



**NOAA**  
**FISHERIES**

# **Re-evaluation of stock structure for Bering Sea/Aleutian Islands northern rockfish**

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# Background

- Information on high exploitation rates and targeted fishing presented to the BSAI Plan Team in September, 2015
- Plan Team requested a stock structure update for the September, 2016 meeting



# Outline

- Stock structure analyses involving catch and survey data are updated
- Other stock structure analyses are summarized
- The extent of targeted fishing is examined in more detail



# Summary of previous information

## *Physical limitations to connectivity*

Deep passes in the Aleutian Islands may limit movement of northern rockfish

## *Genetics*

An isolation by distance pattern of spatial structure has been observed. Estimates of lifetime dispersal distance are ~ 200 km (Gharrett et al. 2012).

# Harvest and trends

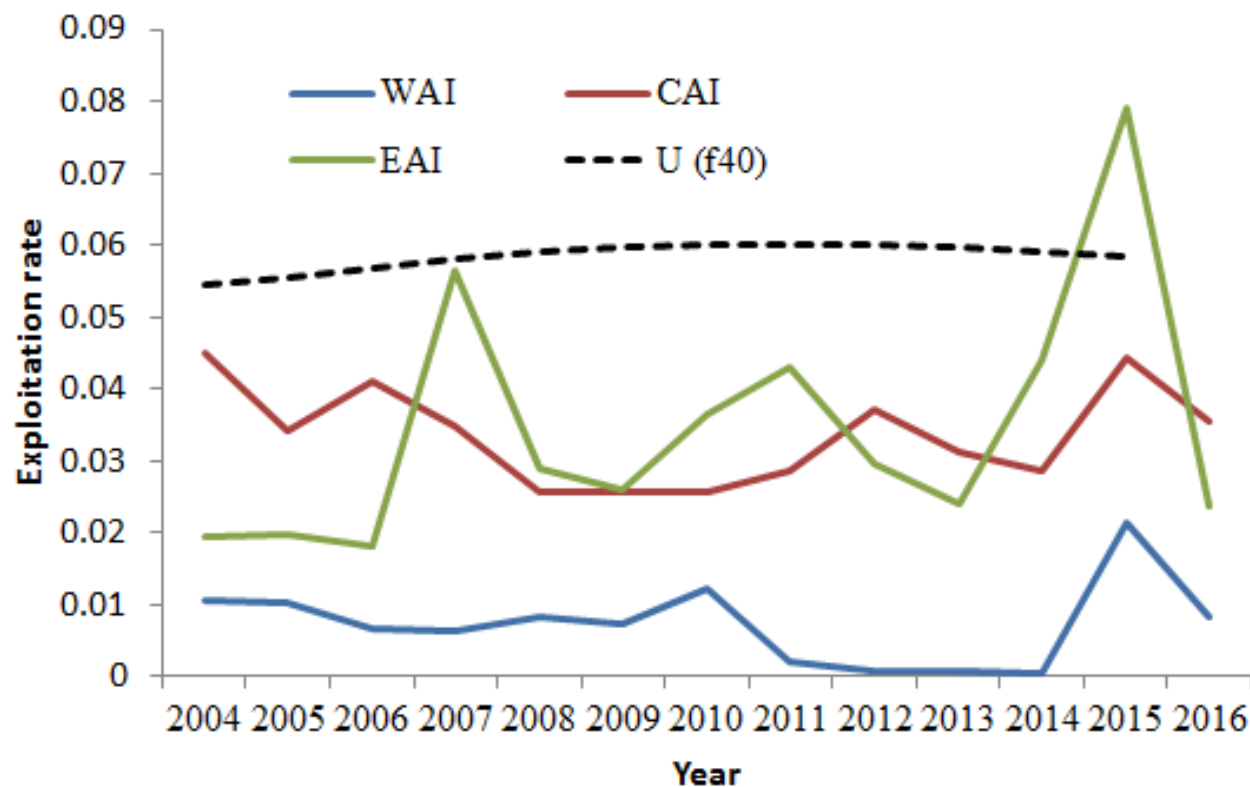
*Fishing mortality relative to target reference point*

Ratio of BSAI-wide  $F$  to  $F_{abc}$  (estimated in 2014)  
from 2006 - 2015 ranged from 0.15 to 0.57.

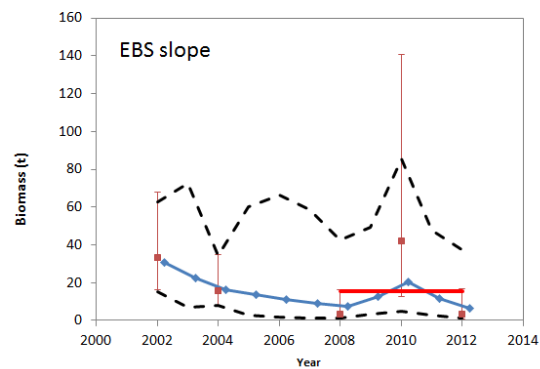
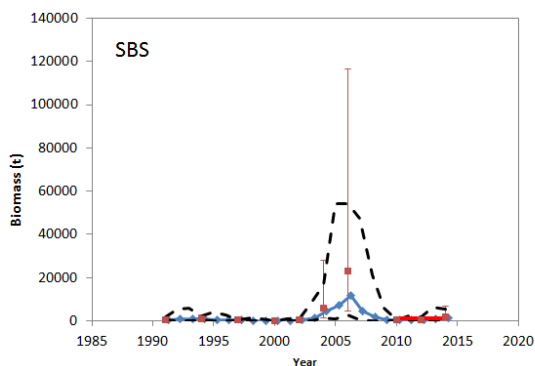
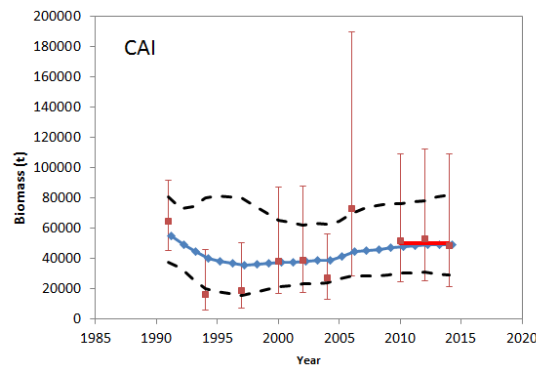
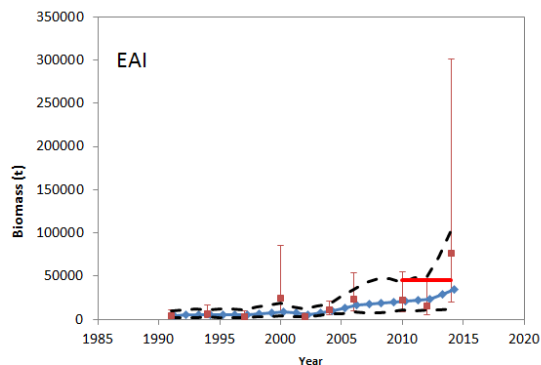
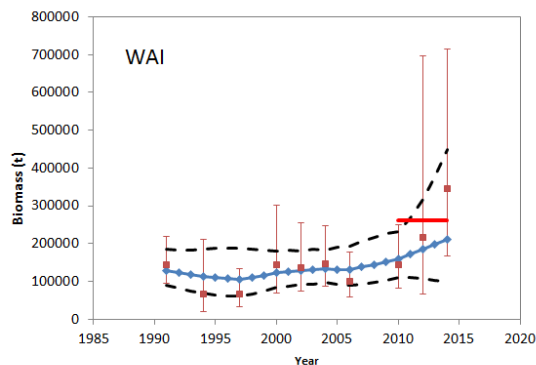


# Spatial concentration of harvest

$U_{F40\%}$  – the exploitation rate associated with fishing at  $F_{40\%}$   
(affected by selectivity, numbers at age, maturity, and size at age)

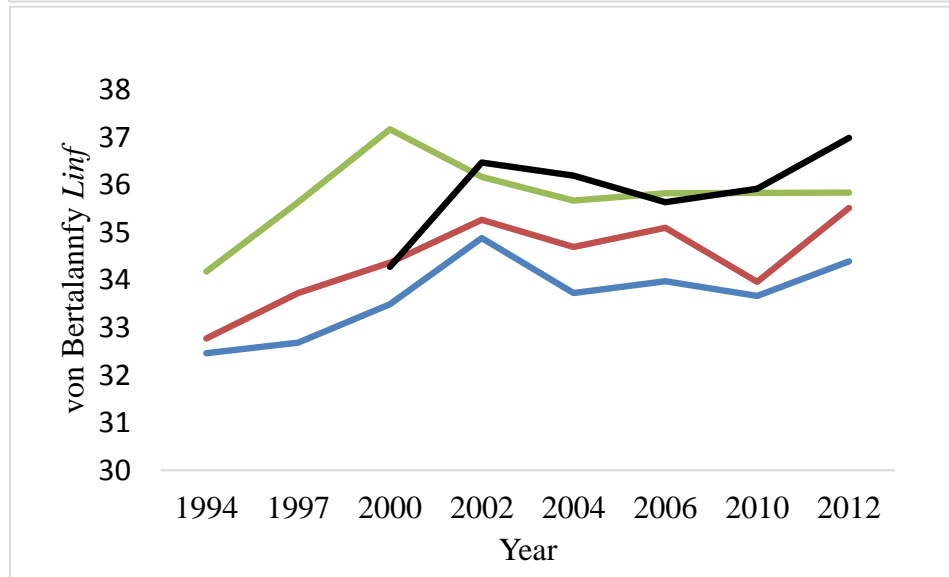
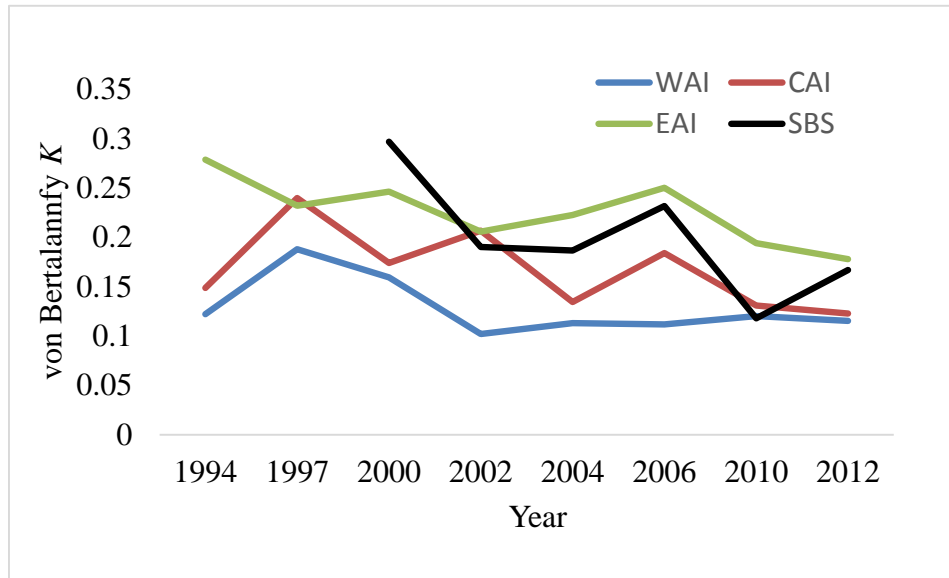


# Trends in survey biomass estimates



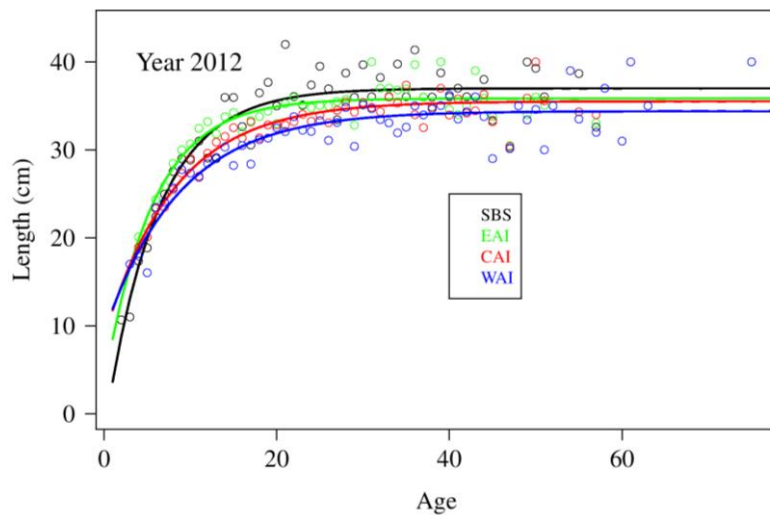
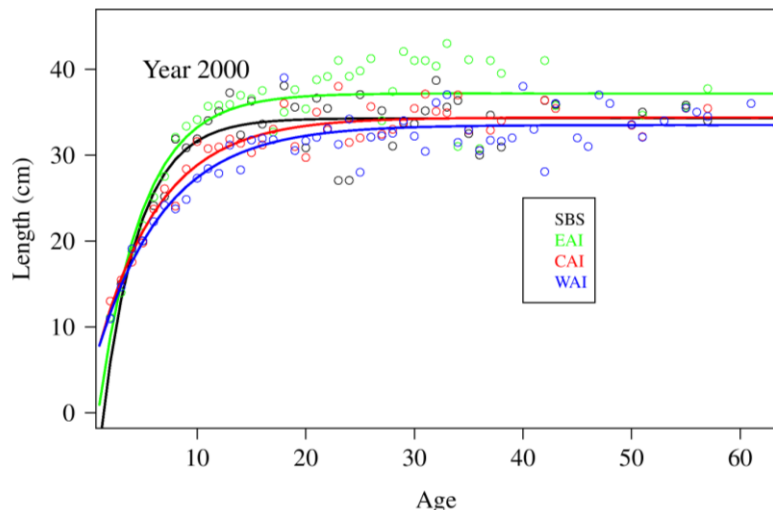
# Growth

Generally, lower values of  $K$  and  $L_{inf}$  in the western AI compared to the central and eastern AI



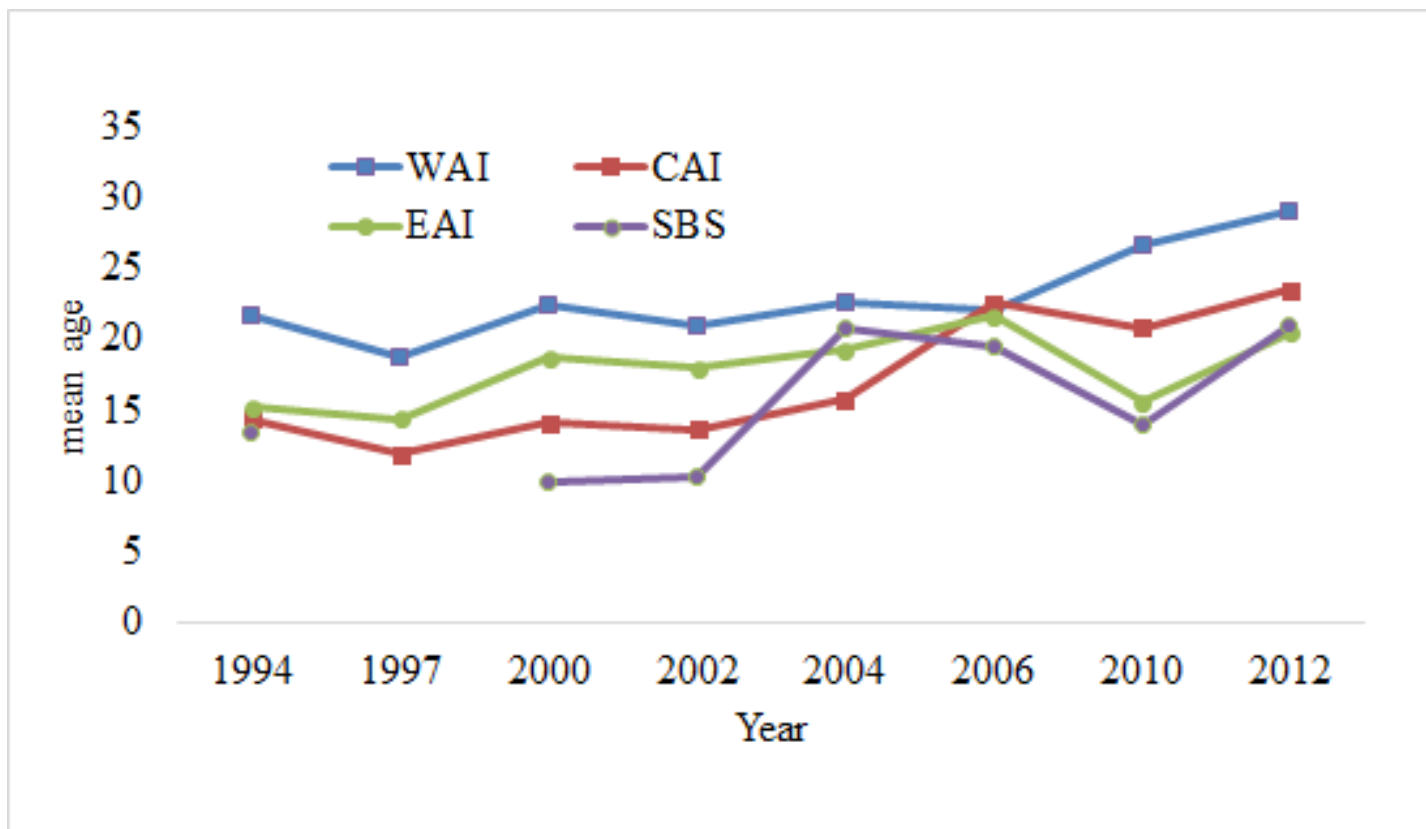


# Estimated size at age



# Age/size structure

## Older fish in the western Aleutian Islands



# Fishery and management activity

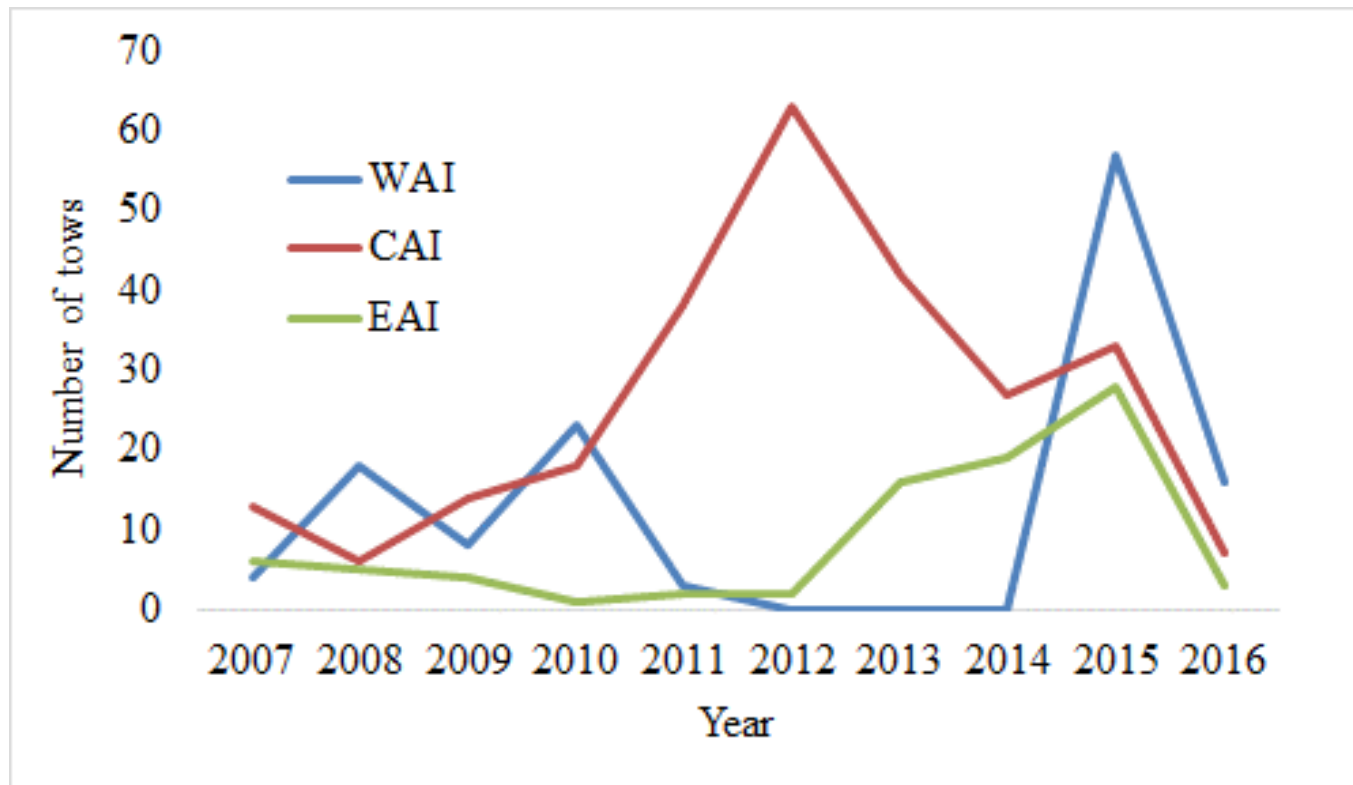
- At the 2015 Plan Team meeting, it was noted that targeted fishing was occurring in the eastern Aleutian Islands in 2015
- Directed fishing was allowed for a portion of each year since 2009
- Additional analyses indicates earlier targeting in other parts of the Aleutian Islands.

# Definition of a “northern rockfish” targeted tow

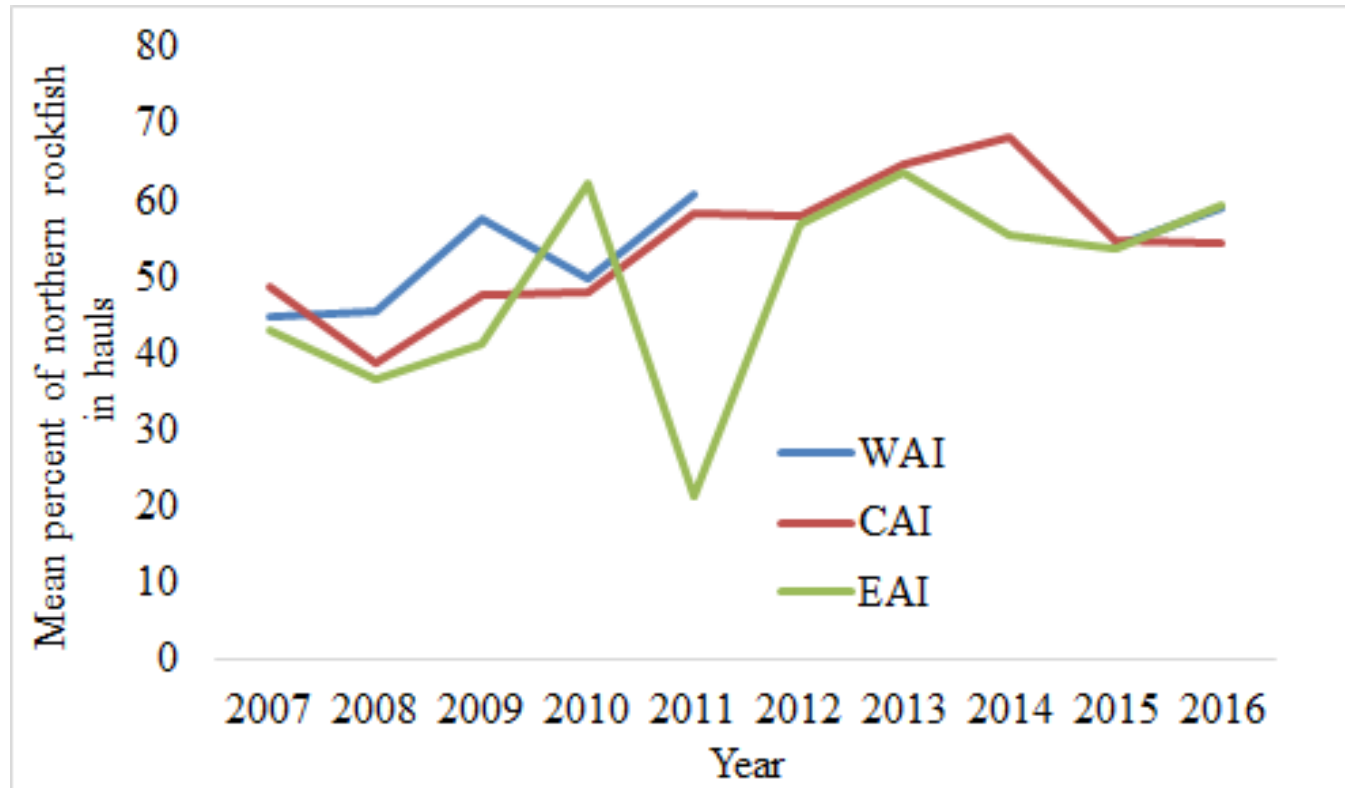
- Based on fishery tows sampled by groundfish observers
- Two criteria:
  - 1) Rockfish have the highest catch of the species or species groups
  - 2) Northern rockfish have the highest catch among the rockfish

# Number of northern rockfish tows

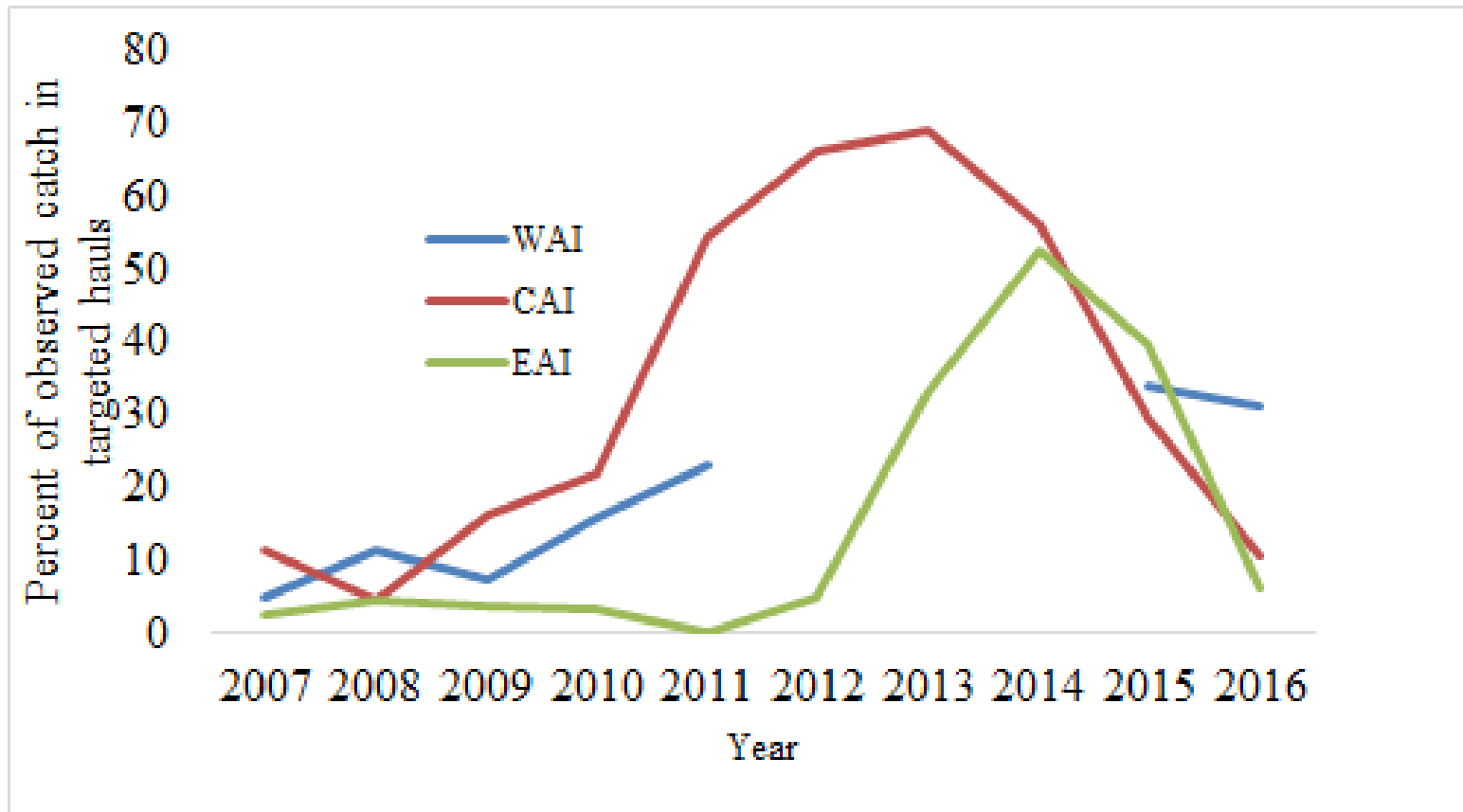
Increasing  
in the  
central AI  
from  
2010-2012



# Average percent of haul catch weight composed on northern rockfish in targeted tows



# Percent of yearly observed catch in targeted tows



# Amount of northern rockfish catch in targeted hauls

Area	Year	Hauls	Catch (t)	Mean Catch
				Per Haul (t)
CAI	2011	38	735	19.34
CAI	2012	63	1090	17.30
CAI	2013	42	899	21.40
EAI	2014	19	521	27.44
EAI	2015	28	814	29.05





# Why should we be concerned if the catch comes from targeted hauls?

- Because the interpretation of stock structure in 2012 was based on the understanding that northern rockfish would be a bycatch fishery
- Directed fishing was allowed since 2009 in order to prevent regulatory discards, with the understanding that targeting or topping off would not occur.
- If we understood in 2012 that targeting was occurring, the 'overage' in 2015 in the EAI could have been more easily anticipated and prevented.

# BSAI Plan Team conclusions, Sept 2012

- Evidence of stock structure
- Splitting the ABC would not reduce mortality
- Economic losses, increased regulatory discards, and management difficulty were considered



# Conclusions

- Evidence for spatial stock structure remains
- Prevention of directed fishing minimizes any conservation concern, but at a cost of restricting harvest for which there may be economic interest
- A useful comparison may be BSAI POP and Atka mackerel, in which directed fisheries were allowed while also managing the spatial distribution of harvest.