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Agenda Item H.1.b
Supplemental NWFSC Presentation 1
September 2019

Groundfish Science Report

Owen S. Hamel

Northwest Fisheries Science Center

September 15, 2019



Overview

- Pacific Halibut Bycatch
- Estimated Discard and Catch of Groundfish
- At-sea Investigations
- Recent Publications



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Pacific Halibut Bycatch in U.S. West Coast Fisheries (2002-2018)

Jason E. Jannot,
Kate Richerson, Kayleigh Somers,
Vanessa Tuttle, Jon McVeigh



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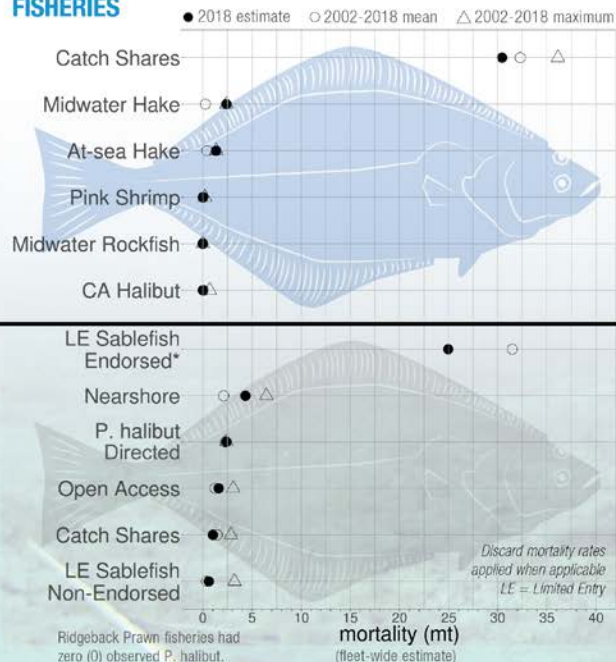


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PACIFIC HALIBUT BYCATCH 2002-2018

CONTACT INFO: Jason Jannot
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jason.jannot@noaa.gov

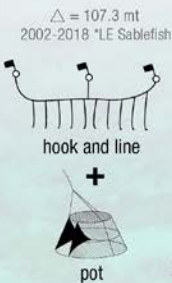
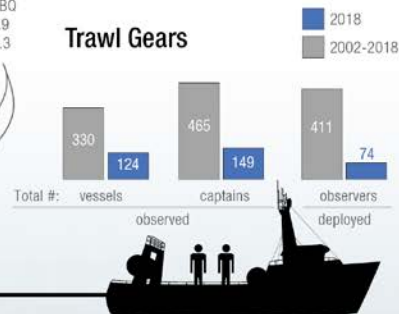
<http://tinyurl.com/PhalibutReports>



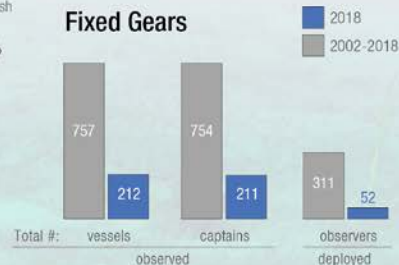
2018 Catch Shares IBO
Allocation (mt) : 79.9
Attainment (mt): 31.3



Trawl Gears



Fixed Gears



Pacific Halibut Bycatch Observed 2002-2018



Pacific Halibut Catch
(mt / sq km)

2.74 - 5.99	6 - 11.04
0.07 - 0.73	11.05 - 16.97
0.74 - 2.73	

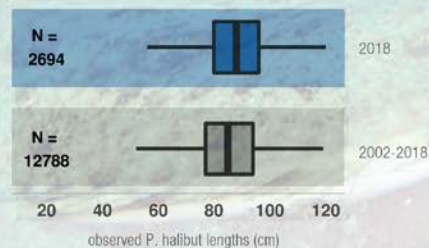
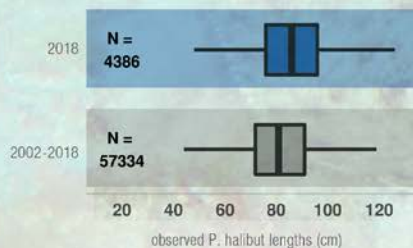
0 75 150 300 N Miles

Map by K. Somers

Trawl Gears



Fixed Gears



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Sector		2017 (mt)	2018 (mt)
IFQ vessels, non-EM (IBQ allocation = 79.9 mt)		31.41	25.77
IFQ Electronic Monitoring EFP		5.47	6.88
At-sea Hake		0.55	0.66
Sablefish and OA Fixed Gear		41.71	29.87
P. Halibut Directed	discarded	2.26	2.39
	retained	116.2	135.0
State Fisheries		1.55	1.61

**Pacific
Halibut
Mortality
Estimates**

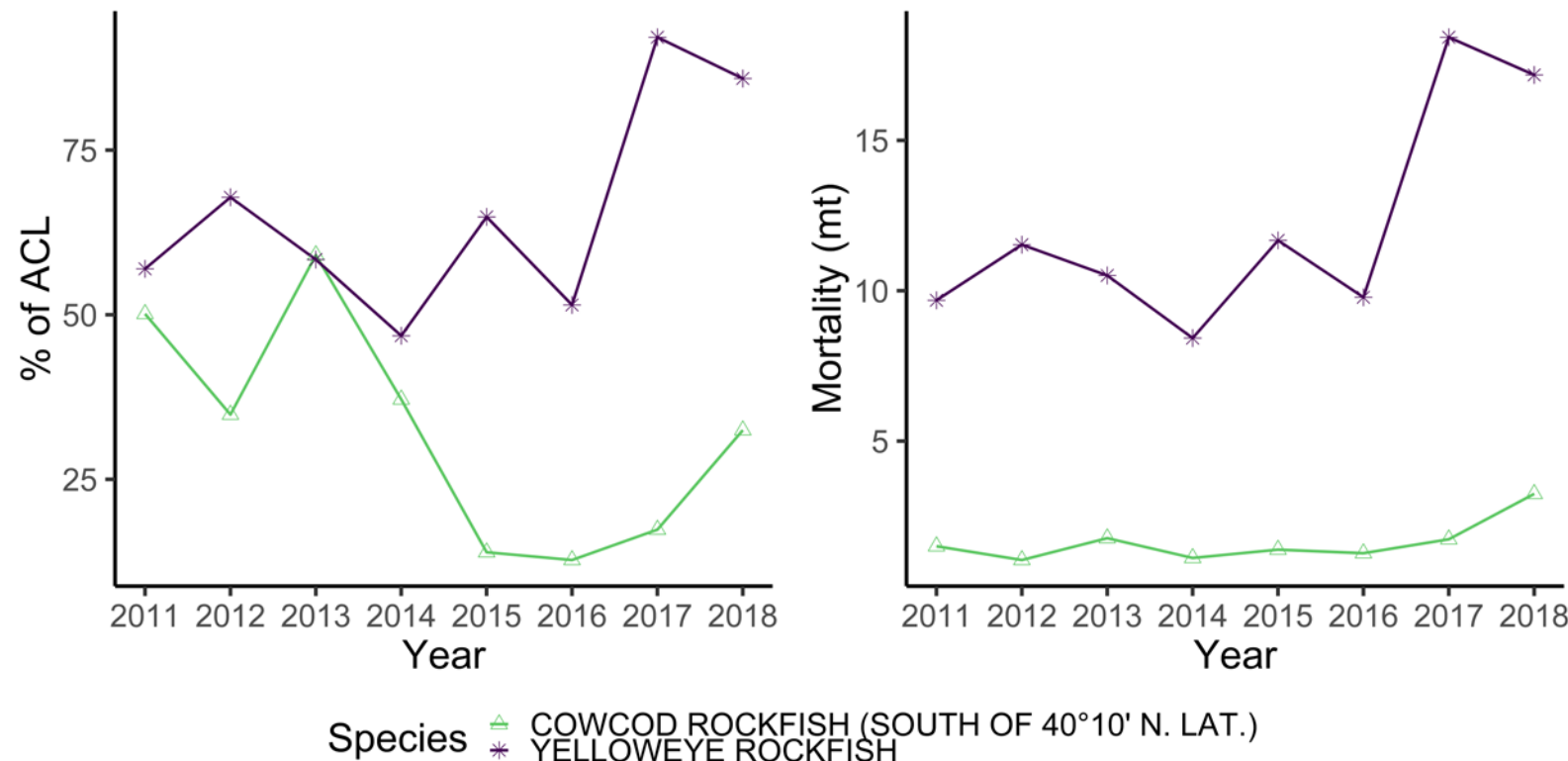
Estimated Discard and Catch of Groundfish Species in the 2018 US West Coast Fisheries

Kayleigh A. Somers, Jason Jannot, Kate Richerson,
Neil Riley, Vanessa Tuttle, Jon McVeigh
September 2019

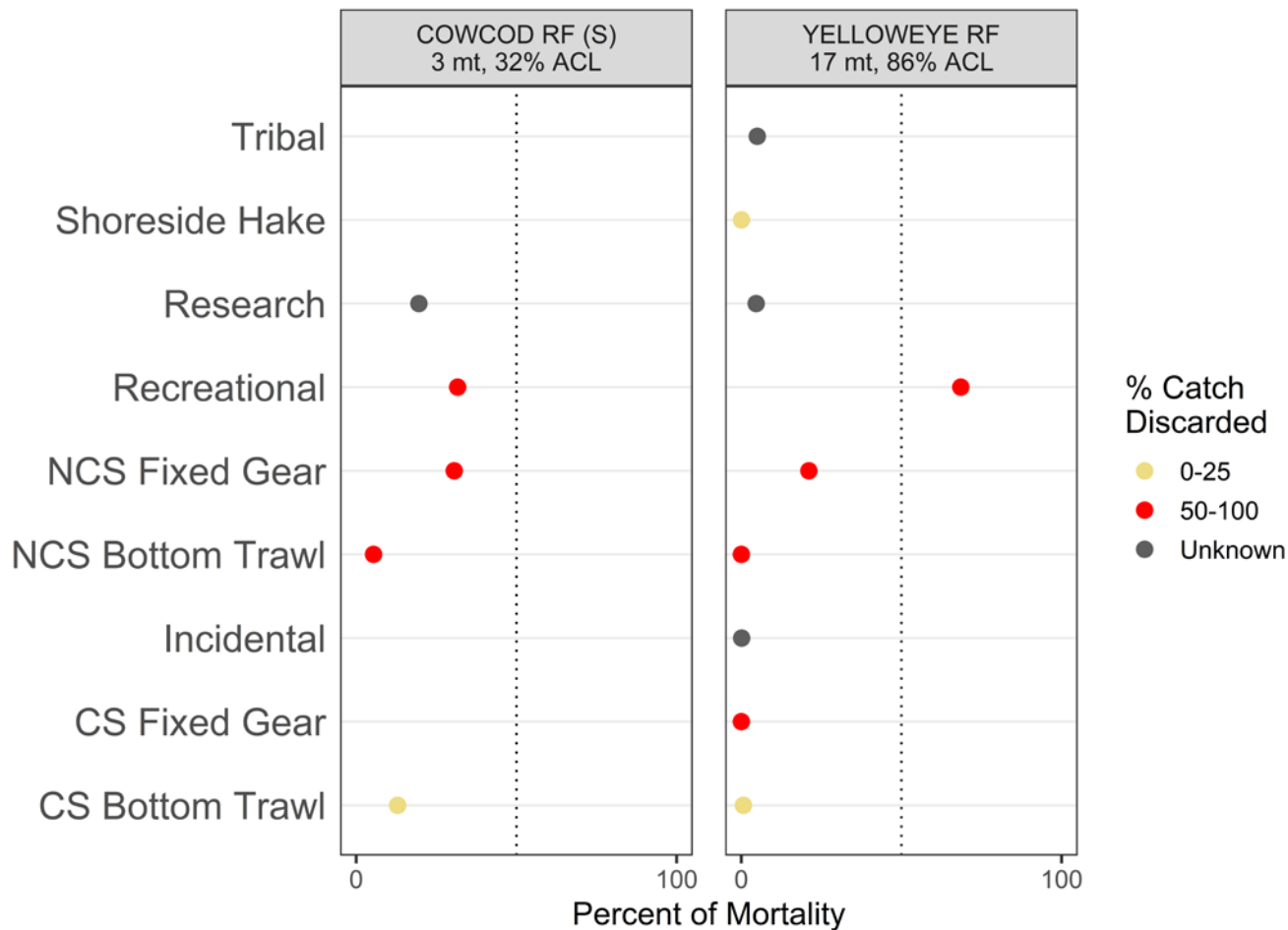


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Harvest Goal Attainment of Rebuilding Species

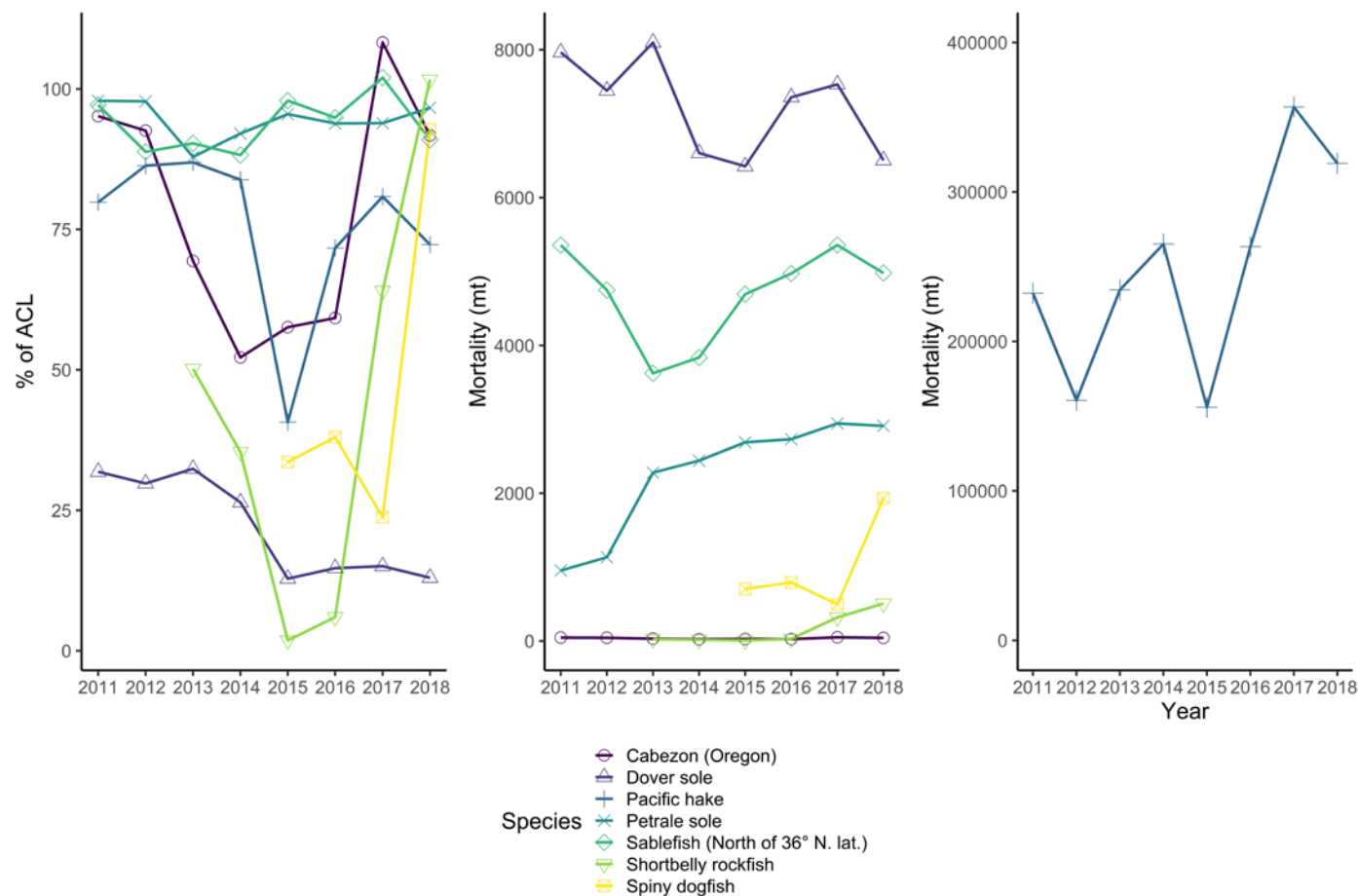


Mortality Contribution to Rebuilding Species



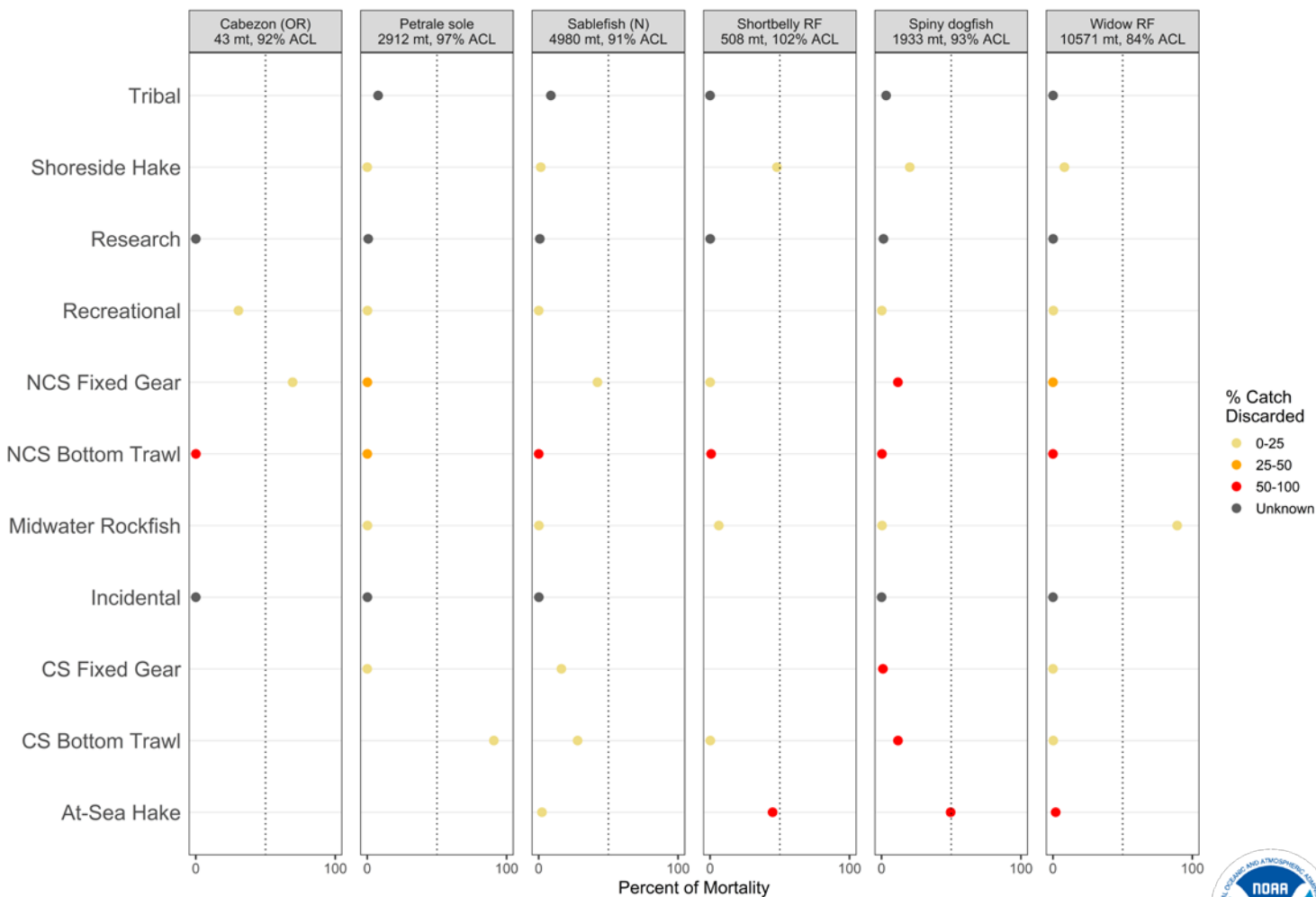
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Harvest Goal Attainment of Highly Targeted and Attained Species



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Mortality Contribution to Highly Attained Groupings



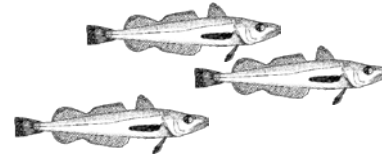
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At-sea Investigations



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2019 Summer Pacific Hake Acoustic-Trawl Survey



NWFSC & DFO Canada

65 DAS FSV *Shimada* (13 June-20 Aug)

35 DAS FV *Nordic Pearl* (17 Aug-18 Sept)

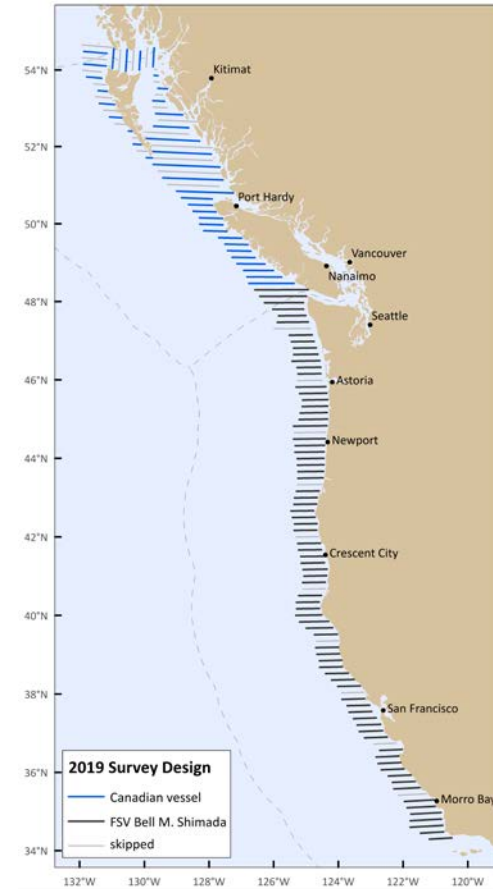
50 to 1500 m depth or 35 nmi offshore

10 nmi spacing, some 20 nmi due to time

Too soon to comment on biomass

Hake more aggregated S than N of Crescent City

Potential for DFO extension into SE-AK



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2019 Summer Pacific Hake Saildrone Survey

2018 work validated the technology
No trawling for Hake, so analysis limited

2019 Saildrones (4) covered *Shimada* transects
+/- 3-5 days offset, preferably less
Allows comparison with survey acoustic-trawl results

NWFSC staff: Can Saildrone be used for acoustic ID of Hake?
NWFSC-funded postdoc:

Can Saildrones be used for Hake biomass estimate?
Can Saildrones be used for Hake stock assessment?



Recent Publications



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Special Issue of Fisheries Research on Recruitment: theory, estimation, and application in fishery stock assessment models

The Center for the Advancement of Population Assessment Methodology (CAPAM) hosted a technical workshop on this topic in Miami, FL, in late fall of 2017.

Talks and participants included many talks and subsequent manuscripts originally developed for the PFMC SSC sponsored Groundfish Productivity Workshop (December 2016).



Effects of recruitment variability and fishing history on estimation of stock recruitment relationships: Two case studies from U.S. West Coast fisheries

Xi He and John Field

Fisheries Ecology Division, Southwest Fisheries Science Center

This paper highlights the role of increasing recruitment variability in complicating efforts to correctly estimate steepness (the parameter in the stock recruitment relationship that most dramatically impacts stock productivity), even in well-informed stock assessment models.

The analysis also evaluates the potential for bias in estimates of steepness that can result when using an informative prior in assessment models.



Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres



Effects of recruitment variability and fishing history on estimation of stock-recruitment relationships: Two case studies from U.S. West Coast fisheries

Xi He*, John C. Field

Fishery Ecology Division, Southwest Fisheries Science Center, National Marine Fisheries Service, 110 McAllister Way, California 95060, USA



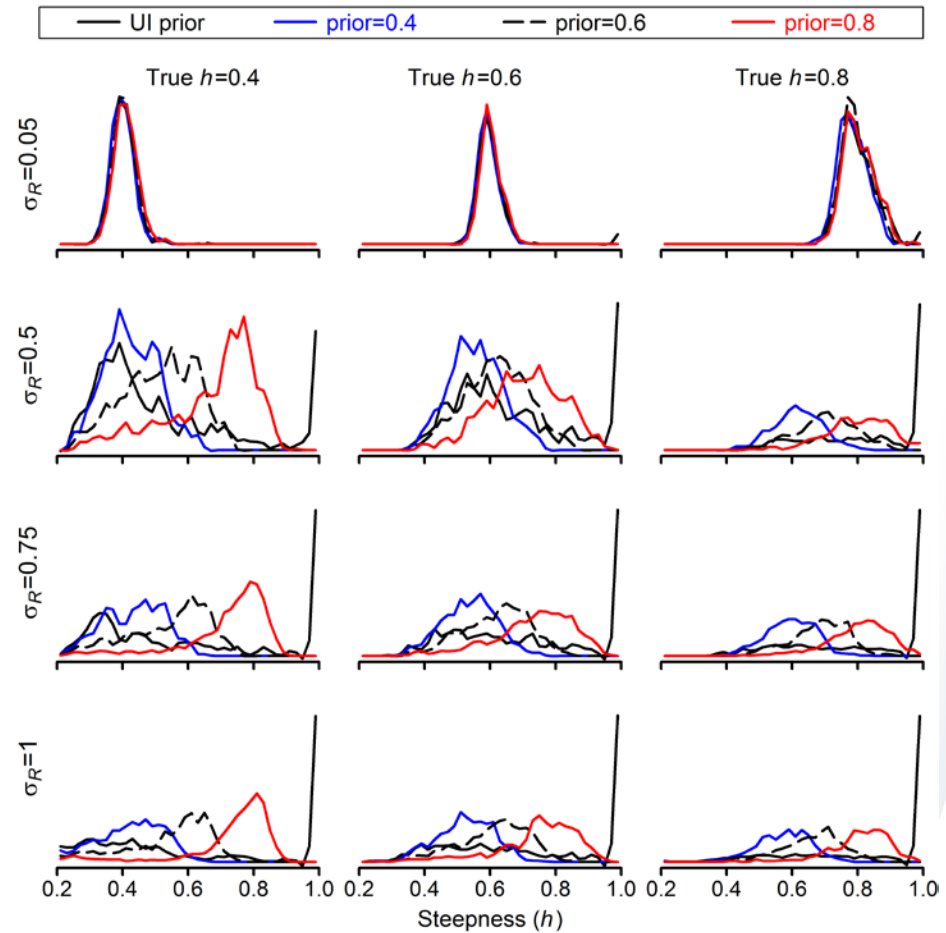
ARTICLE INFO

ABSTRACT



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One key finding,
without good contrast
in the stock trajectory,
the wrong prior is very
likely to lead to an
incorrect estimate for
steepness with even
just moderate
recruitment variability.



Character of temporal variability in stock productivity influences the utility of dynamic reference points

Aaron M. Berger

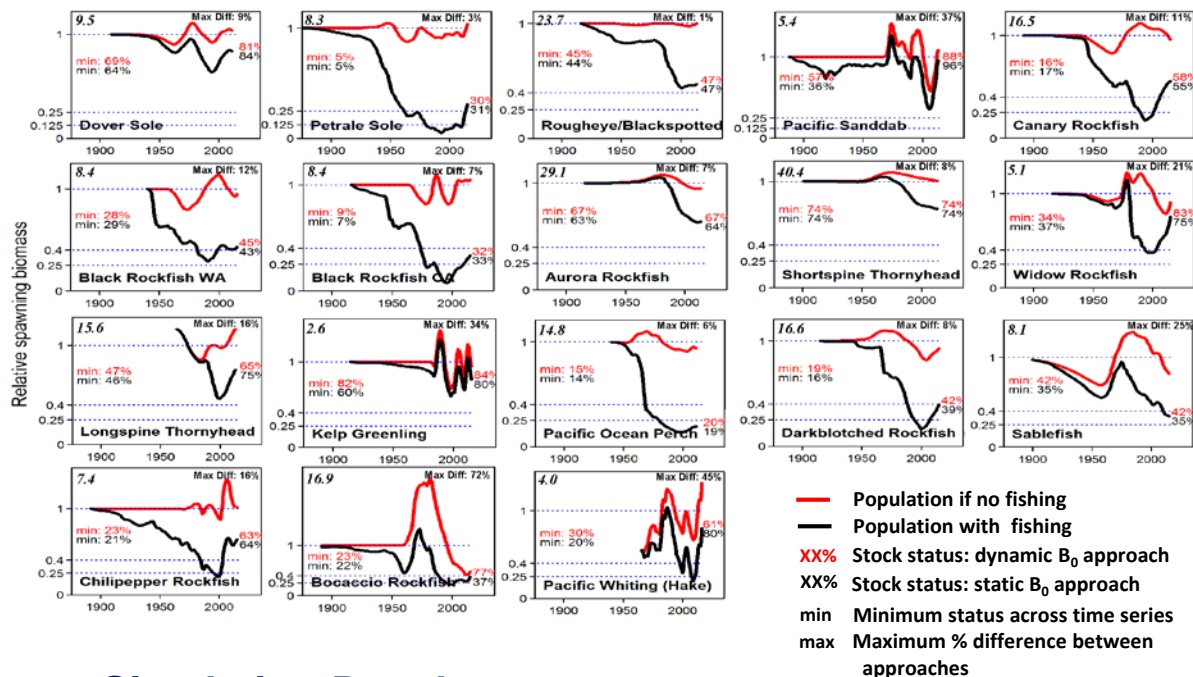
Fisheries Resource and Monitoring Division, NWFSC, NMFS-
NOAA, 2032 S.E. OSU Drive, Newport, OR, 97365

Fisheries Research (Accepted 27 November 2018)



Empirical Results:

Generally small differences (< 10%) between static B_0 and dynamic B_0 based indicators of stock status for groundfish, though up to 72% and spanning reference levels in some cases.



Simulation Results:

Trends in productivity paired with large contrasts in fishing mortality resulted in the largest differences between stock status approaches for all four life histories examined.

Uncertainty from incorrectly identifying changes in stock productivity generally outweighed that from initial equilibrium conditions.



Source water variability as a driver of rockfish recruitment in the California Current Ecosystem: implications for climate change and fisheries management.

Isaac Schroeder^{1,2}, Jarrod Santora³, Steven Bograd², Elliott Hazen², Keith Sakuma⁵, Andrew Moore⁴, Christopher Edwards⁴, Brian Wells⁵, John Field⁵

¹ Institute of Marine Science, University of California, Santa Cruz

² Environmental Research Division, Southwest Fisheries Science Center

³ Department of Applied Math and Statistics, University of California Santa Cruz

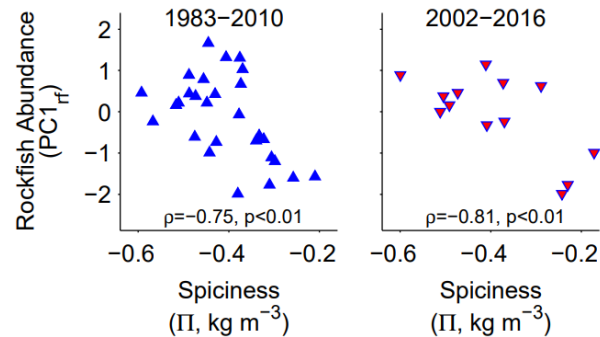
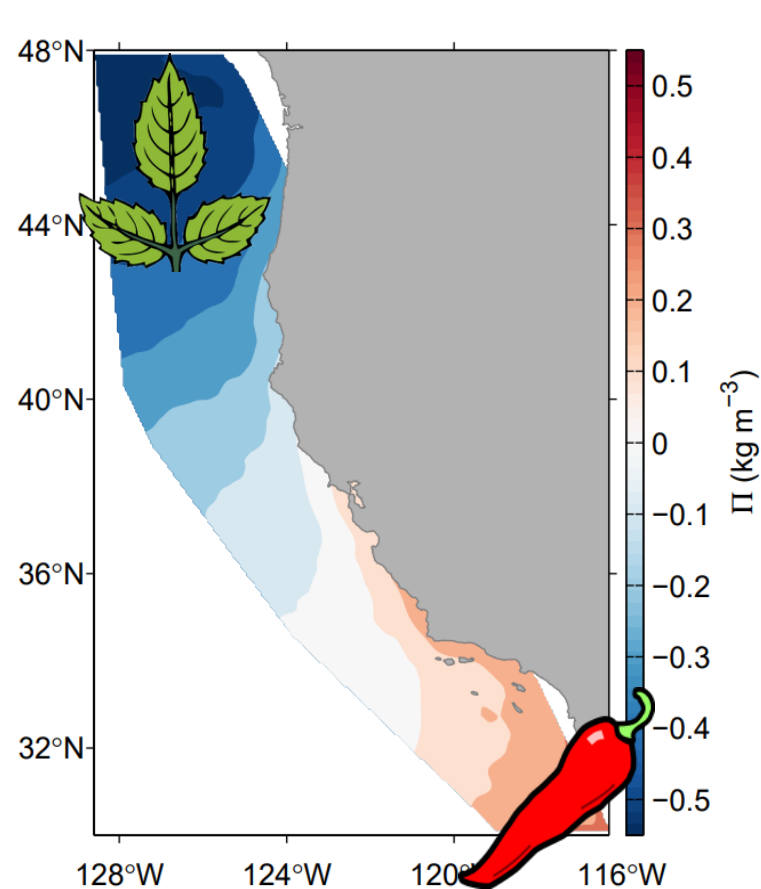
⁴ Department of Ocean Sciences, University of California Santa Cruz

⁵ Fisheries Ecology Division, Southwest Fisheries Science Center

Published in the Canadian Journal of Fisheries and Aquatic Sciences (volume 76: 950–960, 2019)

Highlighted in journal blog: <http://blog.cdnsiencepub.com/young-rockfish-survival-unexpectedly-high-during-the-blob-years/>





Demonstrates connection between rockfish recruitment (pelagic juvenile abundance) to the source waters of the California Current

Recruitment is better when subsurface (100-300 m) waters are “minty” (cold, fresh, subarctic origin), declines under “spicy” ocean conditions (warm, more saline, subtropical origin)

Coupling ocean models and observational data improves our understanding of recruitment processes, helps to explain unusual high abundance of recruits during the large marine heatwave, and will inform future climate change impacts

Overcoming challenges of harvest quota allocation in spatially structured populations

Katelyn M Bosley¹, Daniel R. Goethel², Aaron Berger¹, Jonathan J. Deroba³, Kari H. Fenske⁴, Dana H. Hanselman⁴, Brian J. Langseth⁵, and Amy M. Schueller⁶

¹ Fisheries Resource and Monitoring Division, NWFSC, NMFS, NOAA

² Sustainable Fisheries Division, SEFSC, NMFS, NOAA

³ Woods Hole Laboratory, NEFSC, NMFS, NOAA

⁴ Auke Bay Laboratories, AFSC, NMFS, NOAA

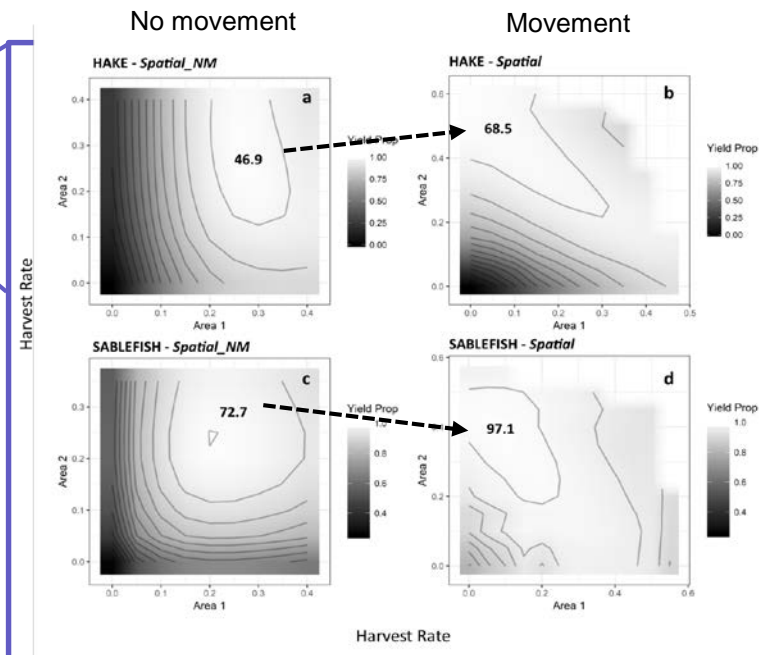
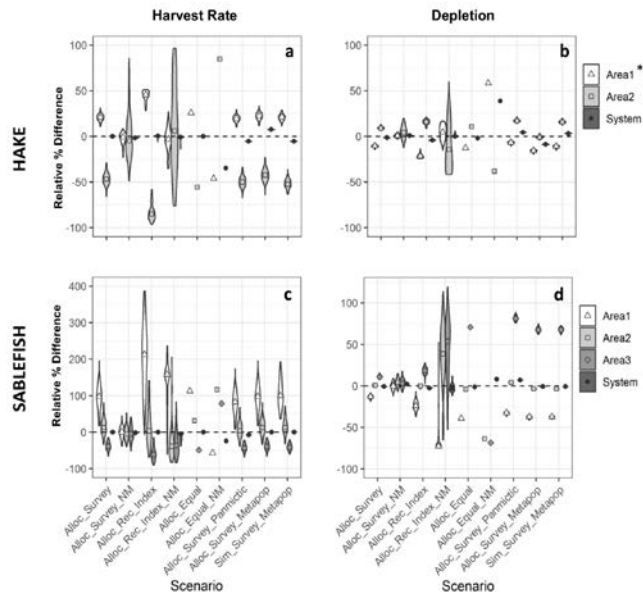
⁵ PIFSC, NMFS, NOAA

⁶ Beaufort Laboratory, SEFSC, NMFS, NOAA

Fisheries Research
Accepted 9 August 2019



A broader range of spatial harvest rate combinations that achieve 'pretty good yield' ($\geq 90\%$ system-wide MSY) are available when accounting for population connectivity



Using the proportion of total survey biomass in each management area to spatially allocate quota performed best for maximizing system yield when the true spatial structure was unknown, considerably outperforming equal allocation and allocation based on a recruitment index

Assessing the effects of climate change on U.S. West Coast sablefish productivity and on the performance of alternative management strategies

Melissa A. **Haltuch**¹, Z. Teresa A'mar², Nicholas A. Bond³, Juan L. Valero⁴

¹NOAA-Fisheries, NWFSC, Seattle, WA, USA.

² NOAA-Fisheries, AFSC, Seattle, WA, USA

³ University of Washington, JISAO, Seattle, WA, USA

⁴ CAPAM, La Jolla, CA, USA



Conclusions

Future sablefish recruitment is likely to:

- fall within the range of past observations

- exhibit decadal trends that result in recruitment levels that persist at lower levels (~ 2040) followed by higher levels (~2040 - 2060)

Climate Models (GCMs) capture long term sea level trends but less natural variability

40-10 and Dynamic B0 HCRs rarely trigger stock rebuilding plans

Dynamic B0 HCRs:

- Track decadal changes in productivity, thus *may* be more robust to future climate change

- But* perform similarly to the 40-10 HCR

- Could* be risk prone in cases where fishing pressure is causing biomass declines, allowing higher catches at low stock sizes due to reference points shifting lower through time.



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Conclusions

HCRs:

Prevent fishery closures

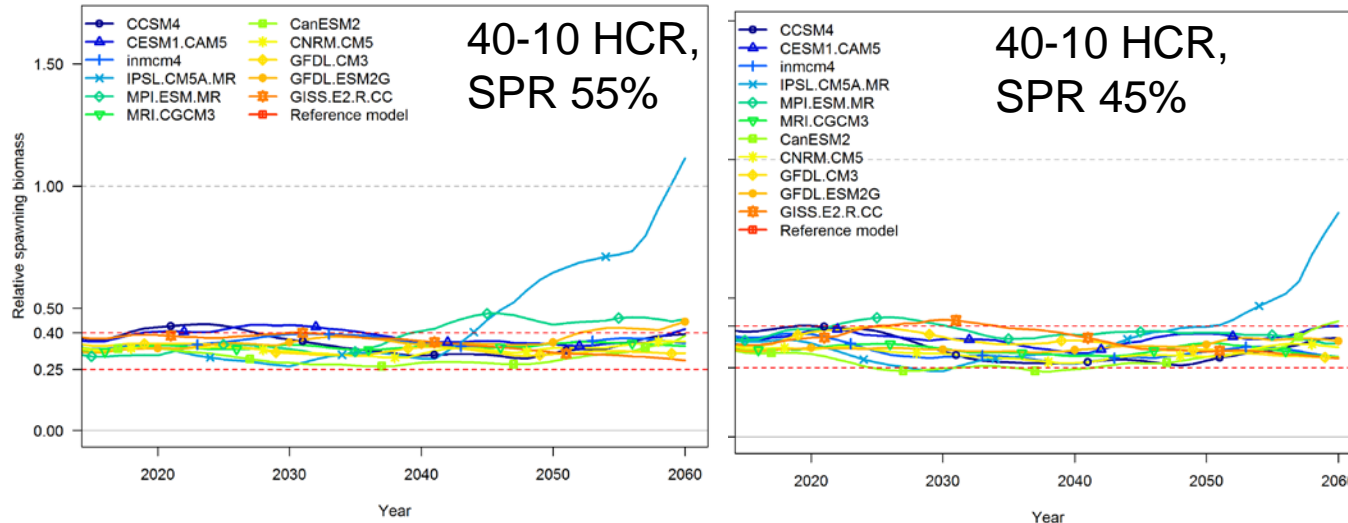
Project declining, then stabilizing or slightly increasing spawning biomass and catch trends

Maintain the stock in the precautionary zone

SPR 45% and target biomass are inconsistent policies

SPR 55% maintains stock around 40% B0

Future MSY Catches ~4100-5100 mt



Recent Advances in Management Strategy Evaluation: Introduction to the Special Issue “Under pressure: addressing fisheries challenges with Management Strategy Evaluation”

Daniel R. Goethel¹, Sean Lucey², Aaron Berger³, Sarah Gaichas², Melissa Karp⁴, Patrick D. Lynch⁵, John Walter¹

¹ Sustainable Fisheries Division, SEFSC, NMFS, NOAA

² NEFSC, NMFS, NOAA

³ Fisheries Resource and Monitoring Division, NWFSC, NMFS,
NOAA

⁴ ECS Federal, Inc., on behalf of Office of Science and
Technology, NMFS, NOAA

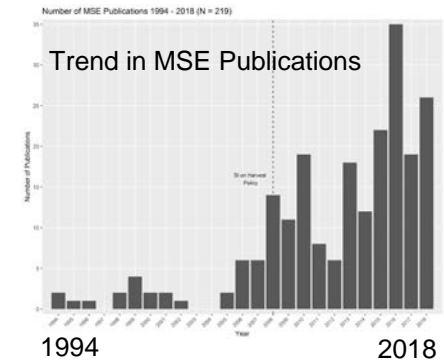
⁵ Office of Science and Technology, NMFS, NOAA

Canadian Journal of Fisheries and Aquatic Sciences
Accepted 5 August 2019



Key points:

- Summarizes special issue research articles (11 in total)
- Prominent themes:
 - Increasing use of MSE in fisheries management
 - Spectrum of MSE applications and a need for a common terminology
 - Improved risk assessment through expansion of MSE operating models
 - Importance of acknowledging MSE limitations
 - Difficulties of dimensionality
 - Improving stakeholder engagement



Author(s)	Topic	Focus
Carruthers and Hordyk	Indicators of MSE Misspecification	Developing indicators to detect MSE misspecification due to changing system dynamics
Cunningham et al.	Management Implementation Uncertainty	Establishing robust escapement strategies to management uncertainty and productivity regime-shifts
Deroba et al.	Ecosystem Dynamics	Implementing intermediate complexity models incorporating ecosystem dynamics for time-limited MSE processes
Feeney et al.	Stakeholder Engagement	Challenges for integrating public participation in open-invitation MSEs
Goethel et al.	Stakeholder Engagement	Methods for improving stakeholder engagement and communication in MSE processes
Harlyan et al.	Data-limited	Testing the performance of data-limited, multispecies HCRs
Hutniczak et al.	Socioeconomics	Valuing stock assessment frequency with bioeconomic MSEs
Miller et al.	Stakeholder Engagement	Improving communication in tuna RFMO MSEs
Sagarese et al.	Data-limited	Comparing the performance of data-limited HCRs through MSE of data-rich species
Wang et al.	Socioeconomics	Incorporating socio-economics models in MSE to better value tradeoffs in escapement strategies
Wiedenmann et al.	Retrospective Analysis of HCRs	Exploring the sustainability of applied HCRs through retrospective simulations

Note: MSE, management strategy evaluation; HCR, harvest control rule; RFMO, regional fisheries management organization

Other Recent Publications Include:

A multi-model approach to understanding the role of Pacific sardine in the California Current food web

Isaac C. Kaplan^a, Tessa B. Francis^b, André E. Punt^c, Laura E. Koehn^c, Enrique Curchister^d, Felipe Hurtado-Ferro^c, Kelli F. Johnson^a, Salvador E. Lluch-Cota^e, William J. Sydeman^f, Timothy E. Essington^c, Nathan Taylor^g, Kirstin Holsman^h, Alec D. MacCallⁱ, and Phil S. Levin^j

Long-term trends in ichthyoplankton assemblage structure, biodiversity, and synchrony in the Gulf of Alaska and their relationships to climate

Kristin N. Marshall^a, Janet T. Duffy-Anderson^b, Eric J. Ward^a, Sean C. Anderson^c, Mary E. Hunsicker^a, Ben J. Williams^d

Investigating the value of including depth during spatiotemporal index standardization

Kelli F. Johnson^a, James T. Thorson^b, and André E. Punt^c

Exploring the utility of different tag-recovery experimental designs for use in spatially explicit, tag-integrated stock assessment models

Daniel R. Goethel¹, Katelyn M Bosley², Dana H. Hanselman³, Aaron Berger², Jonathan J. Deroba⁴, Brian J. Langseth⁵, and Amy M. Schueller⁶



Questions?



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