NOAA Fisheries Science Centers -Ocean Science in Alaska Collaborations & Partnerships with PSMFC

Robert Foy, Alaska Fisheries Science Center August 2021



Department of Commerce | National C

n | National Marine

Outline

- Climate informed science for management
- Alaska surveys status
- Stand alone grants:
 - AKFIN
 - Electronic Technologies
 - Economic Data Reports
- Composite grant (final year)
 - 17 ongoing projects (7 highlighted)
 - 8 new projects



NMFS climate informed science for management



AFSC climate informed science for management



Gulf of Alaska: conditions close to average in 2020.

- Sea surface temperatures returned to the long-term mean after 2014-2016 and 2019 heatwave years, with a warm summer and fall.
- Forage conditions were average or improved over past years. This may have contributed to the increased reproductive success of some seabird and humpback whale populations.
- Some species continue to be affected by past marine heatwaves and elevated ocean temperatures.
- Predicted 2021 La Nina conditions likely to continue to normalize the system.



AFSC climate informed science for management

Eastern Bering Sea: cooling in 2020.

- Considerable <u>cooling</u> began in late December 2019 and allowed for rapid build-up of sea ice, exceeding the median ice extent in parts of February and March 2020.
- <u>Ice thickness</u> was low, and retreated quickly with warm winds in spring. This seasonal sea ice was sufficient to form a cold pool of average spatial extent.
- <u>Above-average sea surface temperatures</u> returned in spring and remained above average through fall 2020.
- <u>Persistent warm stanza</u> (consecutive years of above average ocean temperatures), greater in both magnitude and duration than that of the early 2000s.
- Pollock catch reduced 30% from Tier 1 to Tier 3 maximum permissible noting both ecosystem and fisheries performance concerns.
- Sablefish catch was reduced 44% in part due to a trend of increasing trawl catch of sablefish, primarily in the Bering Sea.





Alaska Climate Integrated Modeling Project

Operational suite of coupled socio-ecological models for climate fisheries hindcasts, forecasts, projections and Management Strategy Evaluation

Characterize and project climate-driven changes to the eastern Bering Sea (EBS) ecosystem, from physics to fishing communities.

EBFM *can* forestall climate declines and provide critical time to adapt

Holsman, K.K., Haynie, A.C., Hollowed, A.B. *et al. Nat Commun* **11**, 4579 (2020). https://doi.org/10.1038/s41467-020-18300-3





Hollowed et al. 2020. Frontiers in Mar. Sci. doi: 10.3389/fmars.2019.00775



Gulf of Alaska fish/eco surveys

Survey	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>
GOA BT vessel 1												
vessel 2												
vessel 3												
Deep shelf and slope												
groundfish longline												
Winter Acoustic-Trawl												
Shumagin/Sanak												
Winter Acoustic-Trawl												
Bogoslof												
Winter Acoustic-Trawl												X
PWS/Kenai Winter Acoustic-Trawl												
Shelikof												
Summer Acoustic-												0.10
Trawl GOA												2/3
GOA larval												
Spring GOA Ichthyoplankton												
Summer GOA Age-0												X
Kodiak Pacific cod												
nursery habitat												
Large-Scale GOA												
Pacific cod nursery												
GulfWatch												
oceanography&forage												



 Limited coverage of GOA deep (>700 m) stations in favor of NBS



charter backup



Bering Sea fish/eco surveys







charter backup



AKFIN

- Catch and survey data served via web application
- Catch Estimation Design and Integration (FMA)
- Economics and Social Sciences Research (ESSR)
 - AKFIN facilitates our access to nearly all primary and secondary data we use in ESSR and also fisheries data for many stock assessment authors
 - AKFIN provides access to federal and state fisheries data through the Pacific States E-journal of Scientific Visualizations (<u>https://psesv.psmfc.org/</u>), Economic SAFE reports, and online web-tools
- Modernizing, integrating, streamlining data access (ABL/REFM)
 - Comprehensive salmon bycatch reporting and database integration
 - Web application to upload data for Ecosystem & Socioeconomic Profiles
 - Integrating environmental & fishery data (already >200 million records!)
 - Web APIs for enhanced / operational data access





AKFIN Web APIs provide operational data products

Automated database routines facilitate interactive web applications that update daily.

Resulting data visualizations support ecosystem based fisheries management

Public products are disseminated via web, Twitter, Facebook.



Highlighted Composite Award Projects

- Longline Survey and GF Tag Database Management
- Cooperative Gear Research for Conservation Engineering (Reducing Salmon Bycatch)
- FISHSET
- Community Social Vulnerability Indicators
- Climate and Communities in the Gulf of Alaska
- Paths of Entry
- Electronic monitoring of large sharks



Innovative Approaches to Reducing Salmon Bycatch in the Alaska Pollock Fishery

AFSC Conservation Engineering Group (Noëlle Yochum, David Bryan, Katherine Wilson)

A collaborative effort among scientists, fishermen, and net makers. This research was facilitated by PSMFC (Dave Colpo) with grants from the NOAA NCRP.

2019: A 'salmon excluder' was developed to allow salmon to escape while retaining pollock







2020: The excluder was tested under fishing conditions, and new methods were developed to quantify loss of pollock.



2021: Additional data were collected to evaluate salmon and pollock escapement, and the ability to increase escapement using light.







Climate and Communities in the Gulf of Alaska Marysia Szymkowiak (AFSC), Andrew Steinkruger (PSMFC)

- AFSC and PSMFC are collaborating on a project to understand Gulf of Alaska fishing communities adaptive capacity to climate change
- The project focuses on answering several key questions:
 - What does adaptation look like across Gulf of Alaska communities?
 - What adaptation strategies will fisheries stakeholders use in the face of climate change?
 - What are the impediments to adaptation and adaptive capacity?





Composite Award New Projects

- Marine Mammal Monitoring
- Bringing together fishermen, funders, and technology developers for innovation in fishing technology
- Modeling socio-economic sensitivity of Alaska communities to ocean acidification
- AK angler survey pretesting development
- Aquaculture and MES
- Exploring the Nexus of Subsistence, Personal Use, and Recreational Fisheries (SPURFs) in Alaska
- Wholesale Market Profiles for Alaska Groundfish and Crab Fisheries 2020/2021
- The Cross Regional Comparison of Cultural Ecosystem Services and Non-commercial Fishing (CESAN)



Thank You!!

Many thanks to PSMFC

Dave Colpo, Senior Program Manager Sarah Kirk, Administrative Support Specialist Michael Arredondo, Grants & Contracts Specialist Courtney Paiva (she who makes everything work!) Bob Ryznar, AKFIN/PacFIN Program Manager (and team: Jenny Suter, Matt Callahan) Jean Lee, AKFIN Data Analyst Extraordinaire Geana Tyler, EDR coordinator Rob Ames, AKFIN/PacFIN Data Analyst Mike Fey, AKFIN Data Analyst Brett Holycross, PSMFC GIS Team **PSMFC FMA Team Members** Van Hare and Brett Holycross (GIS team) neXus Data Solutions (Camille Kohler and her team; subcontractors)



Electronic Technologies

Development of electronic recording and reporting technologies

- Web applications for commercial fishermen operating under the Annual Deployment Plan for monitoring
- Data recording and transmission systems to inform harvester decision making and near-real time management
- Electronic monitoring (EM) to replace and/or supplement fishery observer data collections
- Development of innovative EM systems to improve reporting and/or cost-efficiency of EM
- Partnering with industry to test and refine trawl EM for pelagic pollock fisheries (trawl EM exempted fishing permit)



Economic Data Report (EDR) Program

PSMFC is the Data Collection Agent for NPFMC's Economic Data Reports (EDRs)

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

Innovations:

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

			CRA	B EDR	A80/G0	DA TRAV	VL EDR	A91			
5)	EDR Reporting Year	CV	C P	Processors	A80/G OA CP	CV	GOA SP	CTR	Fuel Survey	Vessel Master Survey	All EDR Forms
	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
ed	Total To-date	1870	74	317	228	264	41	0	498	859	4151



Longline Survey and Groundfish Tag Database Management

- Customized data acquisition software for survey
- Added variance to population estimates in SQL and on AKFIN for us in assessments
- Distributed data via AKFIN website
- Groundfish tag database
 - Incorporated archival and satellite tag data for AFSC into MESA database
 - Developed a mobile application to improve tag reporting by fishers



Stock Assessment

Catch Data Observer Data Longline Survey RACE Survey Crab Data

Longline Survey

Data sourced by the Longline Survey Database with catch, species codes, sable <u>Background Instructions</u>, or the <u>RPN How-to</u>. *Note: The AKFIN customized pro*

Longline Survey Reports

Raw Longline Survey Data

Catch Summary View

Open Catch summarized by stratum sourced by the NMFS AFSC CATCH_SUMMARY_VIEW source area name, or NMFS area code. Available 1979 - present. *Now featuring an interactive*





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:

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



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 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 Simulation Tool Predicts location choices and estimates policy impacts

FishSET: Spatial Economics Toolbox for Fisheries

Alan Haynie (AFSC), Melanie Harsch and Bryce McManus (PSMFC) + many collaborators

- Ongoing AFSC/PSFMC
 project to improve fleet
 behavioral modeling
 throughout the U.S.
- FishSET will be a central modeling tool of the CFI and will also be used to minimize costs of any future closed areas.



Electronic Monitoring of Large Sharks

- Collaboration with MESA (Cindy Tribuzio), FMA (Andy Kingham), AKRO (Jason Gasper), APU (Brad Harris), PSMFC/EM Innovation (Suzanne Romain, Kelsey Magrane, Craig Rose), and industry
- Project initiated spring 2021
- Objectives
- Examine how well EM systems can detect and ID large sharks when not brought onboard/drop-off
- Estimate size of large sharks
 Incorporate EM data stream into Catch Accouting System for use in stock assessments





Paths of Entry

Marysia Szymkowiak (AFSC) and Melissa Rhodes-Reese (PSMFC)

- Examining how entry manifests itself across Alaska's diverse fisheries and whether and how that entry has changed over time.
 - Digging into "greying of the fleet" issues and understanding upward mobility
- Includes understanding workforce development efforts in Alaska's commercial fisheries.
 - How do those efforts compare to other fisheries workforce development efforts across the country?
 - How do they compare to workforce development efforts in agriculture?



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

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