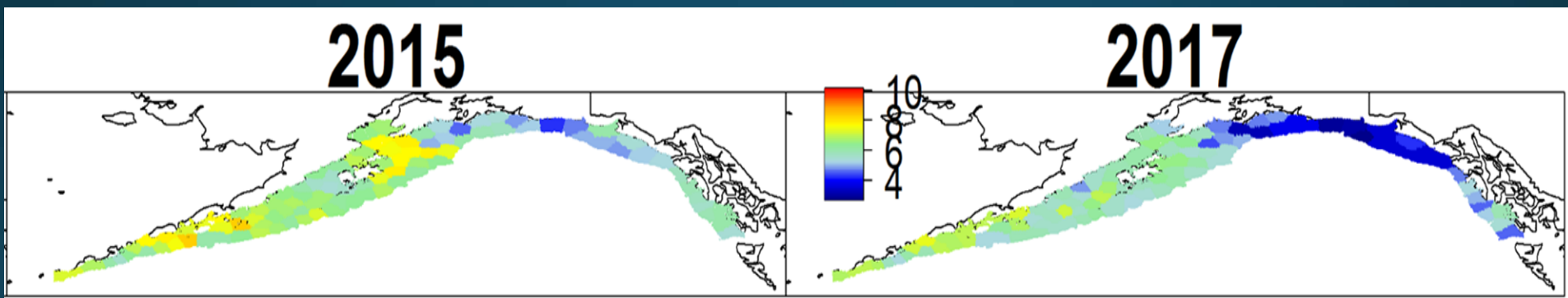




Gulf of Alaska Pacific cod

Steven J. Barbeaux PhD.
NPFMC SSC
October 2, 2017



2017 Bottom trawl survey

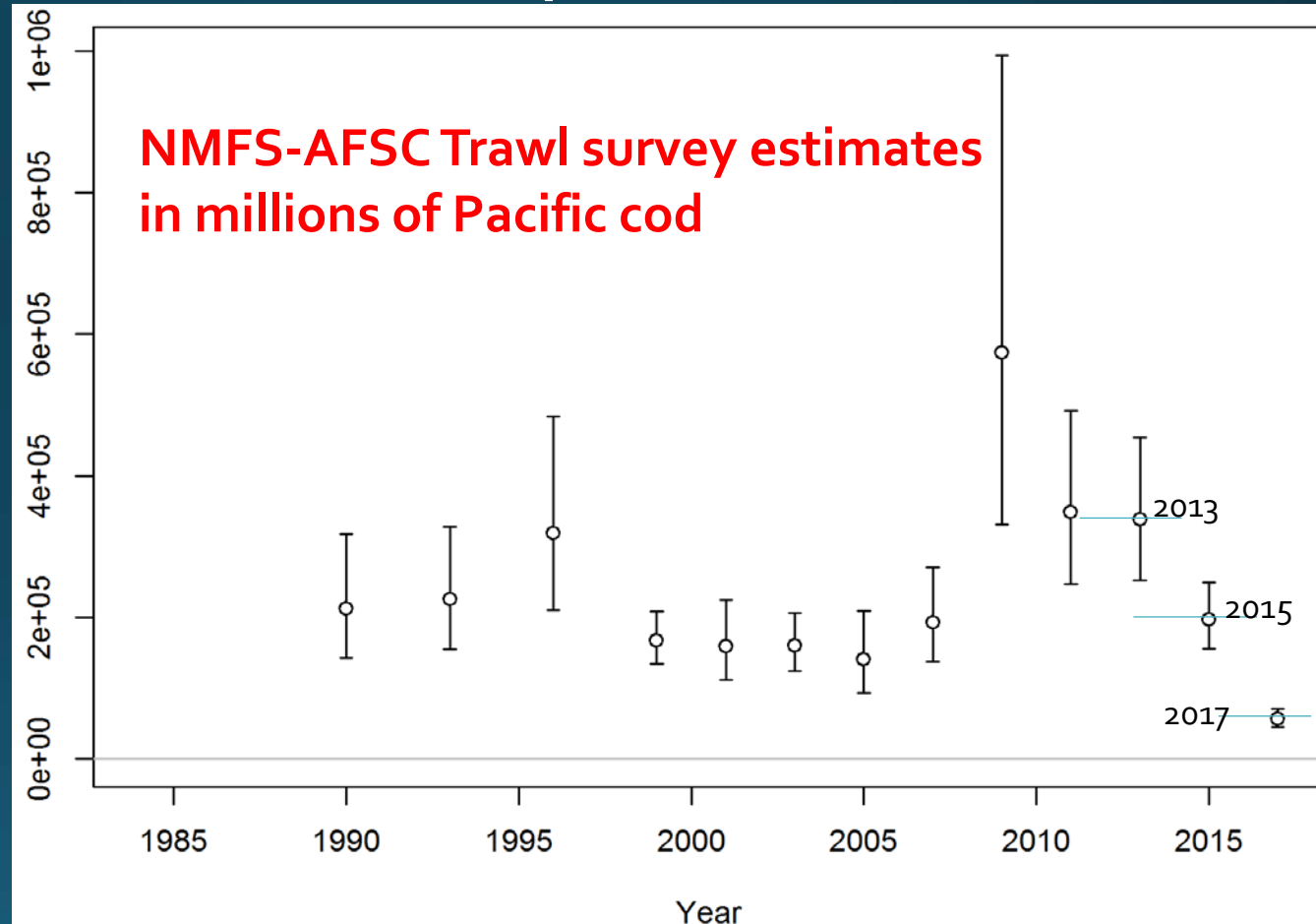
Lowest estimate

- 196 million fish and 107,324 t
- Precise (12% CV)

71% drop from 2015 estimate

- 83% drop from 2013

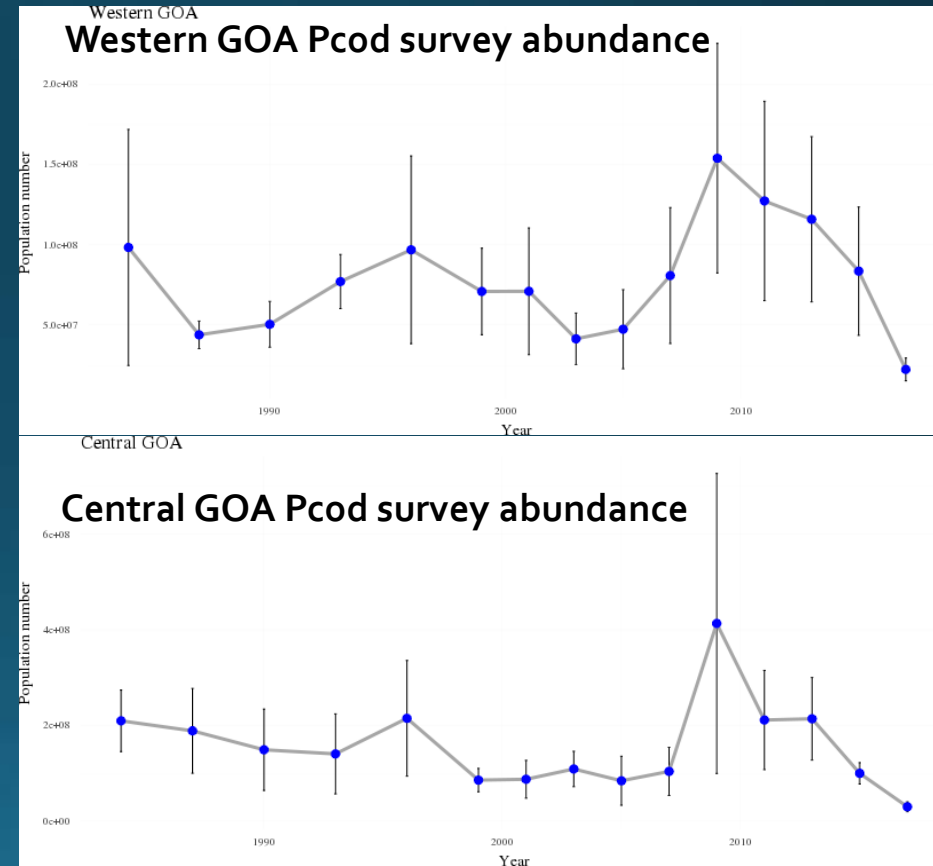
58% decline in biomass since 2015 (78% since 2013)



2017 Bottom trawl survey



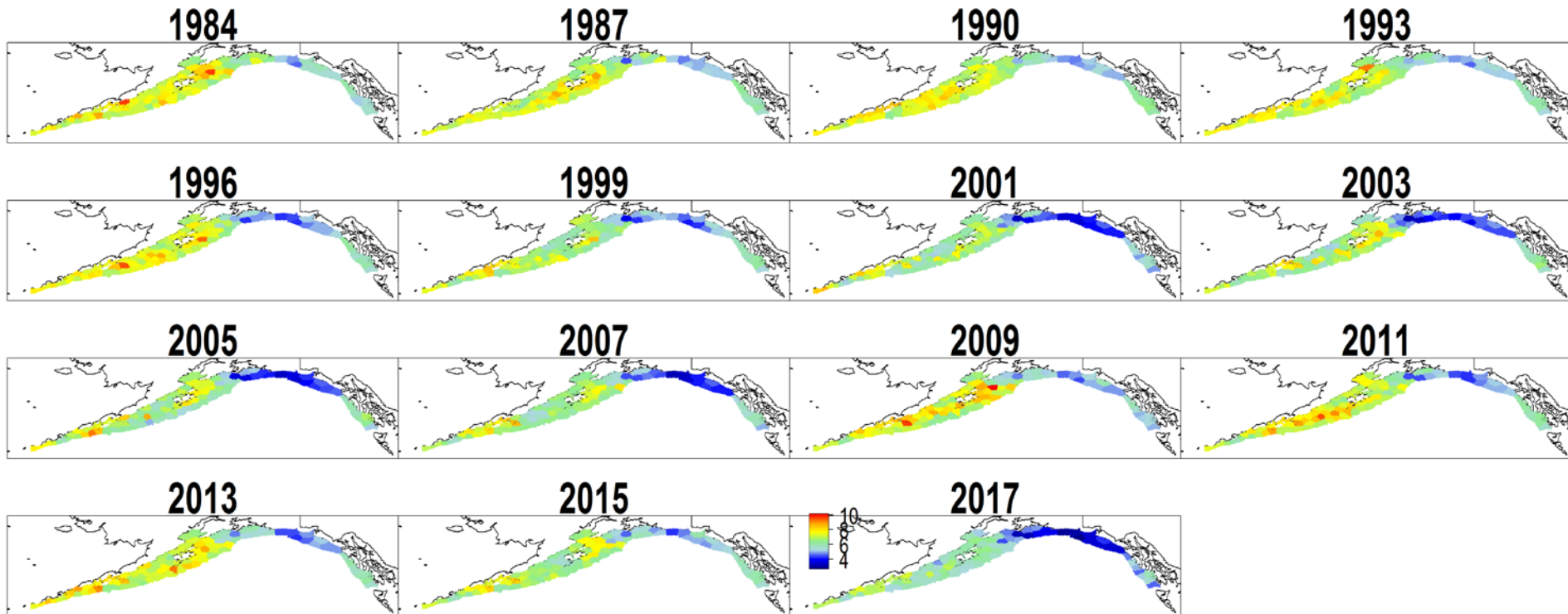
- Lowest estimate ever
 1.96×10^8 fish and 107,324 t
- Precise estimate (0.117 CV)
- 71% decline in abundance since 2015 (83% since 2013)
- 58% decline in biomass since 2015 (78% since 2013)



2017 bottom trawl survey



- Biomass down Gulf-wide
- Highest densities in the Western GOA

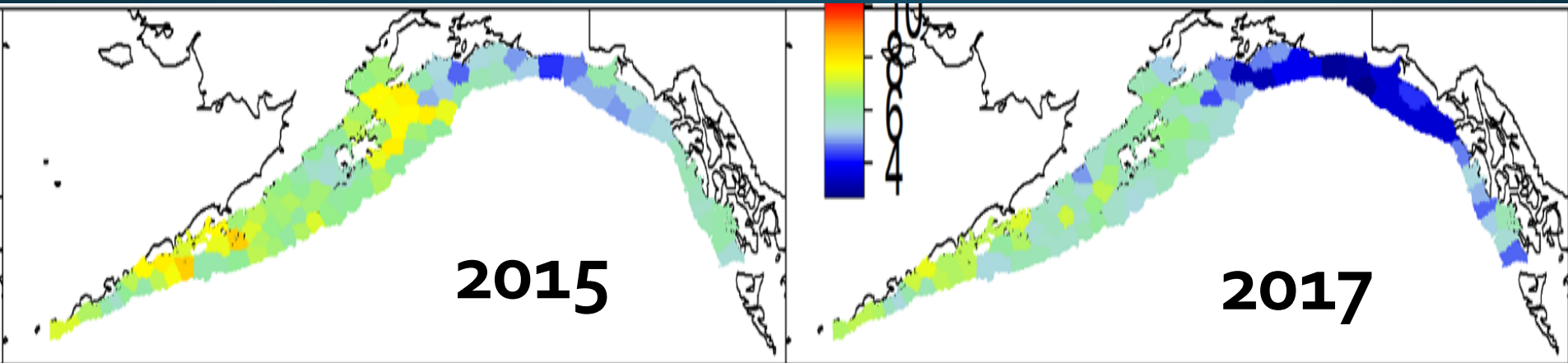


Eastings

2017 bottom trawl survey

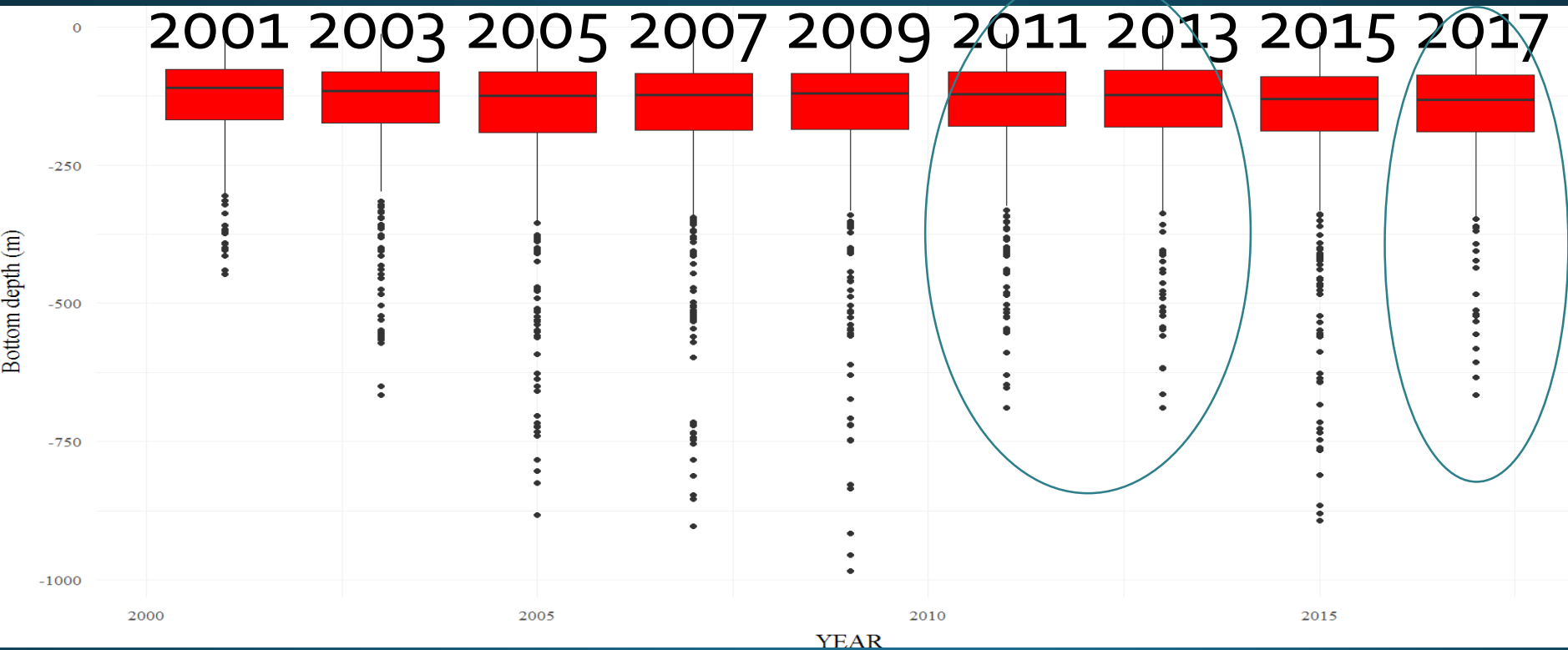


- Biomass down Gulf-wide
- Highest densities in the Western GOA



2017 bottom trawl survey depth coverage

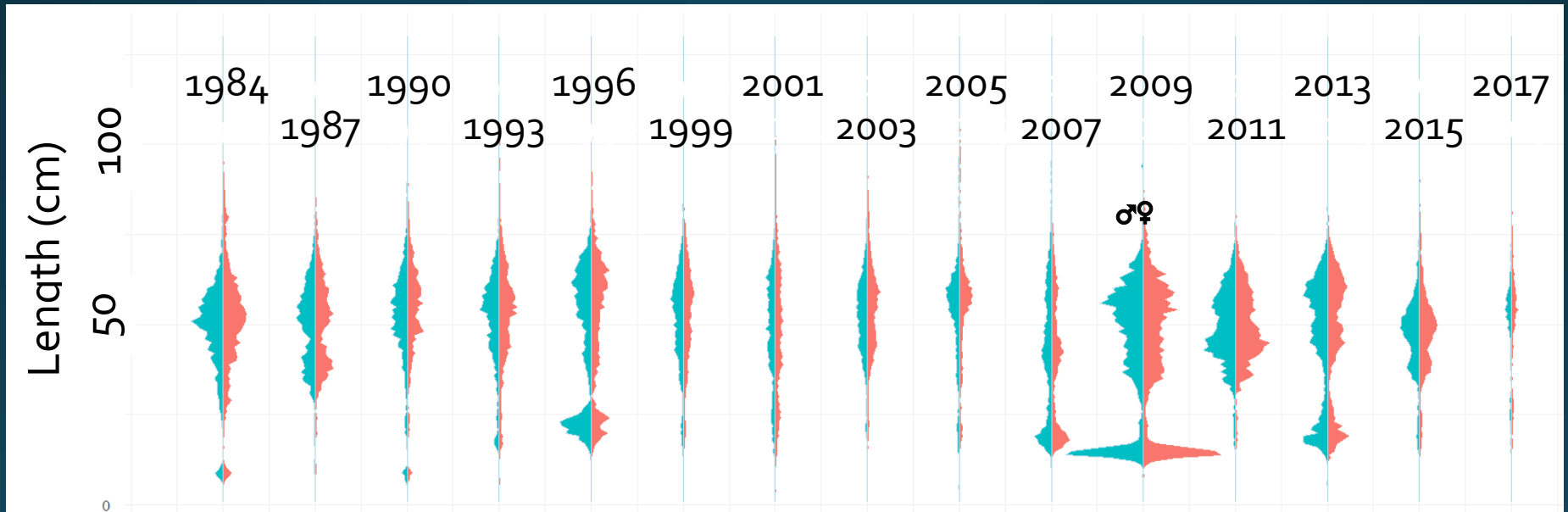
- Similar survey haul distribution
- Similar depths to 2011 and 2013



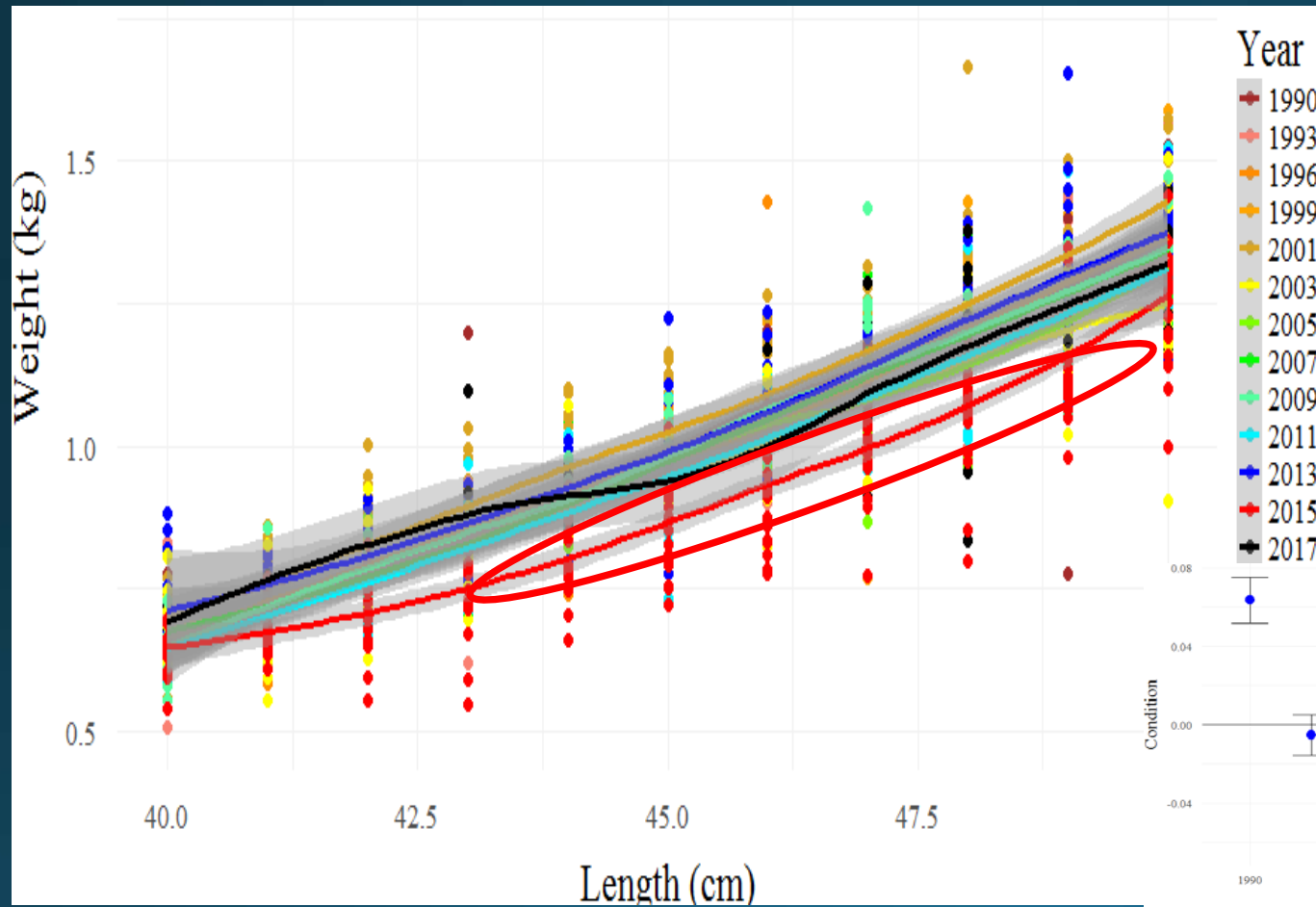
2017 bottom trawl survey



Length frequency from surveys

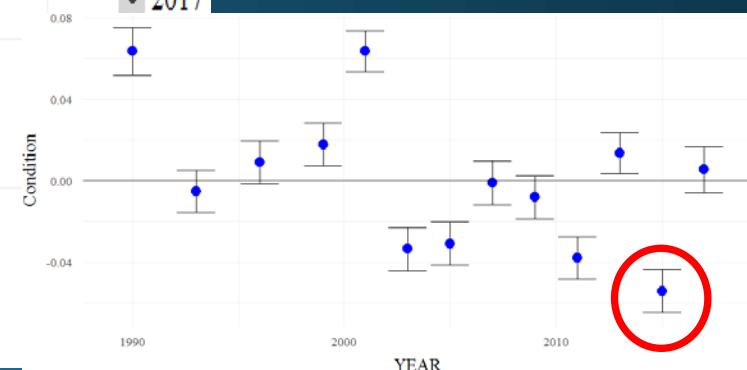


2015 Bottom trawl survey - Condition - Length-Weight



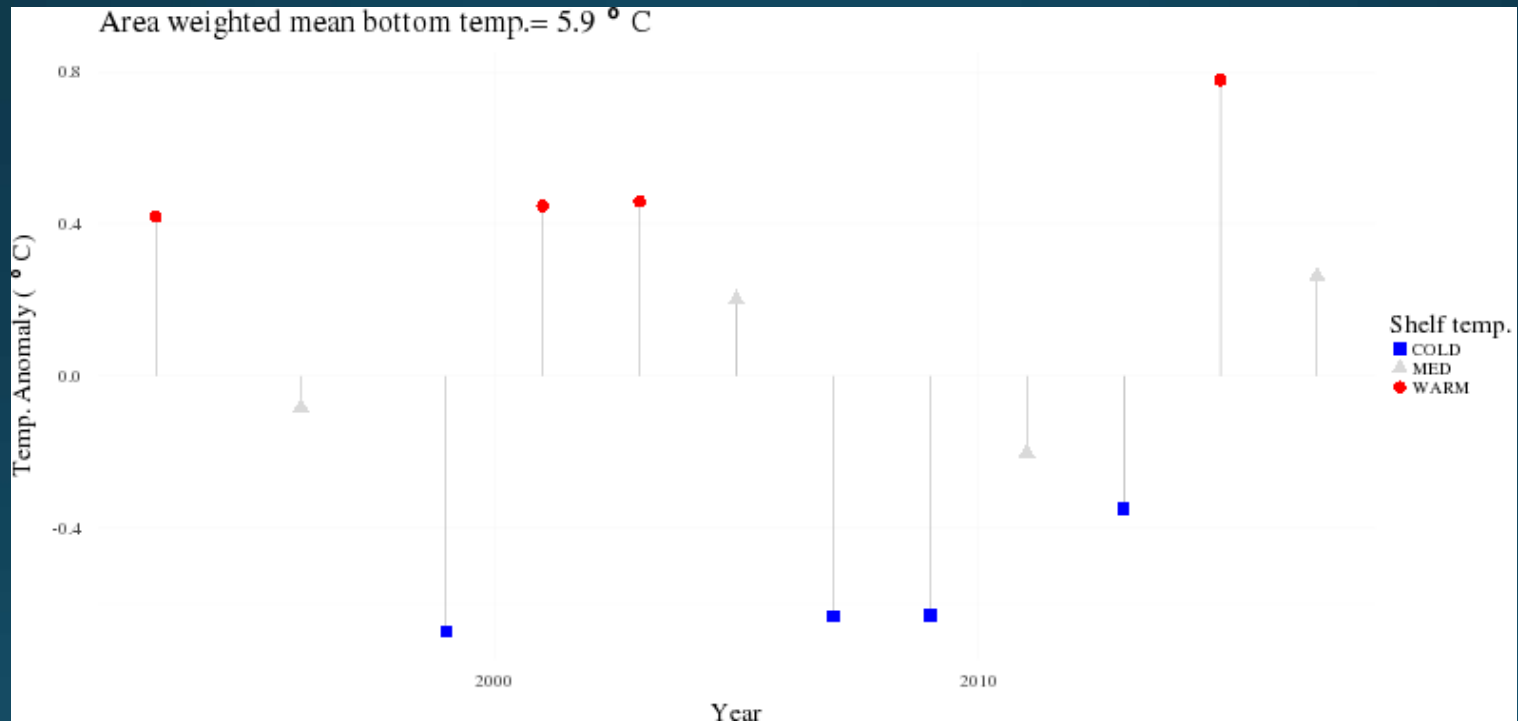
Condition was lowest on record in 2015

- Primarily due to lengths 40-50cm (3-year olds)



2017 bottom trawl survey - Temperature

- 2015 record high temperatures
- 2017 temperatures were warm, but near the 1996-2017 average
Central GOA



Anomalously warm waters 2014-2016



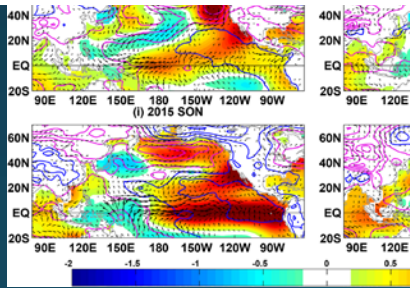
Alaska Dispatch News

Anchorage 55°F

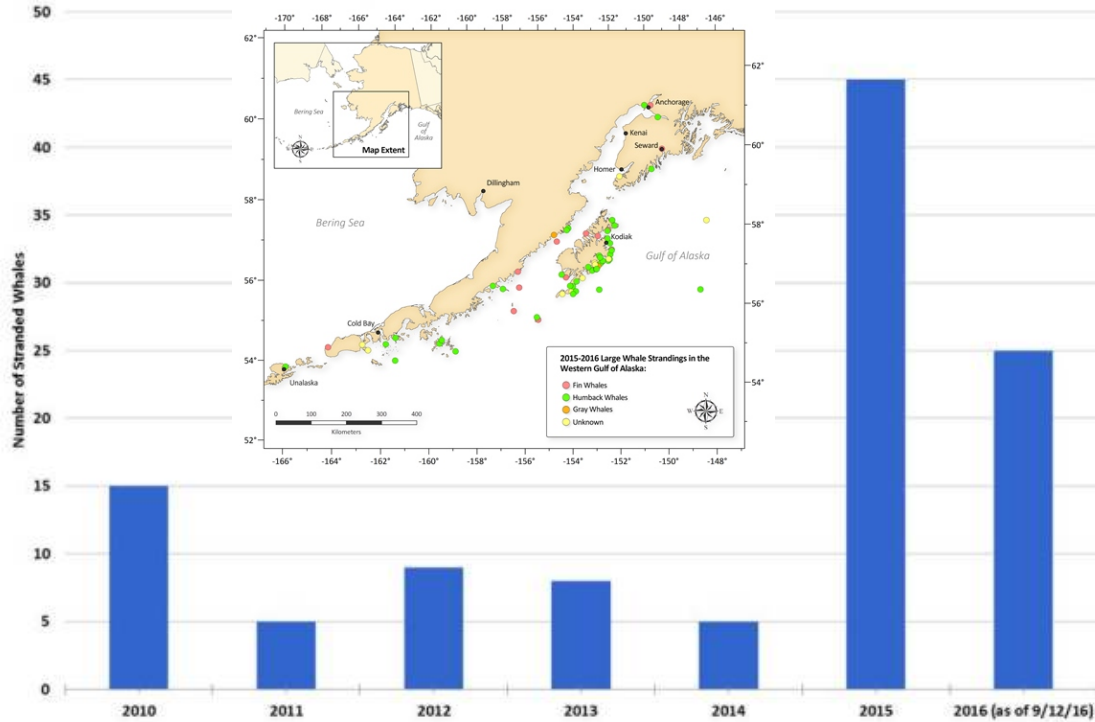
Science

Scientists think Gulf of Alaska has biggest ever record

Author: Yereht Rosen Updated: September 17



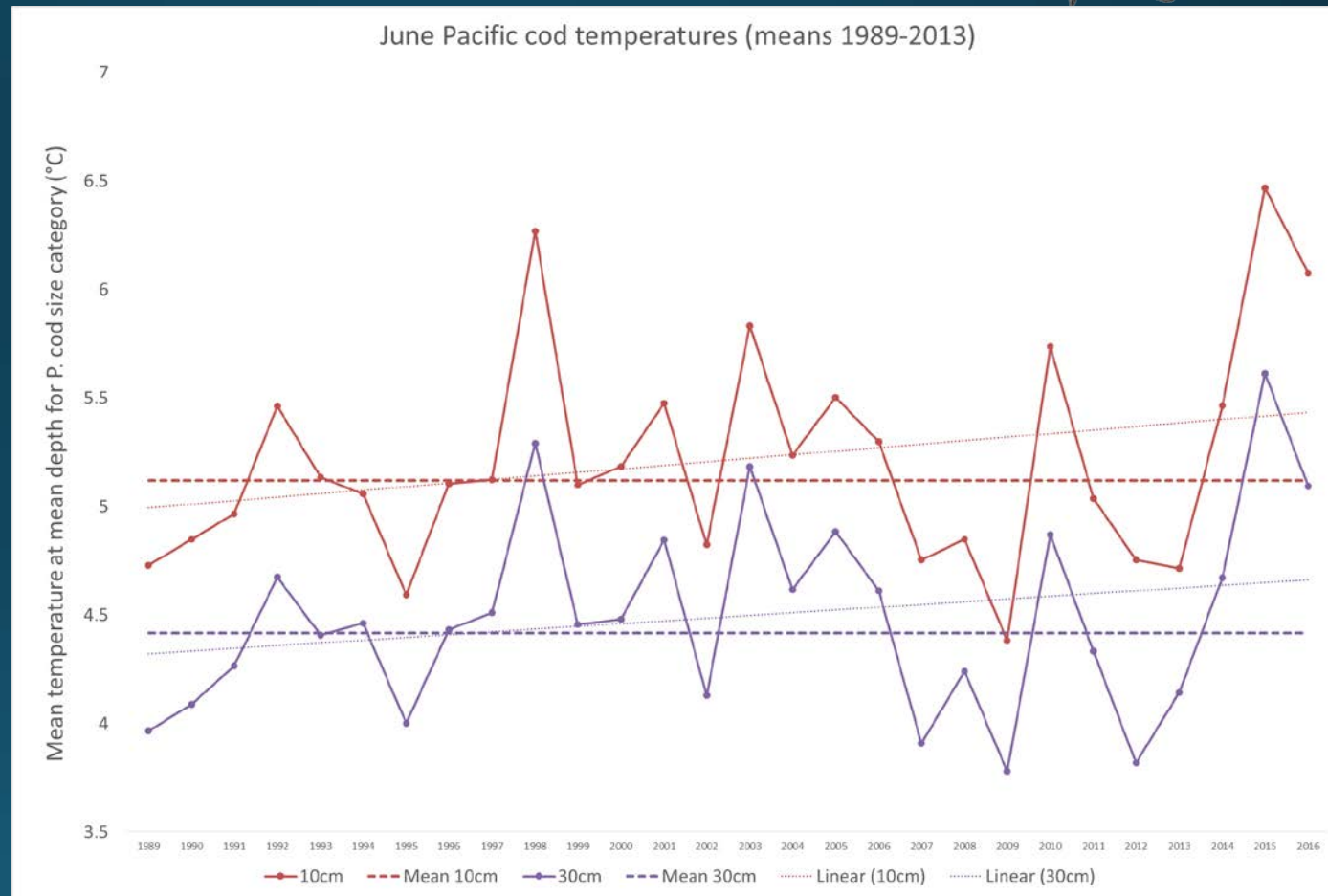
Annual Large Whale Strandings in Western Gulf of Alaska



Anomalously warm waters for Pacific cod



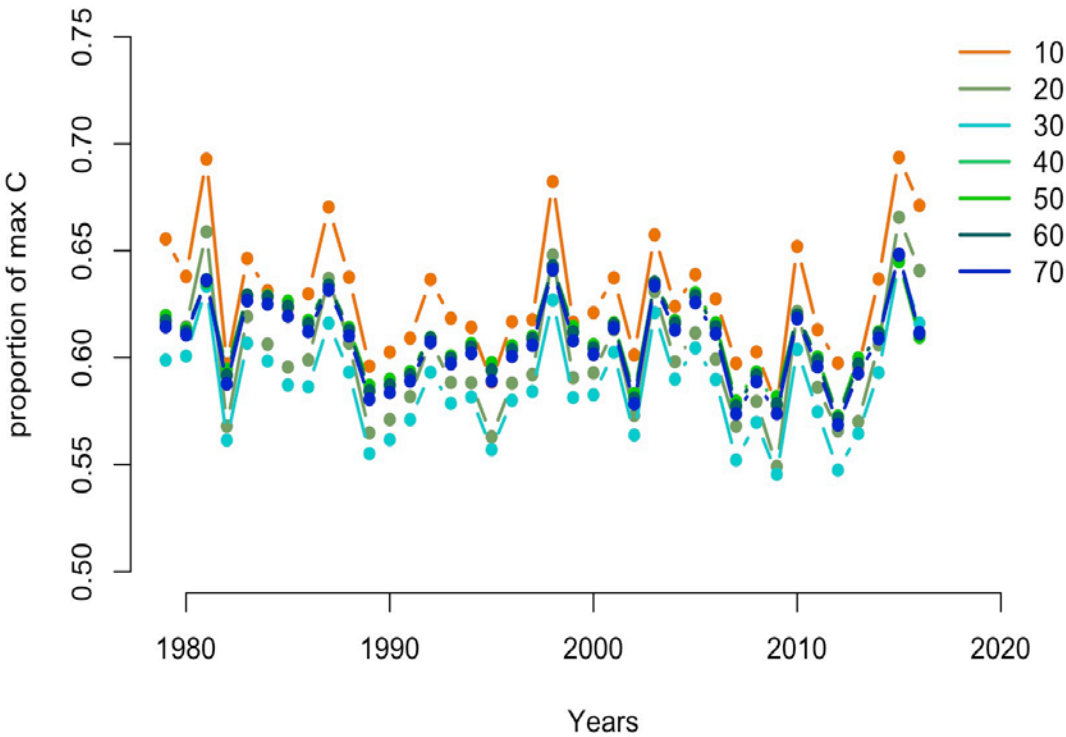
2014-2016
different in
that
temperatures
were higher for
entire year



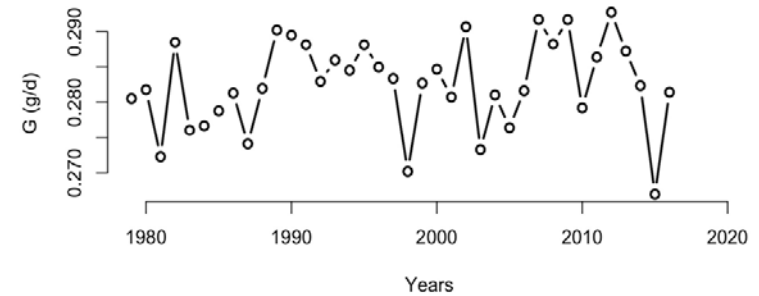
Pacific cod bioenergetics



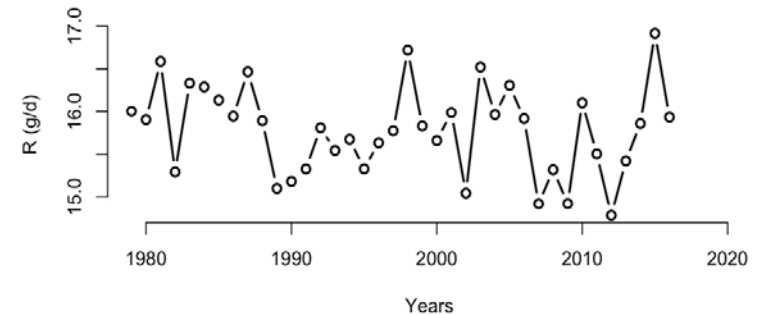
Relative energetic demand



Daily growth (based on mean foraging rate)



Daily metabolic demand

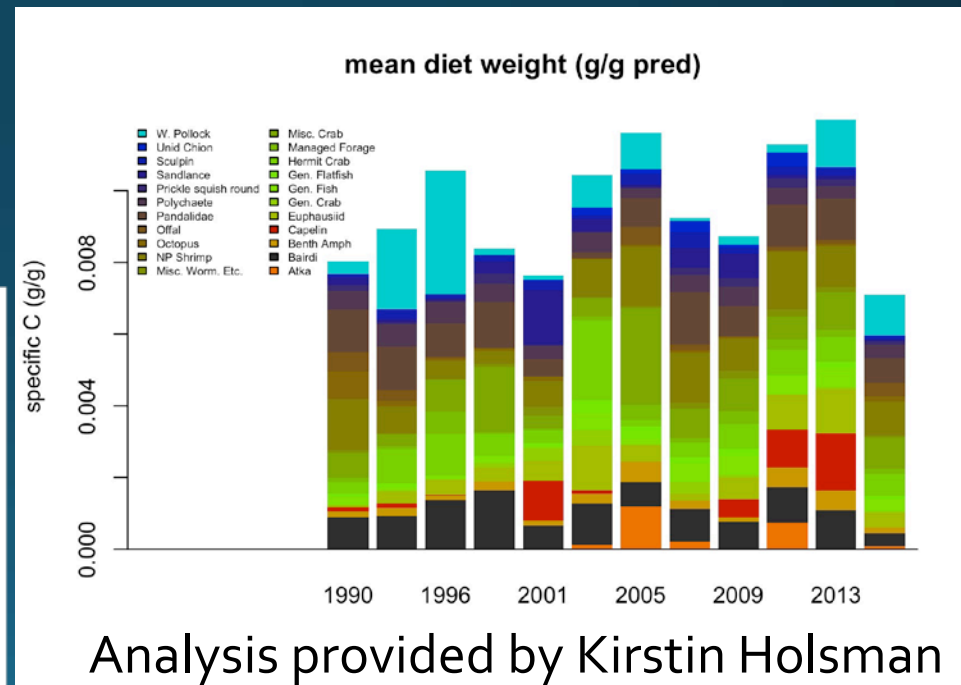
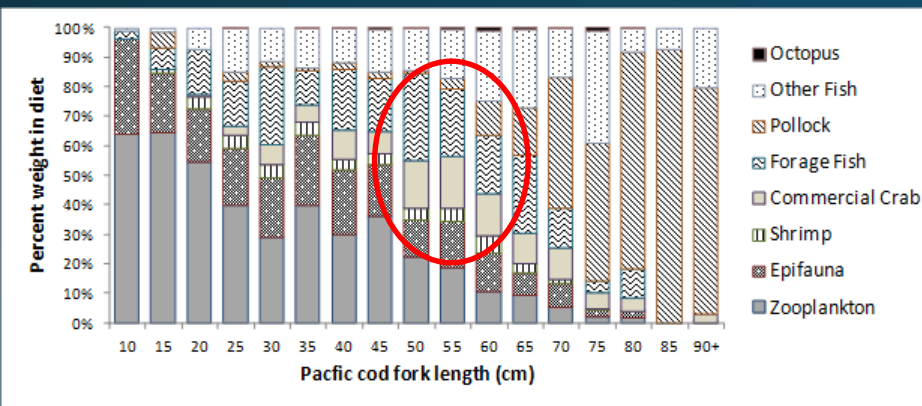


Curtesy Kirstin Holsman

Pacific cod bioenergetics – Available forage



- Overall prey weight down to lowest measured in Pacific cod stomachs in 2015



Analysis provided by Kirstin Holsman

Pacific cod bio-energetics - Summary



- Warmer temperatures were throughout the year and water column
- Higher metabolism in warmer temps lead to higher forage requirements
- Indications of lower forage amounts in 2015-2016
- Combination could have lead to higher natural mortality for these years for the 2012 year class.

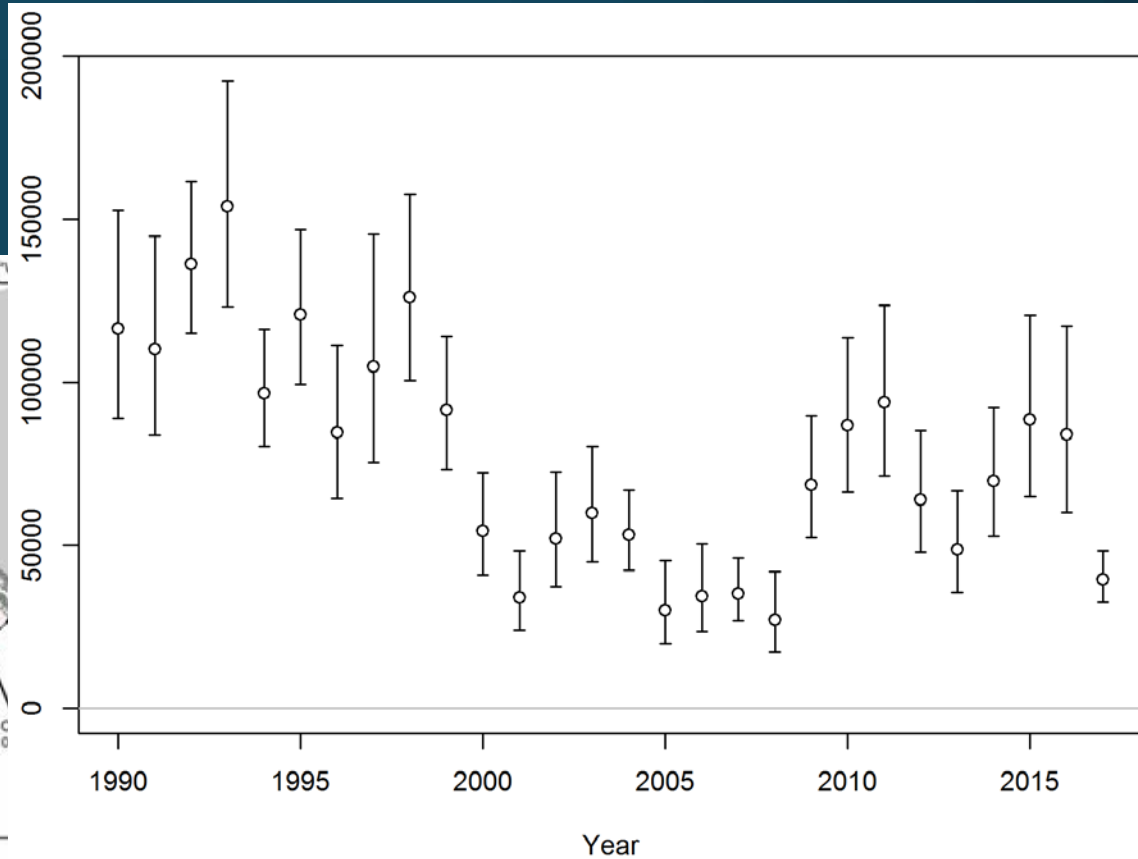
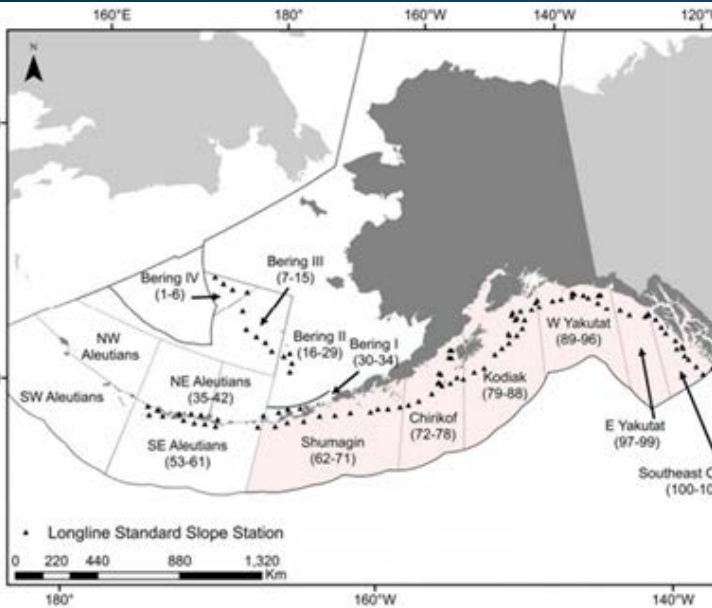
Other surveys and abundance information



2017 Longline survey



- Also declined
 - 53% from 2015

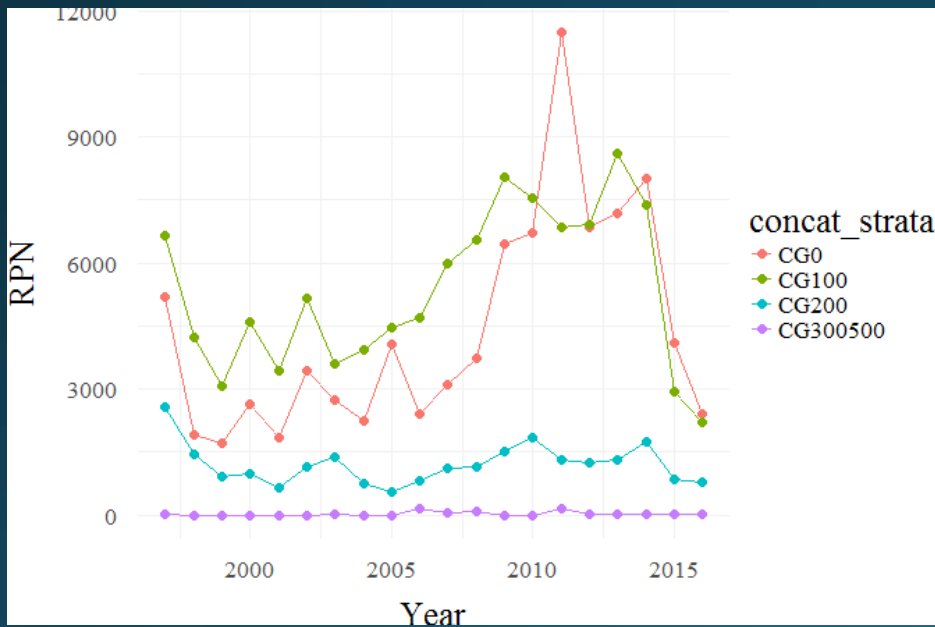


IPHC longline survey

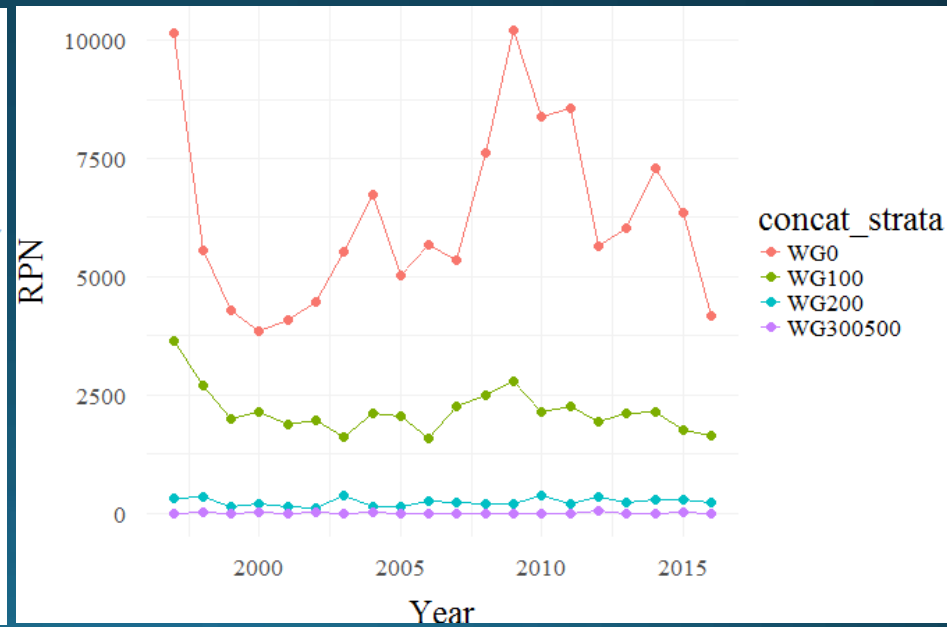


- Through 2016 only

Central GOA



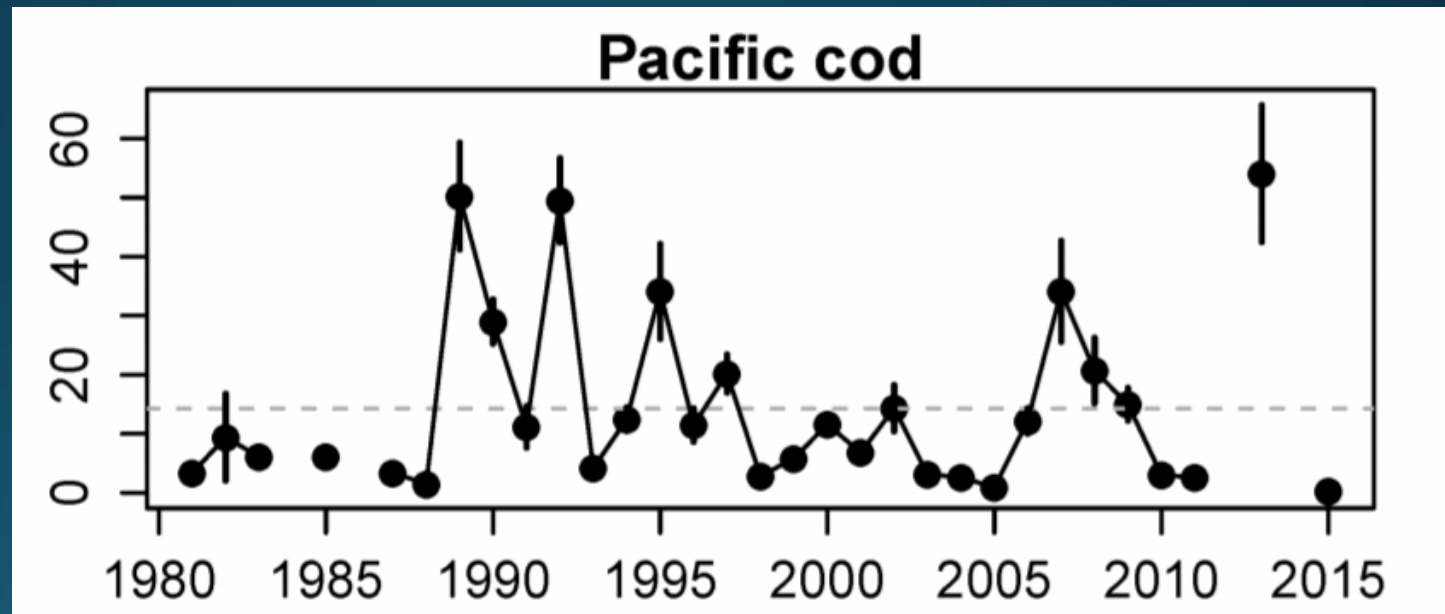
Western GOA



Pacific cod larval abundance



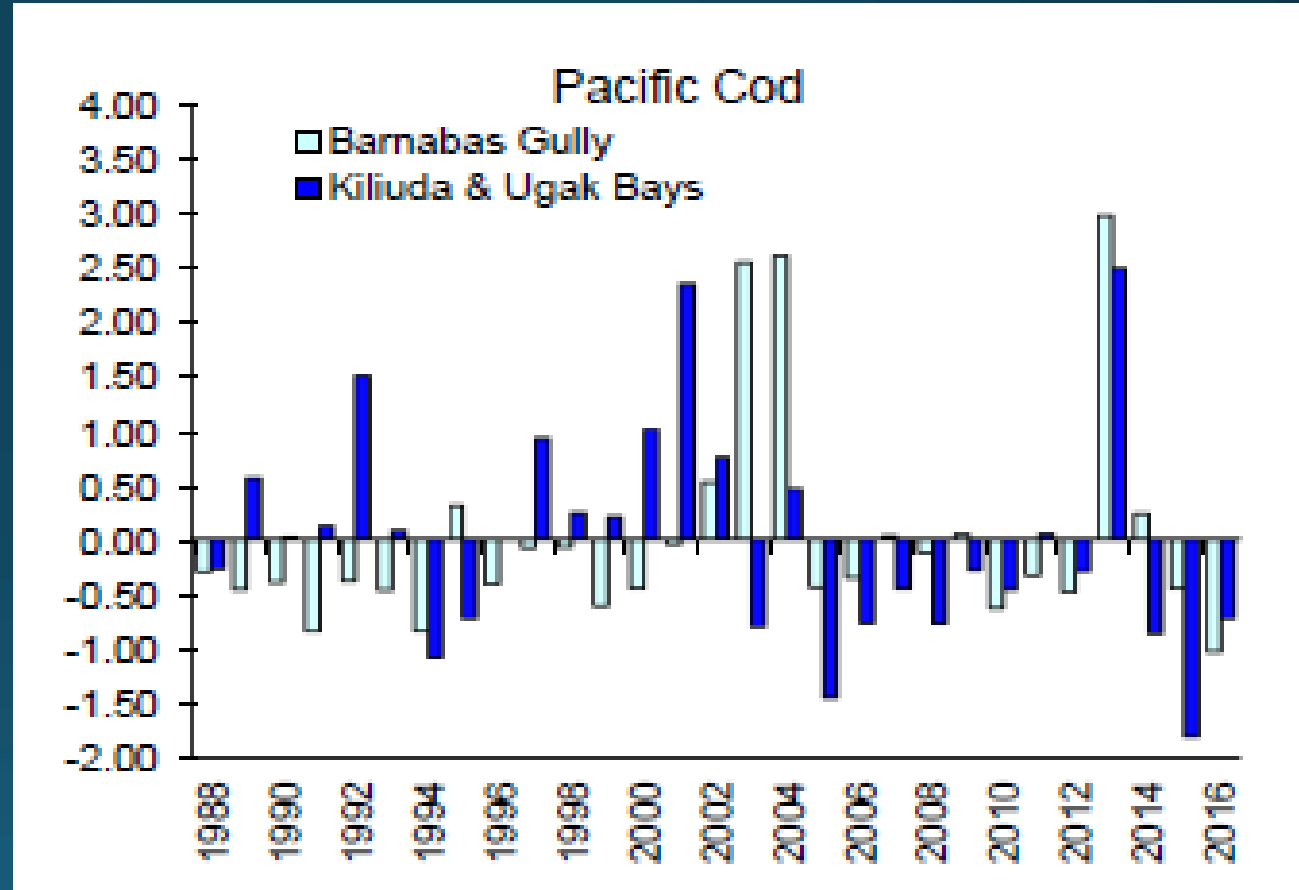
- Low value in 2015
- Apparent high 2013 larval abundance didn't materialize...



ADF&G large-mesh trawl survey

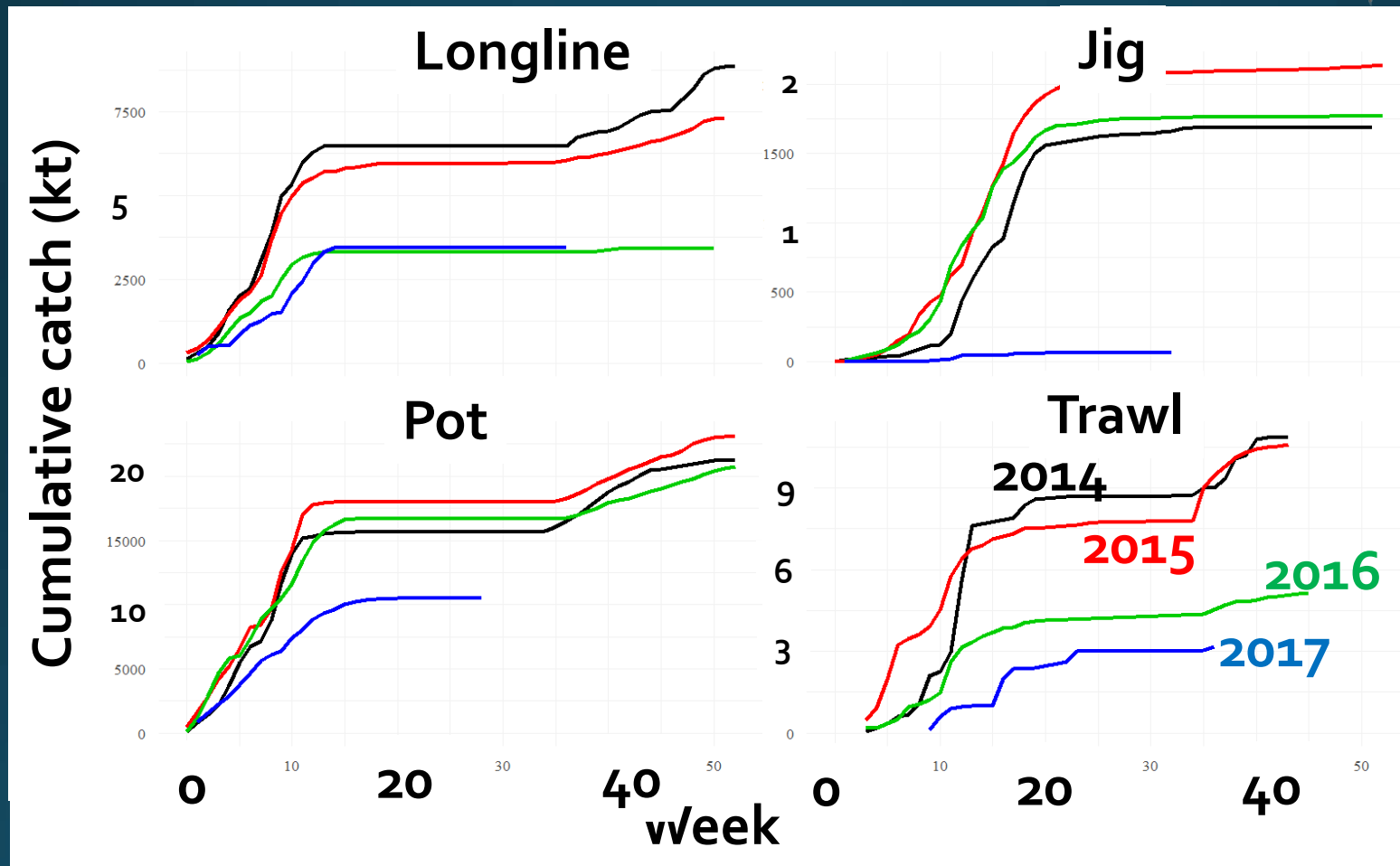


- 2015 and 2016 below average



Fishery data

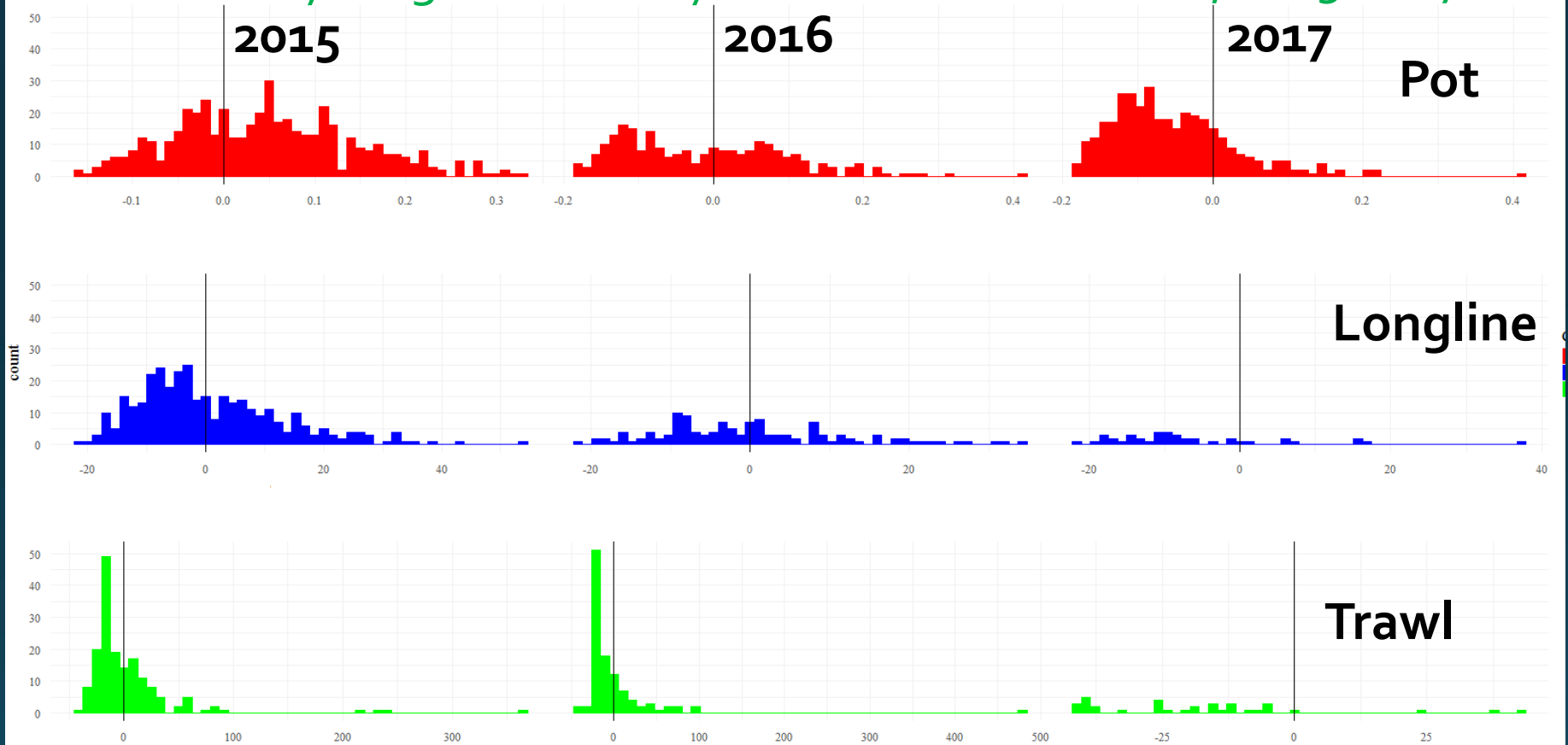
Central GOA Pacific cod fishery



Central GOA Pacific cod fishery



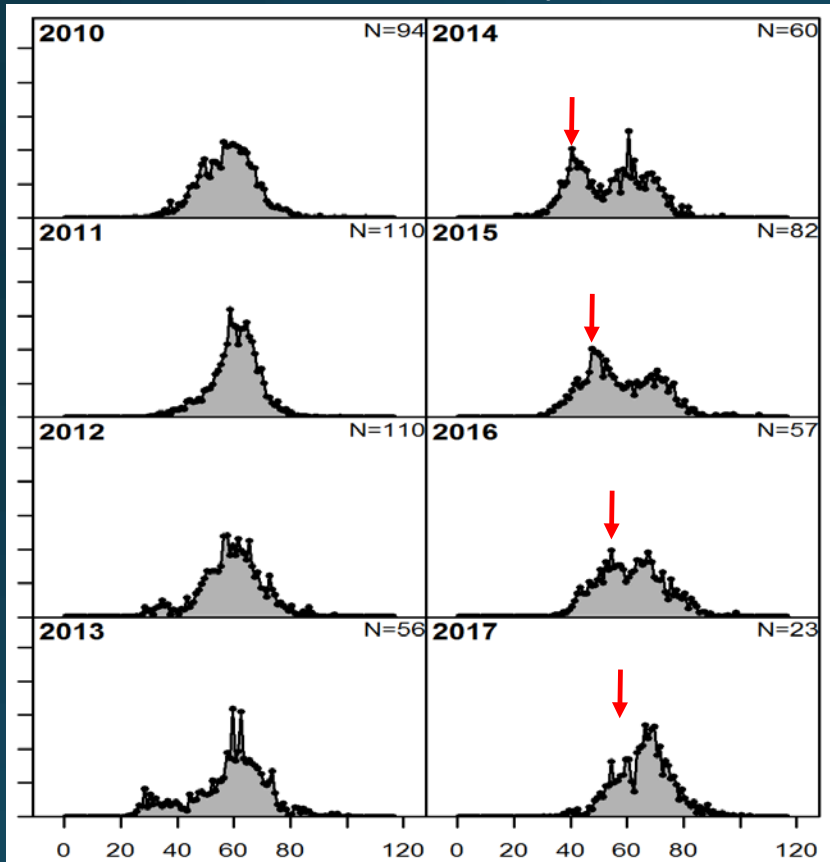
January-August CPUE by number of Pacific cod, 2015-2017



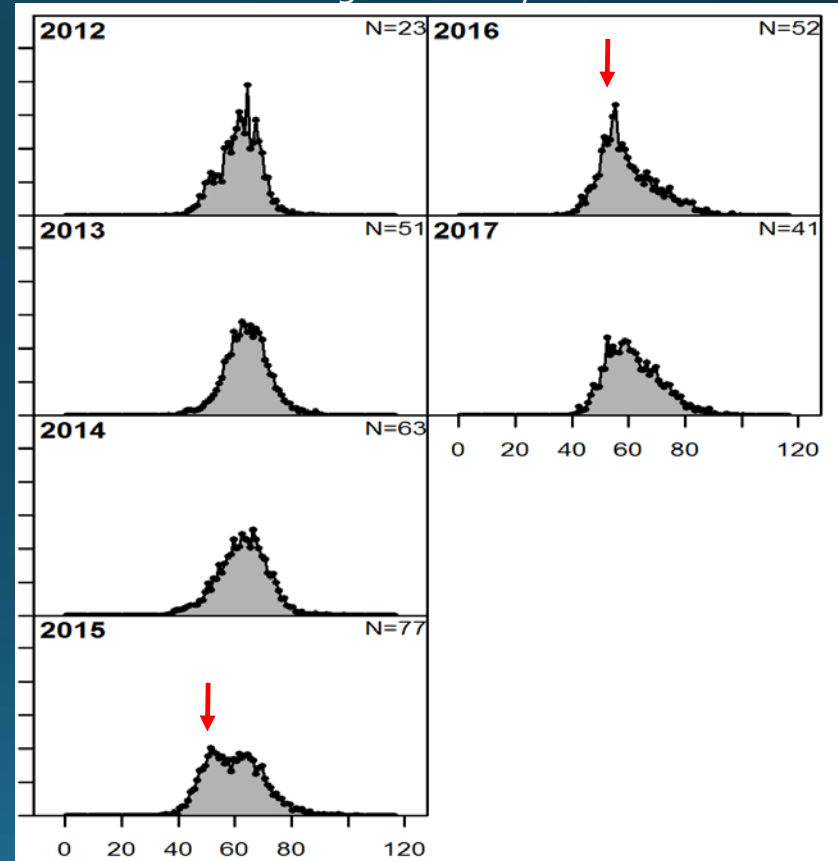
Pacific cod fishery length data



Trawl fishery



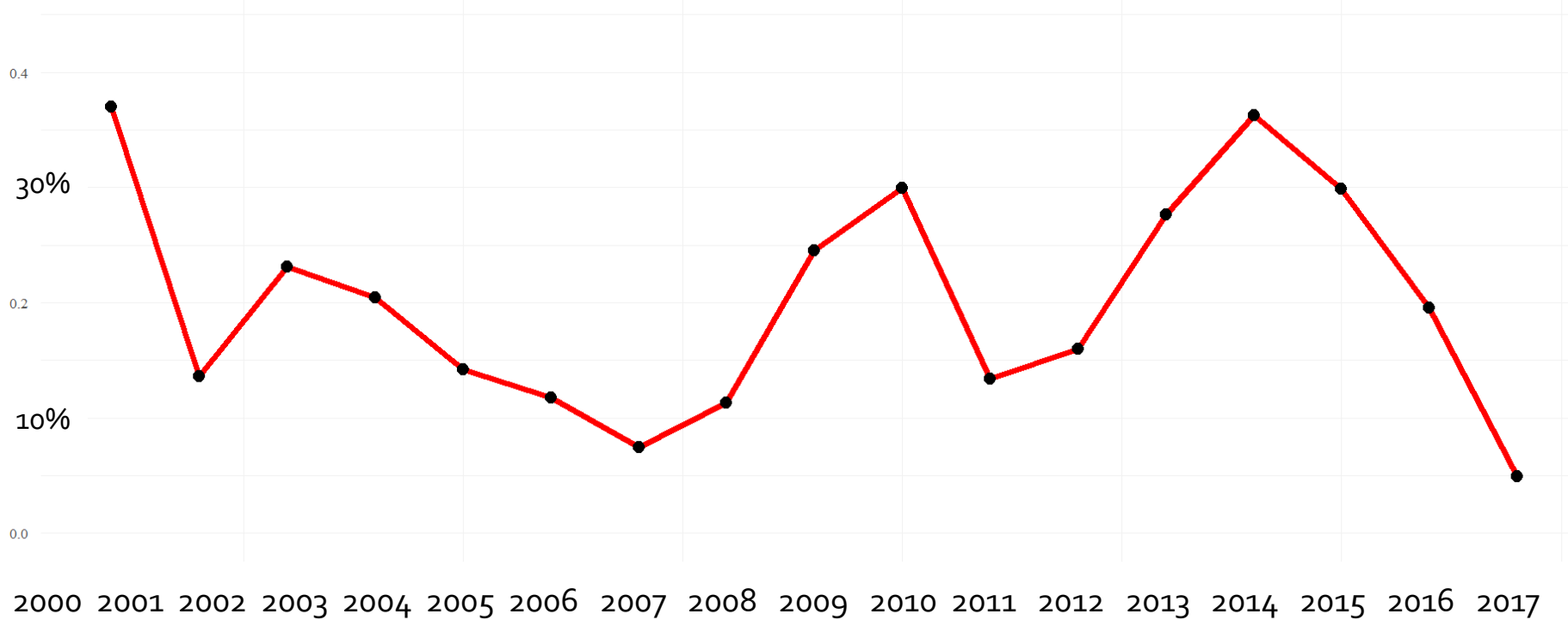
Longline fishery



Pacific cod in pollock fishery



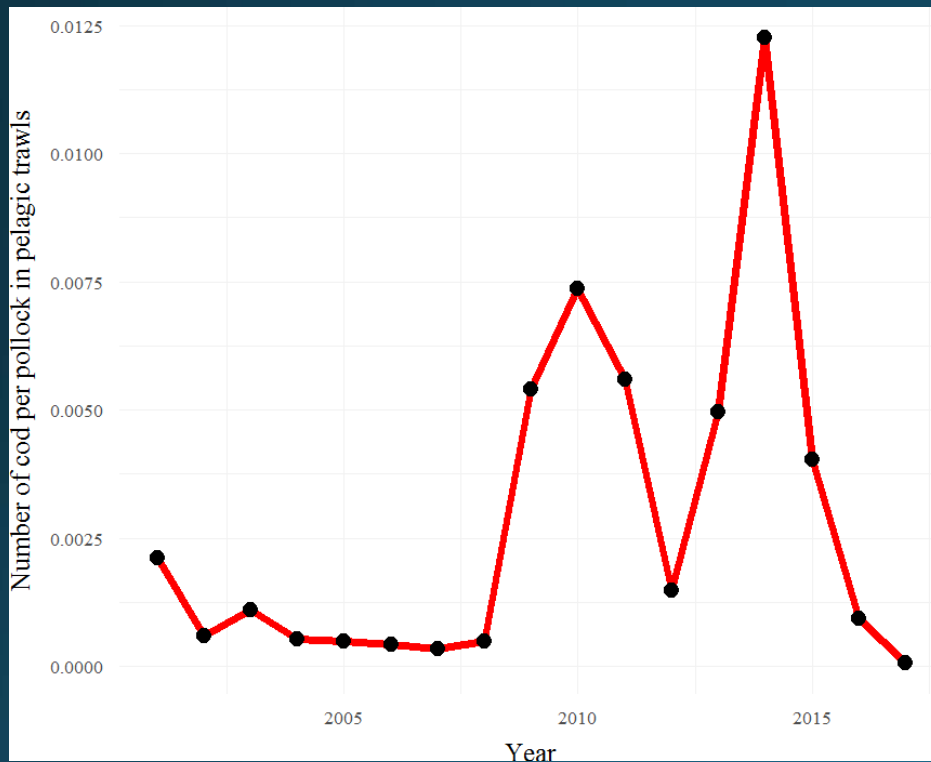
50% Proportion of pelagic pollock trawl hauls with Pacific cod (Jan-Aug)



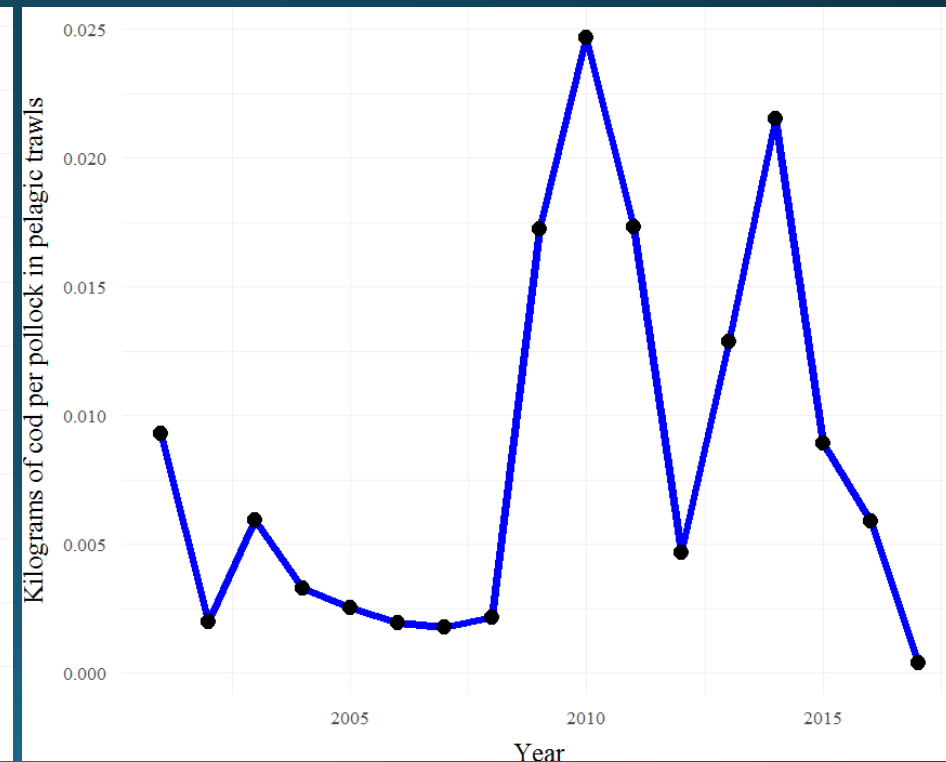
Pacific cod in pollock fishery



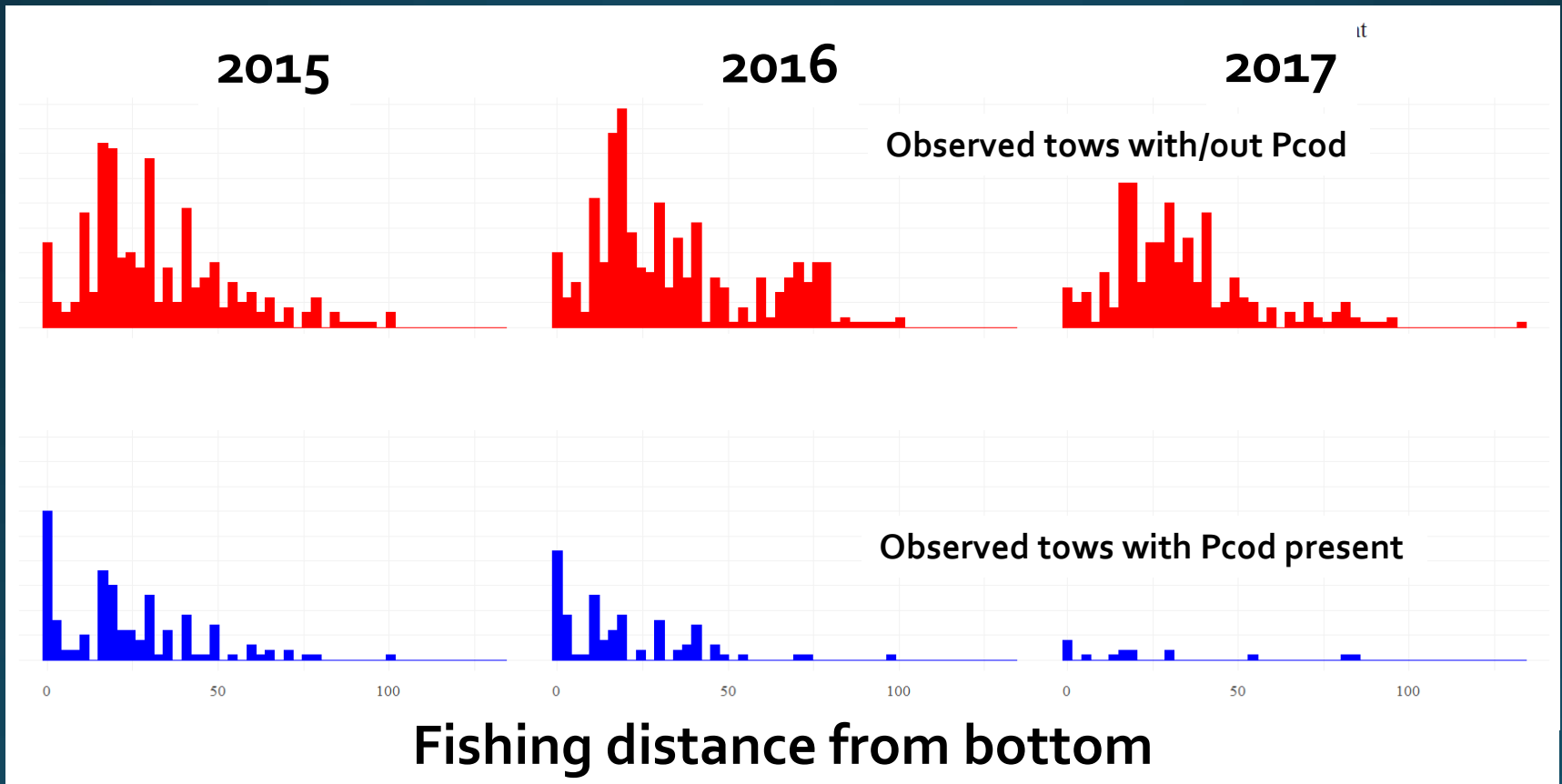
Number of cod per pollock



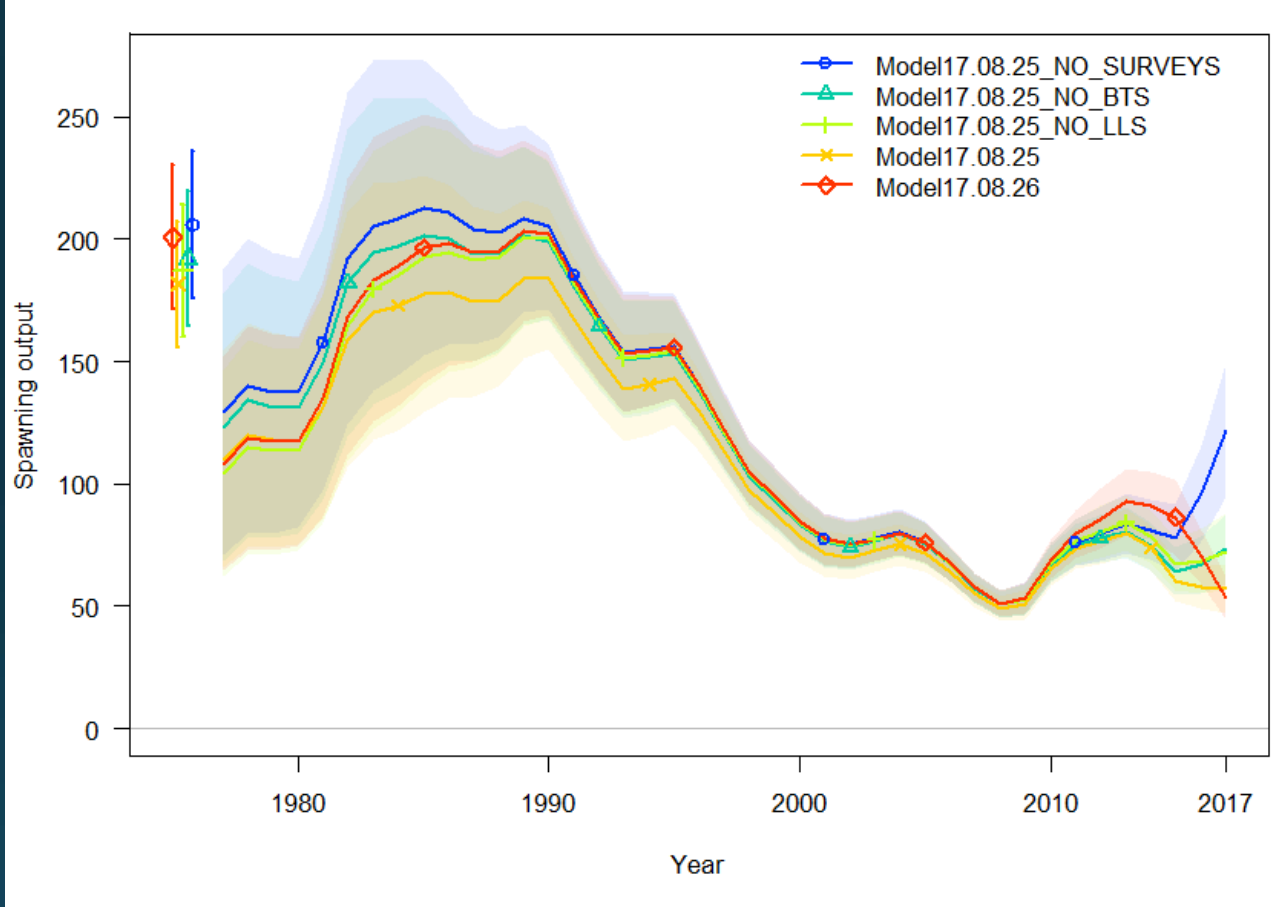
KG of cod per KG of pollock



Pacific cod in pollock fishery Off bottom?



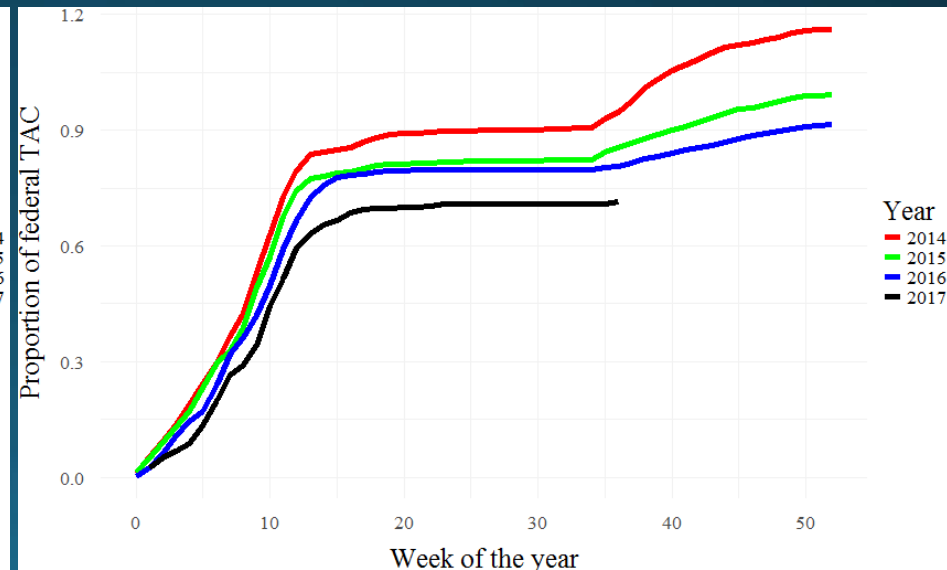
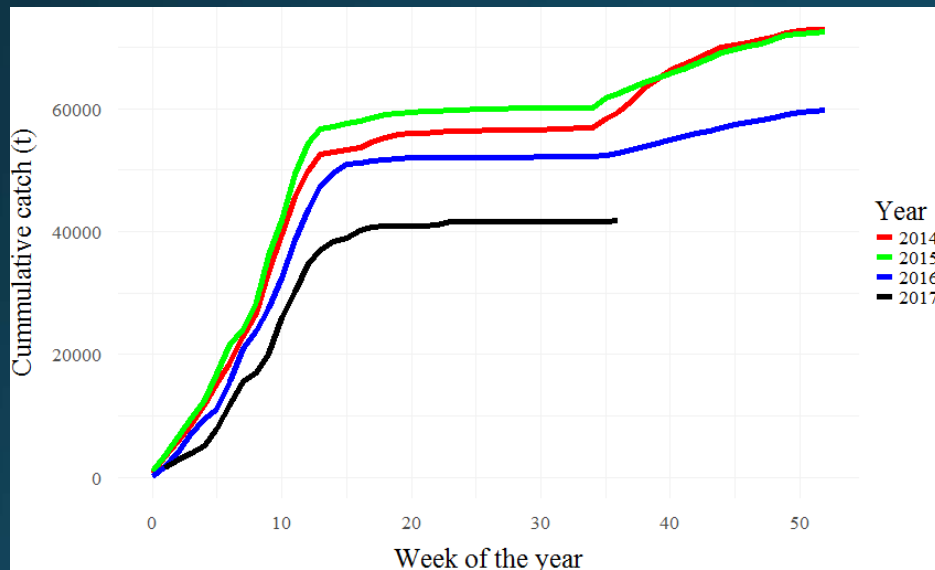
Preliminary model runs for 2018



- Blue same as 2016
- Red same fit with natural mortality pulse in 2015-16
- Others with new survey data added

Preliminary specs for 2018

- ~45-60% of Federal TAC caught by week 10 in directed fishery



Thanks