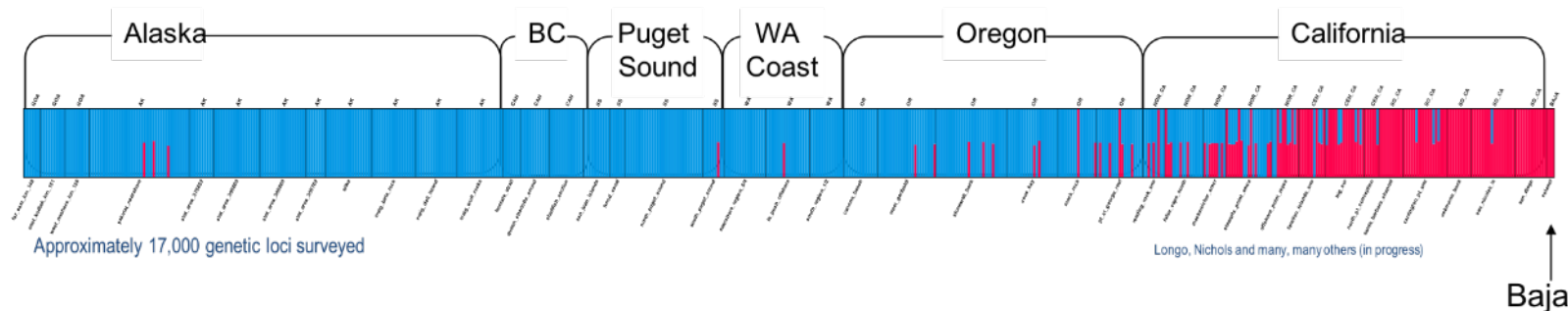
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2. Population genomics of marine species for stock assessment

Is there genetic stock structure in assessed marine species?

Leverages ongoing projects and efforts of Science Centers to evaluate population boundaries relative to assessment boundaries:

- Population genetics
- Cryptic species boundaries
- Introgression & hybridization



Key Finding:

Lingcod along the US West Coast and Alaska includes 2 unique genetic groups.

3. Metagenomics

Identifying diets and trophic interactions in marine species

Leverages ongoing projects and efforts of Science Centers to evaluate diets of protected species

- Development of reference databases for key prey taxa
- Metagenomic analysis of fecal samples from marine fish and mammals for diet analysis



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4. Bioinformatics

Improving bioinformatics capacity at Science Centers

FY19: Funding of a shared High Performance Computing Cluster to be maintained and housed at the NWFSC; basic bioinformatics training across Science Centers.

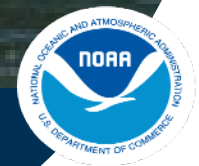
Out years: Continued development of bioinformatics workflows for eDNA, population genomics & metagenomics.

'Omics: A sharp tool to address ongoing fisheries priorities

ADVANTAGES	CHALLENGES or CAVEATS
Quicker, more efficient data collection	Determining limitations and correlates with traditional data types
LOTS more data than traditional methods	Computational burden, both in terms of hardware AND personnel
Finer grain resolution to our research questions	Piecing the results together requires integration across multiple fields
'Omic resources can be developed ad hoc	Baseline information needs development ('barcode' libraries for taxa ID, genomes)

Saildrone

2019 Summer Hake Survey Update



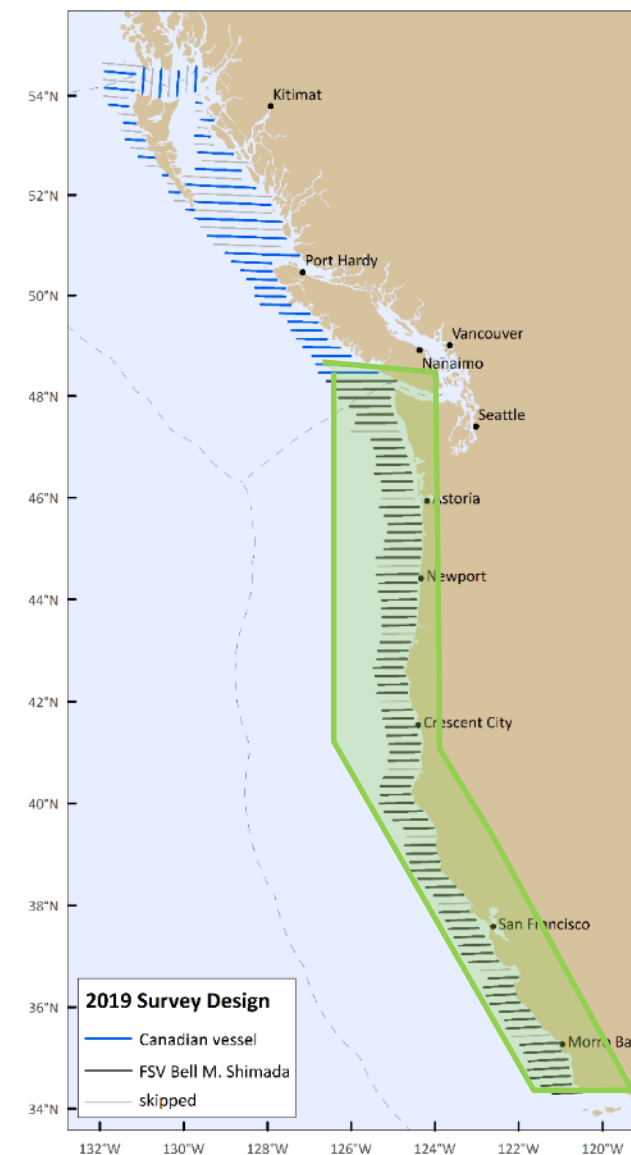
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West Coast Pacific Hake Survey

Summer 2019

Acoustic-trawl survey

- 65 days-at-sea *RV Shimada* (13 June-20 Aug)
- 35 days-at-sea *FV Nordic Pearl* (17 Aug-18 Sept)
- Acoustics (5-frequencies)
- Directed trawling for validation, samples
- Sailable tracking *RV Shimada* in U.S. waters
- 50 to 1500 m depth or 35 nmi offshore
- 10 nmi spacing, some 20 nmi due to time



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West Coast Pacific Hake Survey

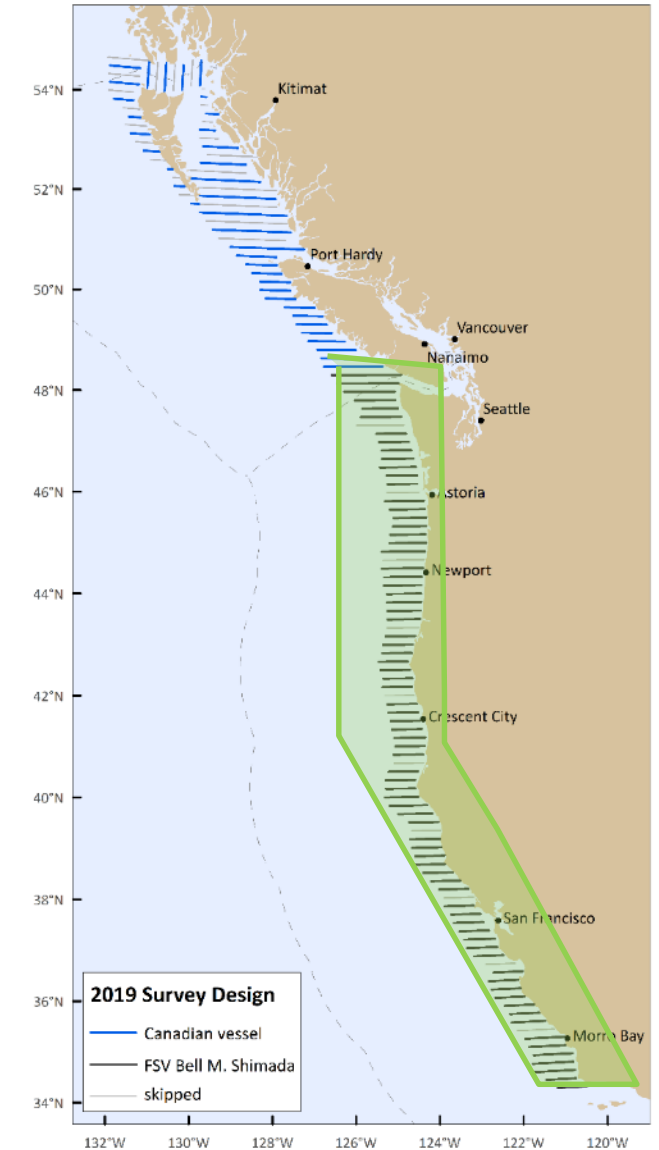
Summer 2019

Saildrone survey objective

- Close coherence (space/time) with *Shimada*

Saildrone mission details

- Target +/- 3-5 days offset from *Shimada*
- Four Saildrones surveying
- One or two Saildrones on each transect
- NWFSC & Saildrone coordination
- Monitor progress & issues via Mission Portal



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West Coast Pacific Hake Survey

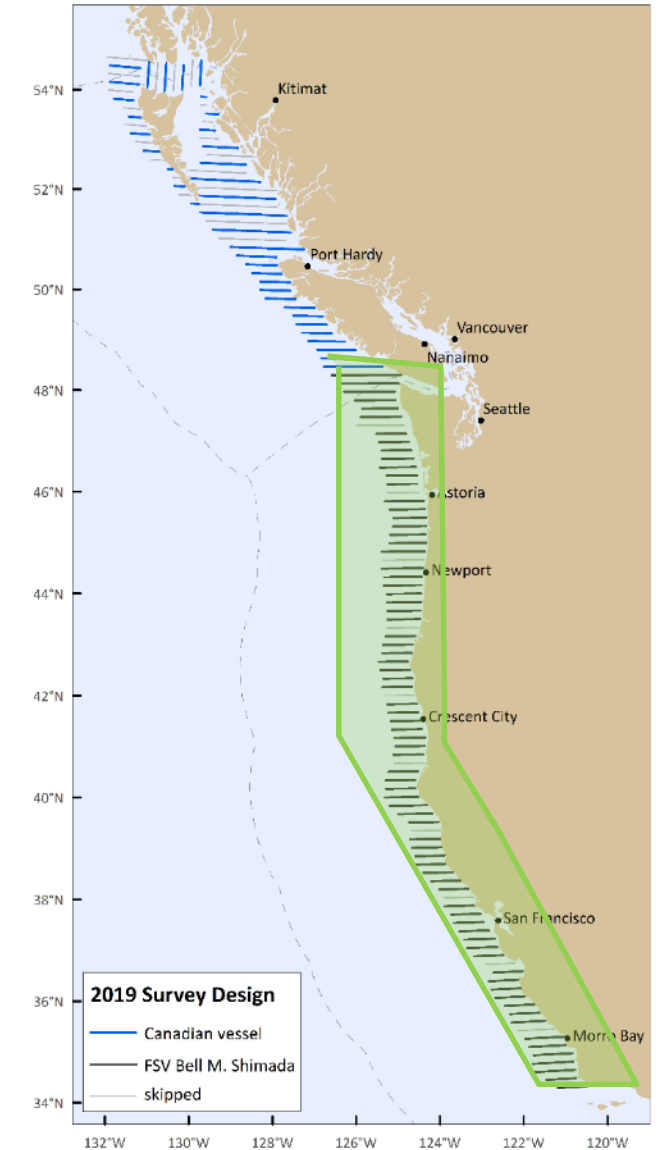
Summer 2019

Saildrone survey overview

- All transects completed
- 68% were +/- 3 days of Shimada, 84% were +/- 5 days
- Switched out 2 vehicles, in-field repairs on 2

Saildrone survey preliminary observations

- Acoustic data quality typically good
- Low winds and strong current = slow/no progress at times
- Slow progress = off-transect regions, messy data
- Mission Portal effective communication tool



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West Coast Pacific Hake Survey

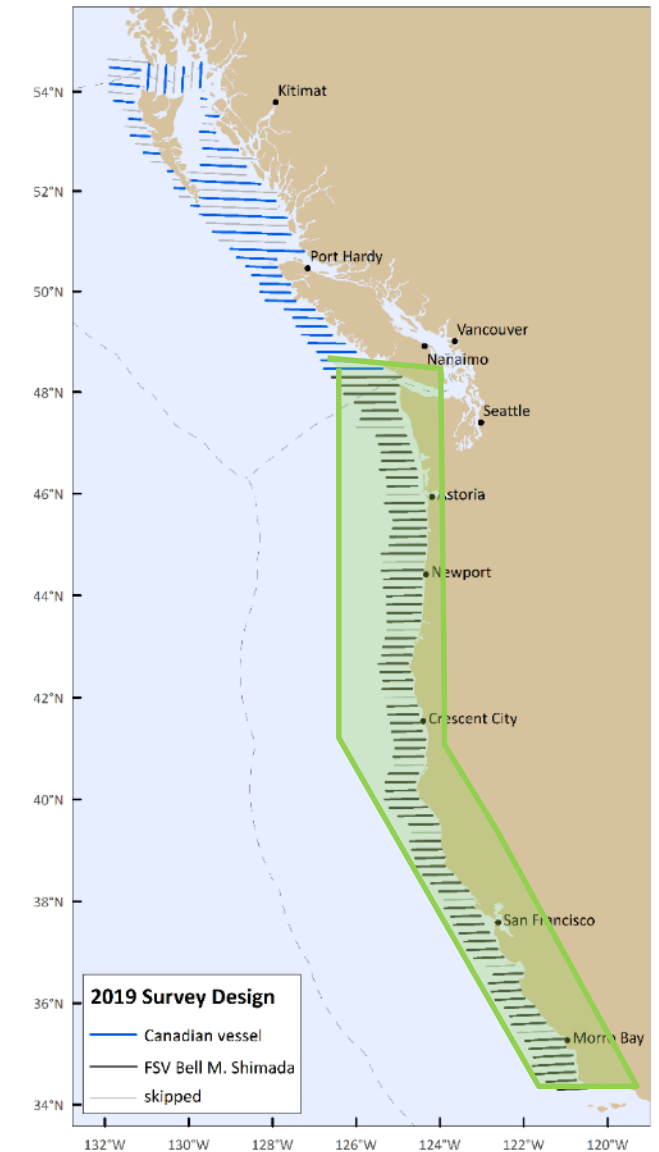
Summer 2019

2019 Saildrone overall goals

- Comparison with validated FSV survey results
- Evaluation of utility for survey & assessment needs

Analytic considerations

- Saildrones: 2 acoustic frequencies, Shimada: 5
- Hake biomass estimate and assessment are age-based
- Saildrones can't trawl, no validation or biological data
- Commercial or non-target surveys for validation or biological data?



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Data

One Touch Reporting

Boatnet

Cloud Services

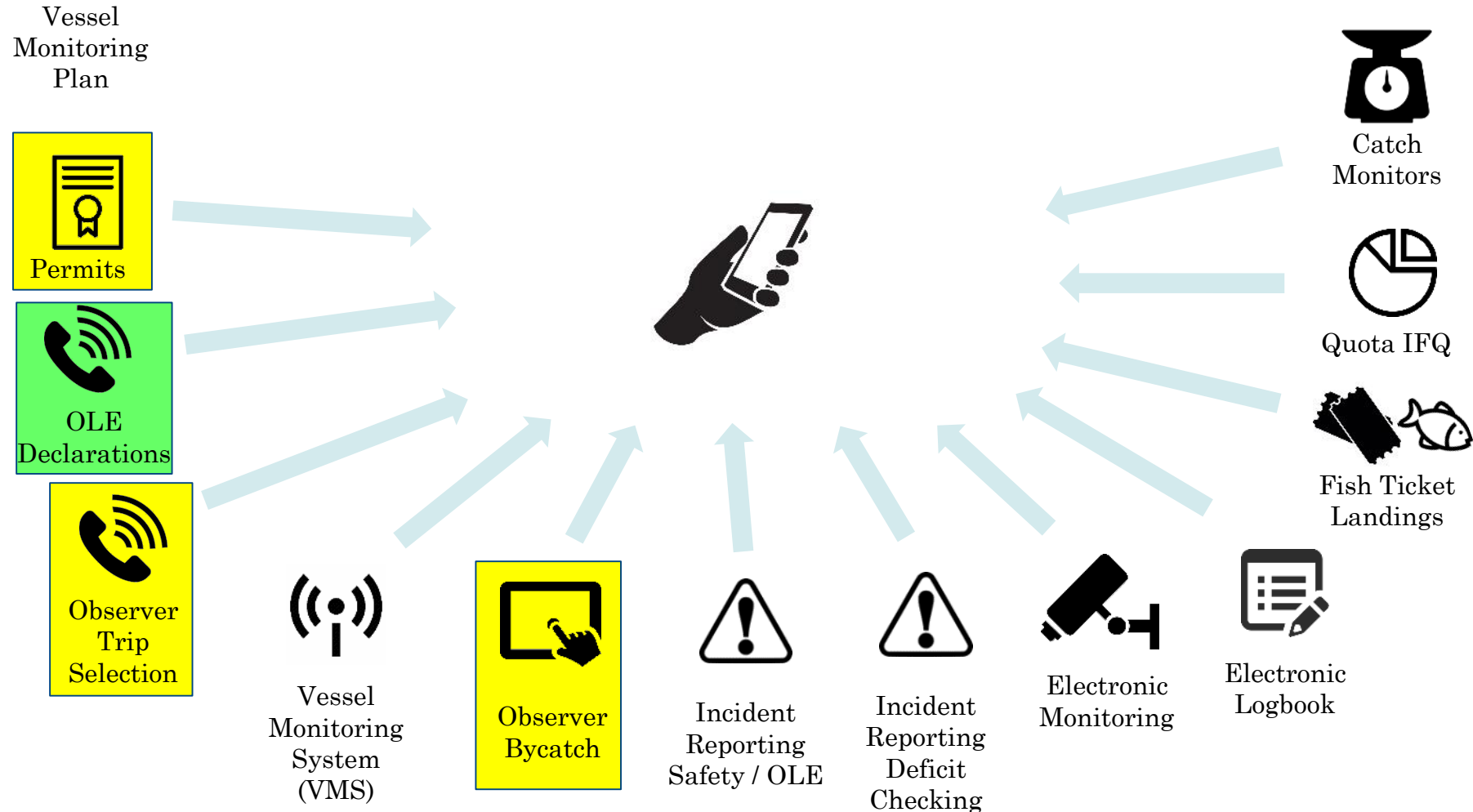
Whale Entanglement



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One Touch Reporting

Streamline these systems for captains



Next Steps

Stakeholder Info Gathering

Who – Feds, States, PSMFC, Captains

What – Data Stream Details

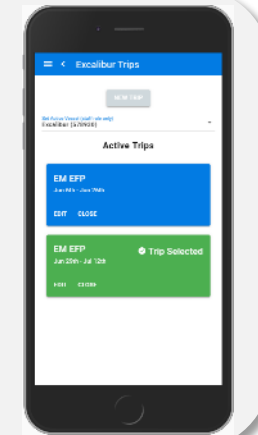
How – 2+ stakeholder mtgs + interviews

Where – Seattle + TBD

When – Sep 10-11 + Later

Technical Enhancements

Observer Trip
Selection (OTS)



Permits Data
Integration

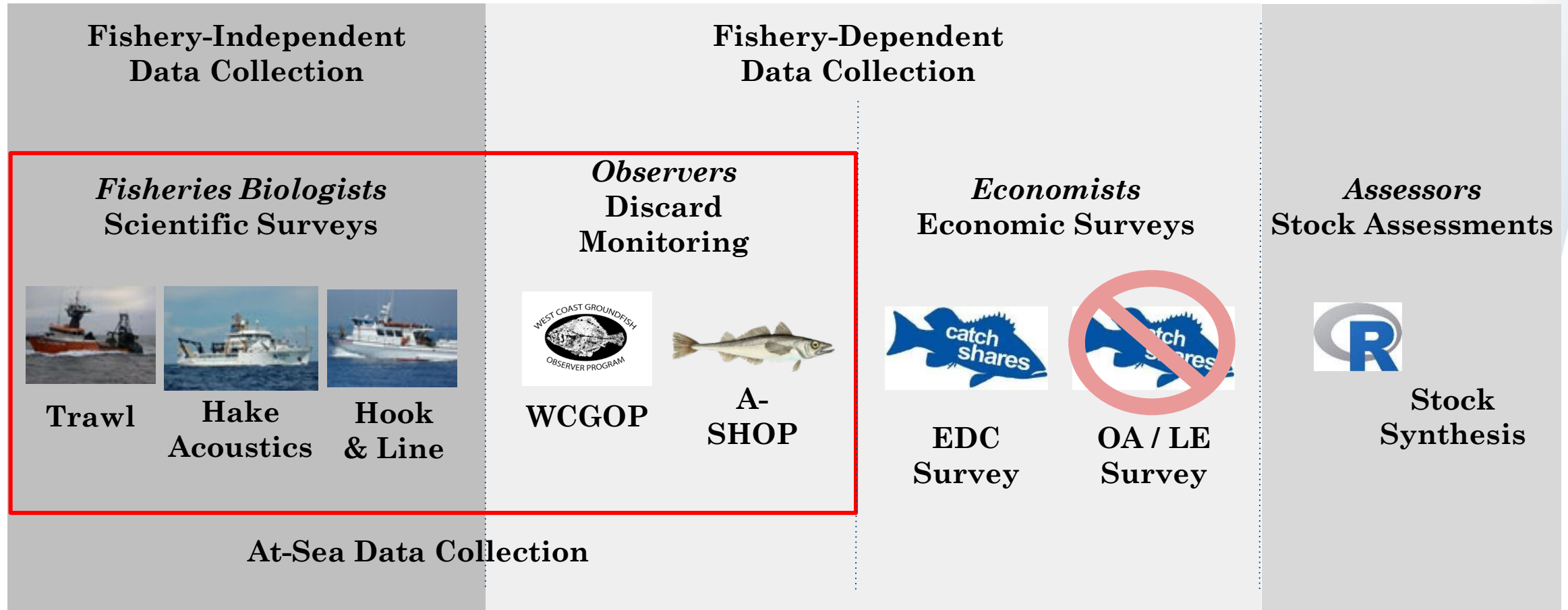
OLE Declarations



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Boatnet

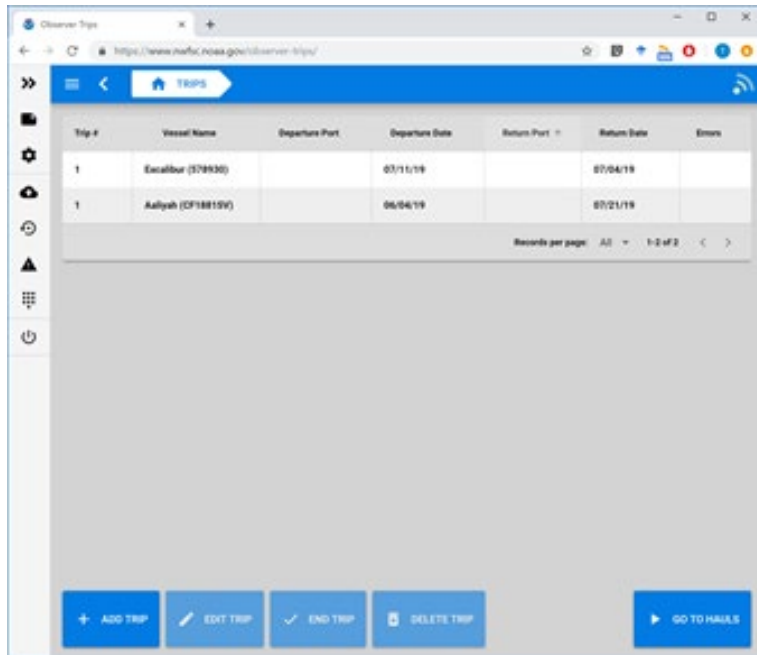
An integrated fisheries dependent and independent field data collection capability



Boatnet

Solution

Progressive Web Applications (PWA) that support offline first web and mobile clients with a robust data replication capability.



The screenshot shows a web browser displaying the 'Observer Trip' application. The URL is <https://www.noaa.gov/observer-trips/>. The interface features a table with columns: Trip #, Vessel Name, Departure Port, Departure Date, Return Port, Return Date, and Errors. Two trips are listed: Trip 1 on the vessel 'Escalibur (579930)' with a departure date of 07/11/19, and Trip 1 on the vessel 'Auliyah (CF188150)' with a departure date of 06/04/19. Below the table, there are buttons for '+ ADD TRIP', 'EDIT TRIP', 'END TRIP', 'DELETE TRIP', and 'GO TO HAULS'.

Trip #	Vessel Name	Departure Port	Departure Date	Return Port	Return Date	Errors
1	Escalibur (579930)		07/11/19		07/04/19	
1	Auliyah (CF188150)		06/04/19		07/21/19	



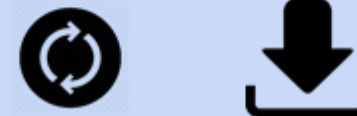
Software works online/offline



Common Technology Stack
Field + At-Center



**Common Surveys +
Observers Software**



Auto Data Sync + Update SW



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Cloud Services

Amazon Web Services Migration

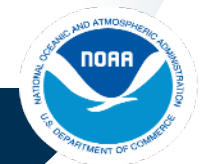
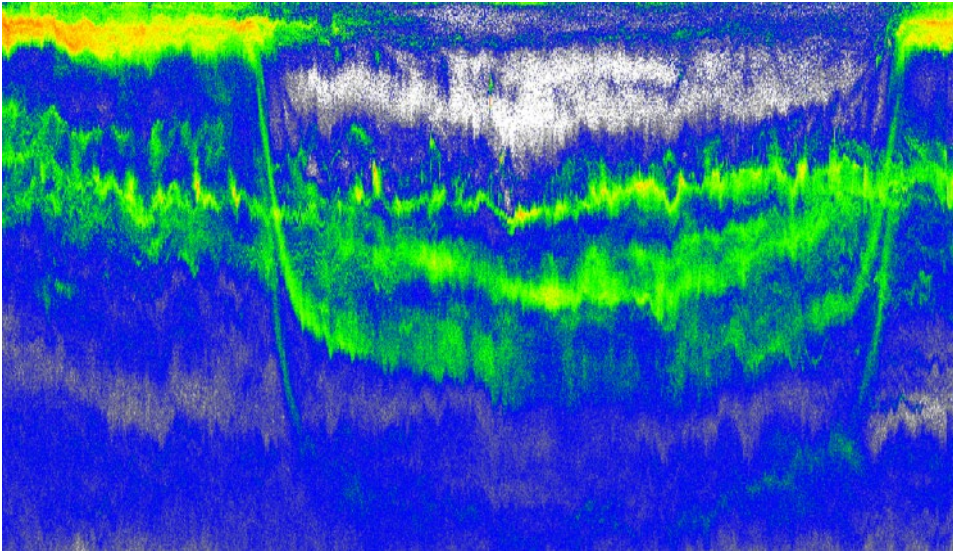
Service Level Agreement signed between NOAA and the Northwest Fisheries Science Center on July 12, 2019 for Amazon Web Services (AWS) access.

Virtual Private Cloud network connection established on August 16, 2019.



Candidate efforts for the Cloud

- Boatnet – Field to Center data synchronization
- Acoustics Data Processing
- Stock Synthesis
- Geospatial Data Processing



NOAA
FISHERIES

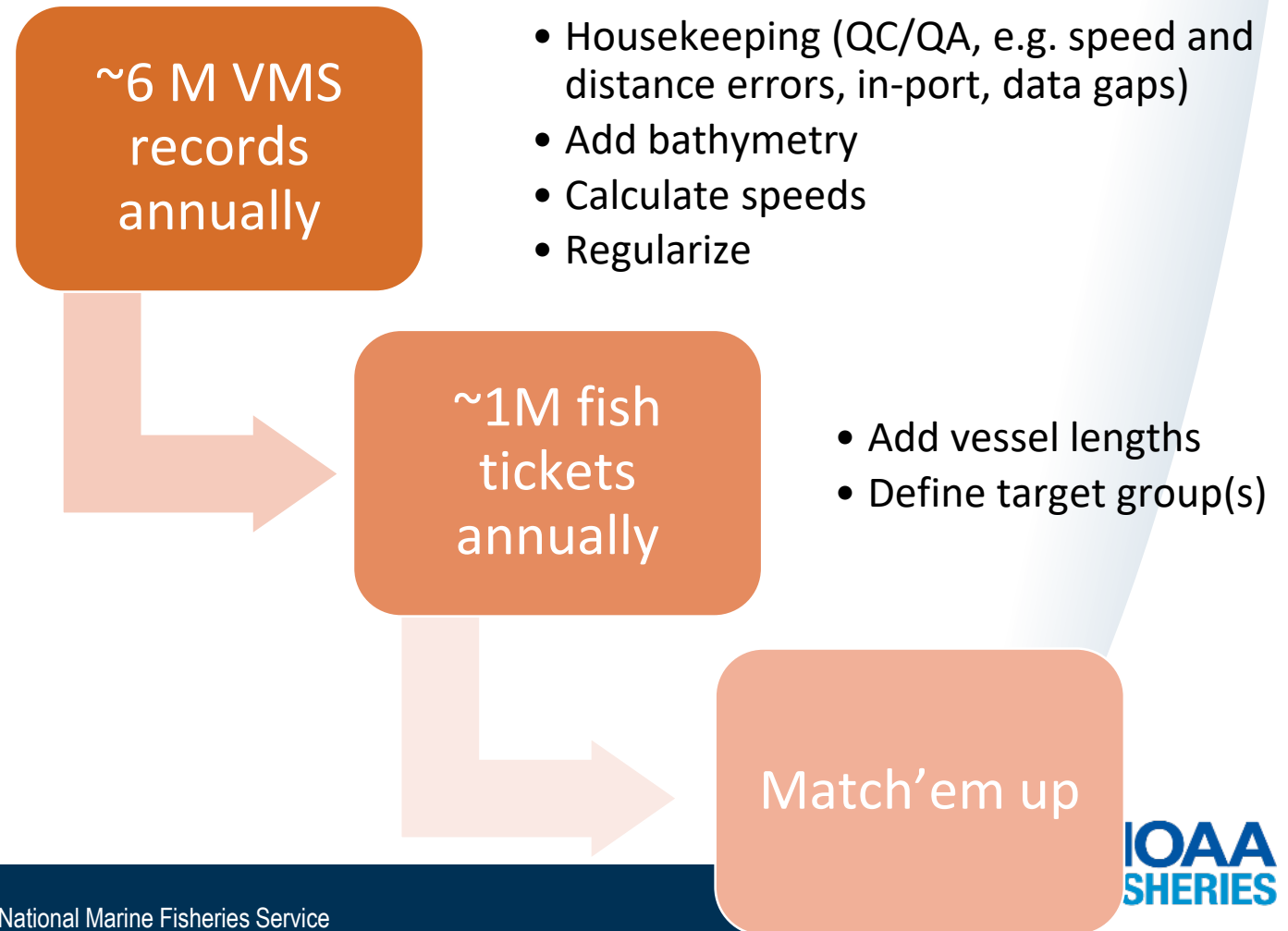
Data sharing between N/SWFSCs and the States

- NMFS relies on the DFWs for information about fisheries, fishing dynamics, fleets, and fishing communities
- PacFIN is a directly accessible and highly functional database in which much of these data are stored
- Huge potential, realized and yet-to-be-realized, from these data

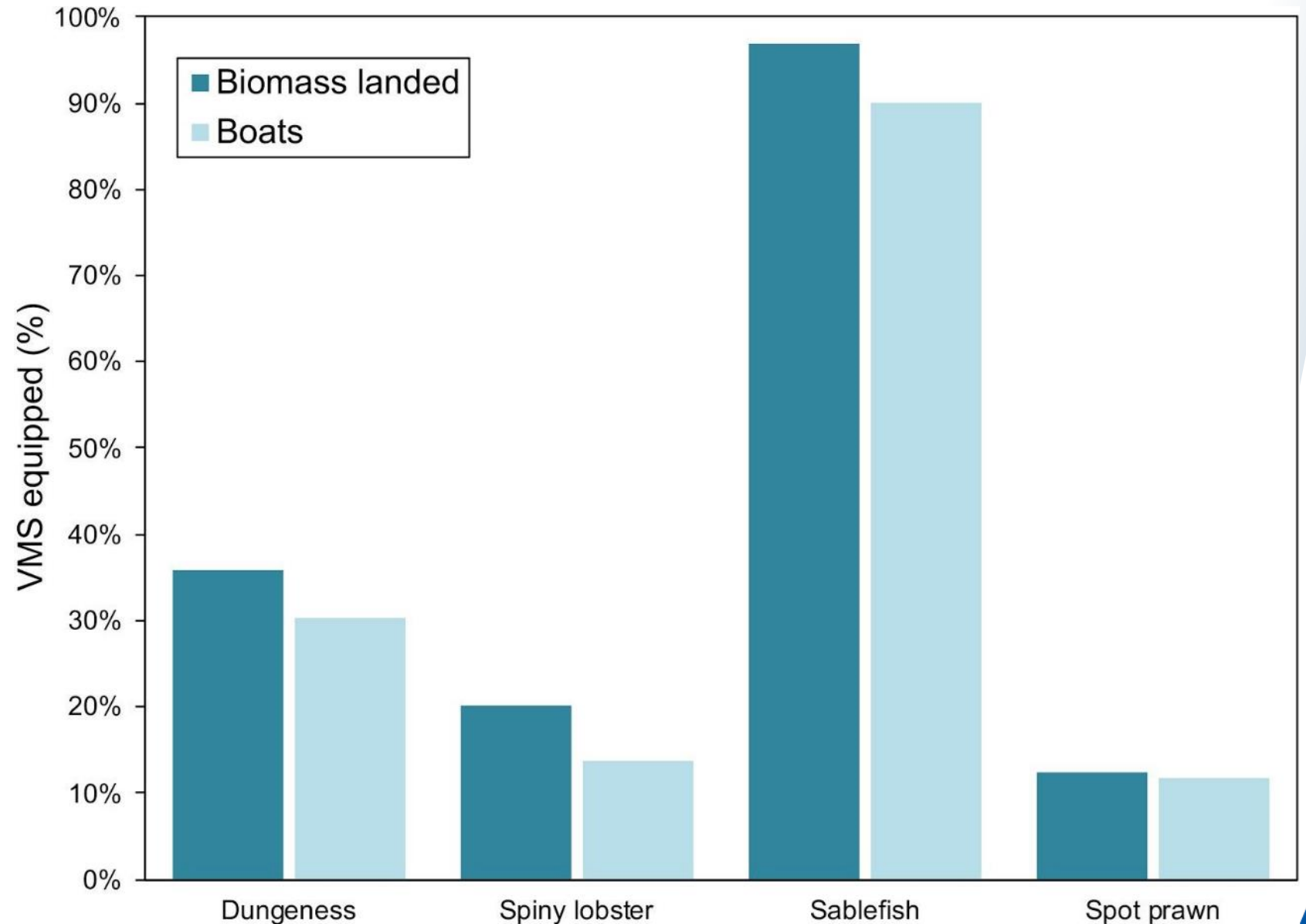


Connecting PacFIN fish ticket landing to VMS data and assigning target species

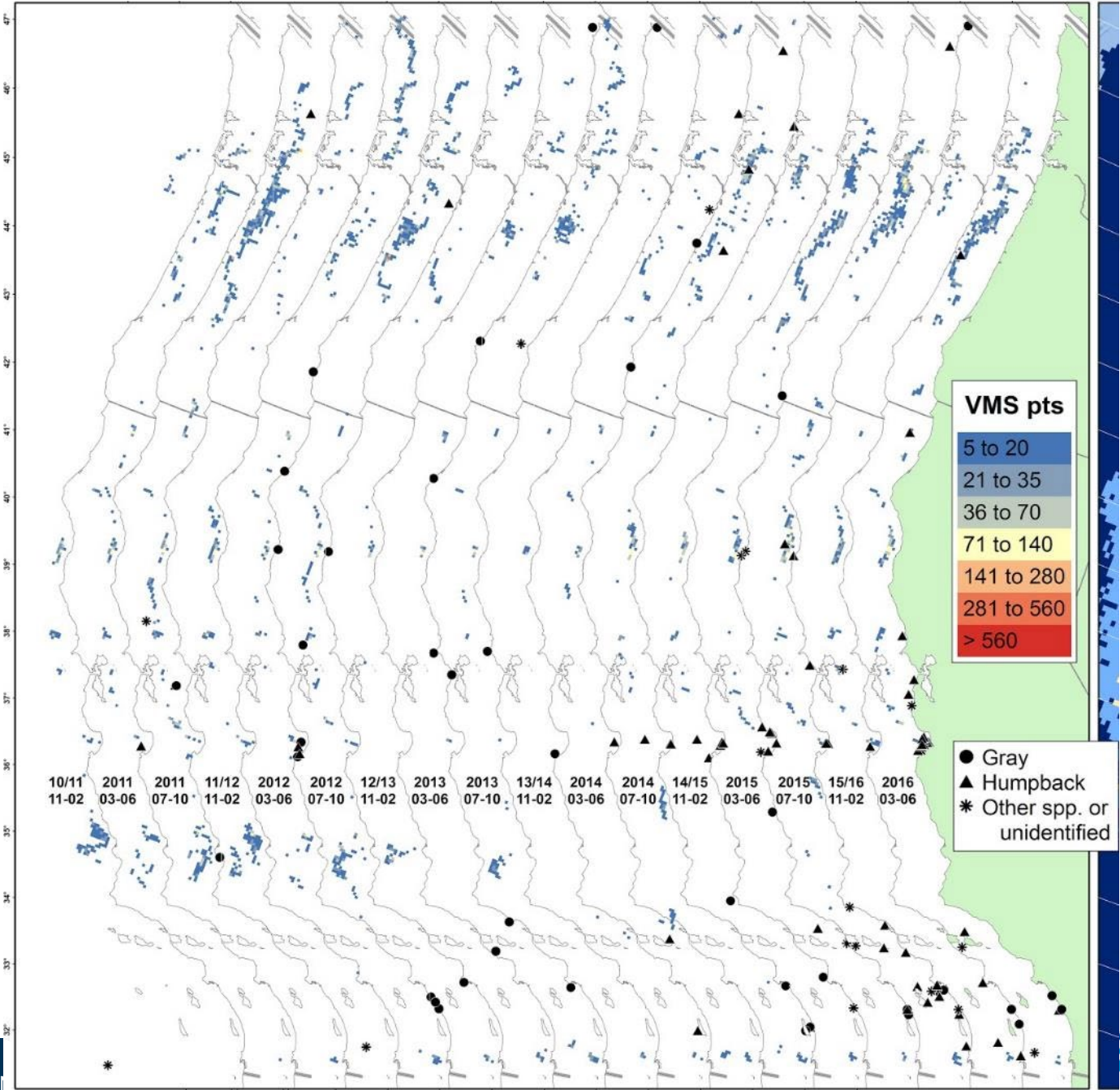
- 2009-present
- Identify potential fishing activity based on:
 - Depth
 - Vessel speed
 - “Look back” window
- Summarize on 5 km grid for west coast



Tracking pot/trap- based fishing activity using VMS and fish ticket data



Pot/trap-based
sablefish fishing
activity in relation
to whale
entanglement
sightings



Data sharing between N/SWFSCs and the States

- PacFIN data come with confidentiality restrictions because they include PII and BII
- Need for increased clarity about project-specific permissions to access and use these data, with an eye toward information security, legal considerations (eg, FOIAs), and efficiencies of workflows
- Currently there are a number of ambiguities and choke points in this process. Two examples related to SC research include stock assessment and large whale entanglement data needs
- Potential solutions?
 - Clear, written documentation of requirements of each state provided to NMFS staff;
 - Fine-tuning of PacFIN access permissions for NMFS staff;
 - Improved communication between DFW, PSMFC, and NMFS IT and research staff as these agreements and processes evolve.



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Alaska Fisheries Science Center

PSMFC: Data analysis and project collaboration



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Catch and survey data through AKFIN

Stock Assessment

Catch Data

Observer Data

Longline Survey

RACE Survey

Crab Data

Analyst Specific Reports

AKFIN works directly with data owners and users to develop reports

- All using same data
- Database knowledge not required
- Fewer data requests to AFSC and AKRO

The screenshot displays the AKFIN web interface for Crab Data. At the top, a navigation bar includes tabs for Catch Data, Observer Data, Longline Survey, RACE Survey, Crab Data (highlighted), and Analyst Specific Reports. Below this, a secondary bar adds Example Charts, Documentation, and ABL Gen. The main content area is titled 'Crab Data' and contains a description: 'This page contains data of interest to BSAI crab stock assessors, including EBS Crab Survey data, N bycatch in commercial groundfish fisheries.' A green arrow points from the 'Crab Data' tab to this section. The interface is divided into two columns. The left column has a header 'EBS Crab Survey' and a section 'Large Data Download' with two options: 'Abundance/Biomass, Large Data Download' and 'Haul Data, Large Data Download'. The right column has a header 'NBS Crab Survey' and a section 'NBS Haul Data' with an 'Open' link and a description. Below this is a 'Lookups/Translations' section with 'Strata/Station Characteristics' and another 'Open' link. The bottom right corner features the NOAA Fisheries logo.

Crab Data

This page contains data of interest to BSAI crab stock assessors, including EBS Crab Survey data, N bycatch in commercial groundfish fisheries.

EBS Crab Survey

Large Data Download

Abundance/Biomass, Large Data Download

[Open](#) Data download that facilitates the full data download for both the 1mm Size Group and 1mm Size bin data for the Eastern Bering Sea Crab estimates of abundance and biomass by species and reporting district. Metrics available include abundance, biomass in metric tons and pounds, with coefficient of variation, and confidence interval. Available 1975 - present.

Haul Data, Large Data Download

[Open](#) This table is a combination of the time series haul data and time series crab specimen data. There are haul records for each station even if no crab were caught at that station.

NBS Crab Survey

NBS Haul Data

[Open](#) This report is a combination of the time series haul data and time series crab specimen data. There are haul records for each station even if no crab were caught at that station. Weights are reported in grams (g) and widths/lengths are recorded in millimeters (mm) Please see the documentation for column descriptions and further information. Data can be exported as a csv or an excel file.

Lookups/Translations

Strata/Station Characteristics

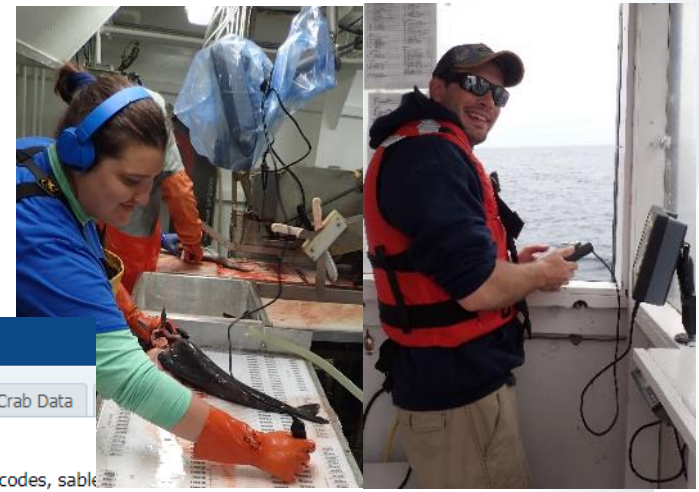
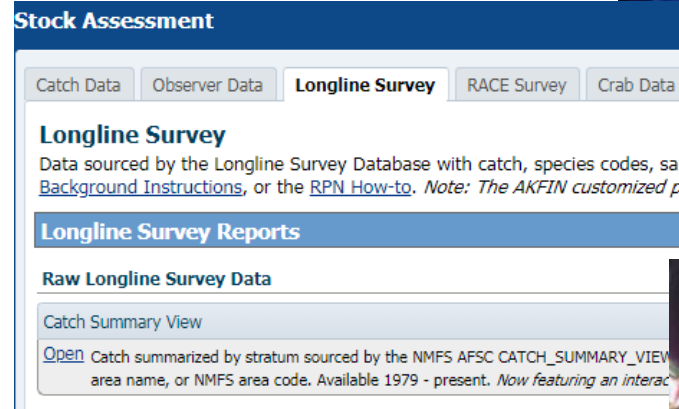
[Open](#) Stratum and station characteristics for NBS crab surveys



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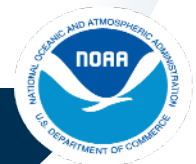
Longline Survey and Groundfish Tag Data Management through AKFIN

- At-sea data acquisition software, SQL database, and R code
- Distribution of data via AKFIN website
- Groundfish tag database and website
 - Add new functionality for big data (satellite tags)
 - New website with tag data: outreach to industry



Collaborations with PSFMC

- Economic and Social Sciences Research (ESSR)
- Alaska Observer Program (Fisheries Monitoring and Analysis Division/AFSC)
- Groundfish Stock Assessment Support
- Untrawlable Habitat



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AFSC Economic and Social Sciences Research (ESSR) Program/PSMFC Partnership

- ESSR has 9 Federal FTEs and we partner with 6.6 PSMFC FTEs
 - Great support from PSMFC employees Colpo, Ryznar, Kirk, Ames, Fey
- PSMFC is the Data Collection Agent for NPFMC's Economic Data Reports (EDRs)
- AKFIN facilitates our access to nearly all primary and secondary data we use in ESSR
- AKFIN provides access to federal and state fisheries data through the Pacific States E-journal of Scientific Visualizations (<https://psesv.psmfc.org/>), Economic SAFE reports, and online web-tools



Economic Data Report (EDR) Program

PSMFC/AFSC Collaboration

- Mandatory annual reporting requirement under NPFMC/regulatory framework
- Started with Crab Rat in 2005; A80 (2008); A91 (2012); GOA Trawl (2015)
- 4,151 surveys collected to-date
- NPFMC is currently considering revisions to this program

FTE's

Geana Tyler (PSMFC)

Jean Lee (AKFIN)

Brian Garber-Yonts (AFSC)

Innovations:

- EDR Portal/Web app for all EDR forms
- Continuous improvement in QA/QC and automated error checking

	CRAB EDR			A80/GOA TRAWL EDR			A91 CHINOOK SALMON EDR			All EDR Forms
EDR Reporting Year	CV	C P	Processors	A80/G OA CP	CV	GOA SP	CTR	Fuel Survey	Vessel Master Survey	
Historical (98,01,04)	673	25	68							766
2005	166	8	17							191
2006	96	5	13							114
2007	82	5	14							101
2008	91	5	15	24						135
2009	84	5	18	23						130
2010	76	3	18	24						121
2011	74	3	19	24						120
2012	80	3	20	20			0	86	135	344
2013	79	2	24	18			0	86	133	342
2014	74	2	19	18			0	75	126	314
2015	80	2	19	19	69	12	0	64	121	386
2016	80	2	18	18	70	6	0	65	117	376
2017	70	2	18	20	66	13	0	61	116	366
2018	65	2	17	20	59	10	0	61	111	345
Total To-date	1870	74	317	228	264	41	0	498	859	4151

FishSET

Spatial Economics Toolbox for Fisheries

FishSET's goal is to enable NOAA Fisheries economists and social scientists to better inform policy decisions by predicting how a variety of factors might influence fisher behavior.

Many modeling challenges exist. While predictive models are valuable tools for sustainable fisheries management and conservation, challenges to their development include preparing, integrating & updating many data sources, choosing appropriate models, and interpreting results.

FishSET provides:

1. **Superior data organization, analysis, and integration** for spatial models.
2. **Best management practices** for data, modeling, and model comparison.
3. **Many models in a single toolbox** for ease of model comparison and use. Combines several fisheries economics modeling approaches in one toolbox.

FishSET facilitates better and more expedient analyses to improve marine resource management.

To learn more, visit:
www.st.nmfs.noaa.gov/humandimensions/fishset/index

What tools are in the FishSET toolbox?



Data Tools

Data Management & Integration Tool
Facilitates the development and integration of datasets for spatial modeling

Monte Carlo Tool
Simulates real fisheries data while preserving confidentiality, allowing better model testing and comparison.

Data Analysis & Mapping Tool
Enables graphical and geographic data viewing and prepares data for spatial modeling



Model Tools

Model Design & Selection Tool
Enables modeling of different combinations of variables and models

Modeling Tool
Runs standard, cutting-edge, and user-designed models

Model Comparison & Reporting Tool
Provides an extensive comparison of model performance and summarizes data, models, and results



Policy Tools

Policy Simulation Tool
Predicts location choices and estimates policy impacts

FishSET: Spatial Economics Toolbox for Fisheries

Alan Haynie (AFSC), Allen Chen, Melanie Harsch, and Sabrina Devereaux (PSMFC)

- Ongoing AFSC/PSFMC project to improve fisher spatial choice modeling throughout the U.S.
- FishSET R Version 1.0 soft roll out will occur during Jan-Feb 2020



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FMP Analysis Retrospective and Improvement Study

Sabrina Devereaux (PSMFC), Alan Haynie (AFSC), Diana Evans (NPFMC), Sally Bibb (NMFS AKR), Rachel Baker (ADF&G)

Goal: To assess and improve the quality of information presented to the North Pacific Fishery Management Council (NPFMC)

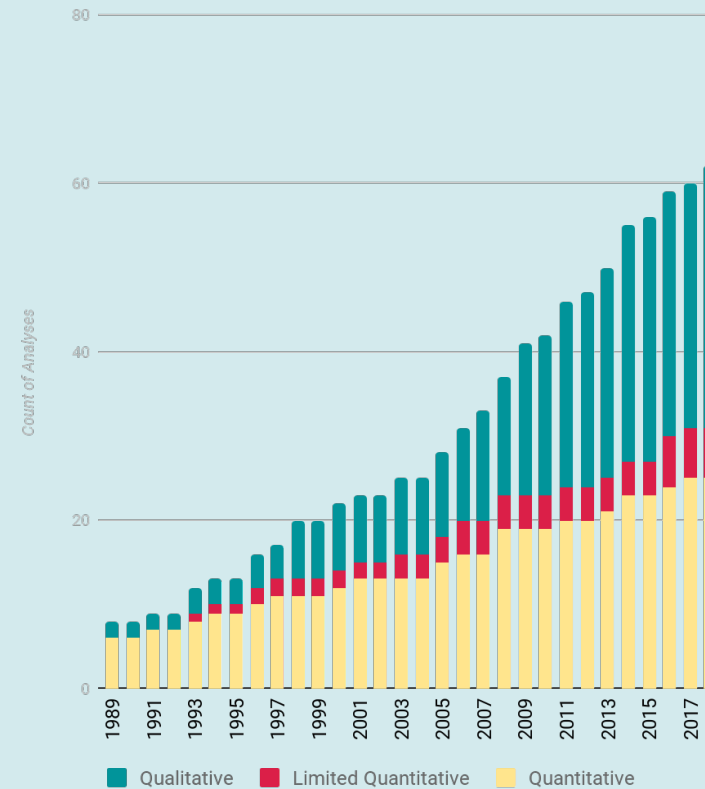
Methods:

- Reviewed and categorized over 100 impact analyses developed for NPFMC fishery management plan (FMP) amendments
- Analyzed trends in the structure and content of analyses, noting effective characteristics and potential areas for improvement
- Conducted in-depth interviews with 36 active participants in the Council process, including:
 - Members of the Council, AP, and SSC
 - Council Staff analysts
 - NMFS Alaska Regional Office analysts
 - Invested members of the public/industry

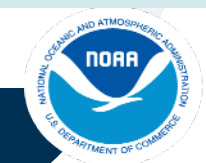
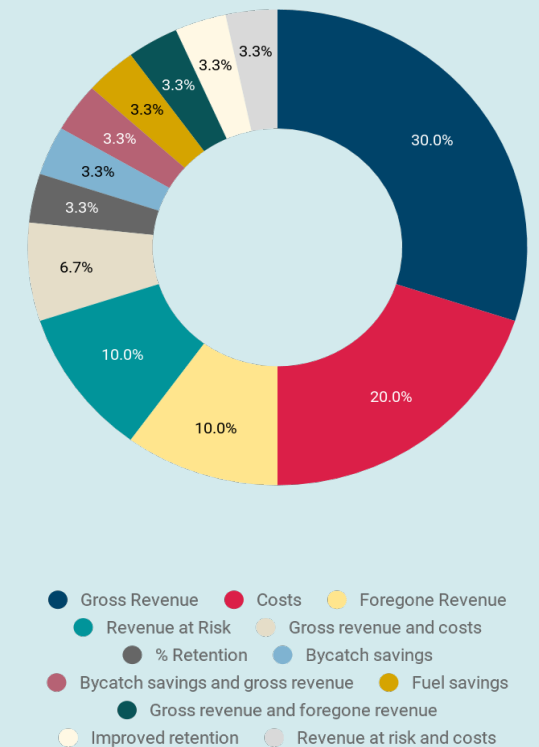
Next Steps: Discussion of results with analysts and publication and presentation of findings

Preliminary Results:

Cumulative Sum of Quantitative/Qualitative Cost-Benefit Estimates in Regulatory Impact Reviews



Common Quantitative Estimates and their Frequency

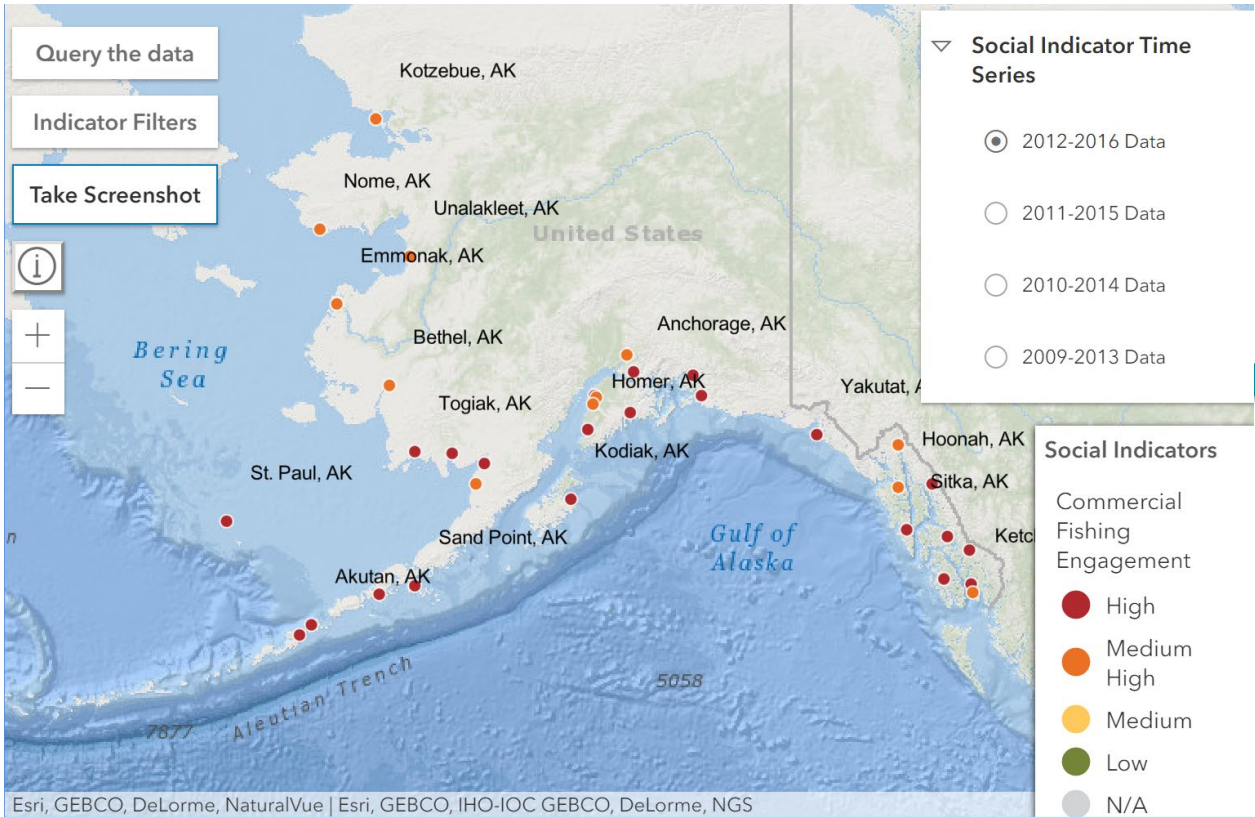


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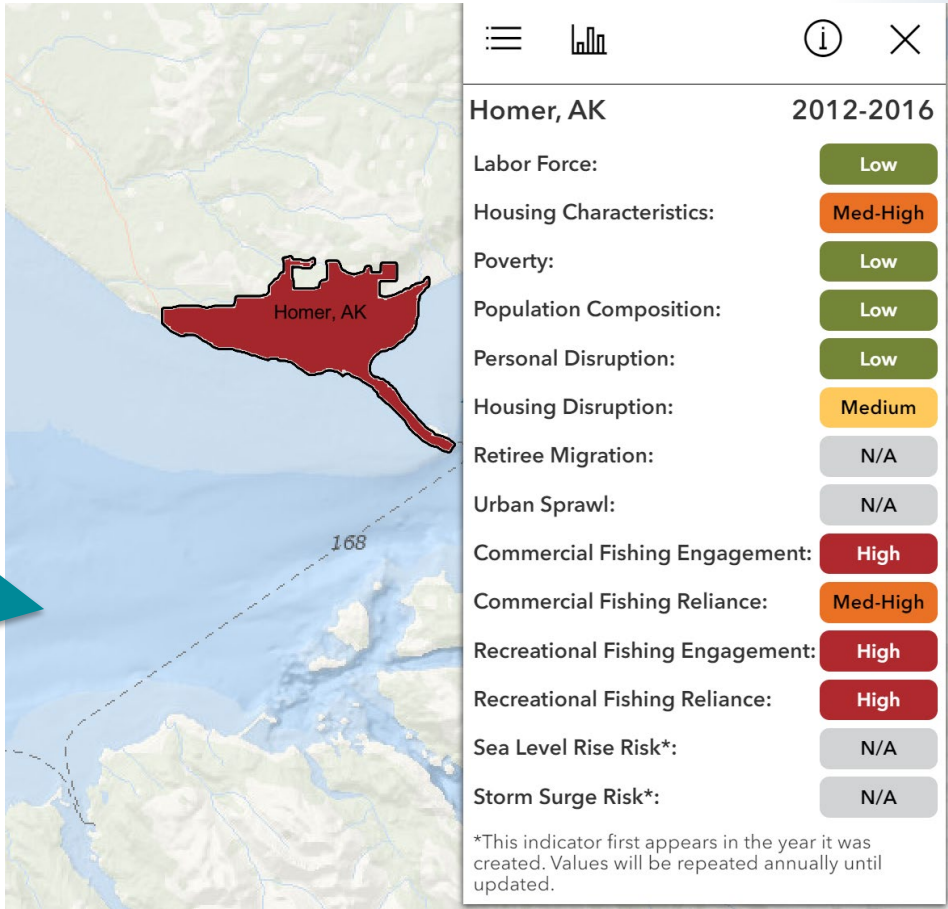
Community Social Vulnerability Indicators: Providing social context to inform fisheries management

Steve Kasperski & Sarah Wise (AFSC), Kim Sparks (PSMFC)

High & med-high commercial fishery engagement in Alaska



All social indicators by community



Alaska Observer Program: Catch and Bycatch

PSMFC Data Quality Control

- Meets PSMFC and AFSC's shared mission to **promote effective utilization of fisheries**
- PSMFC partners with the AFSC to provide **robust data for in-season quota monitoring, stock assessments, ecosystem investigations, compliance monitoring, incidental injury and mortality of marine mammals and birds, and other scientific activities**
 - Enables fine-scale catch share quota management by fishing cooperatives
- Helps ensure **safety at sea** through routine communications with fishery observers

PSMFC Information Services

- Collaborate with AFSC to **develop, maintain, and update database and web applications to provide fishery dependent information to the industry, the general public, and fishery managers**
- Investigate and implement **new data transmission capabilities** to serve data to users in a cost-effective, rapid fashion (transmission costs are borne by the fishing industry)
- PSMFC analytic support includes **developing and evaluating sampling methods, analyzing sampling results, and providing analytic and statistical consulting**



Electronic Monitoring (catch and bycatch accounting)

Fixed Gear Operational EM

- PSMFC-Alaska Longline Fishermen's Association-Archipelago Marine Research partnership to outfit vessels with EM equipment
- PSMFC reviews and annotates EM video and sends catch event data to AFSC
- Reviewers and EM providers communicate with the fleet and AFSC to improve EM data
- EM data available through AKFIN

EM Innovation

- Research and Development projects led by PSMFC and AFSC in cooperation with the fishing industry; sub-contracts with U. of Washington and FishNext Research
- Stereo Rail Camera Systems: generate 3D images (length and species identification)
- Salmon Identification Chute: id salmon to sps to improve salmon bycatch accounting
- Halibut Sorting Chute: captures length and time stamp (time out of water) for halibut bycatch accounting
- Codend Volumes: to accurately estimate volume for catch estimation
- Rougheye/Shortraker/Blackspotted Rockfish: fish id using a multi-spectrum chute, genetics taken to train the program



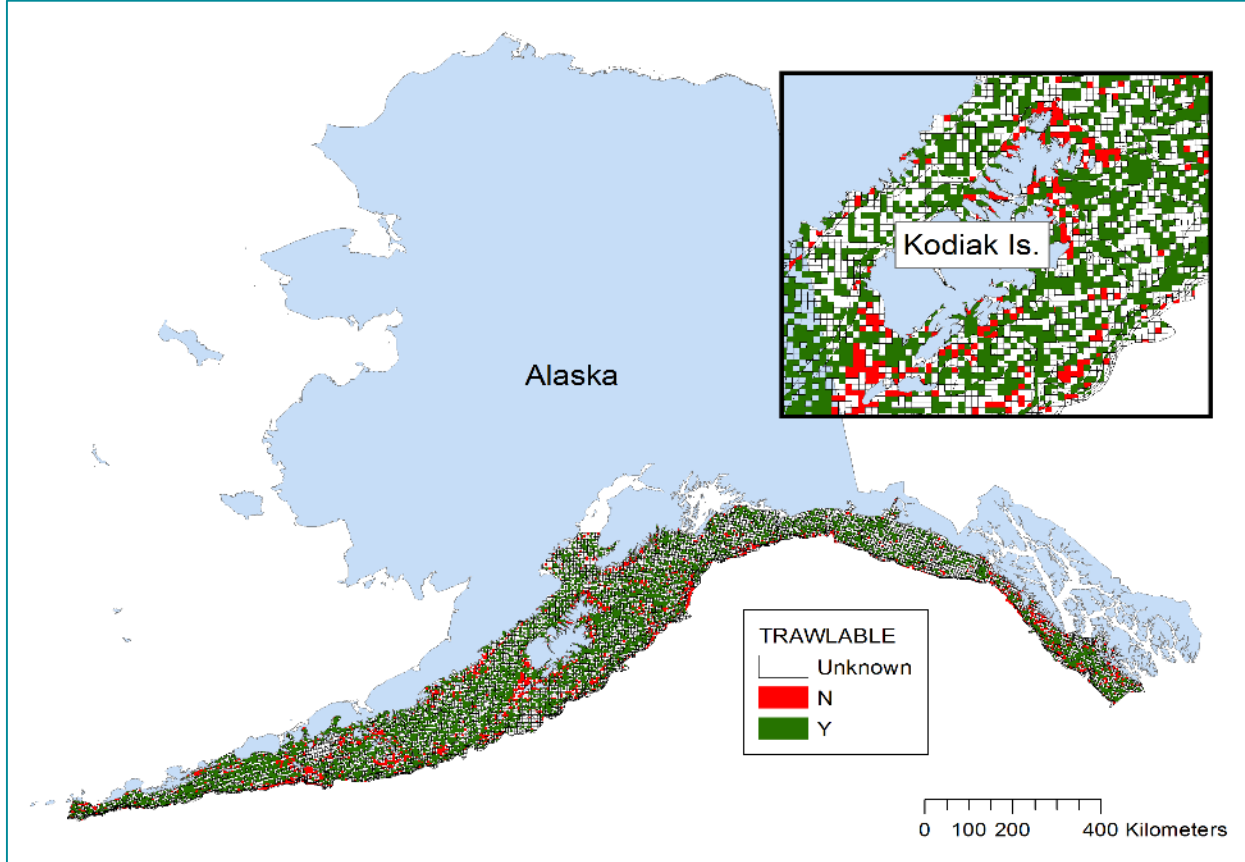
Untrawlable Habitat (mapping/surveys)



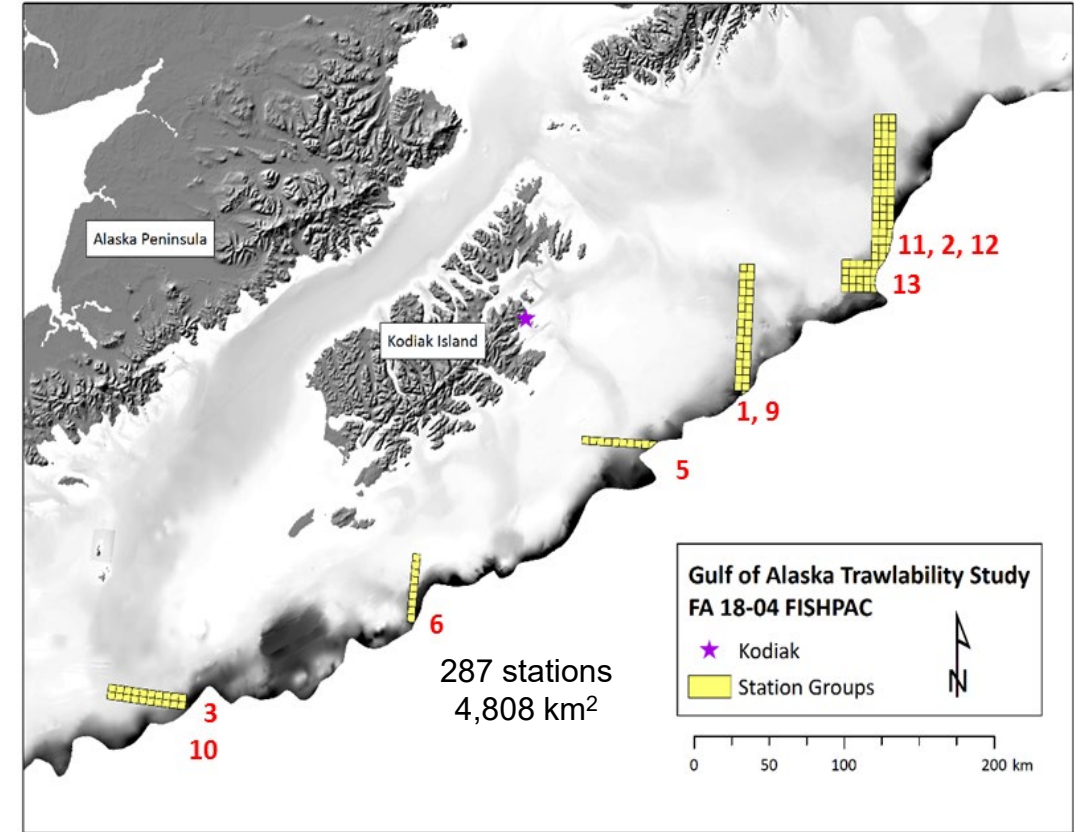
Fairweather

Can a multibeam echosounder distinguish trawlable and untrawlable bottoms?

Pilot study – 100% coverage
bathymetry & backscatter data



68% (n=16,084) of bottom-trawl stations are unclassified



Composite Grant FY19 funded projects just starting

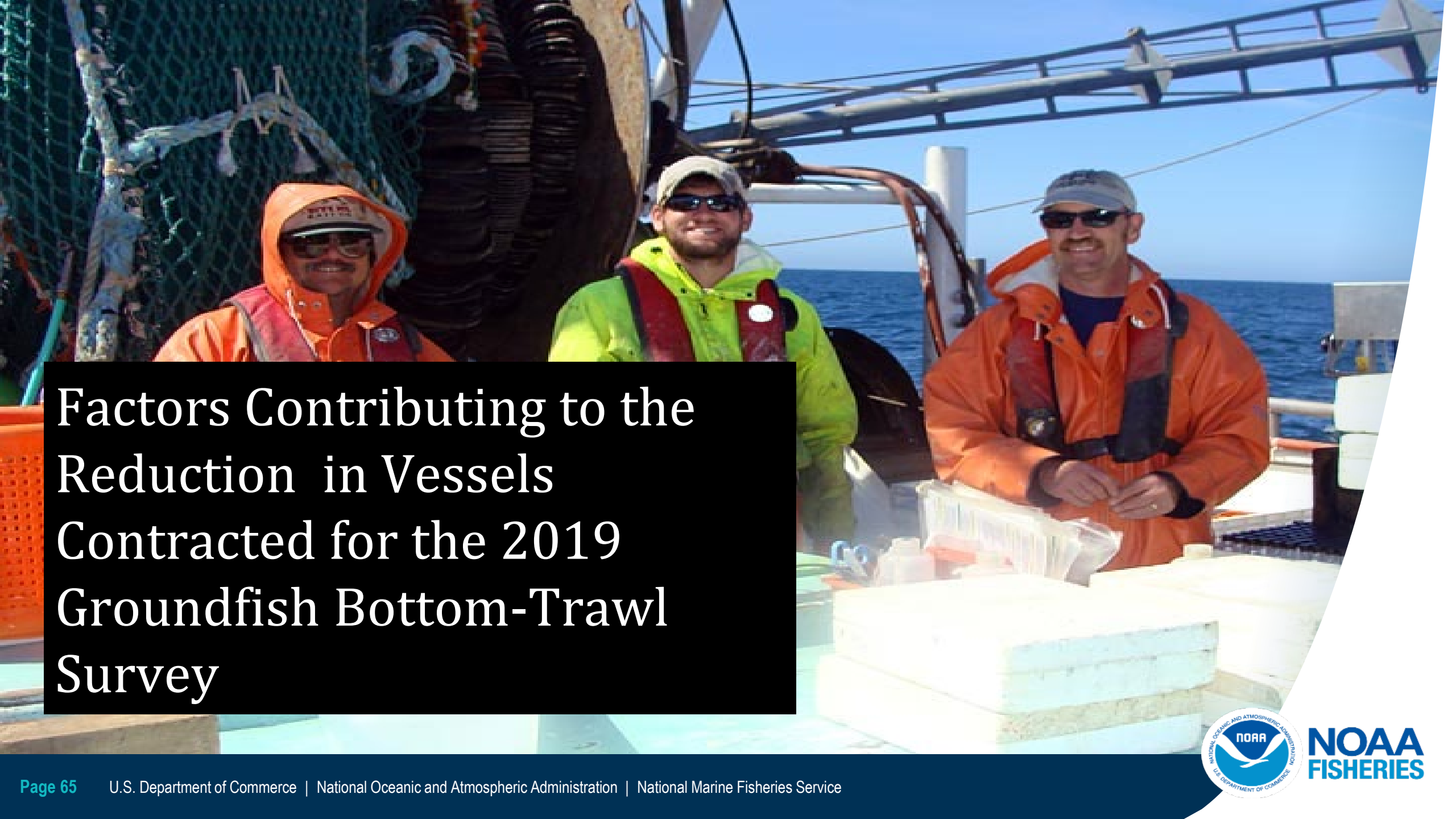
- Analysis of import/export micro data of Alaska caught fisheries products
- The marginal value of Pacific halibut
- Developing performance metrics for the public
- Evaluating the Impacts of Catch Shares and **Environmental Change** on BSAI and GOA Pacific Cod Fisheries



State of the Science Centers

Budget Surveys

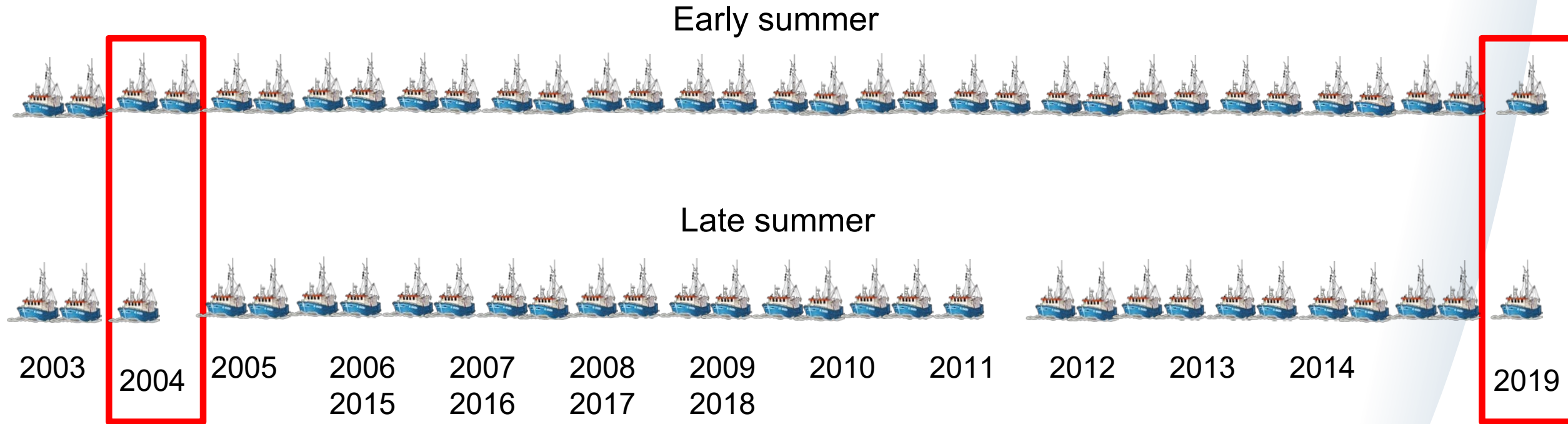


A photograph of three men on the deck of a fishing vessel. The man on the left wears an orange hooded rain jacket and sunglasses. The man in the center wears a bright yellow-green rain jacket, a grey baseball cap, and sunglasses. The man on the right wears an orange rain jacket, a grey baseball cap, and sunglasses. They are standing in front of a large green fishing net. In the foreground, there are stacks of white and light blue foam blocks. The background shows the blue ocean and a clear sky.

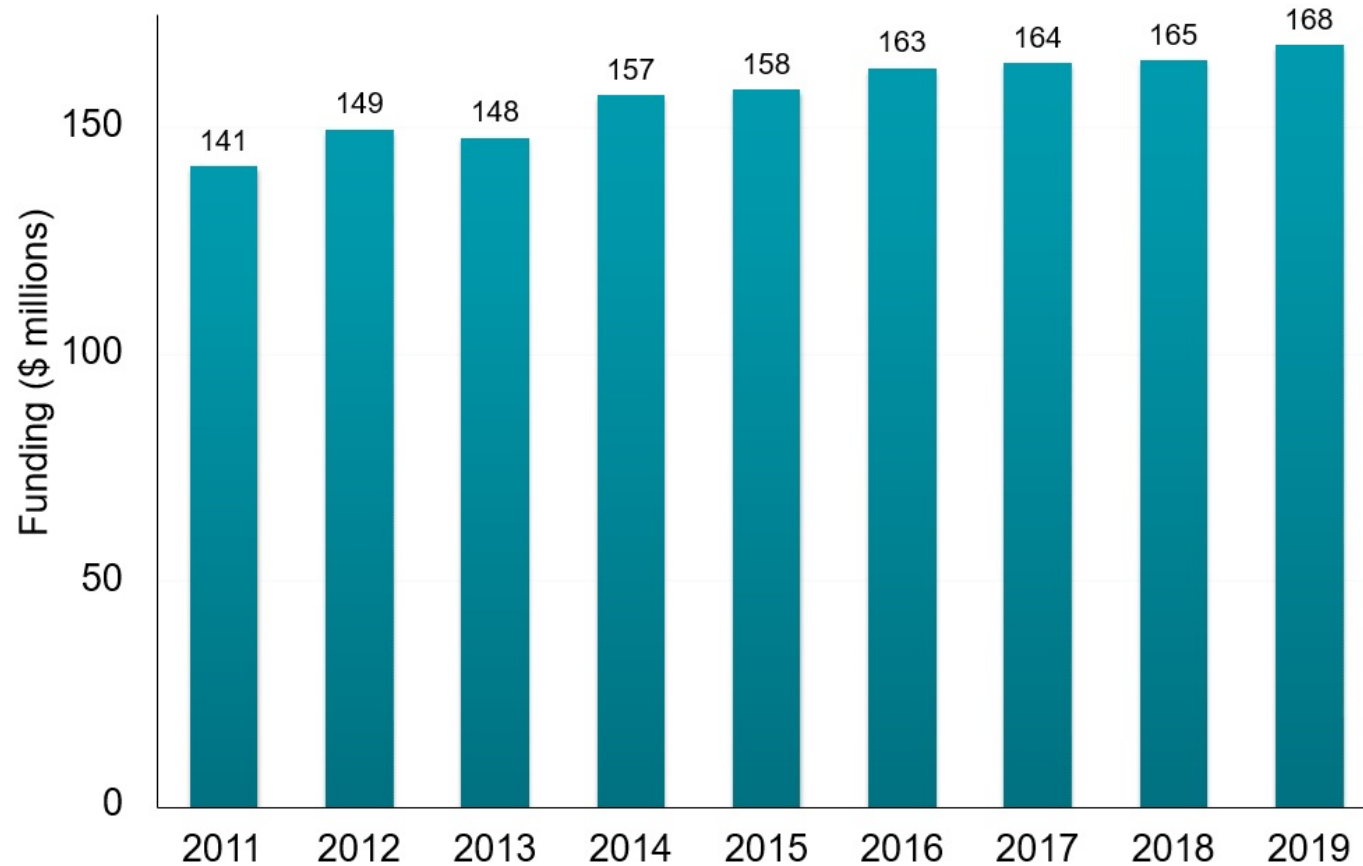
Factors Contributing to the Reduction in Vessels Contracted for the 2019 Groundfish Bottom-Trawl Survey

State of the survey since its inception

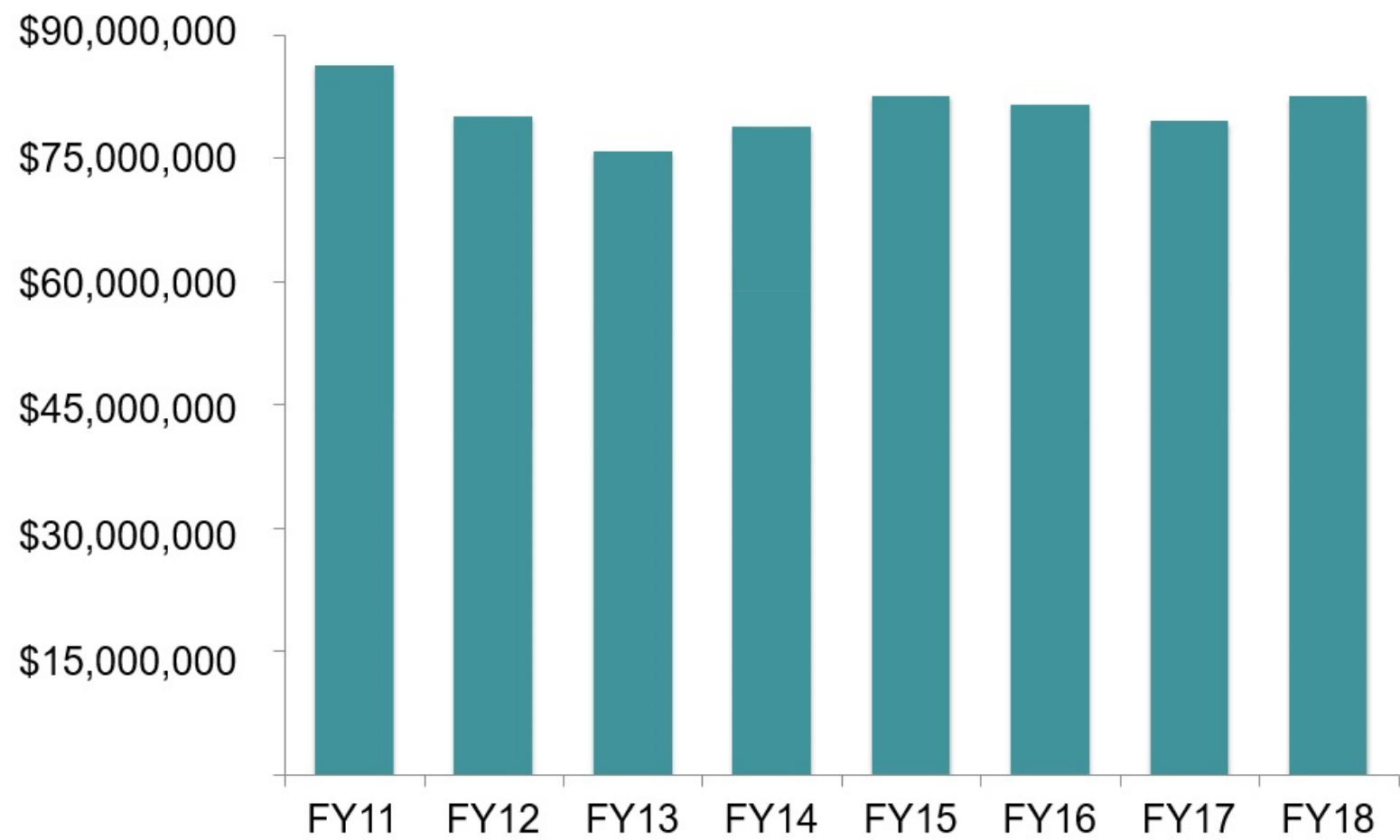
Why was the survey reduced this year?



Recent NMFS Funding Levels for “Fisheries Data Collections, Surveys, and Assessments”



Recent NWFSC Obligations



What goes into survey costs?

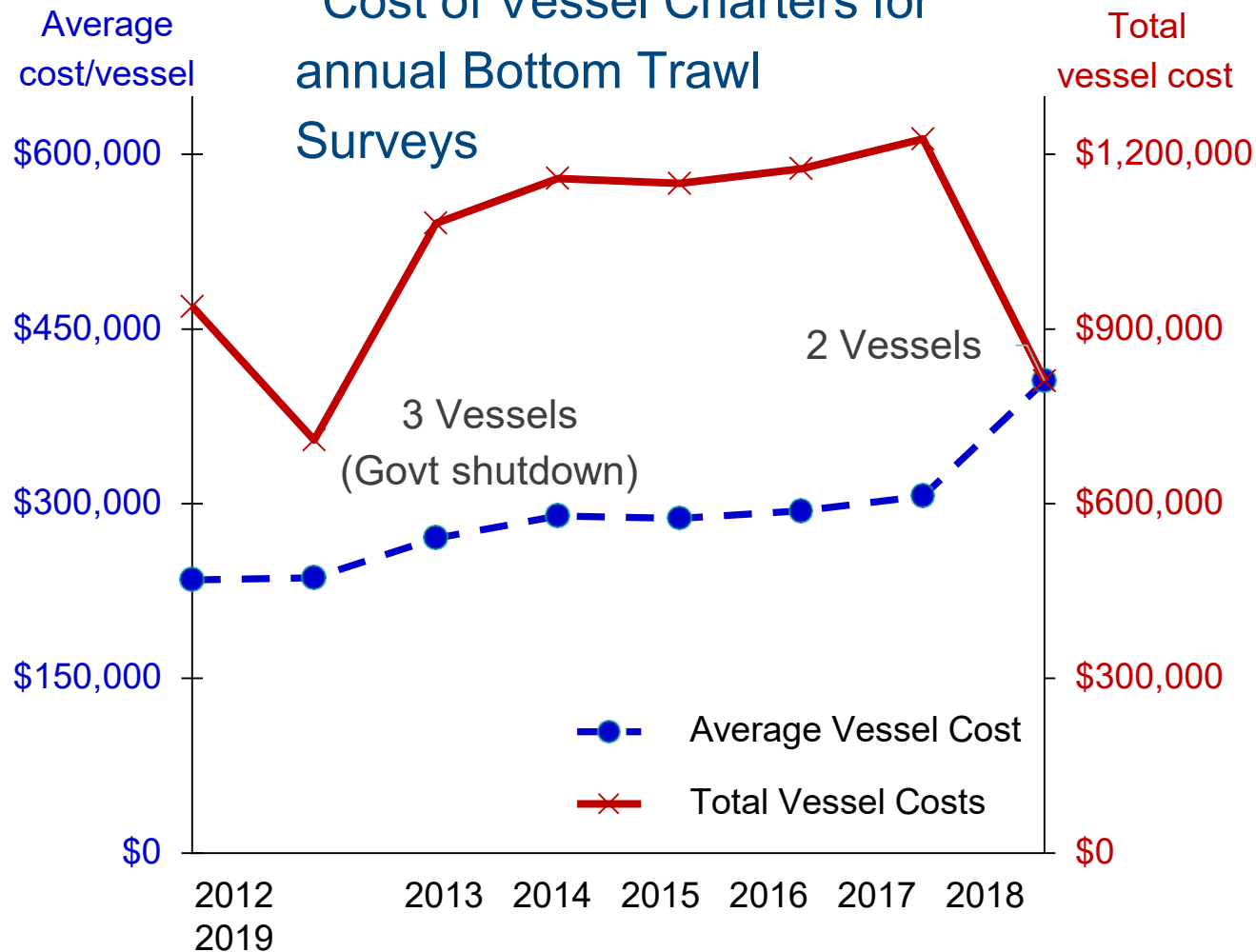
- Contracts with fisheries vessels
- Staff to plan for and execute the survey
- Fuel
- Net repairs
- Sensors repair and updates
- Other supplies and equipment
- Travel and transportation
- Overhead



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The cost of vessel contracts is increasing

Cost of Vessel Charters for annual Bottom Trawl Surveys



Total contract cost of 4-boat survey*

● \$0.94 million in FY 2012

● ~ \$1.4 million in FY 2019

*if all contracts filled in named FY



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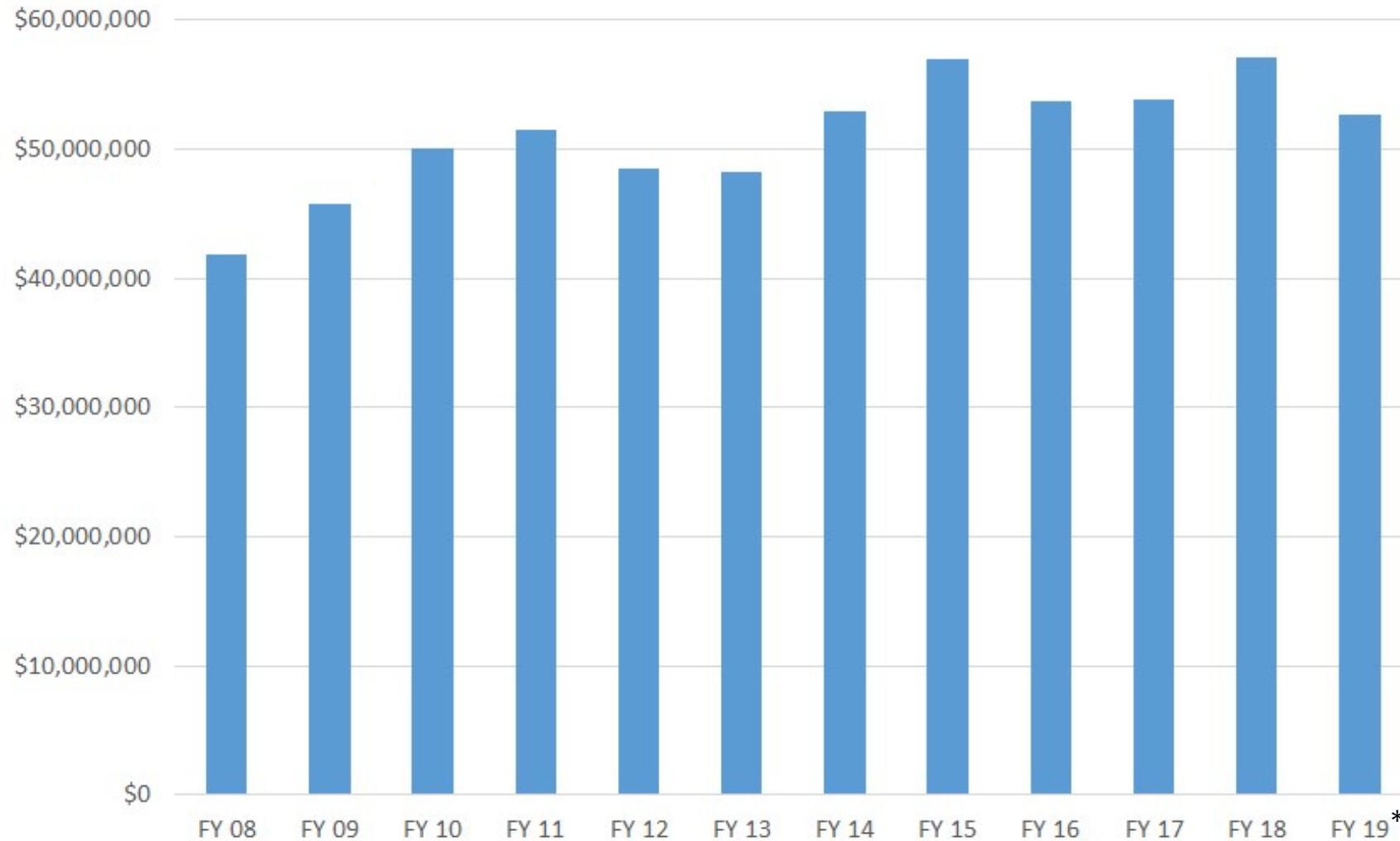
Groundfish Bottom Trawl Survey Summary

- NMFS Science Enterprise is facing broad funding challenges for every program due to increasing mission demand, rising costs of mission and mission support, and inflation.
- Costs for vessel contracts and labor have increased.
- Groundfish survey was reduced from 4 vessels to 2 vessels in FY 19.
- Planning for surveys in FY 20 is underway. Restoring a four boat survey for FY20 is likely, with strategies and approaches for future years in development



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Recent SWFSC Obligations



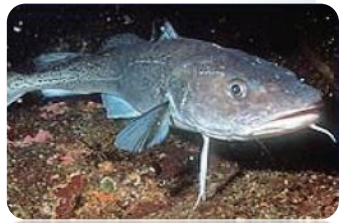
*FY19 not final

State of the Center: AFSC

Beaufort Sea

Northern Bering
Sea/Chukchi

- **Healthy Marine Ecosystems**
- **24+ Research Surveys**
- **Sustainable Fisheries Management**
- **99 stock assessments**
- **>250 fish and crab**
- **42 marine mammals**
- **Ecosystem Based Fishery Management**



East Bering
Sea

Gulf of Alaska

Aleutian Islands



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AFSC budget and coop research need

Escalating (inflationary) costs:

- Survey and Charter costs increasing
- Labor cost increases
- Facilities costs rising
- Corporate costs increasing

Managing costs strategically:

- Increase reliance on external funds and partnerships
- Technological advances and innovations

End result:

- ~\$10 M in FY19 for 'operational' research activities (surveys, assessments, process studies)...other research priorities must seek external or temporary funds.



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AFSC budget and coop research need

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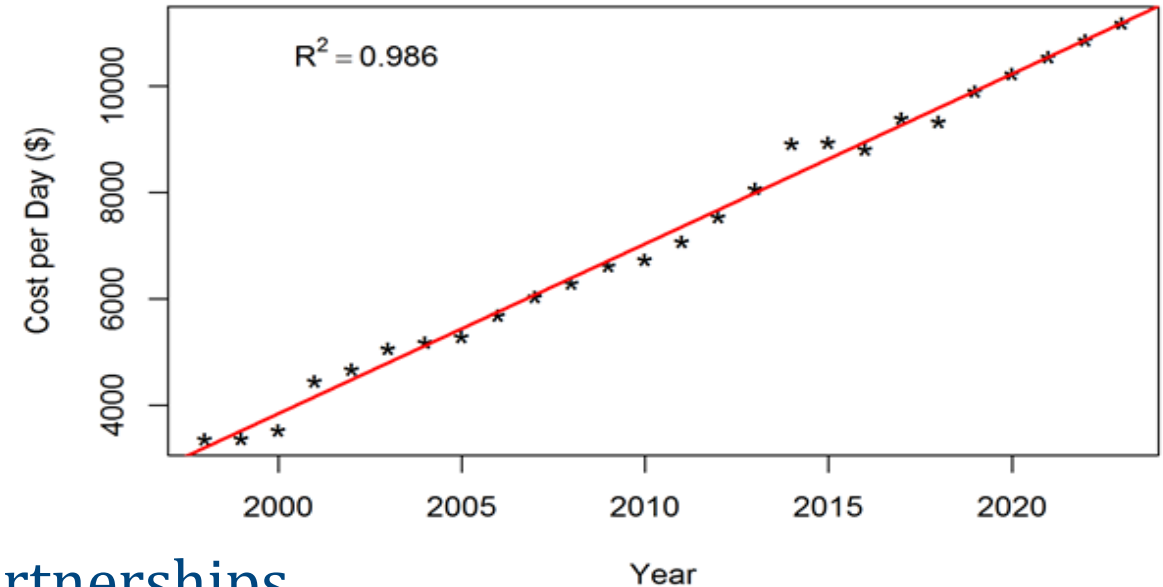
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AFSC budget and coop research need

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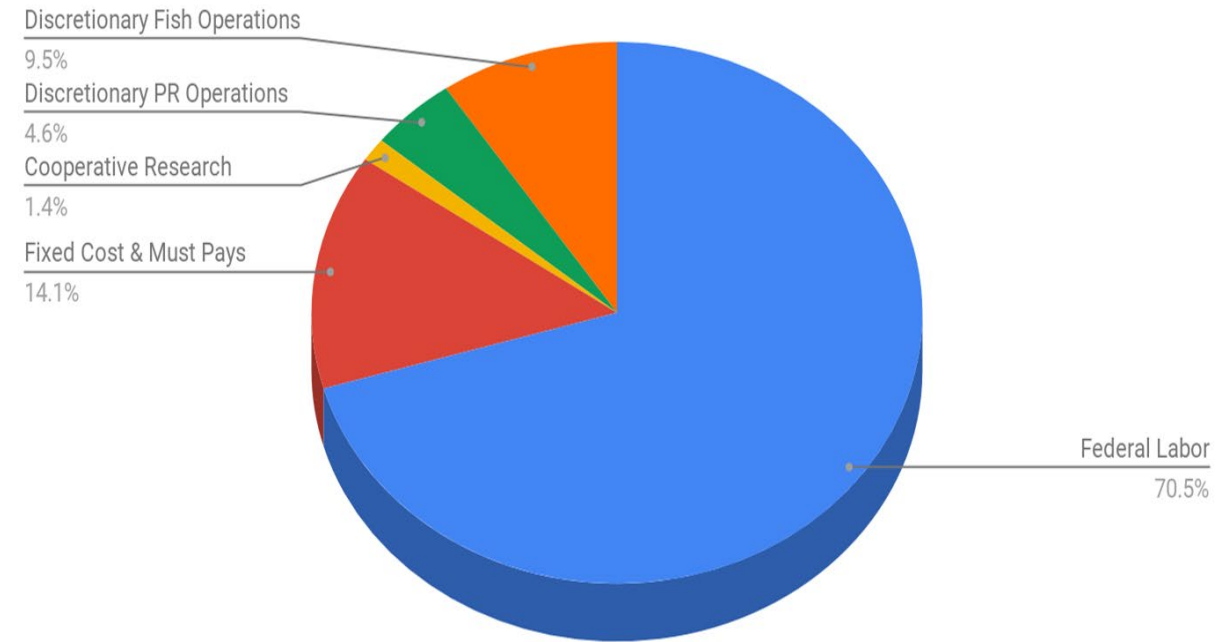
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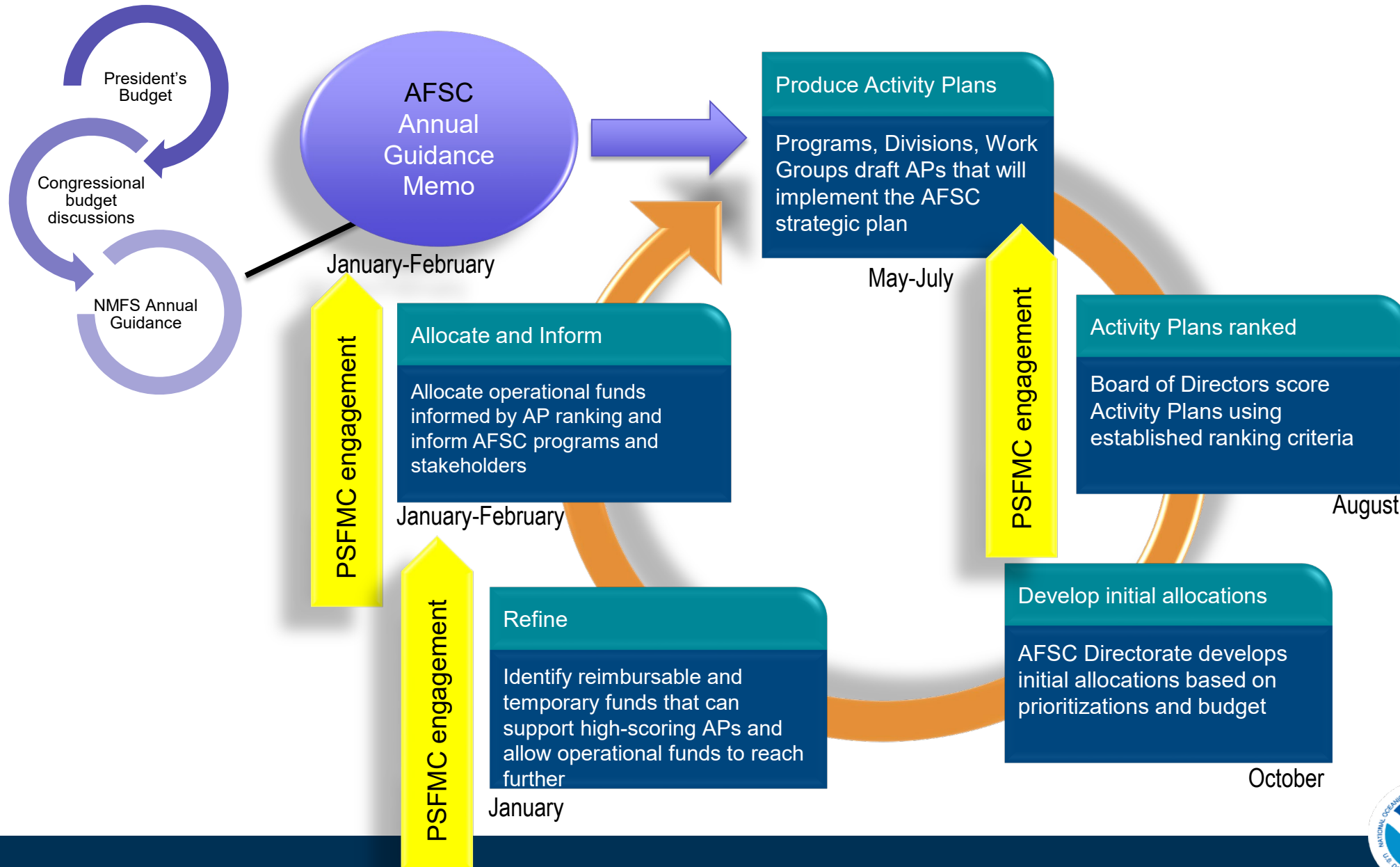
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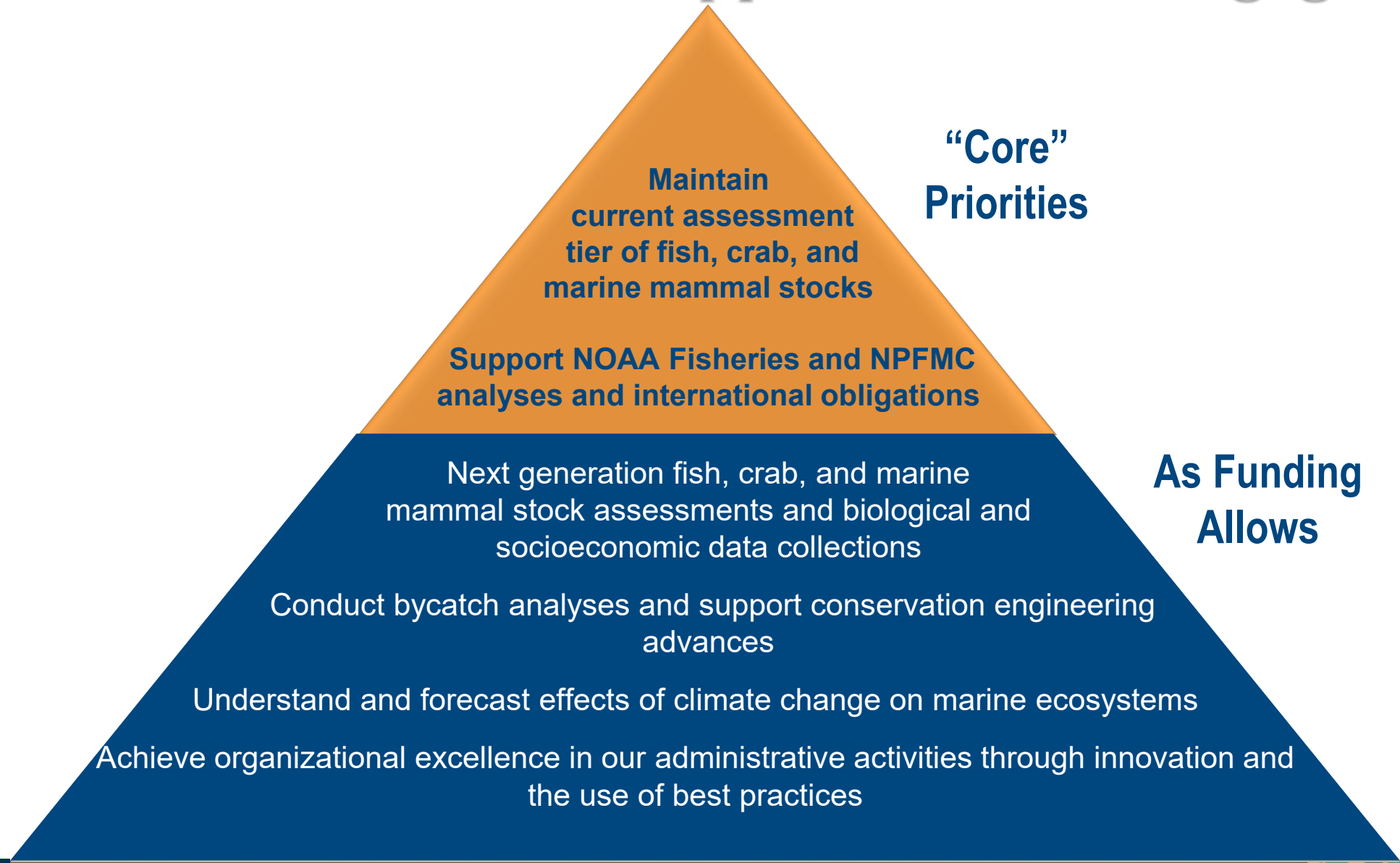
Workforce <17% in past 7 years

AFSC Science Prioritization: opportunities to engage PSFMC



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AFSC Science Prioritization: opportunities to engage PSFMC

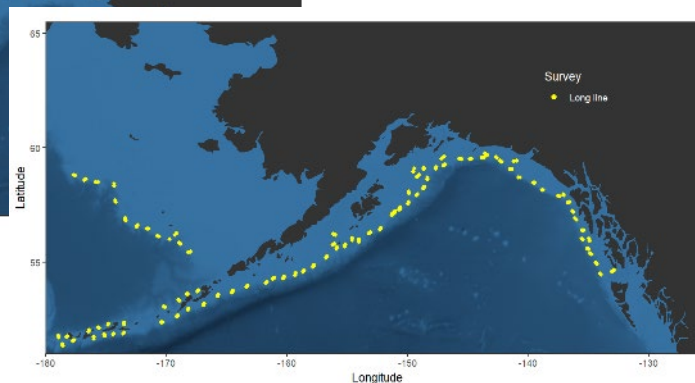
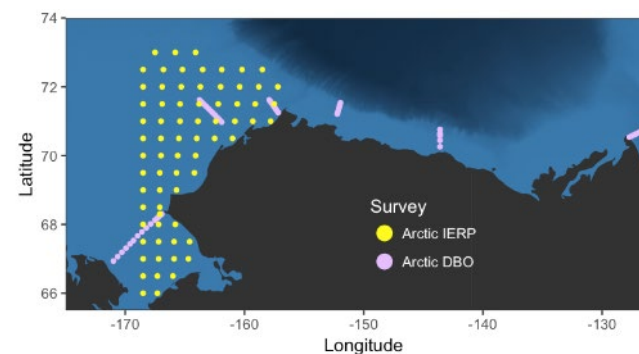
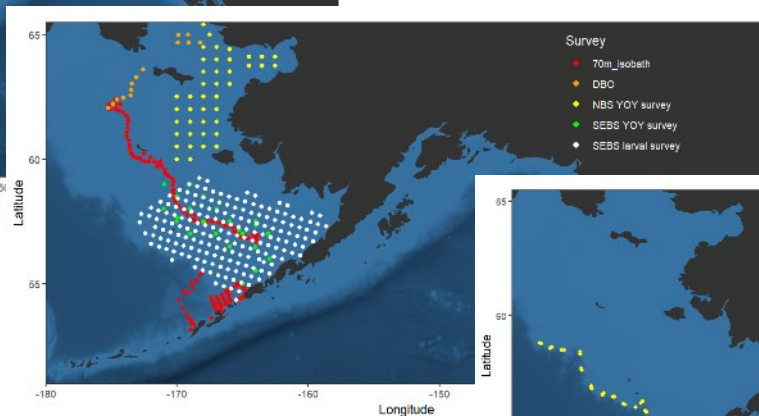
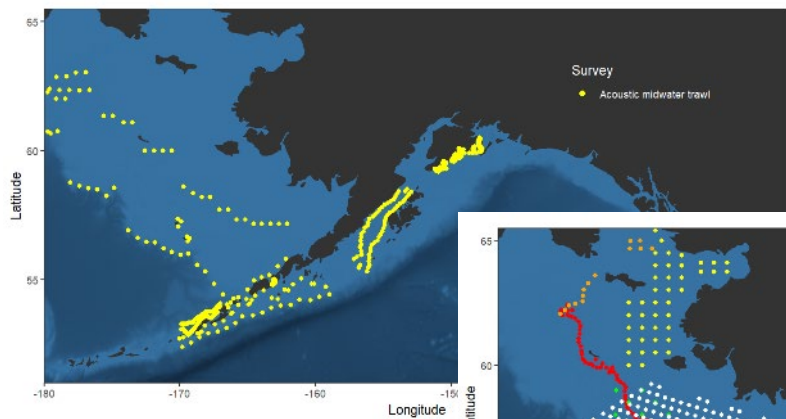
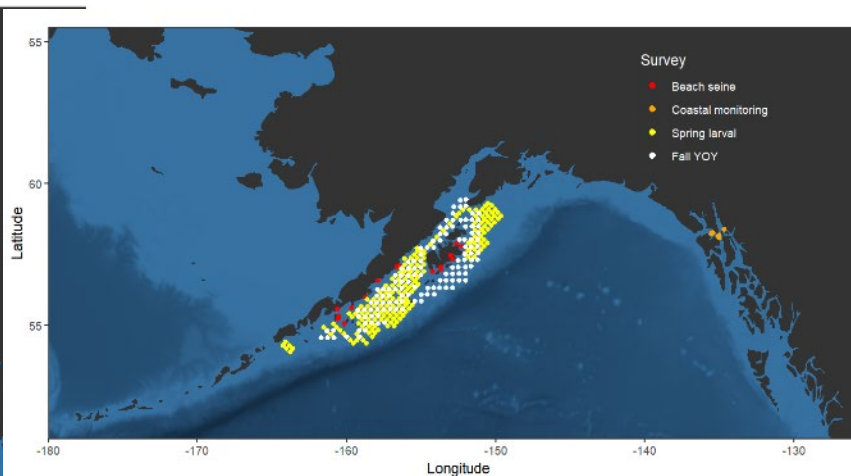
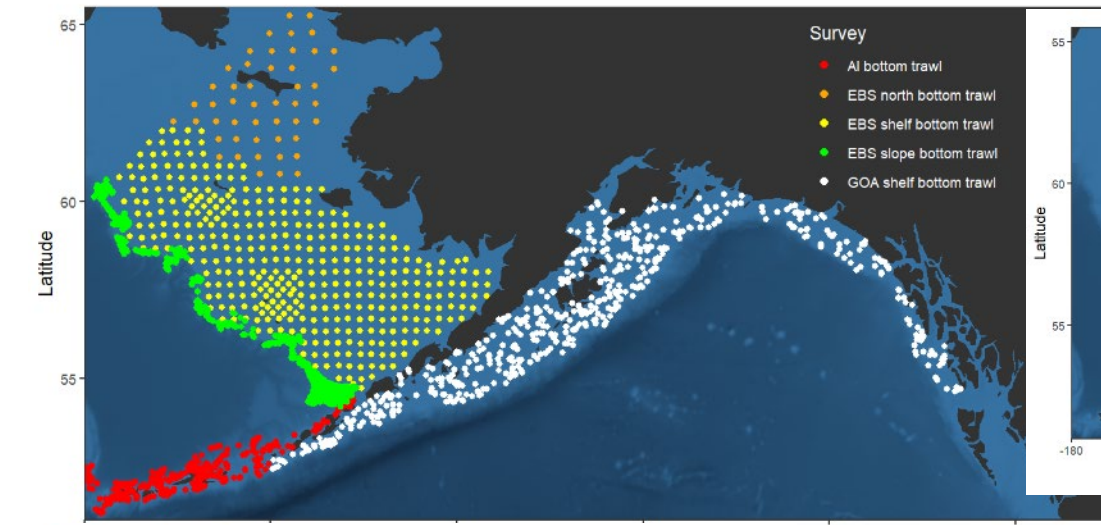


DATA & USE

Assessment model

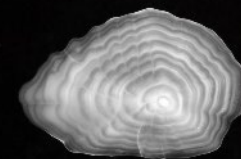
Ecosystem Status Report

Explored in model



Number

004,57g



Body Condition

Diets



Tagging



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