

**NOAA**  
**FISHERIES**

- Alaska  
Fisheries  
Science  
Center

# Fisher responses to variability in the Bering Sea pollock fishery

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Sciences

# Bering Sea pollock fishery

Catch share management

Two seasons – focus on summer B season here

Shoreside deliveries (Akutan and Dutch Harbor)

~70 vessels per year

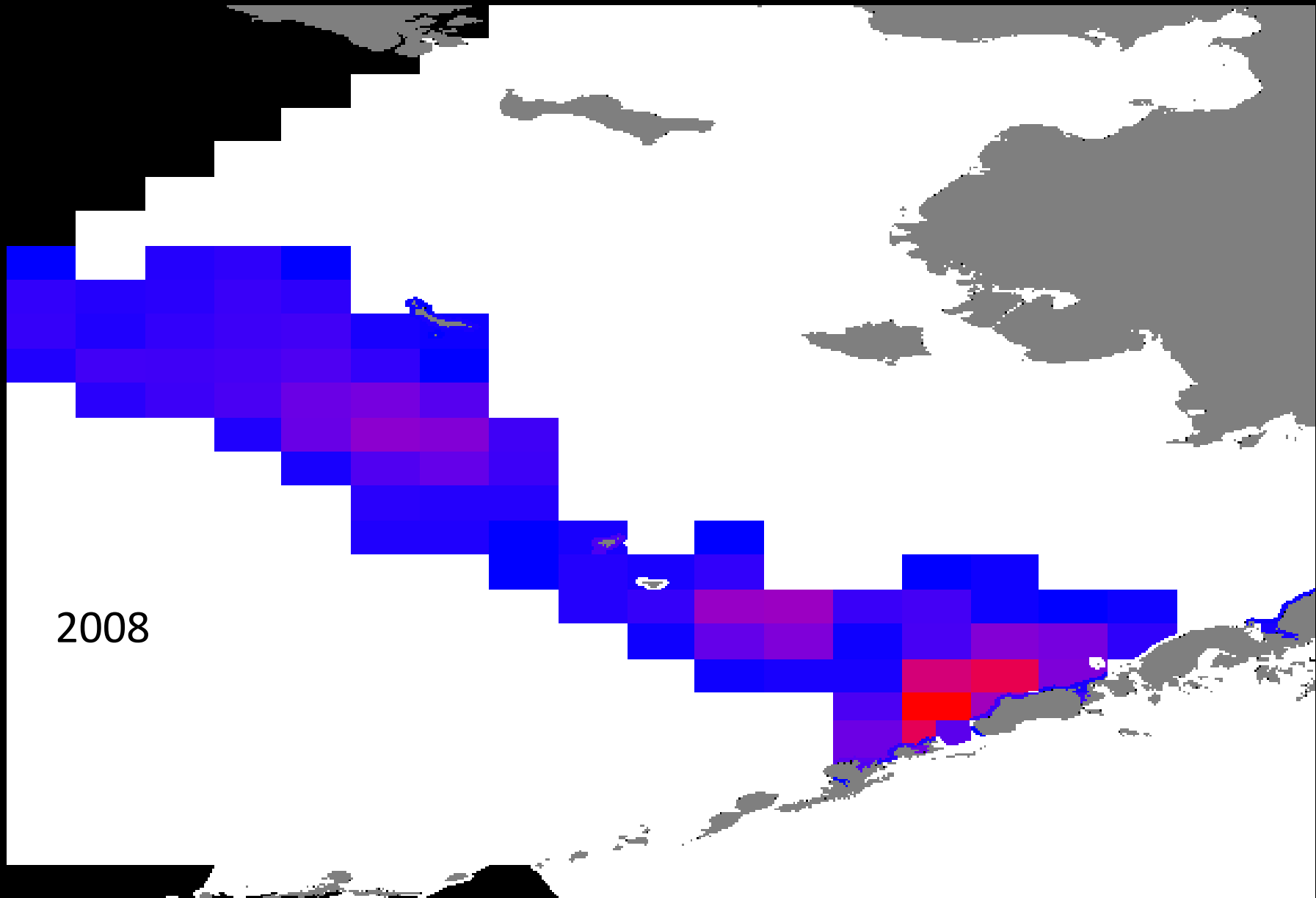
Vessel length 80' – 200'

2003 - 2015



Akutan

Dutch Harbor



2008

# Data!!!

VMS (~39,000 trips; Watson & Haynie 2016)

Observer

Fish tickets

Production reports

A91 Economic Data Report (fuel consumption)

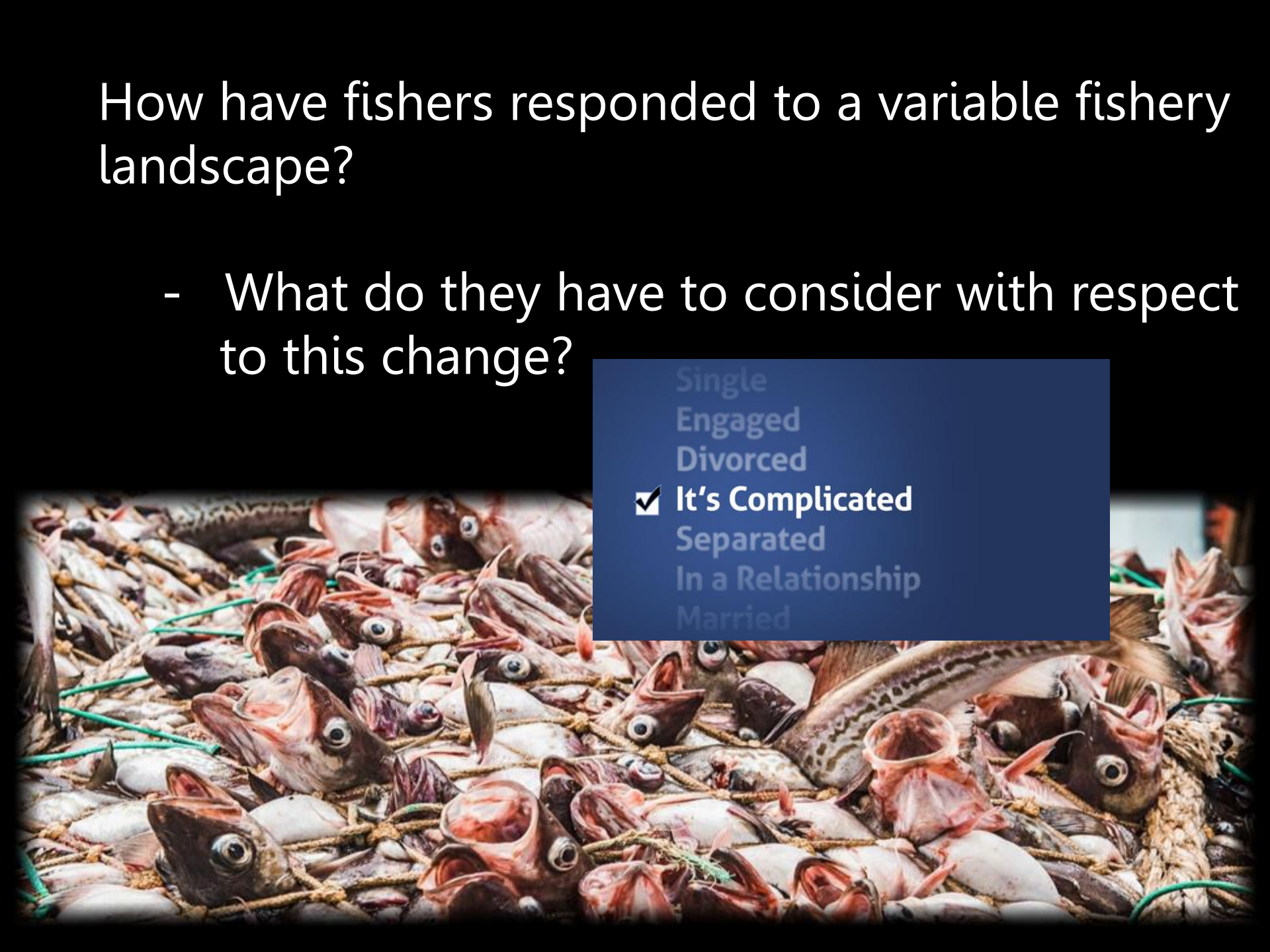
Fuel price survey data

Bering Sea bottom trawl survey

Stock assessment reports

# How have fishers responded to a variable fishery landscape?

- What do they have to consider with respect to this change?



Single  
Engaged  
Divorced  
 It's Complicated  
Separated  
In a Relationship  
Married

# Fictional delivery tracking sheet

	Quota	7,500,000		King salmon Cap	350	
	Remaining	5,105,896		King salmon catch	4	
	Capacity	400,000		King salmon remaining	346	
Delivery date / time		Pollock Wt.	# Kings	# Chum	Avg age	Avg wt.
6/10/2016	5pm	399,047	1	17	50	470
6/17/2016	5pm	399,408	3	32	45	491
7/8/2016	5pm	402,485	0	12	47	483
7/15/2016	5pm	392,516	0	14	44	539
7/22/2016	5pm					
7/29/2016	5pm					

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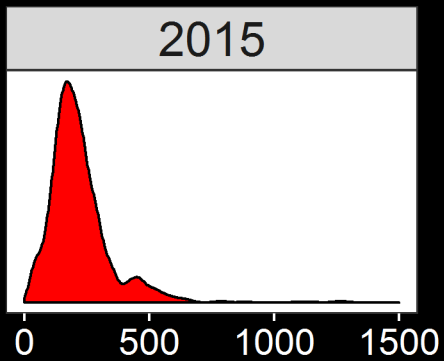
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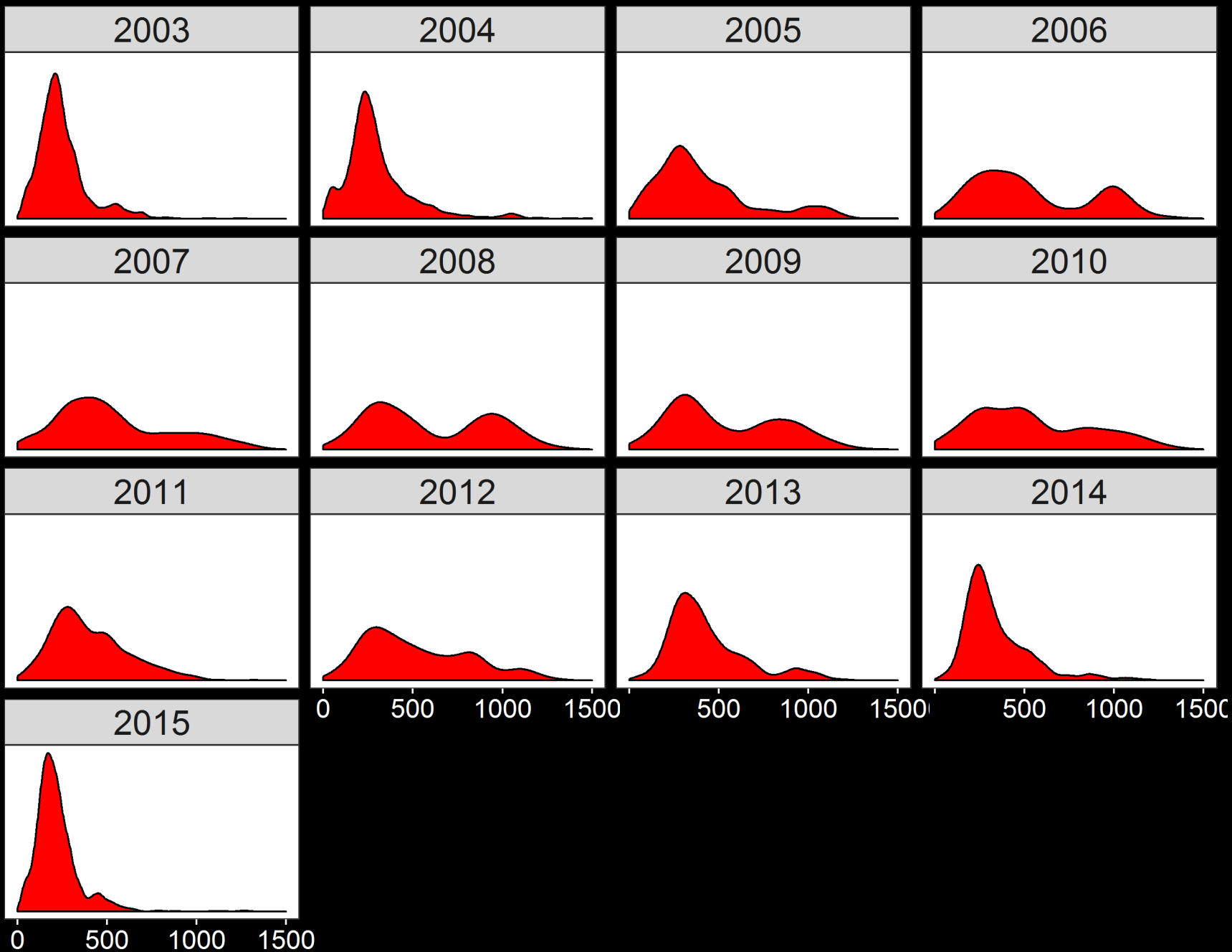
How have fishers responded to a variable fishery landscape?

- Changing fishing location / trip distances

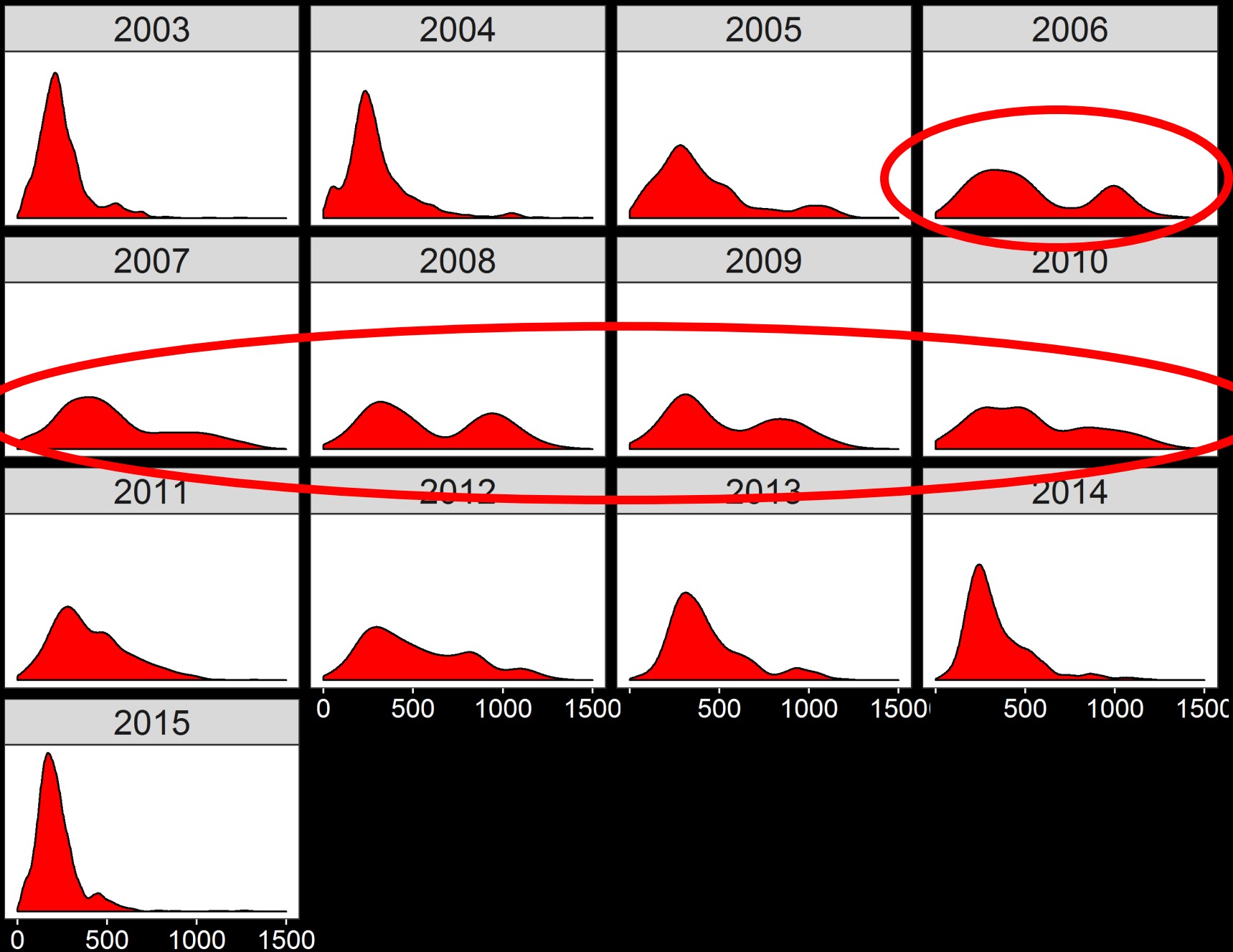




Trip Distance (nm)



Trip Distance (nm)



Trip Distance (nm)





Crew of the C/P Starbound (not a catcher vessel) with a full net;  
Photo courtesy of Chris Miller (csmphotos.com)

Trip Distance (nm)

1500

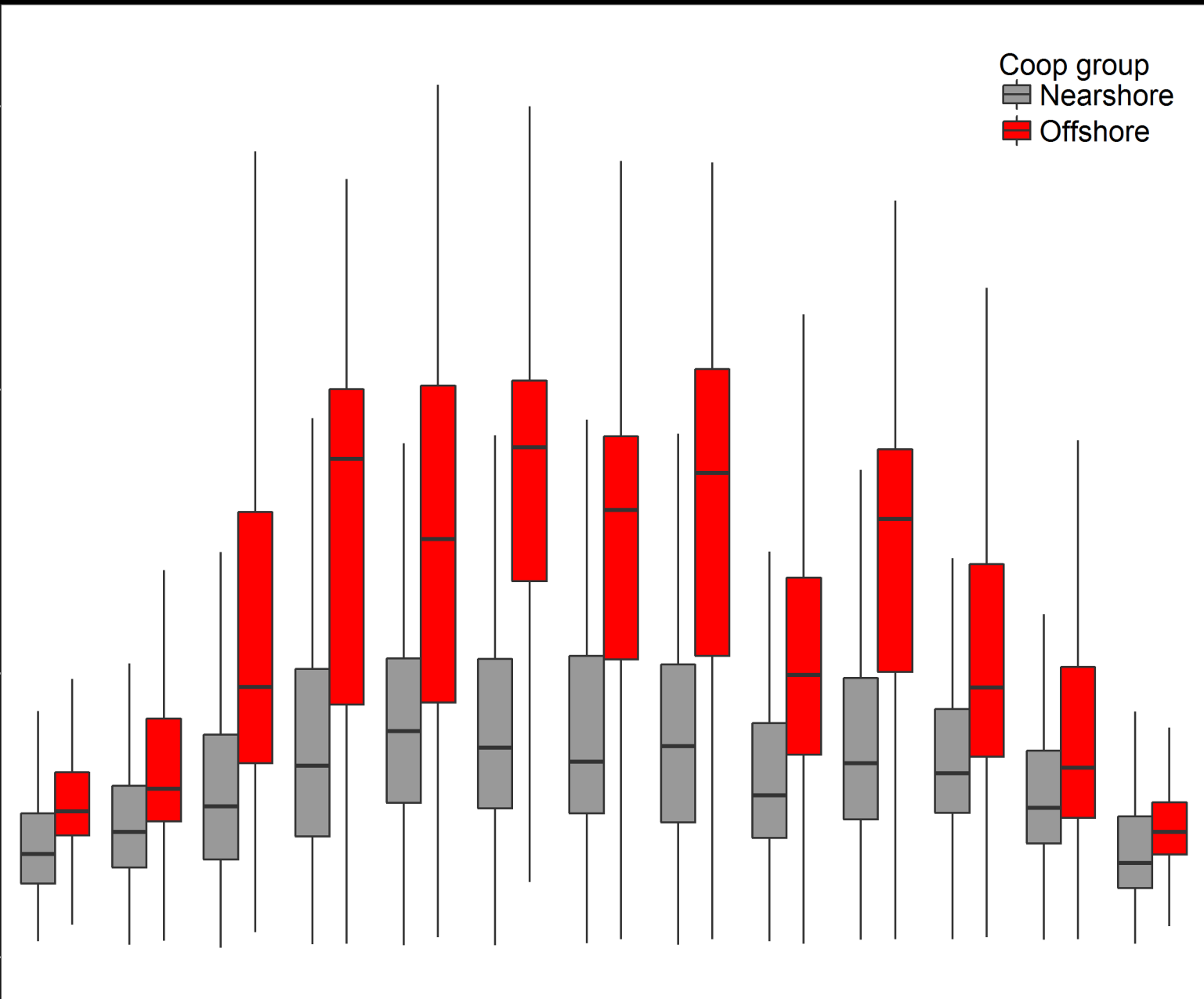
1000

500

0

Coop group  
Nearshore  
Offshore

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015



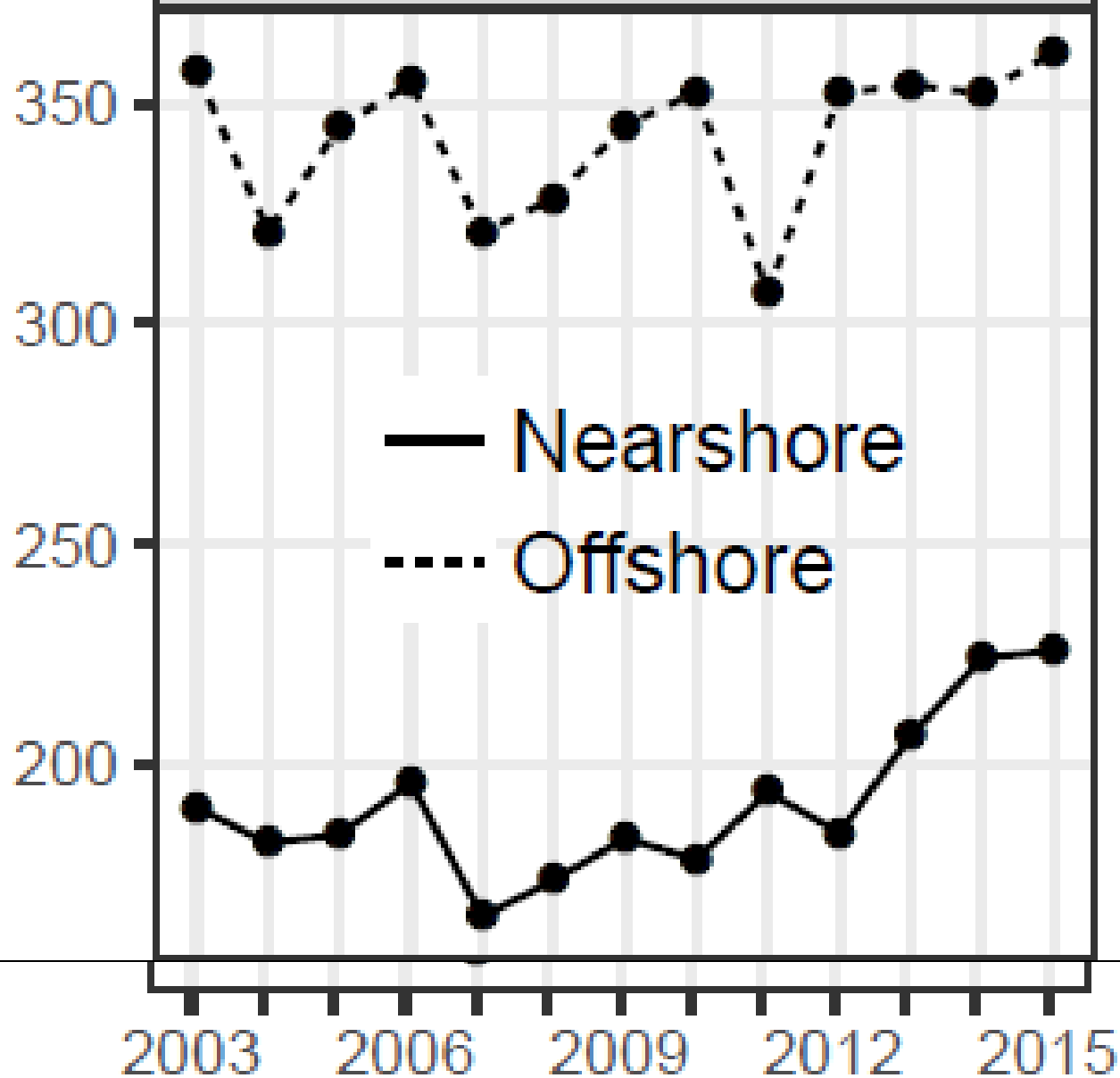


## Compared to Offshore, Nearshore boats:

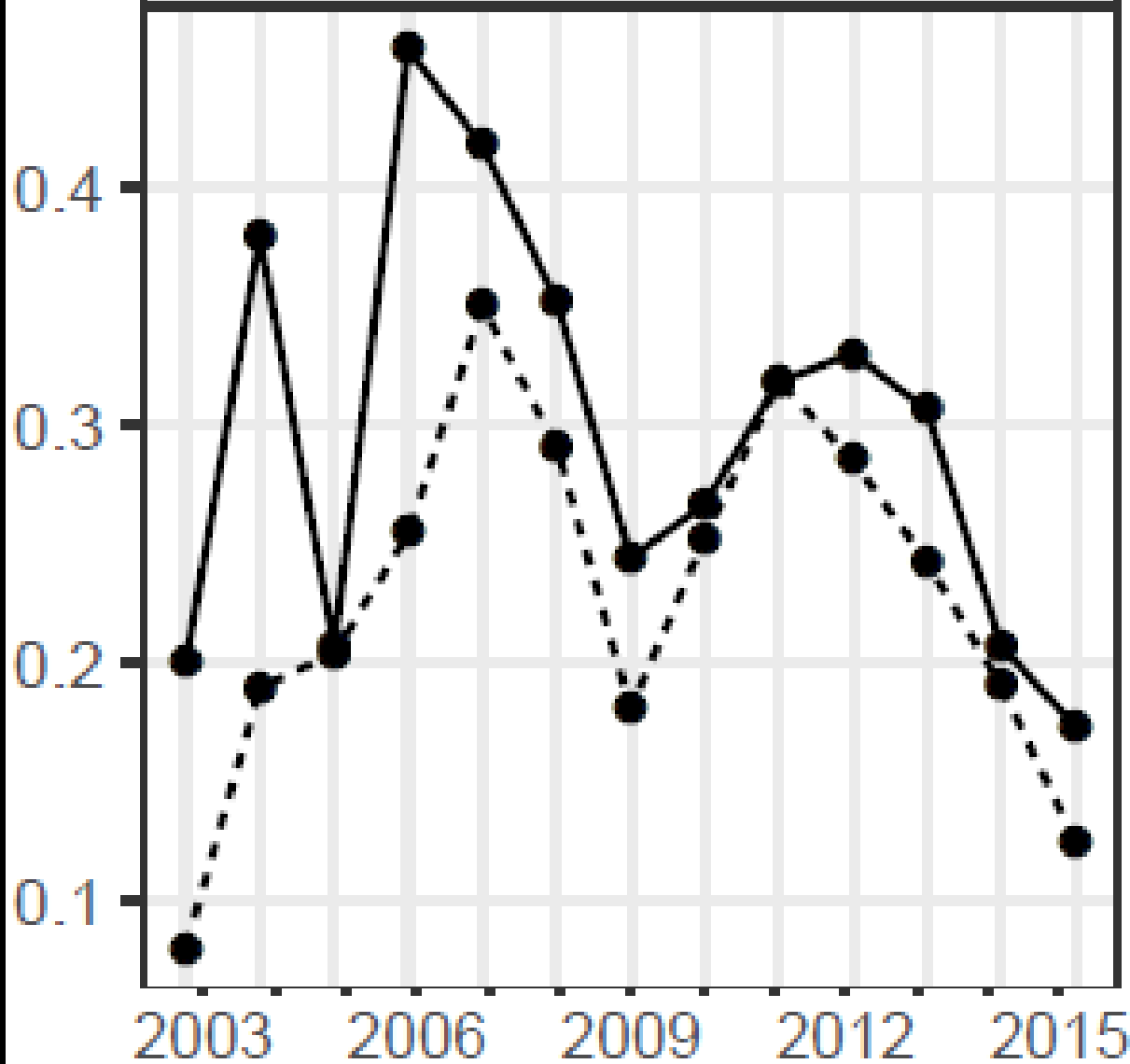
- Smaller
- Less fuel
- More opportunities elsewhere (73% v 88% participation)
- Higher catch variability (less full)
- Lower catch rates
- Larger, fresher fish
- Majority of production: fillet
- Higher revenue variability



# Catch / trip (tonnes)



# Fuel cost / gross earnings

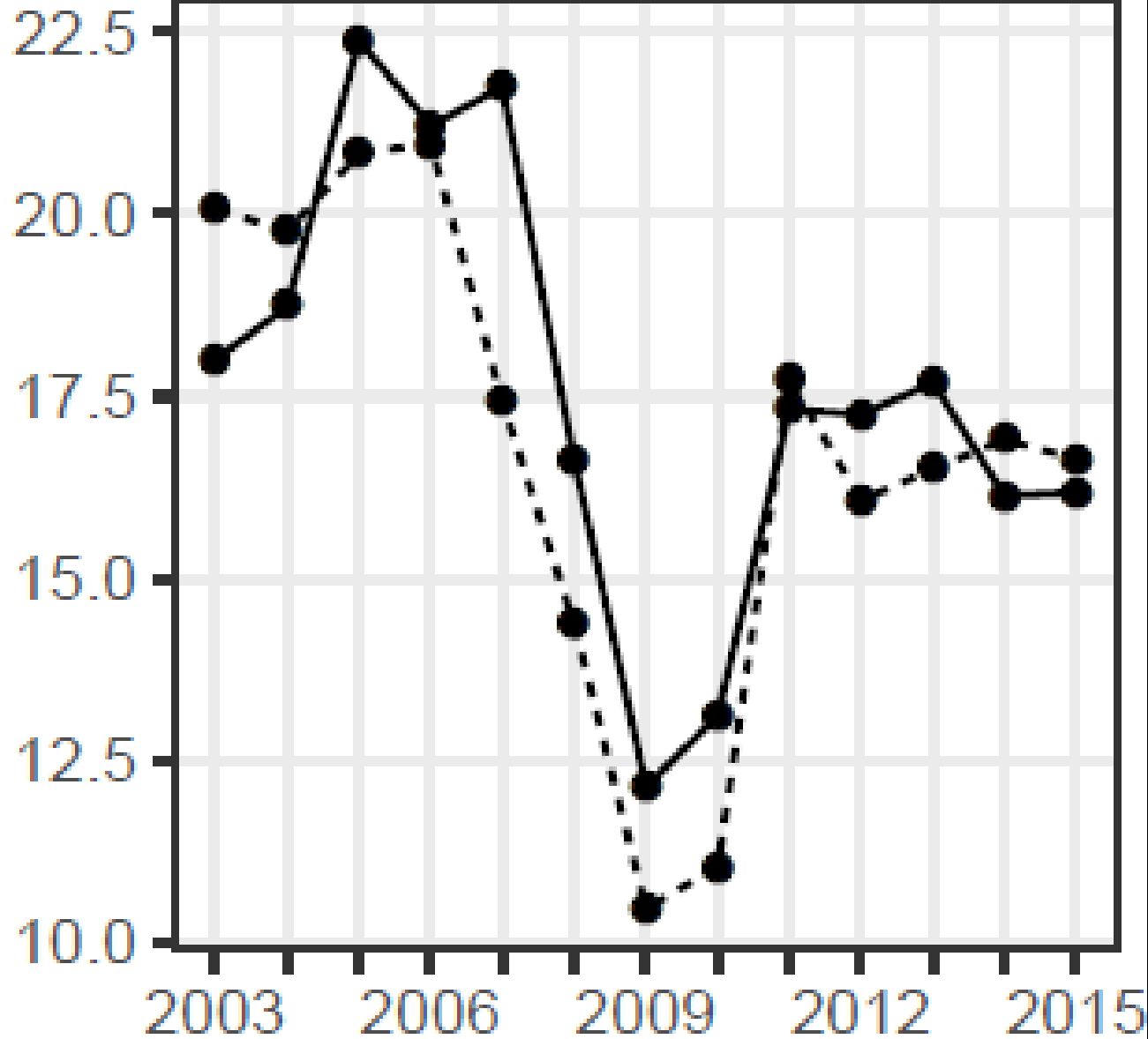


coopflag

— Nearshore

---- Offshore

# Trips / vessel

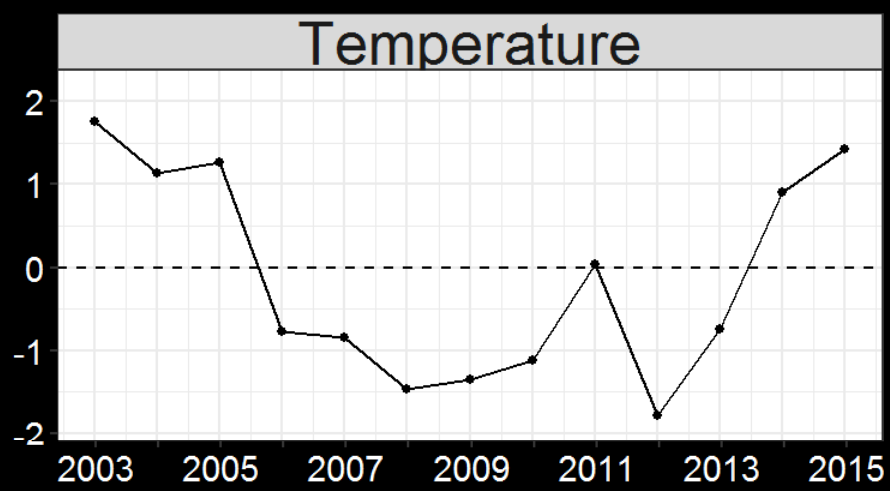


How have fishers responded to a variable fishery landscape?

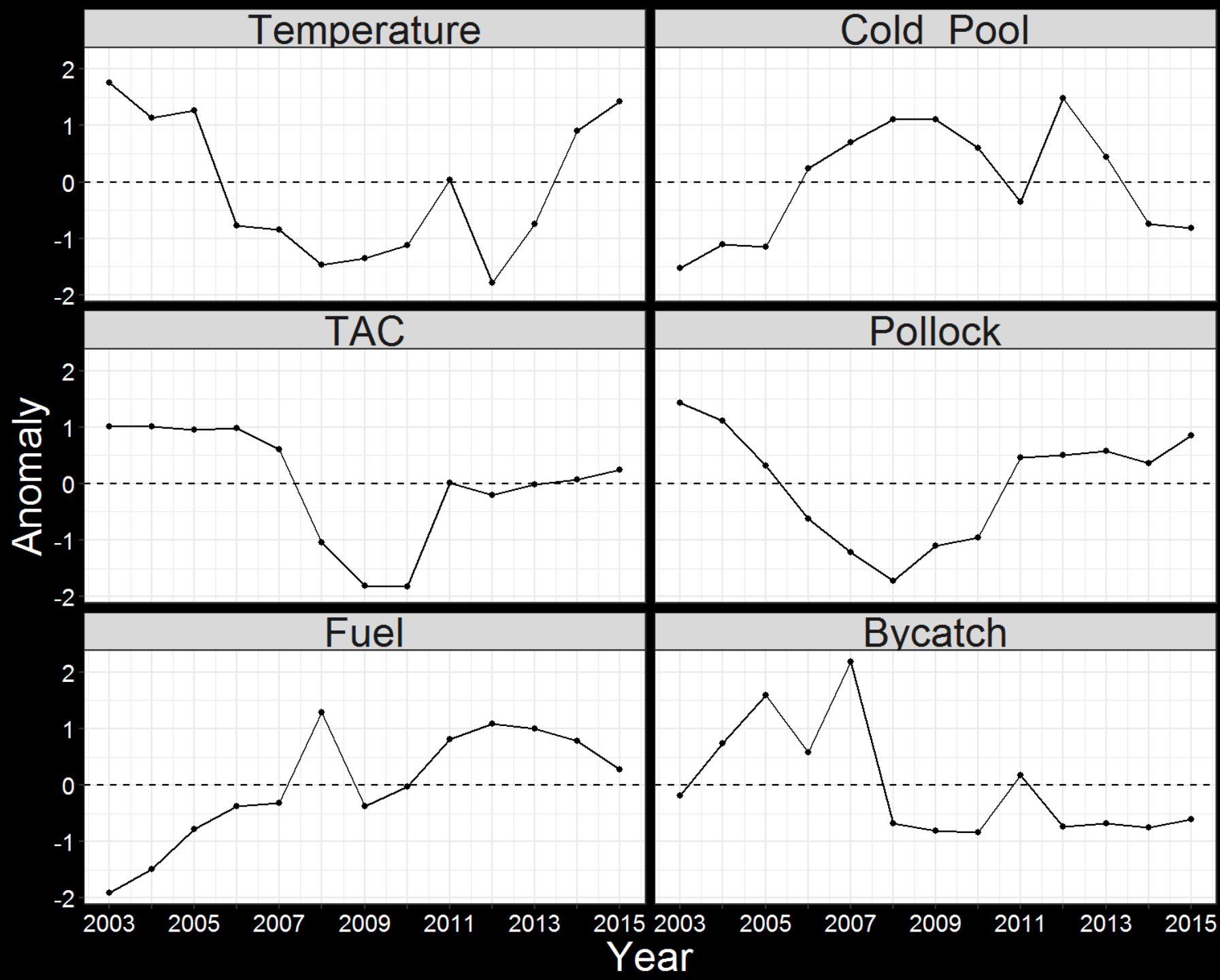
- About that fishery landscape part...

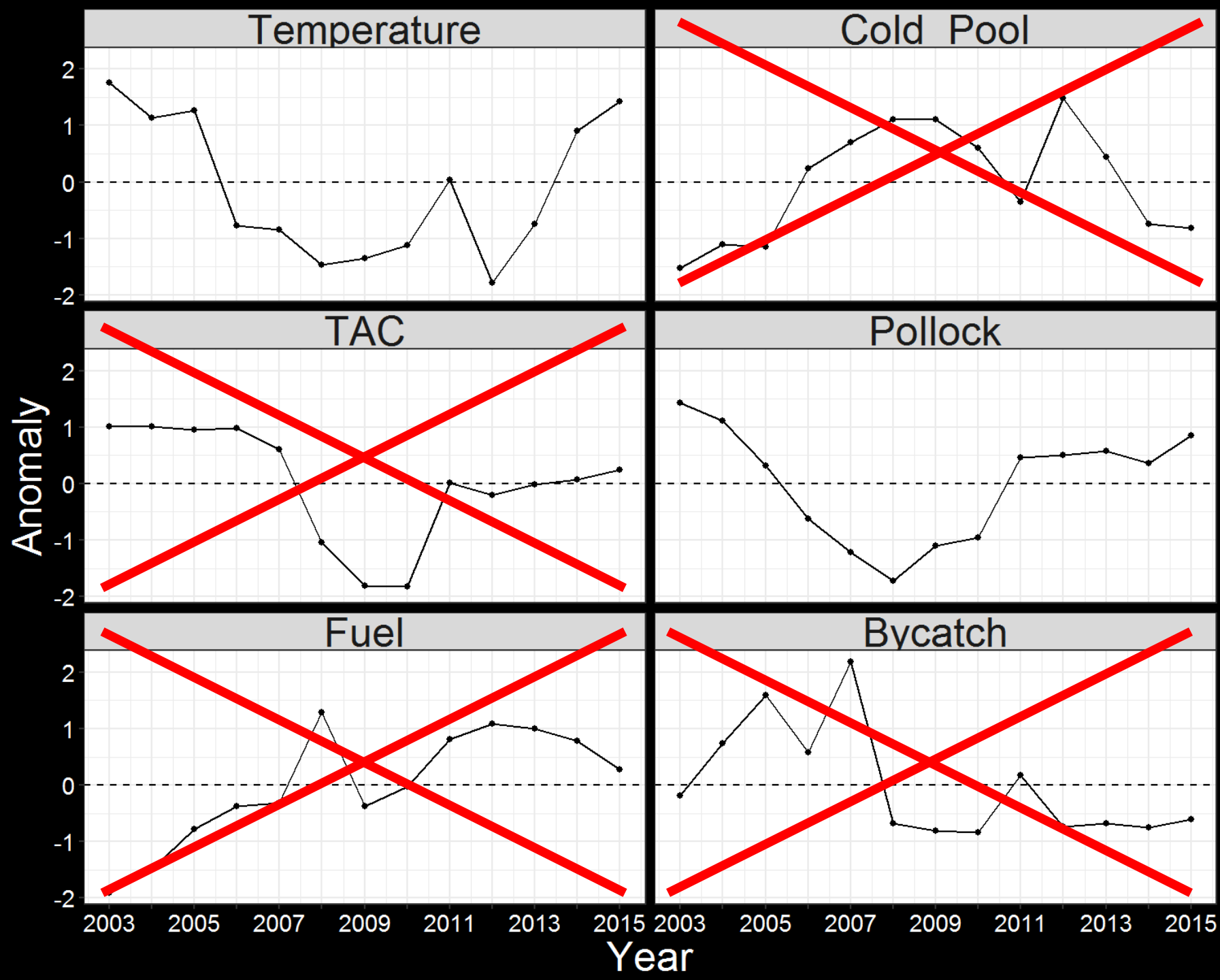


Anomaly











Trip Distance (nm)

1500

1000

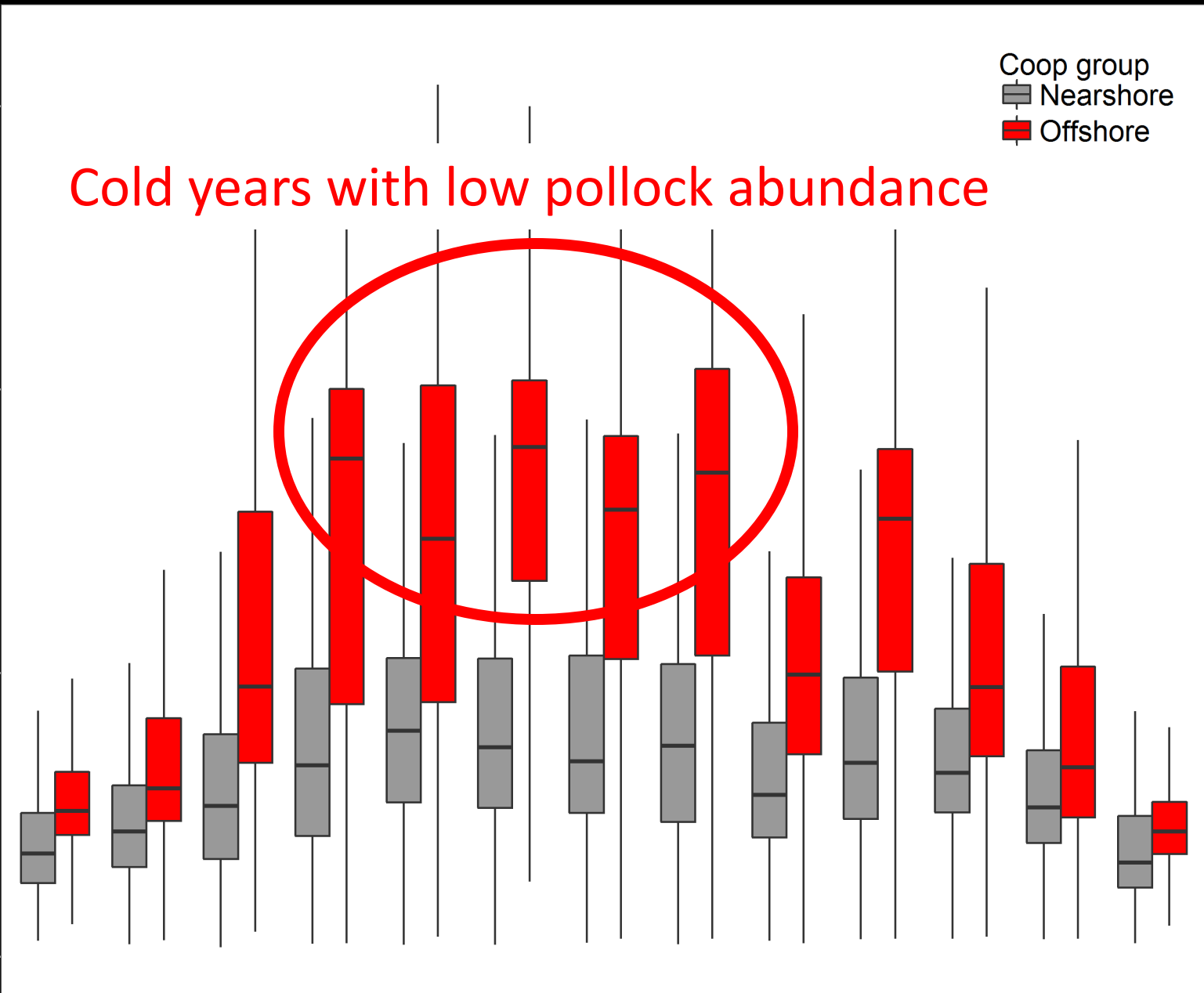
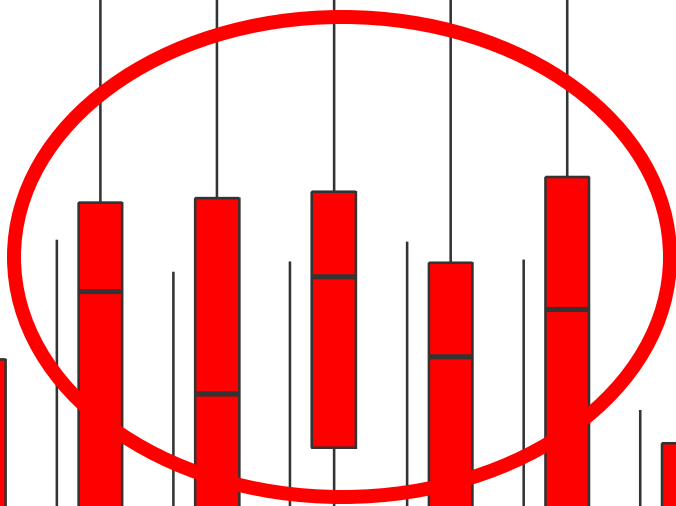
500

0

Coop group  
Nearshore  
Offshore

Cold years with low pollock abundance

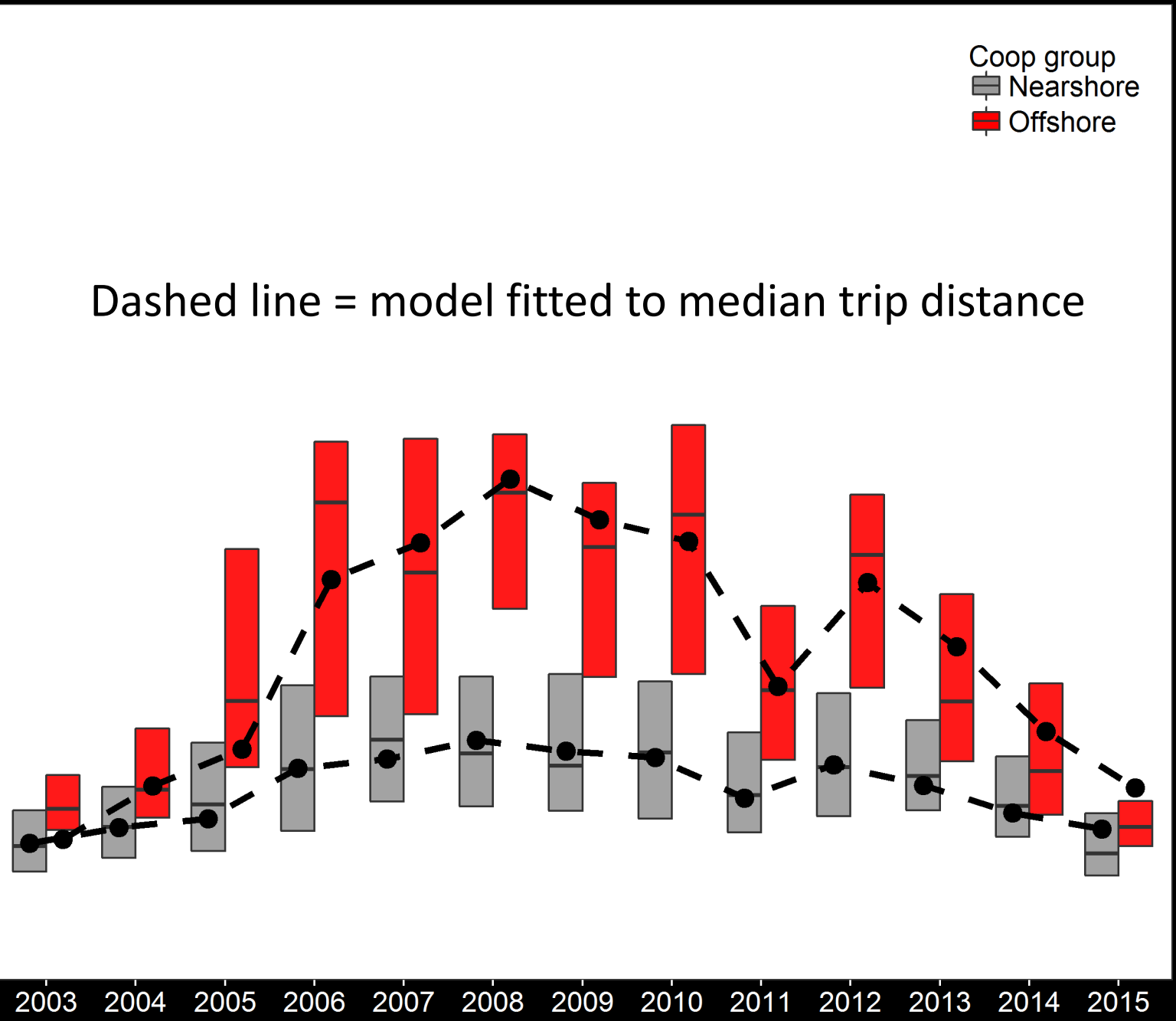
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015



Trip Distance (nm)

Coop group  
Nearshore  
Offshore

Dashed line = model fitted to median trip distance



Trip Distance (nm)

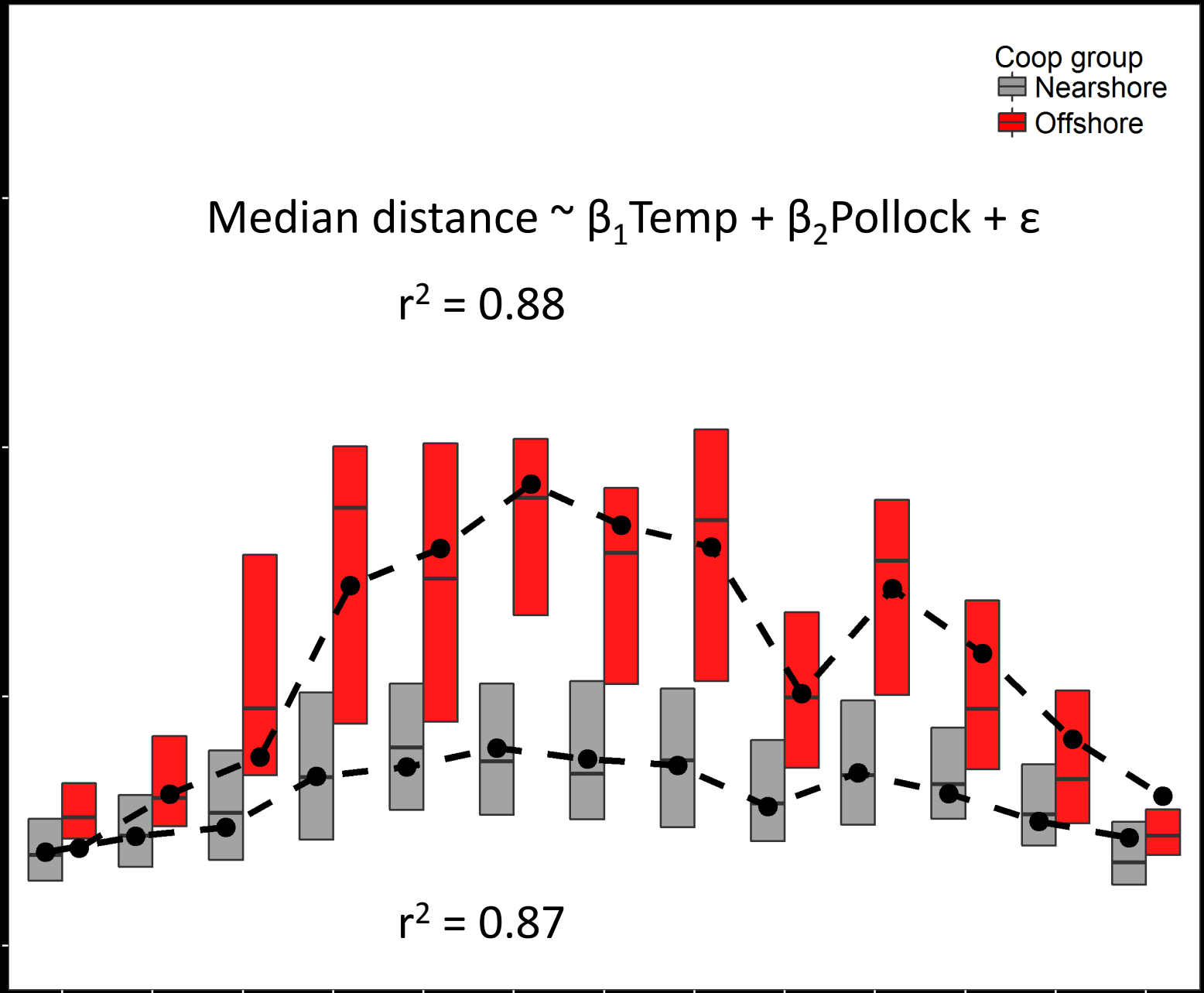
Coop group  
Nearshore  
Offshore

Median distance  $\sim \beta_1 \text{Temp} + \beta_2 \text{Pollock} + \epsilon$

$r^2 = 0.88$

$r^2 = 0.87$

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015



How have fishers responded to a variable fishery landscape?

- Did responses impact success?





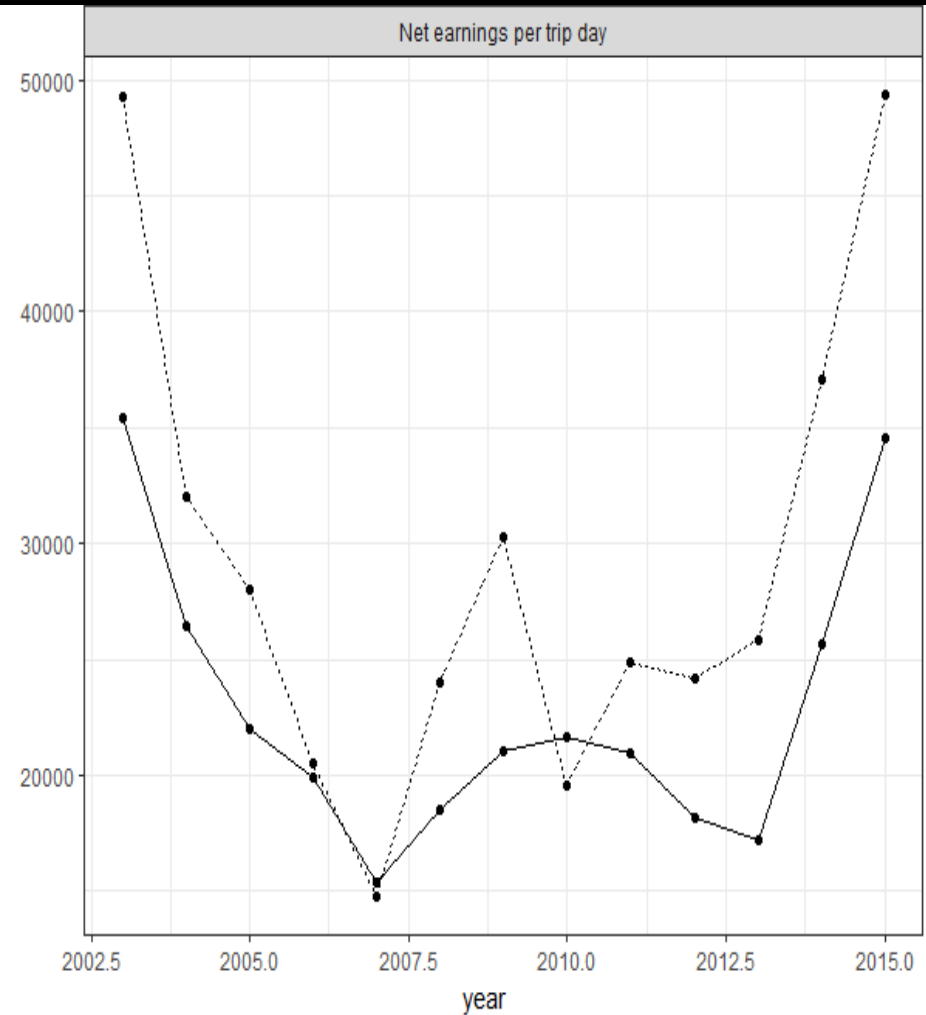
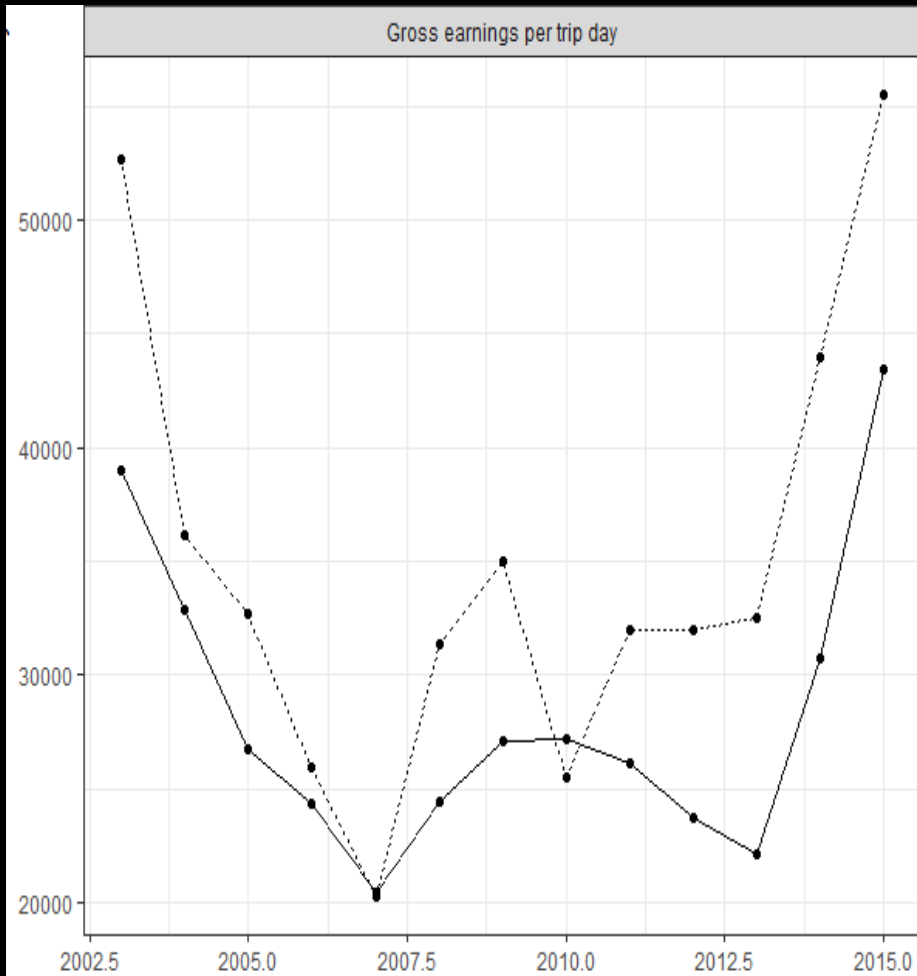
Imagine that I had time to describe hundreds of inter- and intra- annual comparisons of catch, effort, CPUE, fuel costs, gross, and net revenues...clever analyses...brilliant and innovative analyses (we really have the best analyses ever)...

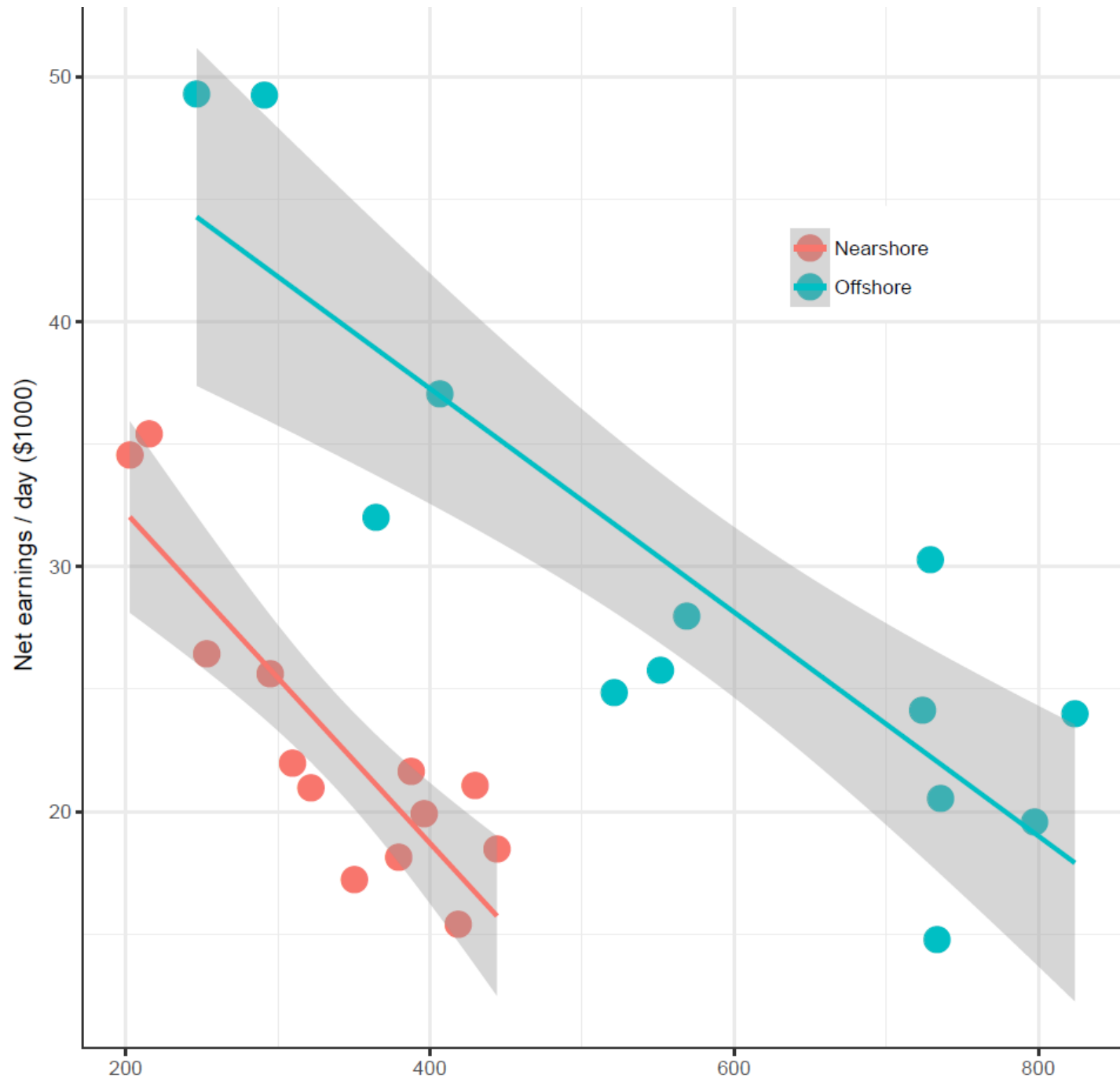


Chris Miller – csmphotos.com

# Gross v Net Revenue per Trip Day

coopflag  
— Nearshore  
- - - Offshore





## Summary of Results

Within a given year, “net” revenue variability for “Nearshore” vessels  $\geq$  that for “Offshore” vessels.

Variability of mean annual revenues (i.e., across years) was not different between vessel groups.

Different vessel strategies had similar long-term results in response to variability in pollock abundance & water temperature.





So we're good then, right?



Cold ; Abundant

Warm; Abundant

Cold; Scarce

Warm; Scarce

Pollock anomaly

Temperature anomaly

Pollock anomaly

Cold ; Abundant

Warm; Abundant

2003

2004

2015

2012

2013

2011

2014

2005

2006

???

2010

2009

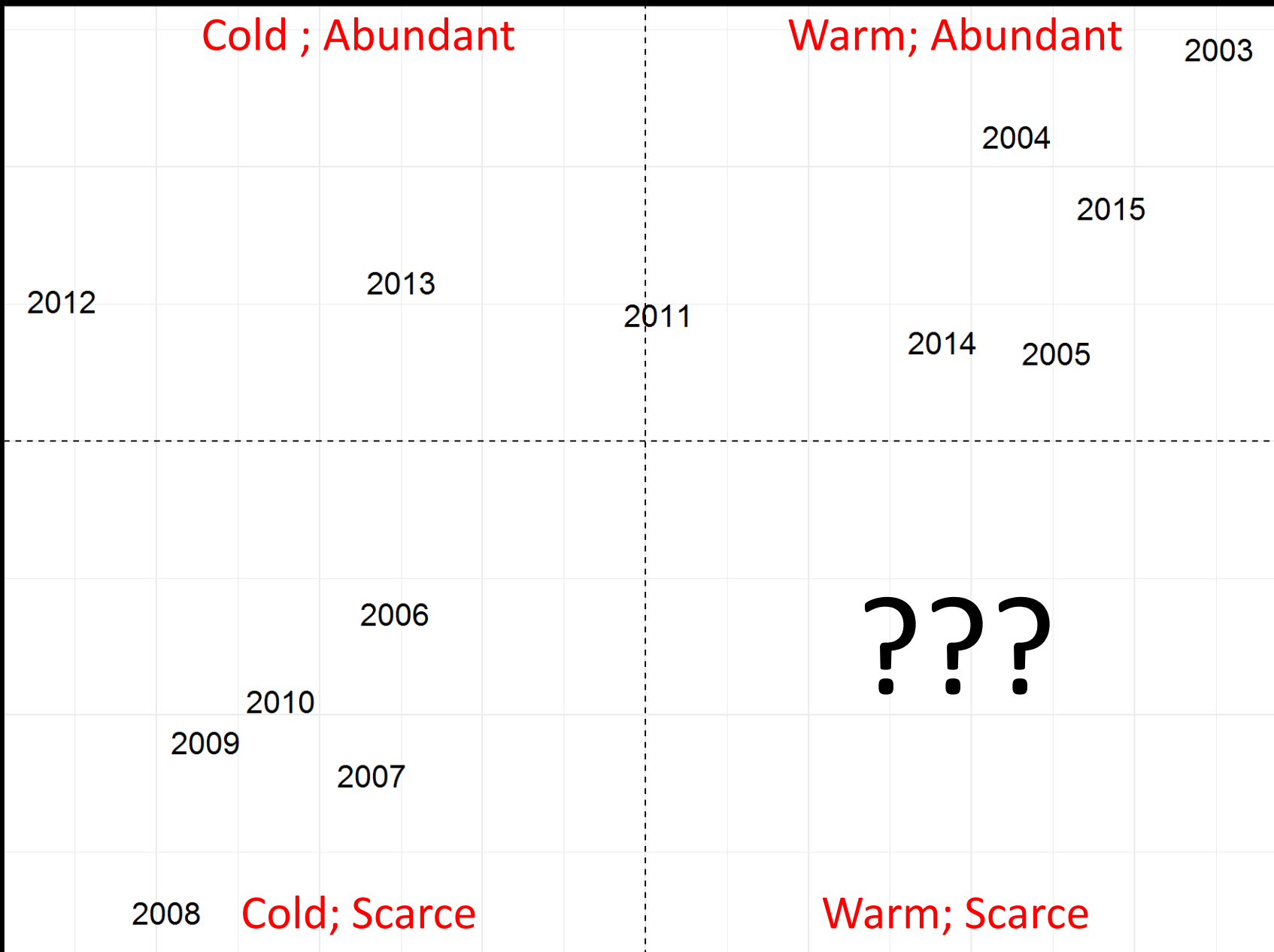
2007

2008

Cold; Scarce

Warm; Scarce

Temperature anomaly



# Funding & Thank you's

- FishSET, Spatial Economics Toolbox for Fisheries, NOAA Fisheries Science & Technology
- Alaska Sea Grant, Pacific States
- Franz Mueter , Jen Shriver
- Bob Lauth
- North Pacific Observer Program
- Numerous pollock industry folks
- John Gauvin







Thank you!

Questions?