Science, Service, Stewardship

Agenda Item G.1.b
Supp NOAA Science Center PPT
March 2016

Groundfish Science Report

Michelle McClure
Northwest Fisheries Science Center

March 12, 2016

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NWFSC NORTHWEST FISHERIES SCIENCE CENTER

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Overview

- Hake Assessment
- Winter Hake Survey
- FISHEyE Economic Explorer
- US National Bycatch Report
- Bycatch Reduction Engineering Project
- Western Groundfish Conference
- Science Report

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Hake Assessment

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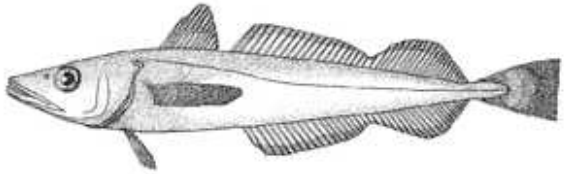
2015 Hake Fishery



- U.S.A.
  - Fishery started very well in May with high catch rates, but declined as season progressed
  - Many vessels stopped fishing because it was not economical
  - 47.4% of the U.S. quota was caught
- Canada
  - Fishing was variable throughout the year with the best fishing reported at various times
  - Large aggregations of adult hake and of age-1 hake were reported
  - 31.8% of the Canadian quota was caught

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2016 Hake Assessment

- Improved acoustic survey estimates (index and age compositions) produced for 1998 – 2015.
- Coastwide fishery age compositions:
  - Age 5 (2010 year class) was dominant making up 70% of the catch
  - Age 1 (2014 year class) was 3.7% of the catch
- Estimated large 2010 and 2014 year classes.
- Recent biomass increasing.
- 2016 status (relative spawning biomass) is 78.9%, but highly uncertain.
- A 3% probability that relative spawning biomass is less than target (40%) in 2 years with catches of 500,000 mt in 2016 and 2017.

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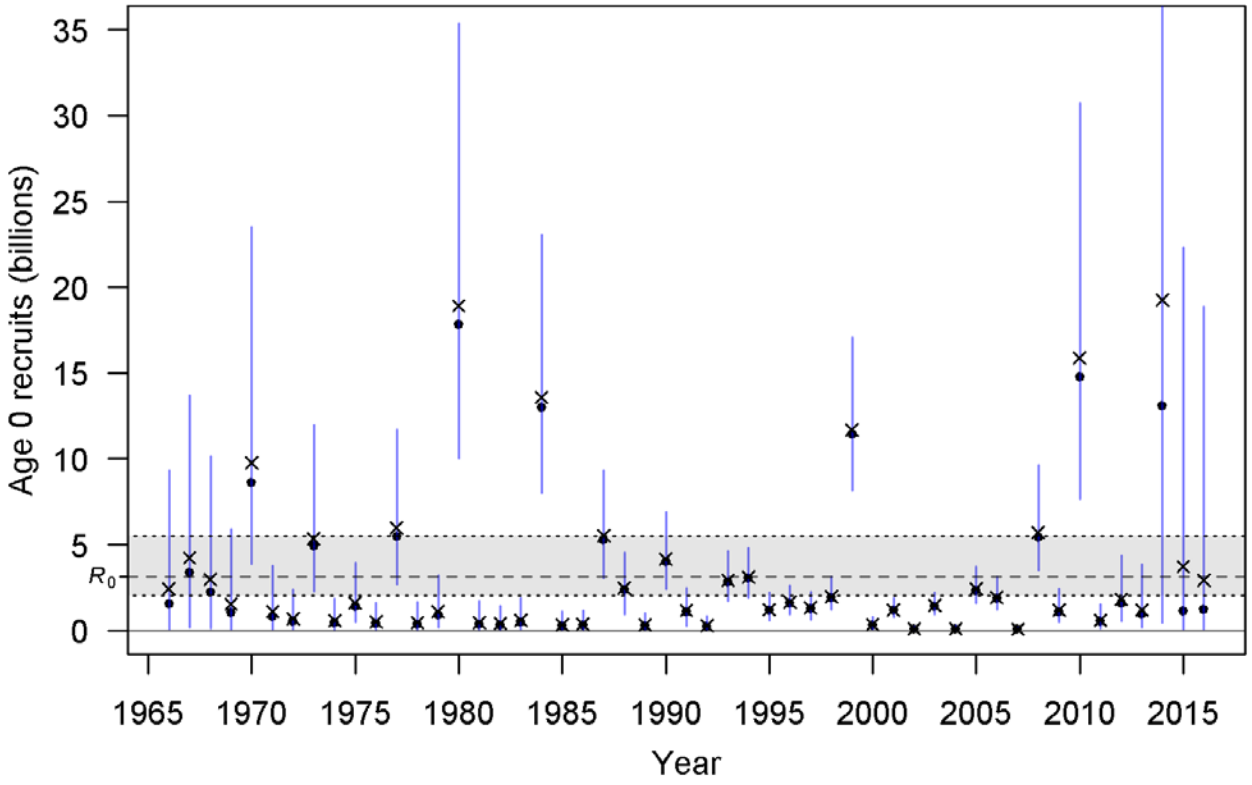
Estimates of recruitment



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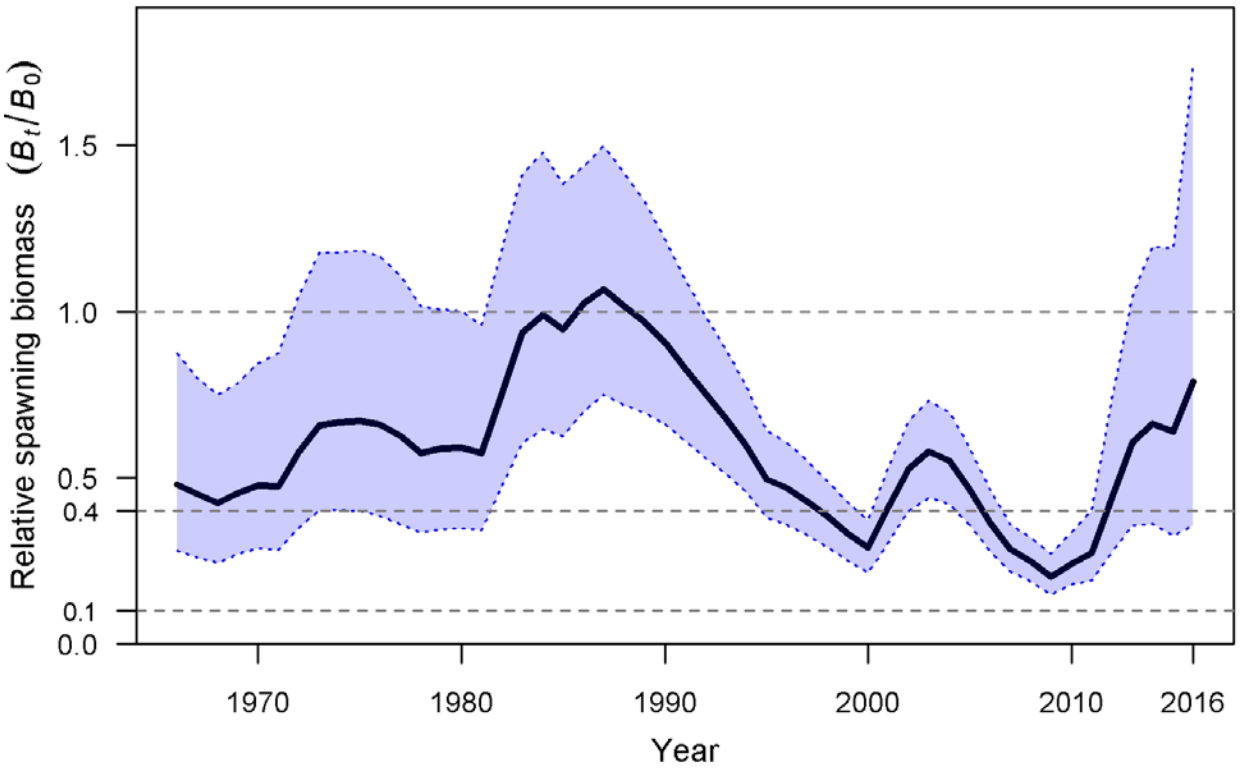
Relative spawning biomass (depletion)



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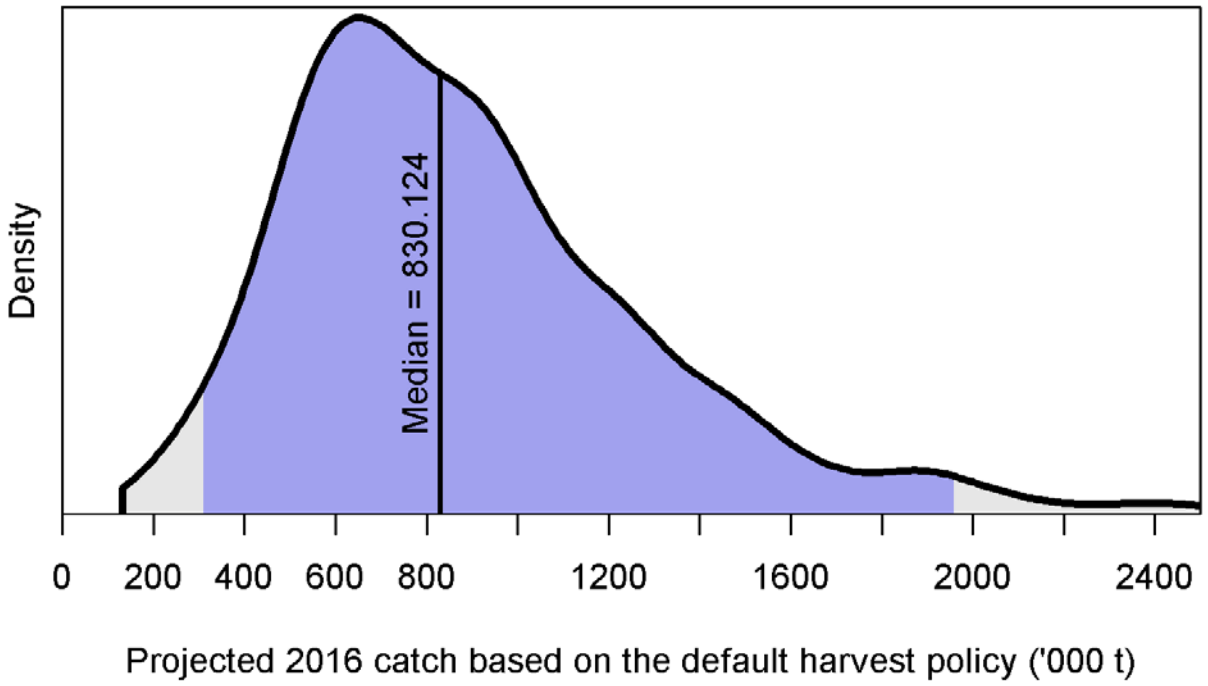
Catch advice for 2016



* Highly uncertain 2014 recruitment has very little effect on projected 2016 catch

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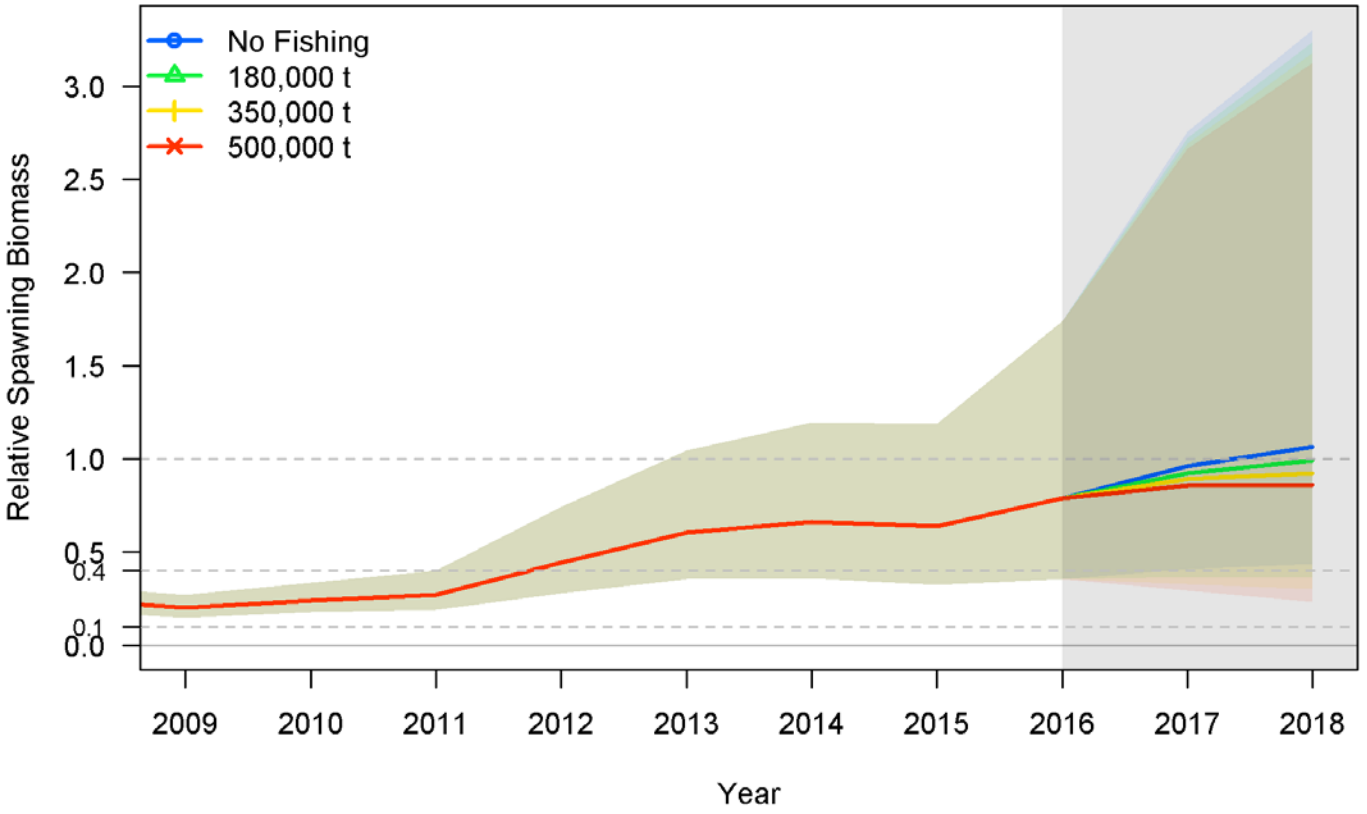
Forecasts



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Winter Hake Survey

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2016 Winter Hake Survey - Goals

Migratory stocks surveyed during spawning

In summer, hake are from CA to BC (or AK)

West Coast winter hake survey?

The goal of this survey is to characterize the distribution of spawning hake, spawning hake aggregations, and the fish within those aggregations, in order to evaluate the feasibility of, and inform the design of, a winter spawning hake biomass survey.
(+To address major gaps in our understanding of hake biology)

Motivation was the unknowns, not biomass

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2016 Winter Hake Survey - Outcome

We found hake in winter

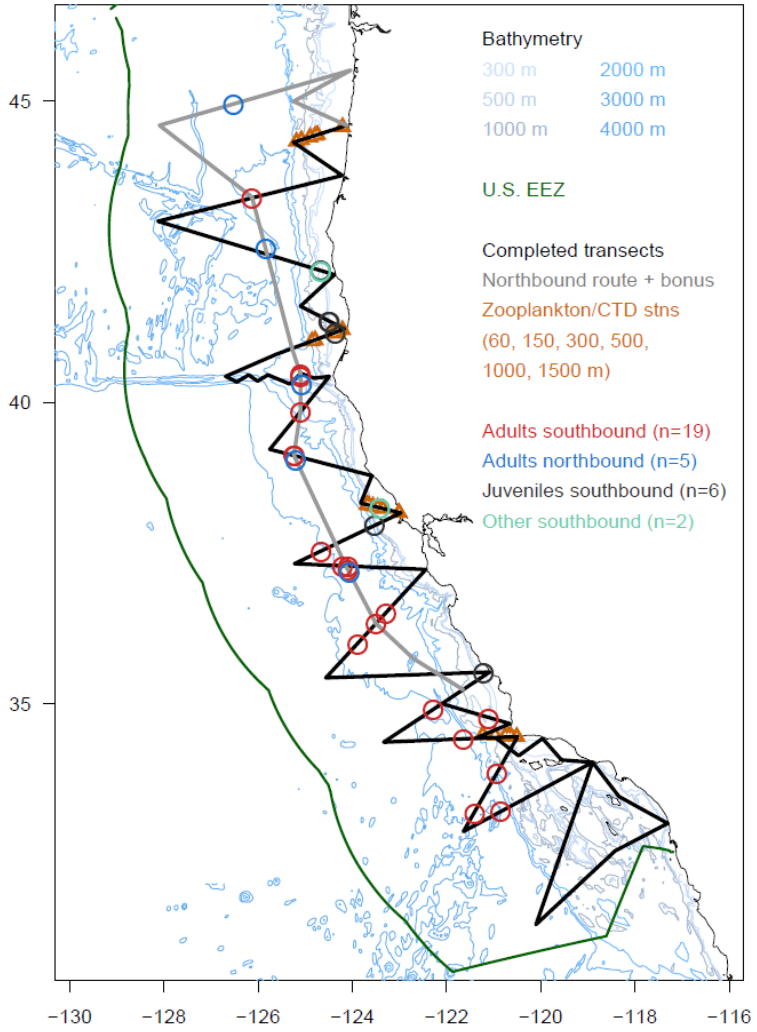
- Typically over bottoms >2,000 m
- Long, thick layers not schools
- Oceanographic link?

Acoustic identification is clear

- Obvious signal (automate?)
- Clean catches of age-3+ deep
- Age-1s & -2s near shelf break

Biology is complicated

- Undergoing diel migration
- Male:female ratios varied
- Range of maturities



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FISHEyE goes Live

Online, interactive tool from FRAM's Economic and Social Science Research team enables users to examine the West Coast Groundfish Trawl Catch Share program's economic impacts on participants and local economies.

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FishEye Online Tool

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FishEye – Ongoing Development

Currently, FISHEye provides a Net Revenue Explorer tool for catcher vessels.

https://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/

Next Steps

- Adding catcher-processors, motherships, and first receivers and shorebased processors to the Net Revenue Explorer application.
- Adding new tools for exploring other performance metrics for the West Coast Groundfish Trawl Catch Share Program.

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U.S. National Bycatch Report

Second update to the first edition released in February 2016 with contributions from FRAM scientists Kayleigh Somers, Vanessa Tuttle, Jason Jannot, and Yong-Woo Lee.

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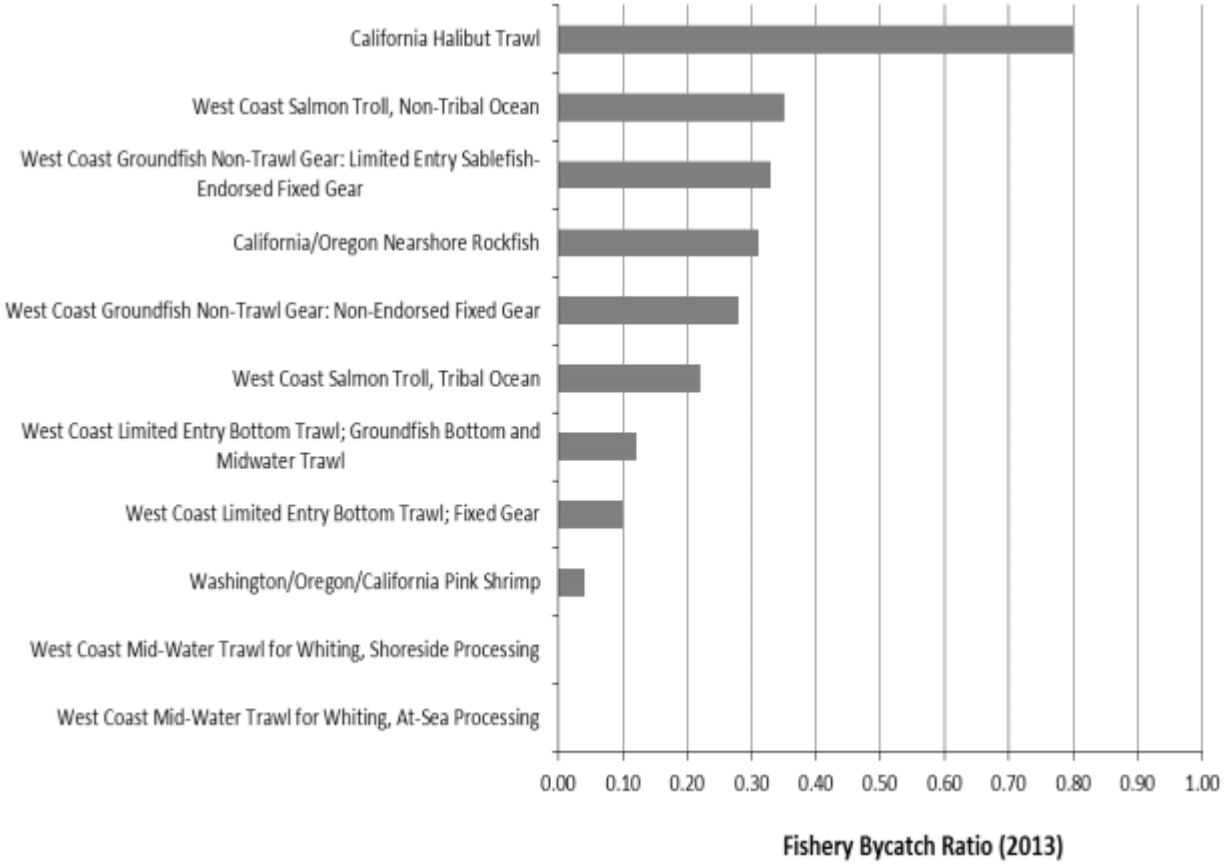
2013 West Coast Bycatch Estimates

Fishery bycatch ratios for 11 West Coast fisheries based on 2013 data.



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Bycatch Reduction Engineering Program Report to Congress

Released February 2016

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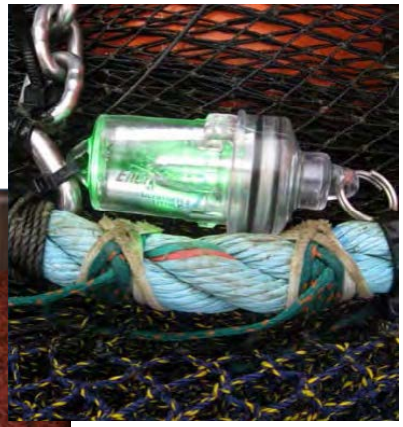

Report highlighted several 2014 & 2015 Pacific Coast groundfish projects, including:

- Using LED lights to reduce eulachon and groundfish bycatch in the shrimp fishery
  > *Reduced bycatch of protected eulachon by up to 91 percent*
- Using flexible sorting grates to reduce Pacific halibut, sablefish and rockfish bycatch in West Coast bottom trawl flatfish fishery
  > *Reduced bycatch of sablefish by 97 percent*

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National Bycatch Reduction Engineering Program Pacific Coast Projects *2016* Field Season

- PSMFC - Examining the use of artificial illumination to reduce rockfish bycatch in the west coast groundfish bottom trawl flatfish fishery
- PSMFC - Modifying trawl selectivity to reduce Chinook salmon bycatch in the Pacific hake fishery
- PSMFC – Continuation of ongoing research on the effectiveness of netting turned 90 degrees to reduce bycatch in the bottom trawl fishery
- Hanan and Associates - Testing potential bycatch reduction from deep-set compared to shallow-set pelagic longline fishing targeting swordfish in the California Current
- Pfleger Institute - Strategic deep-setting for swordfish: Developing an alternative for the California drift gillnet fishery


West Coast Groundfish Conference
species
environmental
Role
juvenile
fishing
surveys
transport
groundfish
growth
ocean
ratio
Parturition
otoliths
light
example
acidification
video
spawning
Preliminary
californicus
deviations
biogeographic
experience
population
oxygen
recompression
Pacificus
biology
Flatnose
California
West
fish
indicator
otolith
quota
seabird
Marine
used
hook
tool
offshore
midwater
habitat
timing
size
physiology
vermilion
larval
validation
deepdwelling
Double
halibut
use
Using
rockfish
Pacific
mortality
Fisheries
Puget
optimization
reduce
central
Bering
Selastes
fishery
reduction
isotope
sunset
index
device
180
value
Sea
design
seasonality
survival
Gear
Gulf
study
along
Alaska
bycatch
survey
cod
results
within
plate
microchemistry
Avoiding
Thaleichthys
miniatus
suffering
life
lander
perch
area
effects
Improving
stock
Rov
goodei
Paralichthys
microlepis
electronic
stable
structure
Alaskan
water
fishermen
devices
cowcod
Reserve
relative
allocation
natural
indices
maturity
yelloweye
bocaccio
black
variability
modeling
foraging
spatiotemporal
strategy
temperature
barotrauma
Constrained
longline
dynamics
agespecific
uncertainty
sablefish

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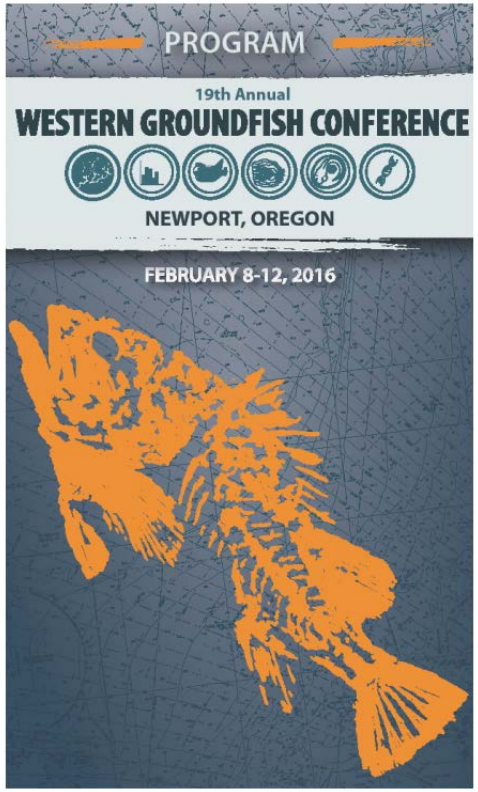
19th Western Groundfish Conference



- WGC represents a continued tradition dating back to the first conference at Gleneden Beach, Oregon in 1981.
- Biennial forum held in Pacific coast communities from California to Alaska.
- Showcases research on the biology, fisheries, ecology, habitats, assessments, and management of groundfishes in the eastern North Pacific and Arctic Oceans.
- Over 225 participants in 2016!
- 78 oral presentations and 57 posters.
- Significant support for and participation by students.
- Included Canada-U.S. Groundfish Technical Subcommittee workshop, *Developing Electronic Data-Gathering Systems for Marine Fisheries.*

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Participation and Sponsorship across Agencies, Academia, Industry and Environmental Community

20th Western Groundfish Conference in 2018 somewhere in California

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Science Report

Papers Accepted and Published since November, 2015

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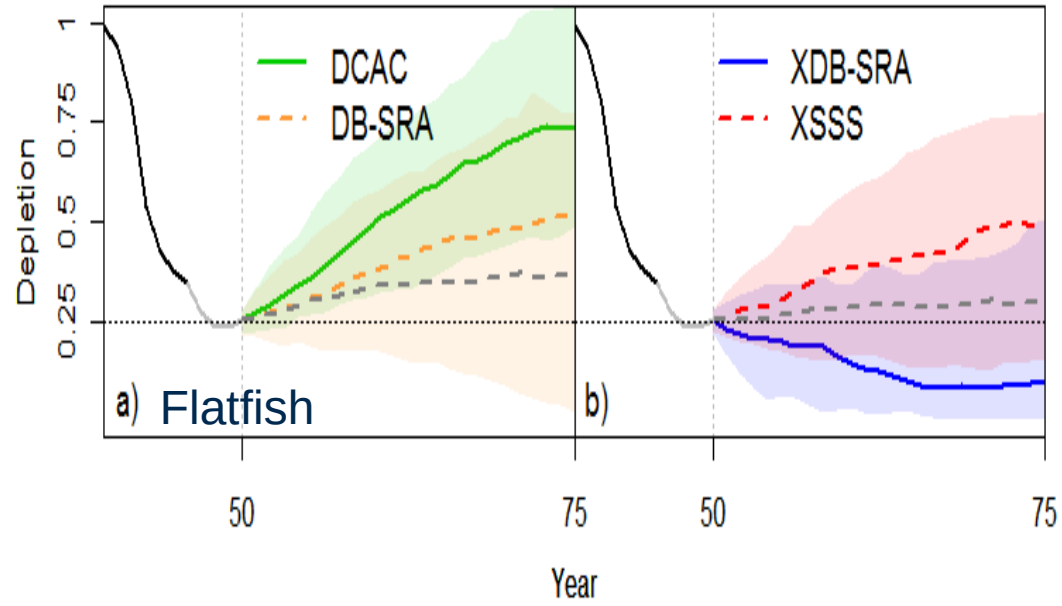
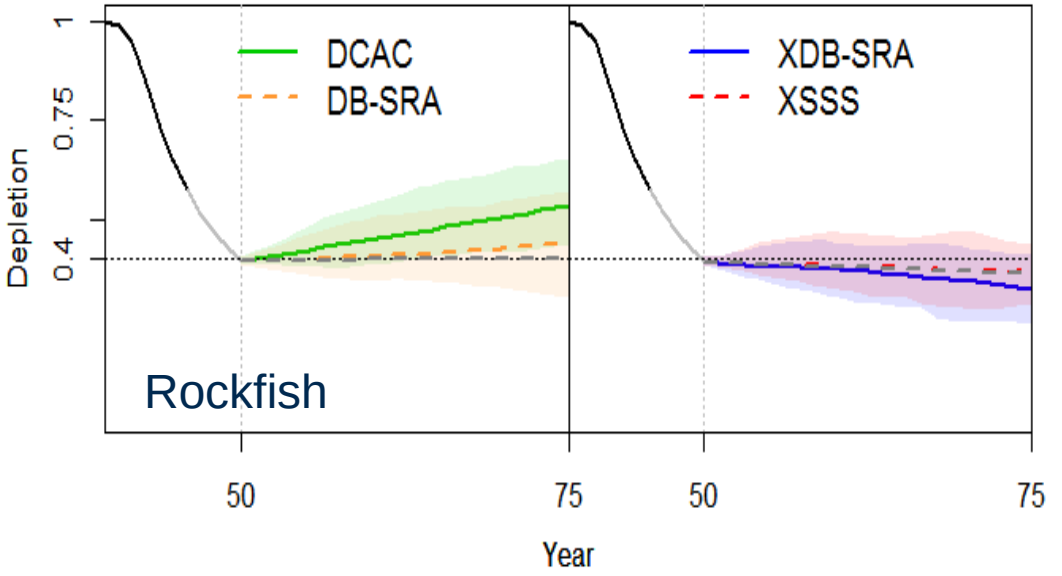
Evaluating the performance of data-moderate and catch-only assessment methods for U.S. west coast groundfish

Chantel Wetzel[1,2], Andre Punt[2]

[1] NWFSC/NMFS
[2] University of Washington

Fisheries Research, 171: 170-187, 2015.





- Evaluated the performance of data-limited and data-poor (category 2 & 3) assessment methods for flatfish and rockfish stocks.
- XDB-SRA is extremely sensitive to non-informative index data – resulting in overfishing (e.g. flatfish).
- Despite short-term poor estimation, over time the data-limited methods improved performance with increasing index data resulting in improved harvest estimates.

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Safety Incidents in the West Coast catch shares fisheries

February 2016

Lisa Pfeiffer

Study featured in national article on catch shares and safety on NPR.

http://www.npr.org/sections/thesalt/2016/02/16/466612148/study-program-to-protect-fish-is-saving-fishermens-lives-too

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Annual fatality of fishers and all US workers

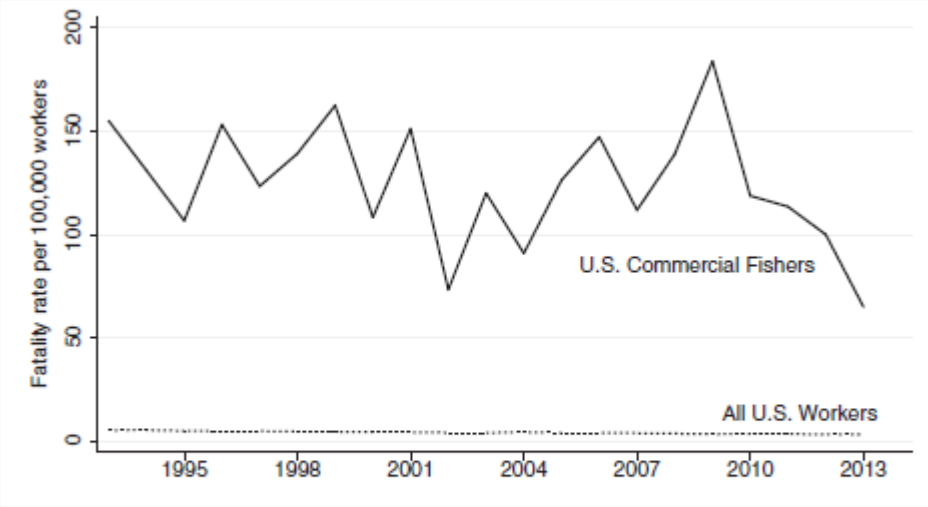

Fig. 1. Annual fatality rates of fishers and all workers in the United States. Figure was created with data available from the Bureau of Labor Statistics. Note: 1993 is the first year in which data are available online.

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Change in annual average of fishing on high wind days

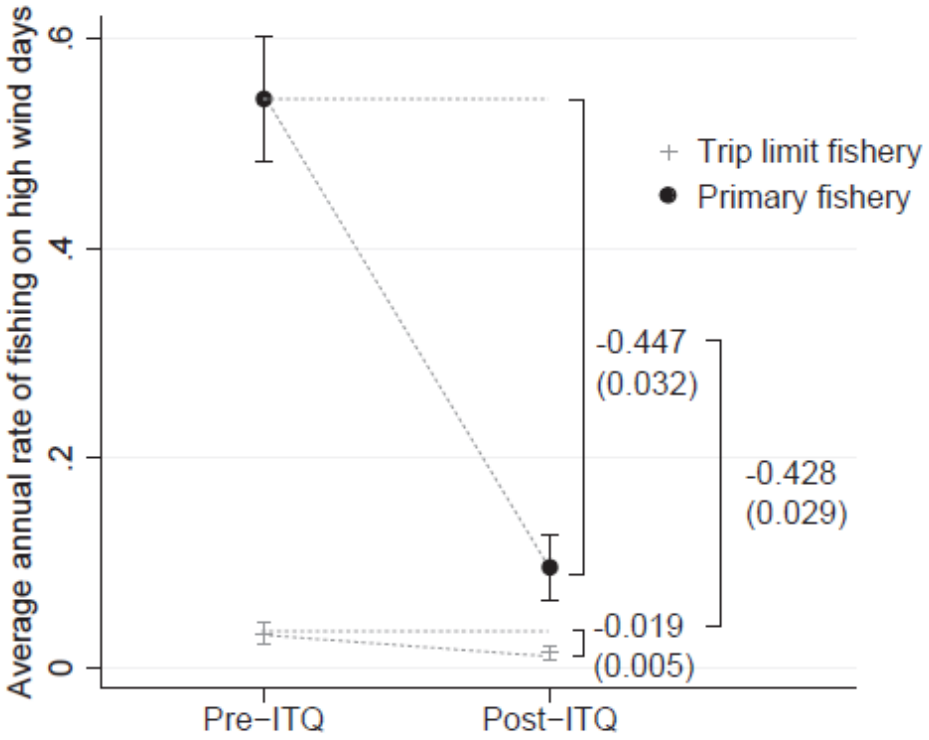

Fig. 2. Change in the annual average rate of fishing on high wind days. Estimates result from difference-in-differences regression of the annual vessel average rate of fishing on high wind days. Individual fixed effects included. Bars show 95% CIs around the estimates. SEs in parentheses. Number of observations: 5,396. $R^2 = 0.50$.

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Techniques for improving estimates of maturity ogives in groundfish using double-reads and measurement error models

Melissa A. Head[1], Gretchen L. Stokes[2], James T. Thorson[1], Aimee A. Keller[1]

[1] FRAM Division, NMFS/NWFSC
[2] Department of Fish and Wildlife Conservation, Virginia Polytechnic Institute and State University

Fisheries Research, 2016

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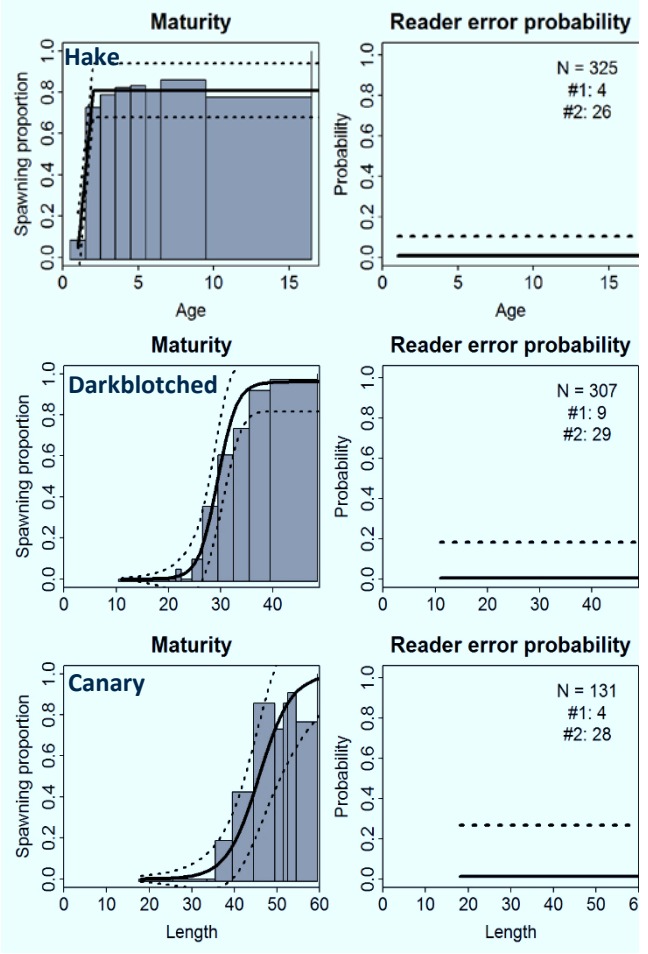
- Model: synthesized information from two maturity readers and flexibly estimated the maturity ogive
- Best fit models:
  - Hake: Maturity predicted by age, asymptote of 0.81 (indicating skipped spawning)
  - Darkblotched: Maturity predicted by length, asymptote of 0.96
  - Canary: Maturity predicted by length, asymptote of 1.0 (no skipped spawning)
- Reader error probability
  - samples marked as 'certain' by readers had <2% probability of maturity assignments disagreeing
  - Indicating that recording certainty is important when using multiple readers
  - Experienced reader (#1) recorded ~ 2% of samples as 'uncertain', ~11% for inexperienced reader (#2)



- Double reads: variation among two readers minimal
  - Research indicates new readers can be quickly trained and analysis is useable for management, level of certainty should be recorded
  - Double reads: important when using a new reader, determine imprecision and variance
- Flexible models that incorporate multiple covariates and estimate the maturity ogives, will provide more accurate results
- Important for monitoring shifts in maturity ogive, especially in anomalous oceanographic years

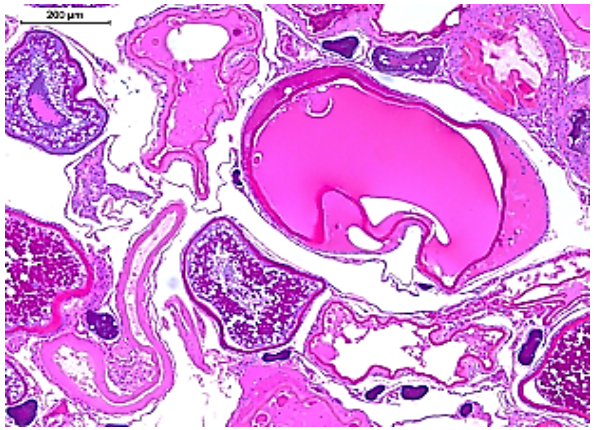


Image: Pacific hake in spawning condition with hydrated oocytes and post ovulatory follicles present, collected during summer months on WCGBT.