



**NOAA
FISHERIES**

**Alaska Fisheries
Science Center**

**Results from the 37th Annual
Southeastern Bering Sea Shelf &
“Rapid Response” Northern Bering Sea
Bottom Trawl Surveys
May 31 to August 20, 2018**

**Resource Assessment &
Conservation Engineering Division
Groundfish Assessment Program**

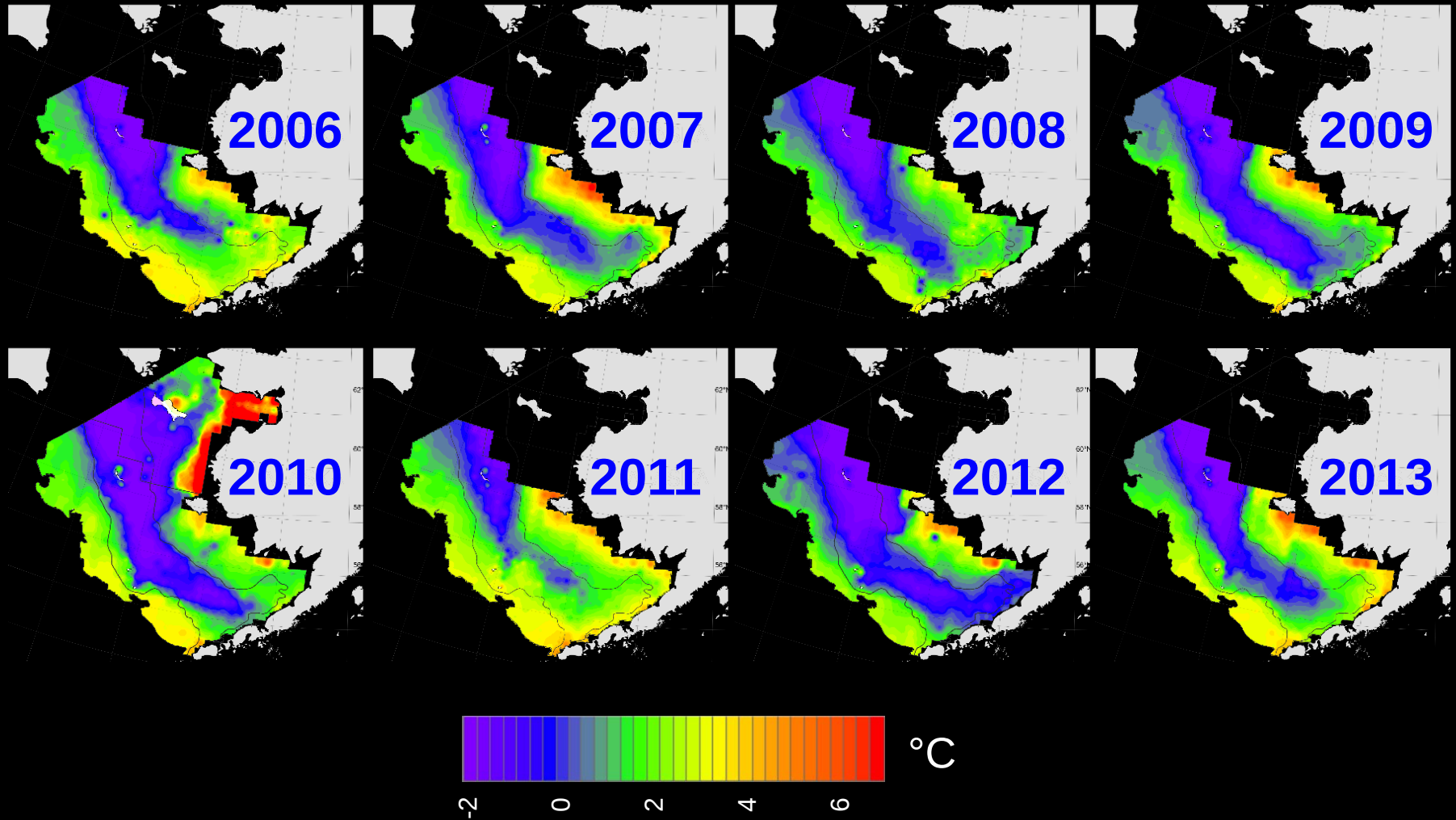
October 1-4, 2018



Eastern Bering Sea Shelf Environment

Ice extent/bottom temps shape fish/crab distribution

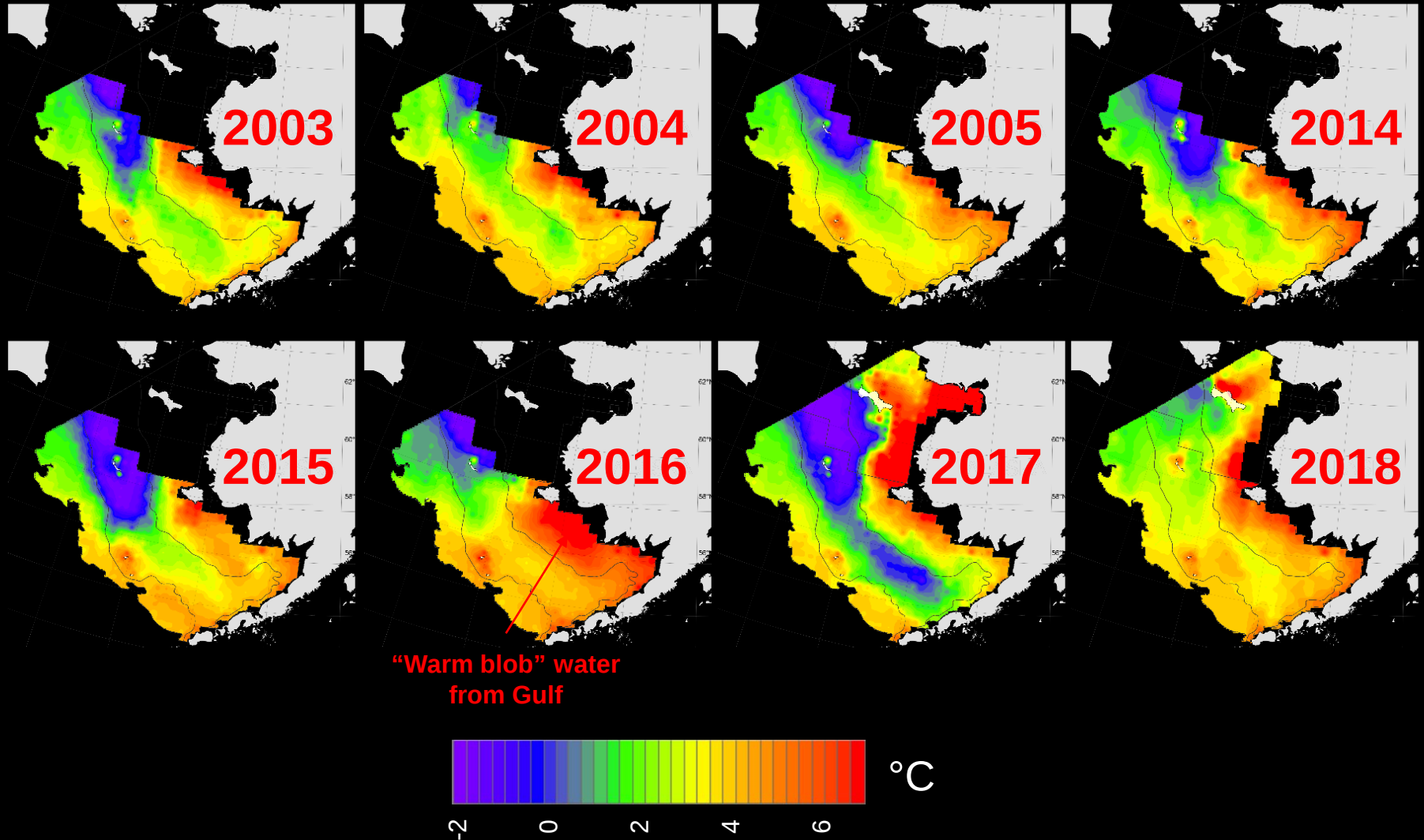
Colder years



Eastern Bering Sea Shelf Environment

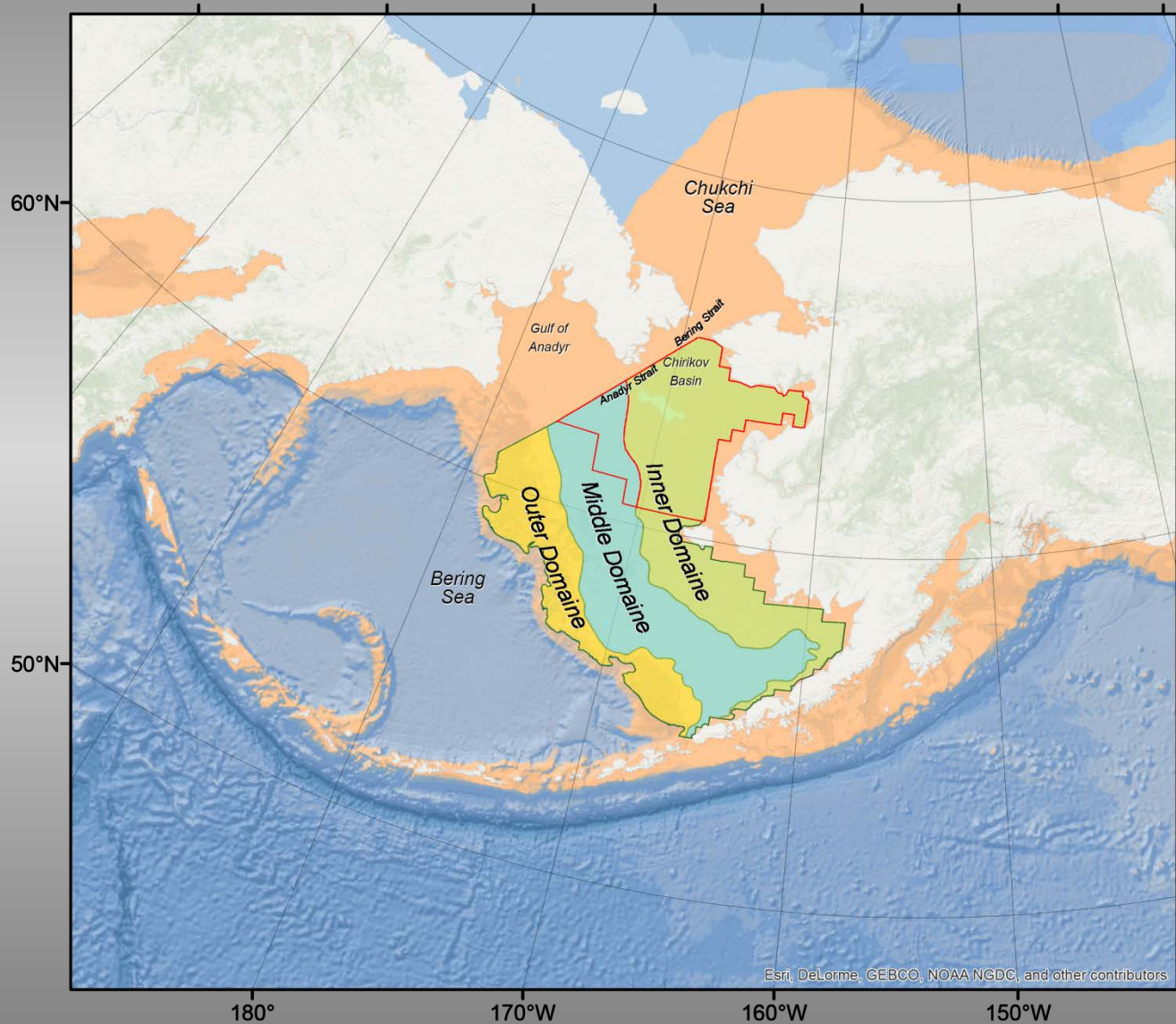
Ice extent/bottom temps shape fish/crab distribution

Warmer years



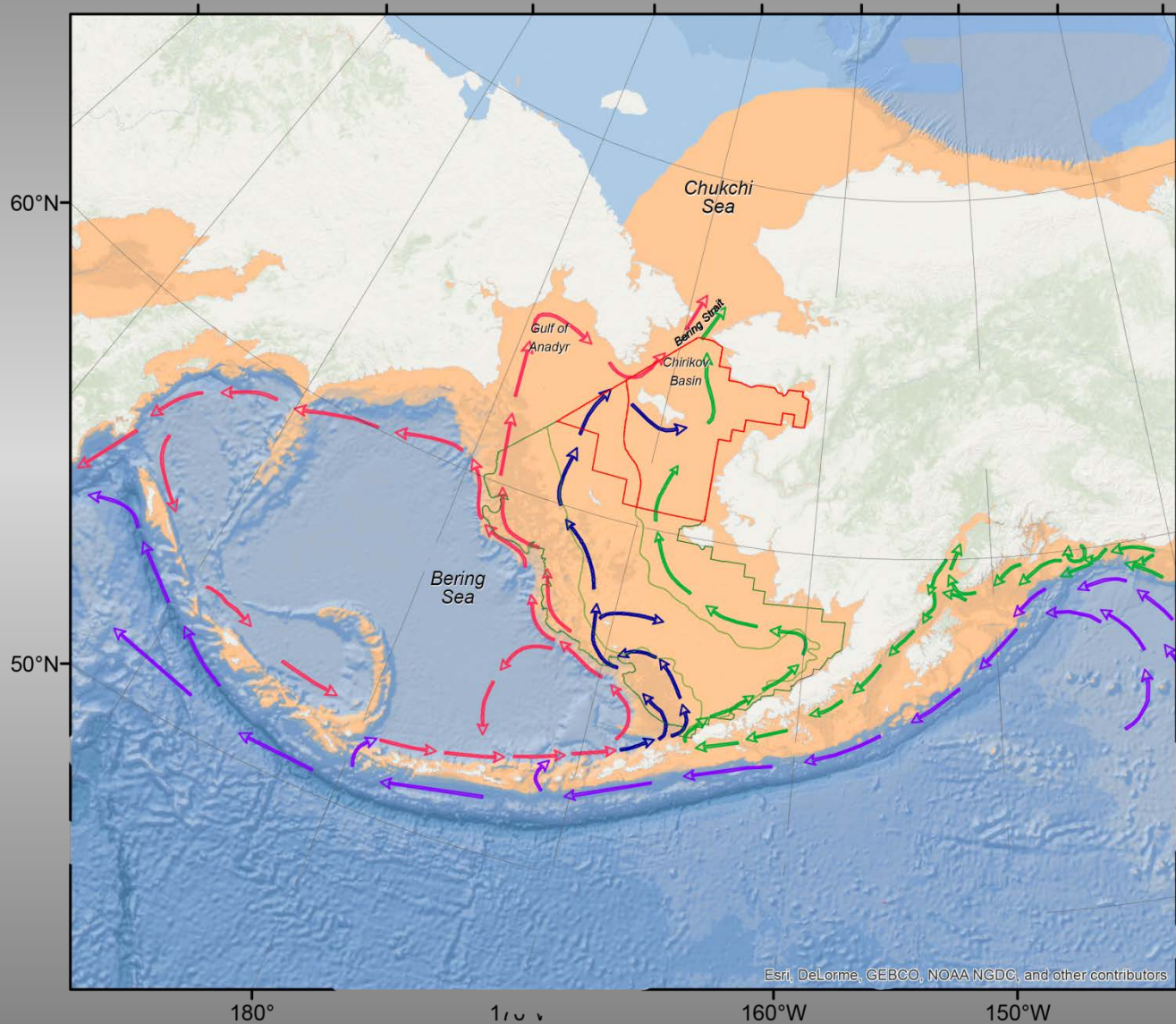
Eastern Bering Sea Shelf Environment

Bottom depth < 200m



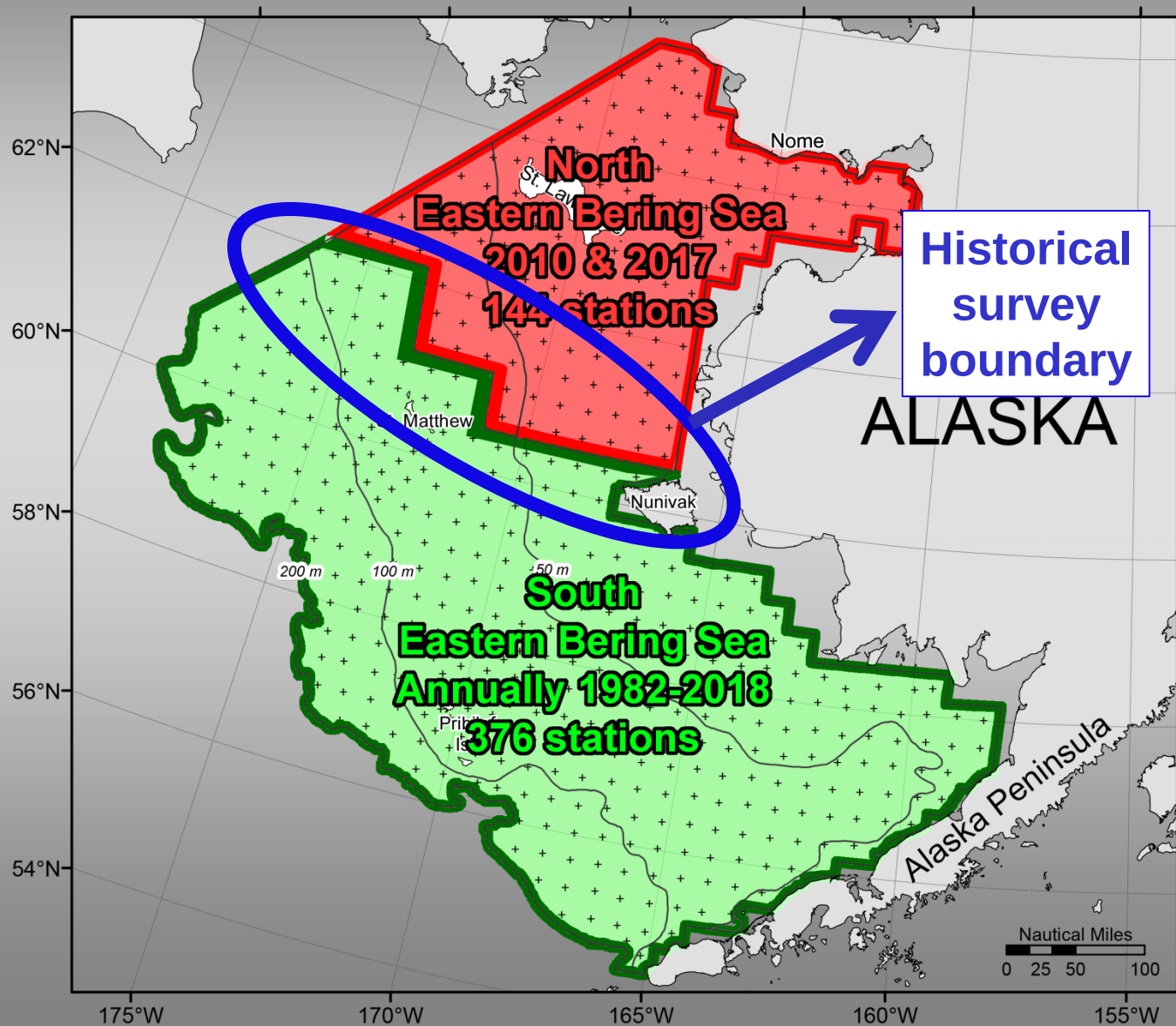
Eastern Bering Sea Shelf Environment

Currents affect plankton productivity



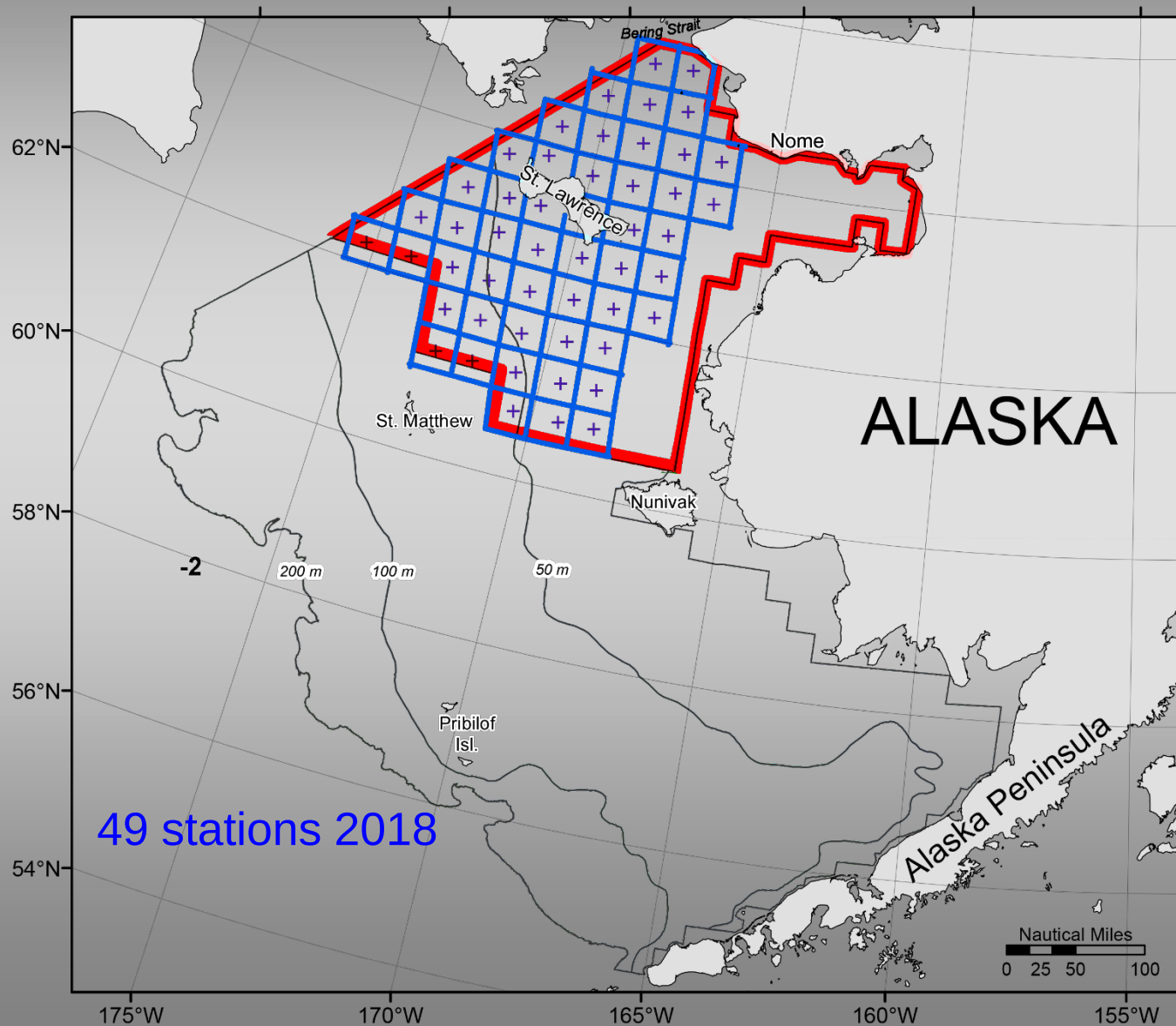
Standard Eastern Bering Sea Shelf Surveys

20 nm² grid pattern

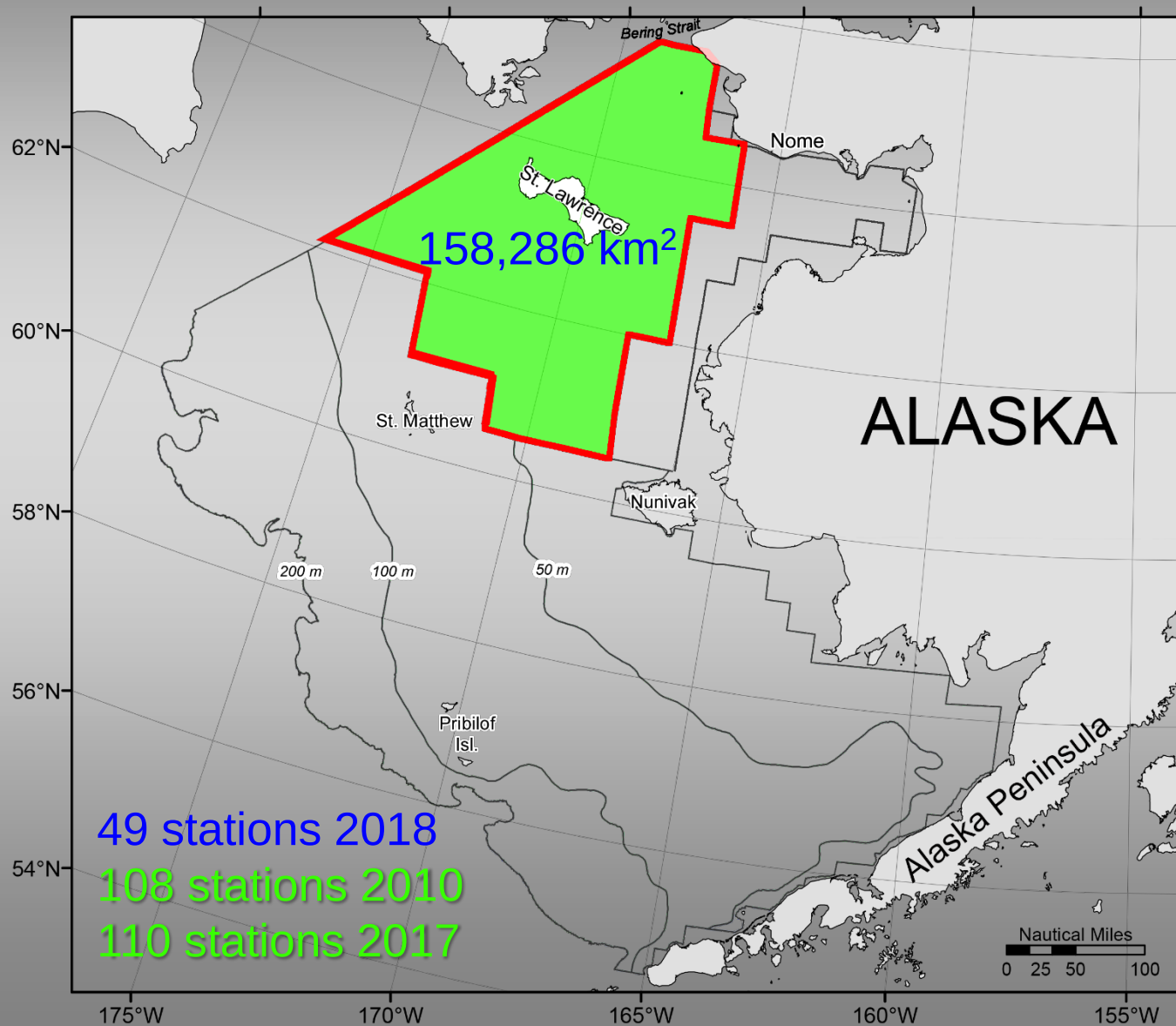


“Rapid response” 2018 NEBS survey

“Special” 30 nm² grid pattern



Comparing results 2010, 2017 & 2018



2018 Survey Charter Vessels

SEBS & NEBS

May 31 – August 20



FV Alaska Knight
2010 -present
9^h year

SEBS only

May 31 – August 7



FV Vesteraalen
2014 -present
5th year

Both vessels on contract to do standard **SEBS & NEBS** next year (charters fully funded). Thank you AFSC leadership and NOAA Fisheries HQ!

Length measurements SEBS & NEBS

walleye pollock	48,535	8,126
yellowfin sole	27,237	4,299
flathead sole	26,708	11
northern rock sole	25,765	2,540
arrowtooth flounder	18,689	12
Alaska plaice	12,992	1,992
Pacific cod	5,511	511
Alaska skate	376	376
Kamchatka flounder	7	7
rex sole	425	-
plain sculpin	1,899	290
Pacific halibut	1,828	63
Bering flounder	1,450	1,250
yellow Irish lord	1,354	1
starry flounder	1,024	54
great sculpin	782	24
longhead dab	498	72
bigmouth sculpin	346	-
Greenland turbot	249	10
other taxa (22)	2,817	1,431
TOTAL		213,302

**Plus 1000's and
1000's of crabs!**

Age structures SEBS & NEBS

Random

Walleye pollock	1502 & 250	Aging completed
Pacific cod	1352 & 196	
Flathead sole	805	
Arrowtooth flounder	804	

Per cm/sex/area

Yellowfin sole	724
Northern rock sole	571
Alaska plaice	472
Kamchatka flounder	485
Greenland turbot	203
Pacific halibut	381
Yellow Irish lord	258

Other survey projects & samples

Genetic samples

Pacific cod	250
-------------	-----

Crab pathology

Snow crab	783
-----------	-----

Tanner crab	446
-------------	-----

Pacific halibut

Wire tags	768
-----------	-----

Tissue samples	181
----------------	-----

Fin clips	518
-----------	-----

Stomachs

Pollock	Lots
---------	------

Pacific cod	&
-------------	---

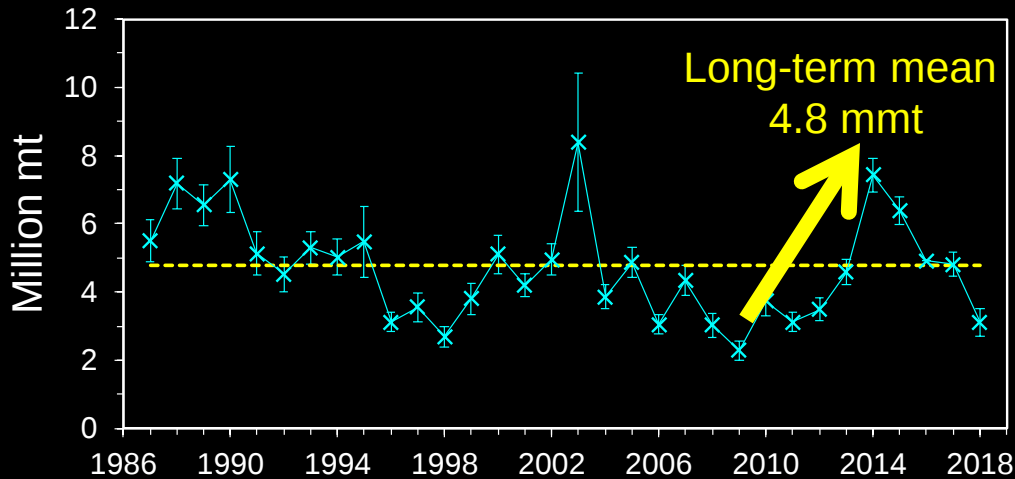
Halibut	Lots
---------	------

ATF	
-----	--

Other major projects

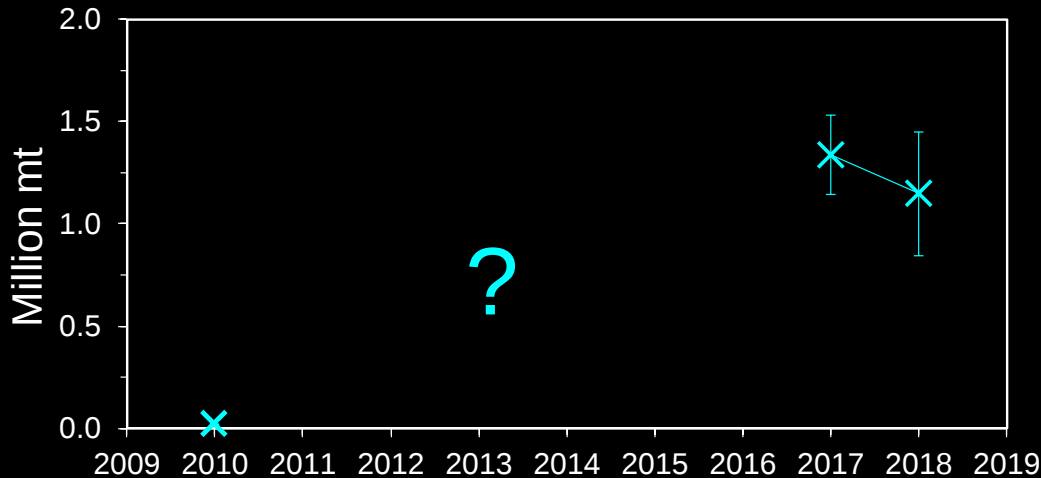
- Temporal-spatial variation of juvenile flatfish condition
- MACE “AVO” pollock index
- Estimation of catchability of the combined BT & AT survey for pollock
- CTD and light intensity data collections
- Population genomics of RKC and Tanner crabs
- Genetics and mating dynamics of snow crab
- Cooperative BSFRF Tanner crab catchability study

SEBS & NEBS Walleye pollock



SEBS Biomass
3.1 mmt

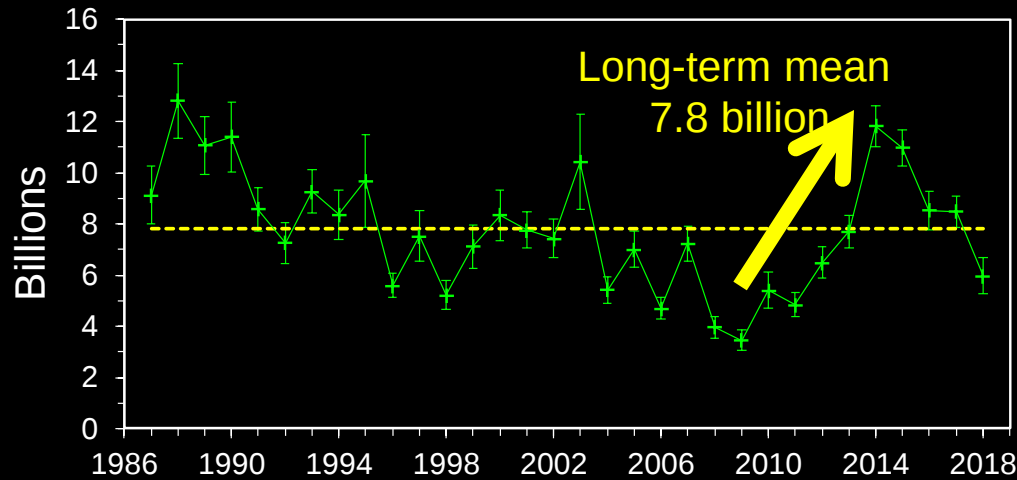
-35% from 2017 (4.8 mmt)



NEBS Biomass
1.15 mmt

-14% from 2017 (1.34 mmt)

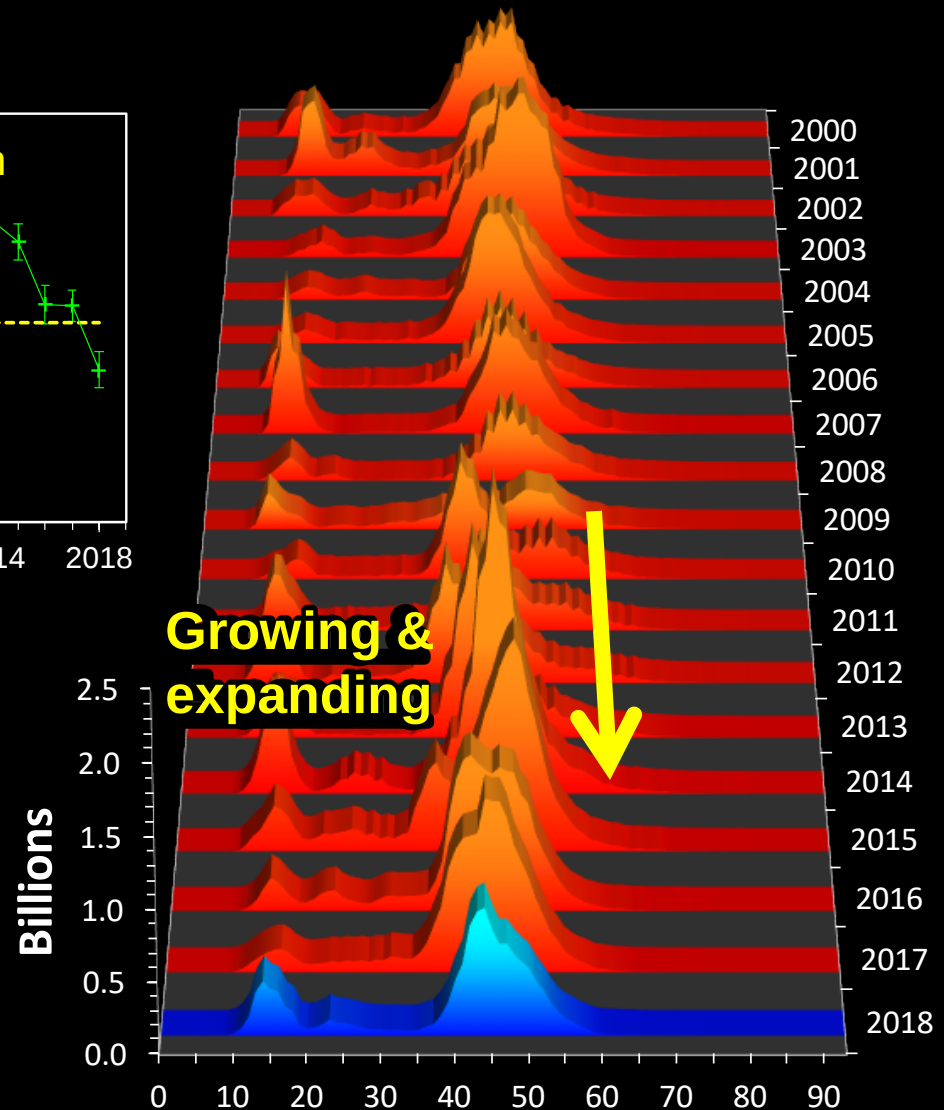
SEBS Walleye pollock



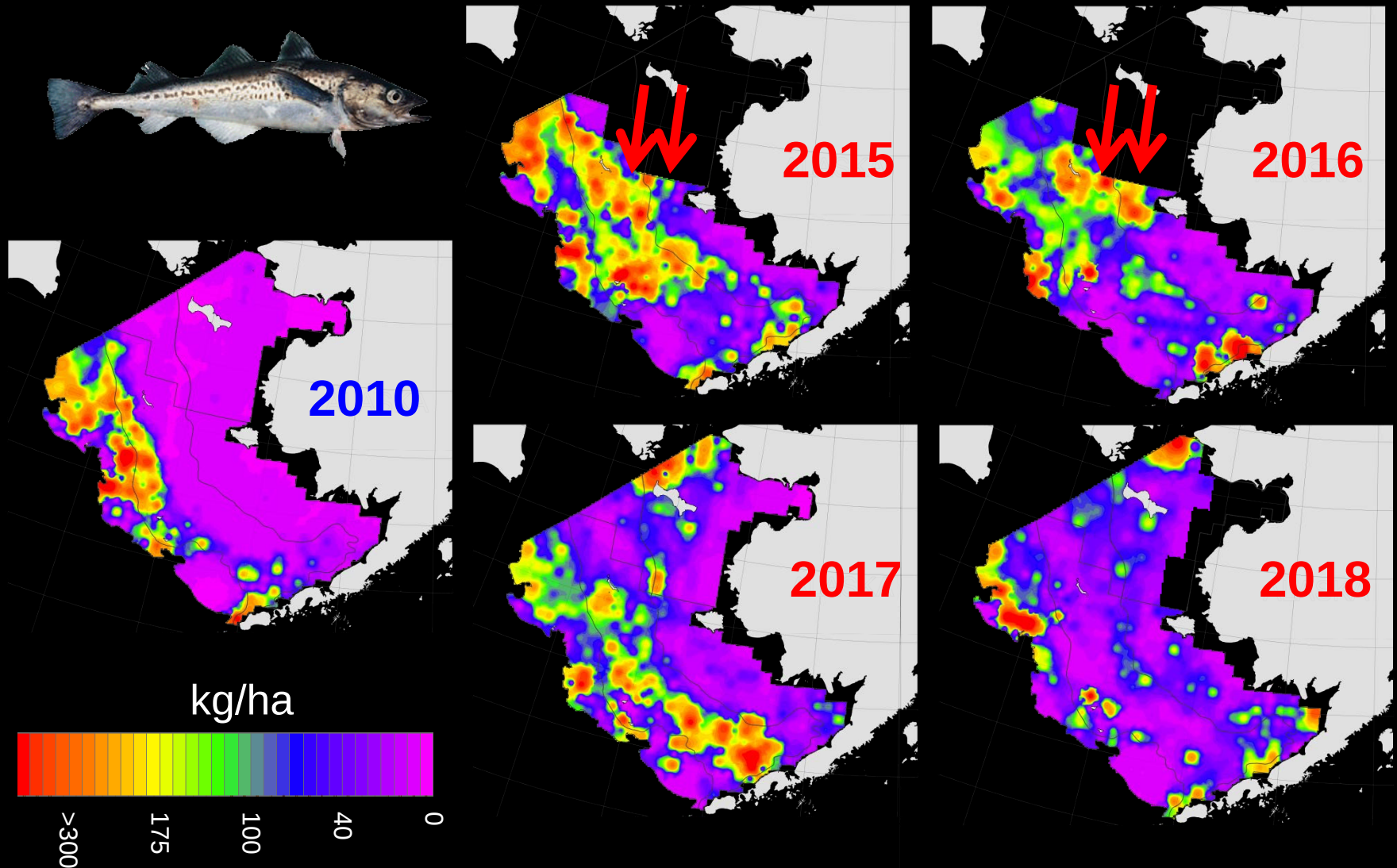
SEBS Abundance

6.0 billion

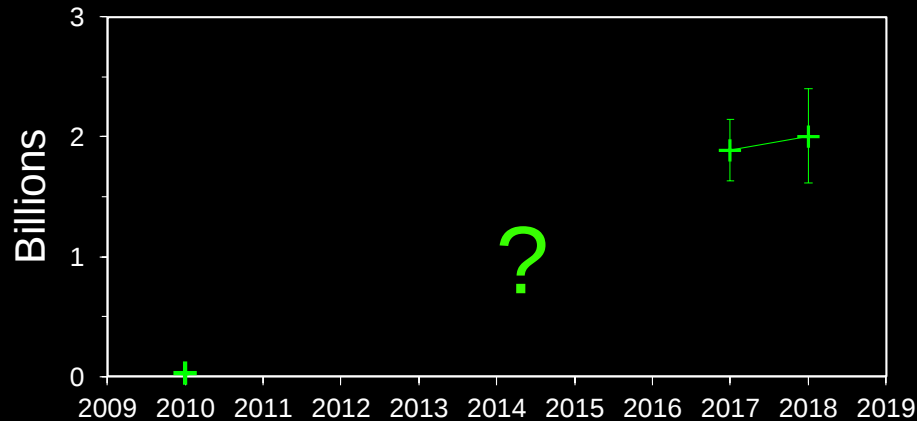
-30% from 2017 (8.5 billion)



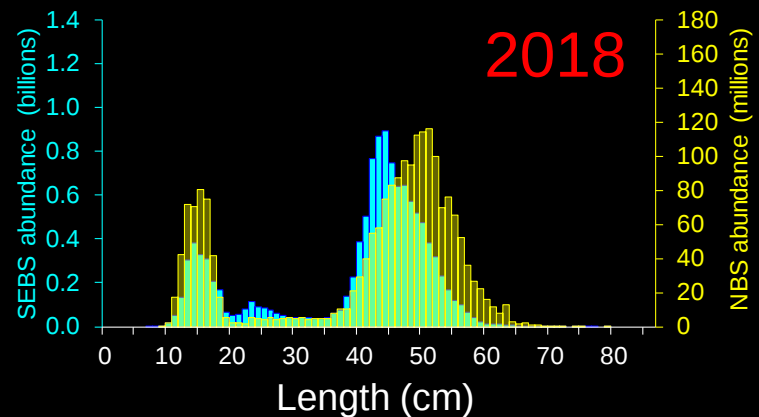
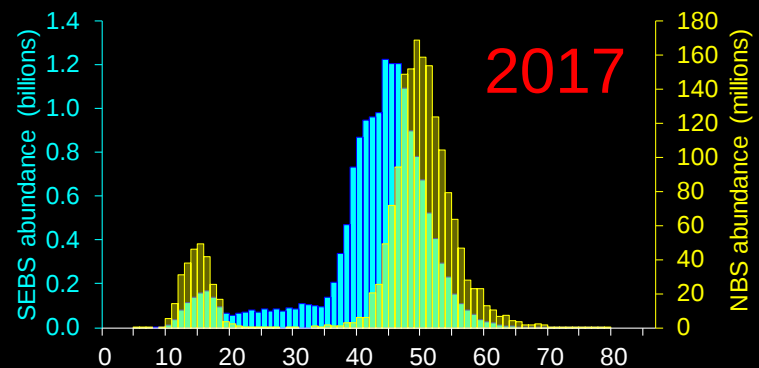
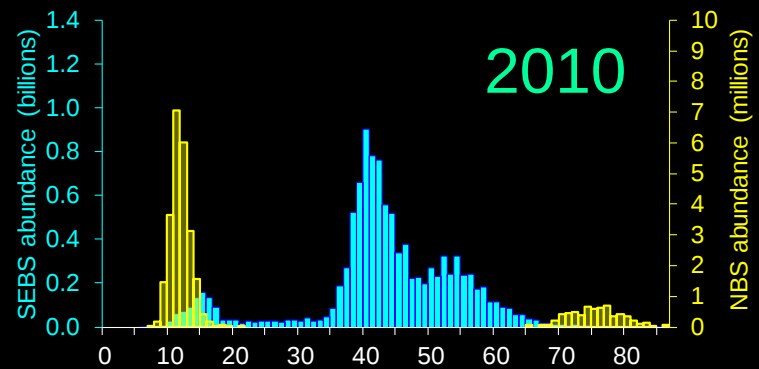
Walleye pollock distribution by catch weight



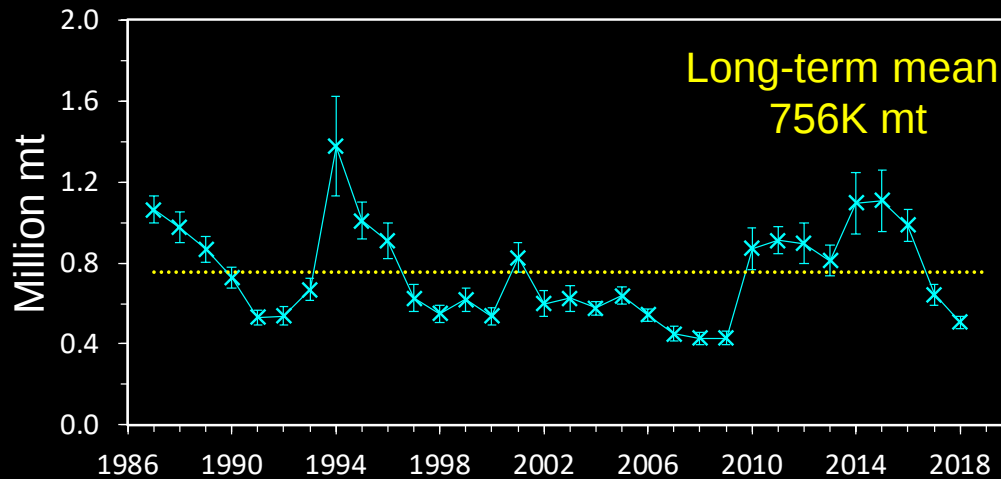
NEBS Walleye pollock



NEBS Abundance
2.0 billion
+6% from 2017 (1.9 billion)

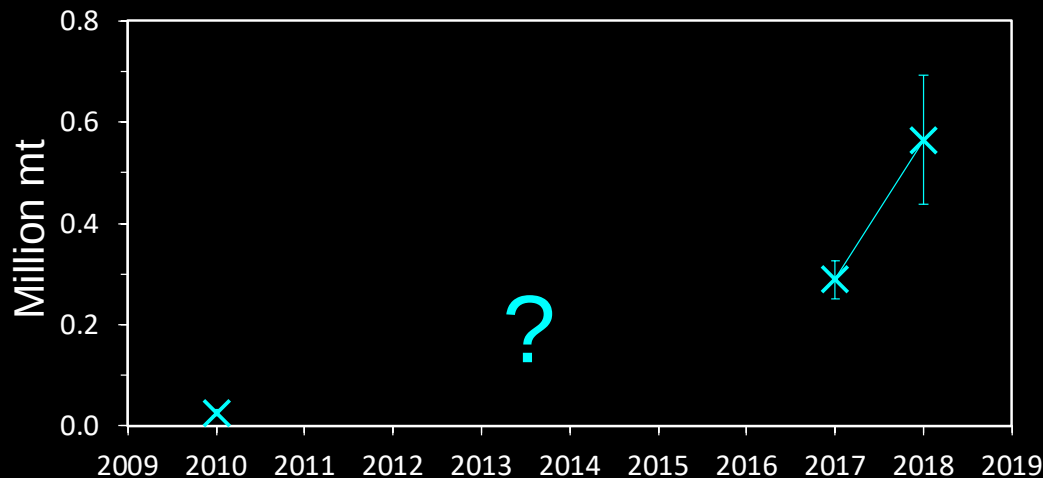


SEBS & NEBS Pacific cod



SEBS Biomass
507K mt

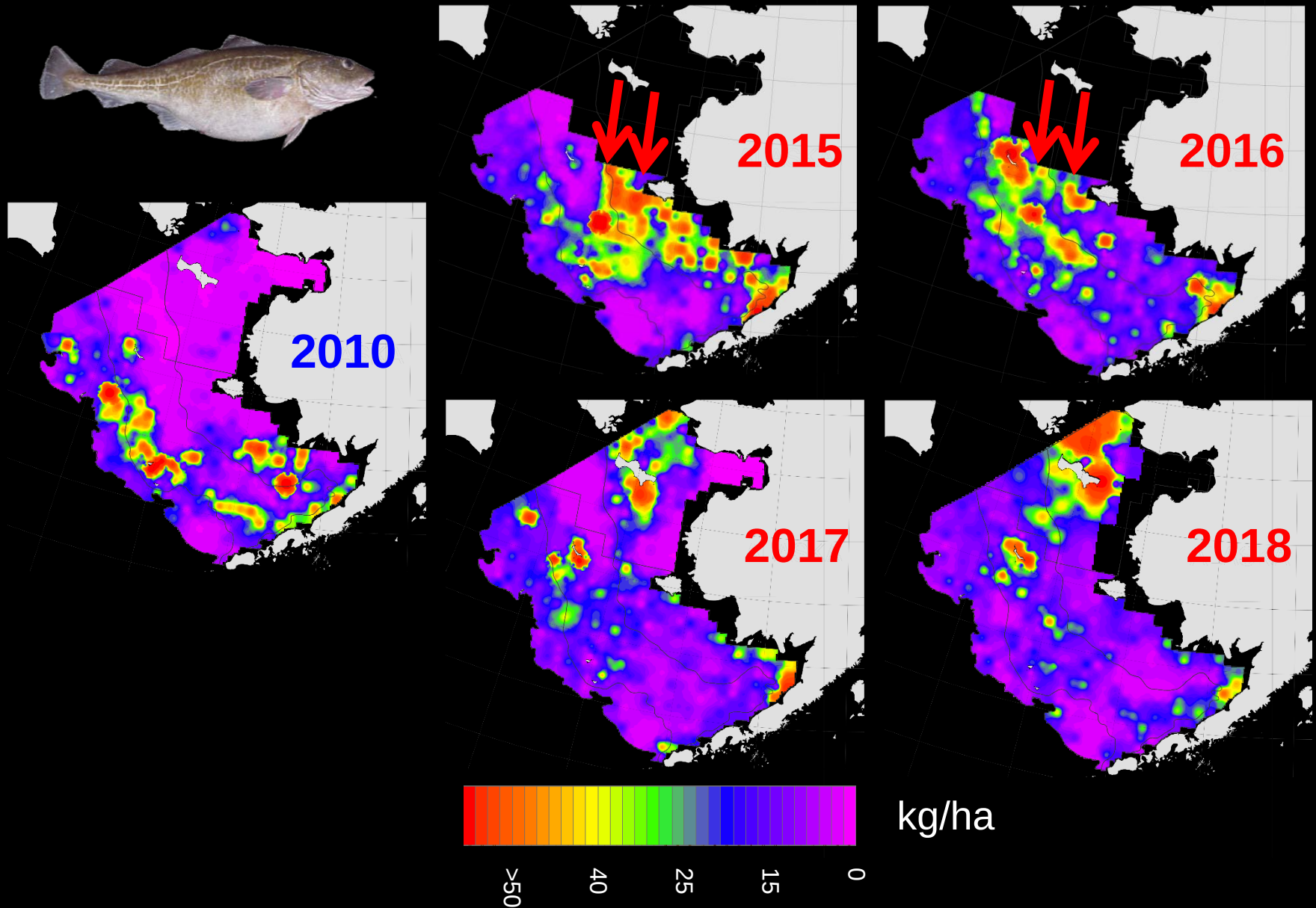
-21% from 2017 (644K mt)



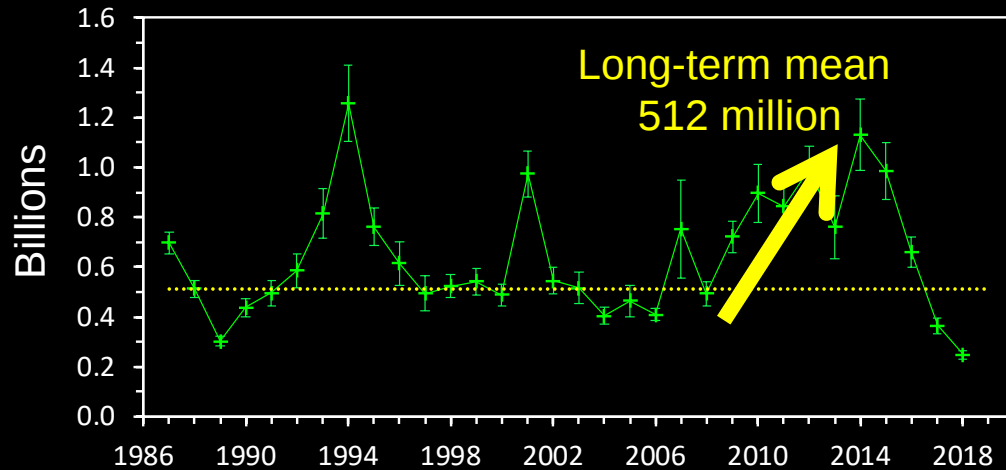
NEBS Biomass
565K mt

+95% from 2017 (289K mt)

Pacific cod distribution by catch weight



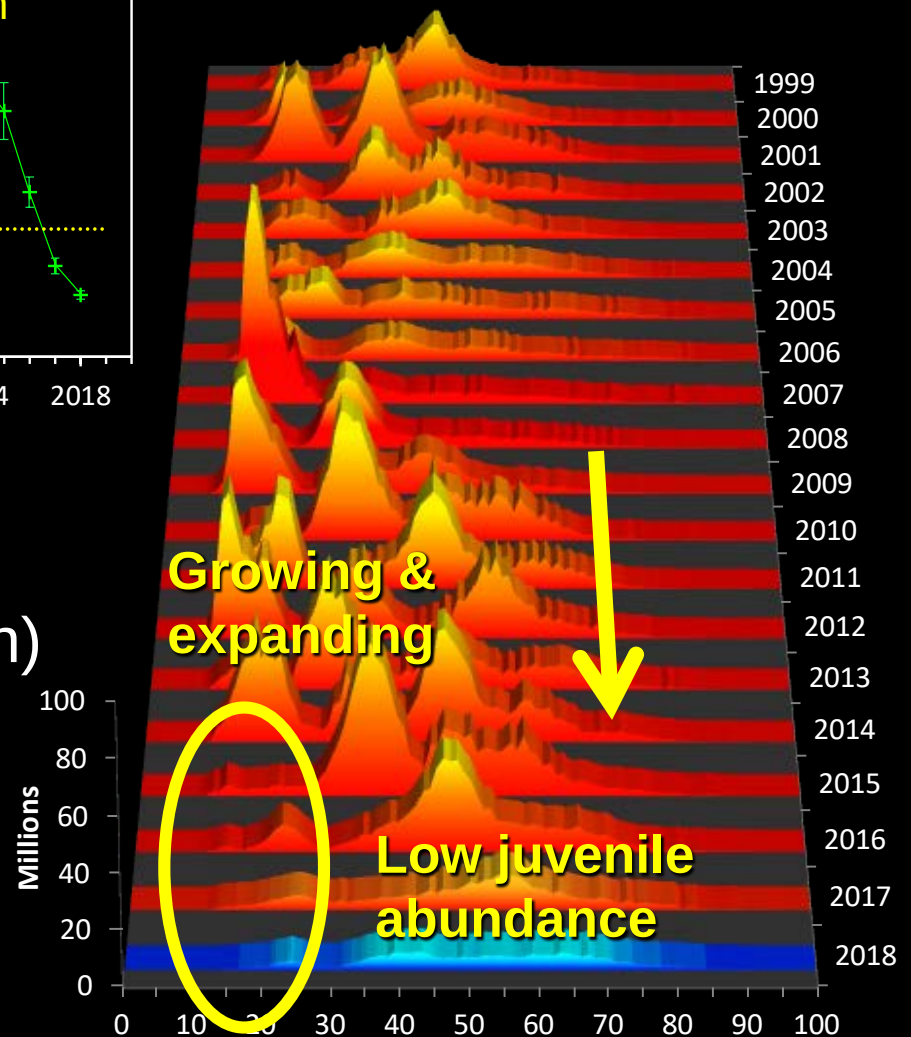
SEBS Pacific cod



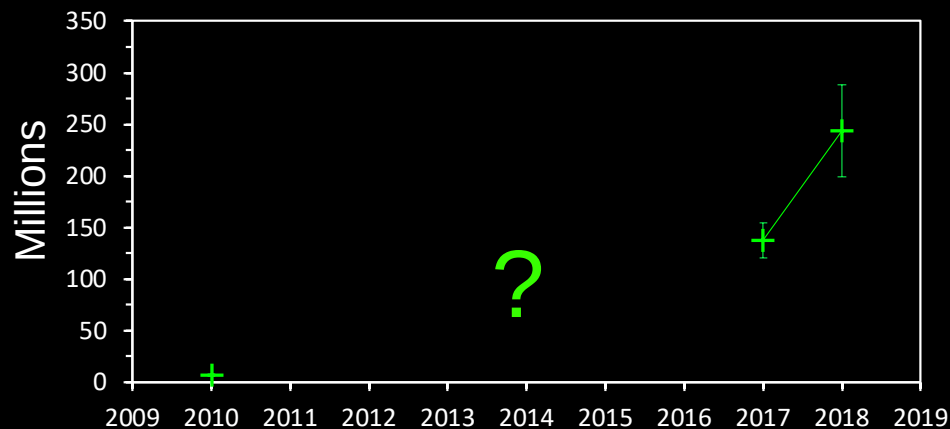
SEBS Abundance

248 million

-32% from 2017 (364 million)



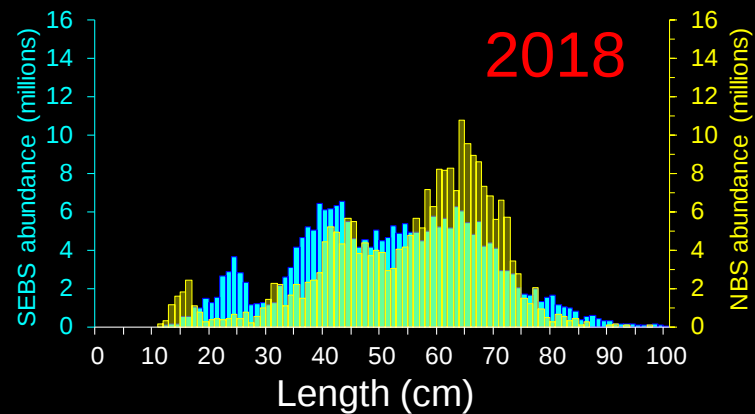
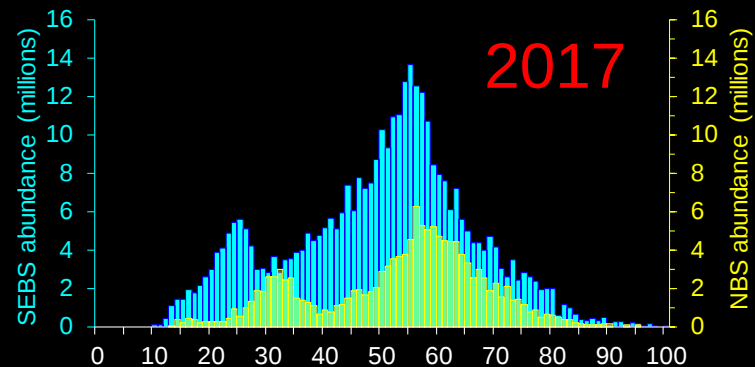
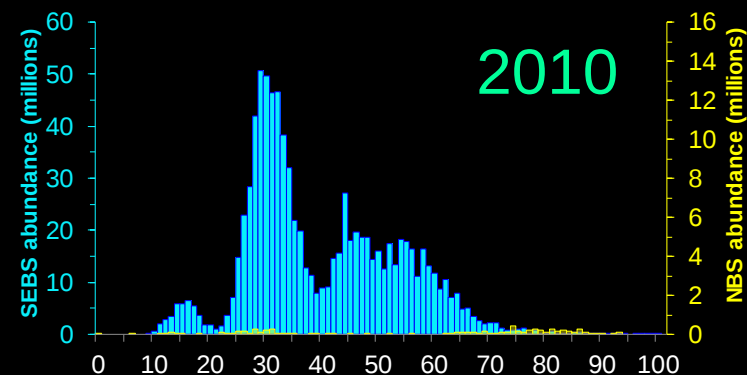
NEBS Pacific cod



NEBS Abundance

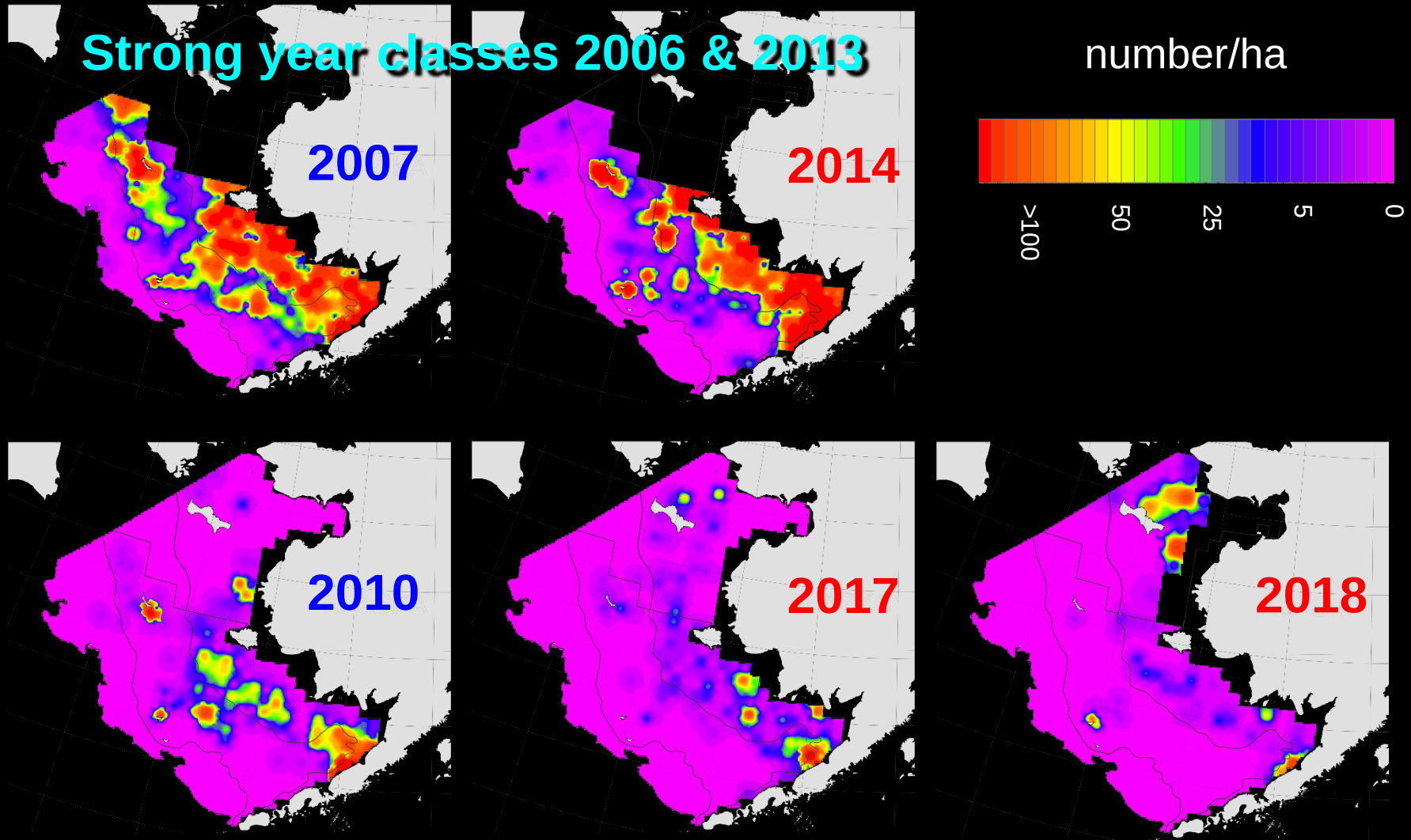
244 million

+78% from 2017 (137 million)



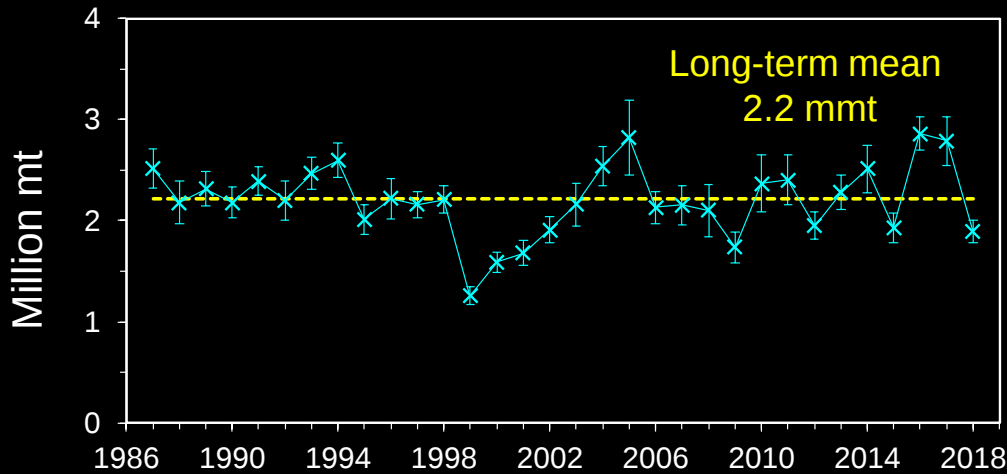
Juv. Pacific cod distribution <20 cm

Low abundance since 2015



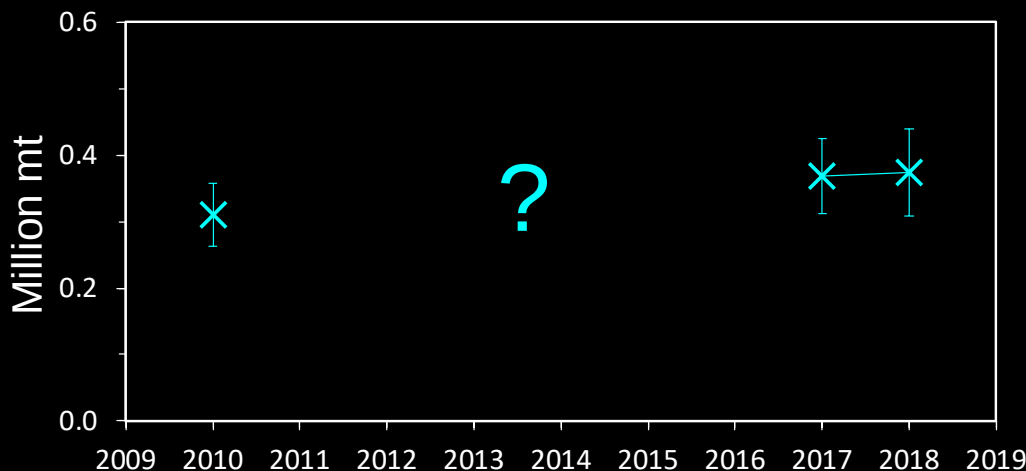
SEBS & NEBS Yellowfin sole

Spawning migration affected by bottom temps



SEBS Biomass
1.9 mmt

-32% from 2017 (2.8 mmt)

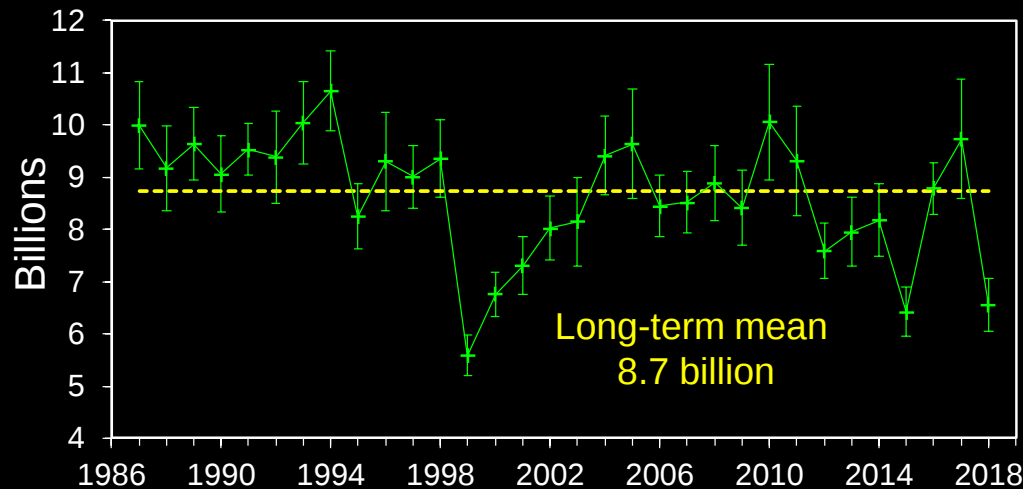


NEBS Biomass
373K mt

+1% from 2017 (368K mt)

SEBS Yellowfin sole

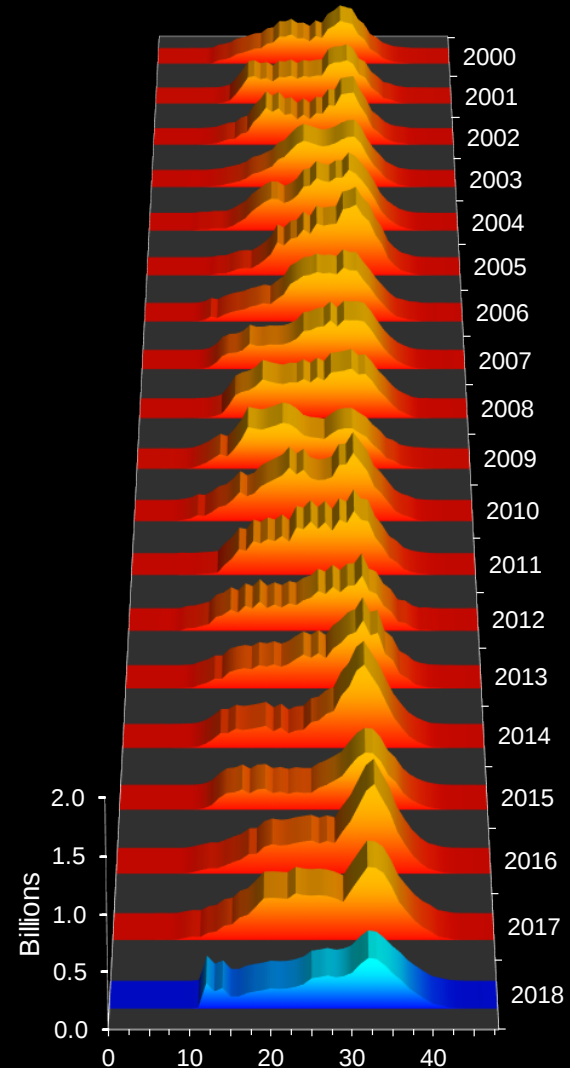
Spawning migration affected by bottom temps



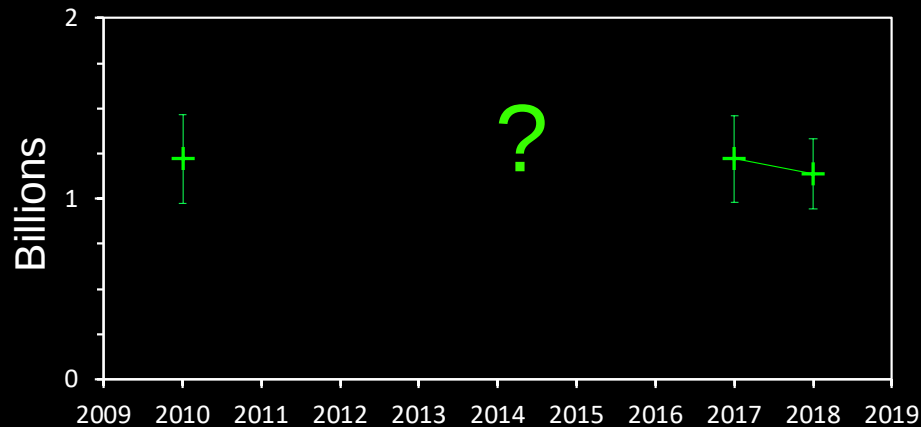
SEBS Abundance

6.5 billion

-33% from 2017 (9.7 billion)



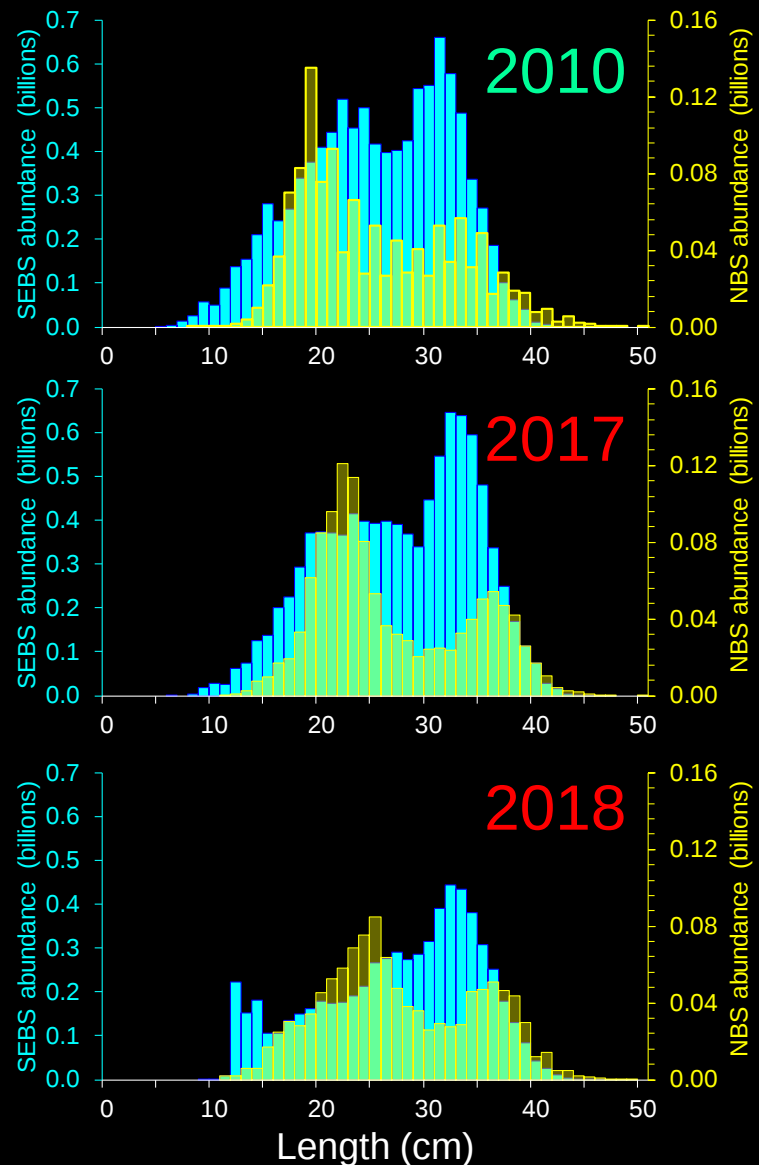
NEBS Yellowfin sole



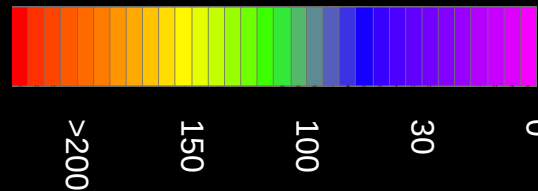
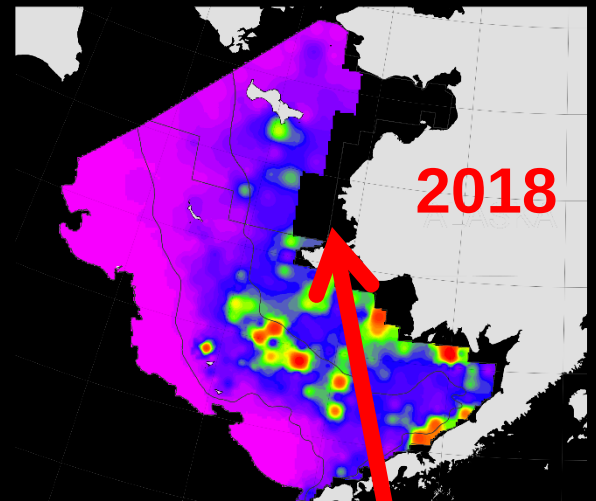
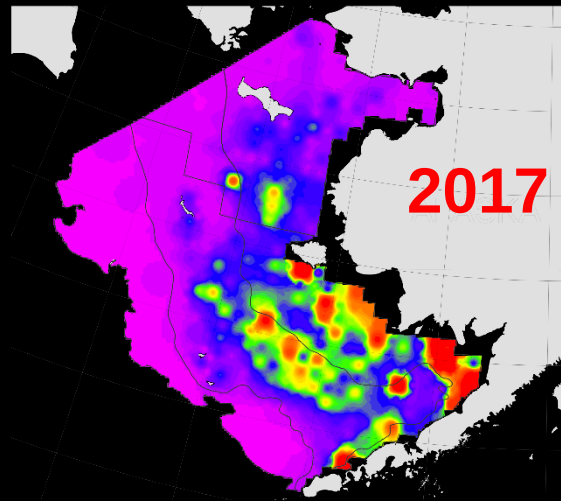
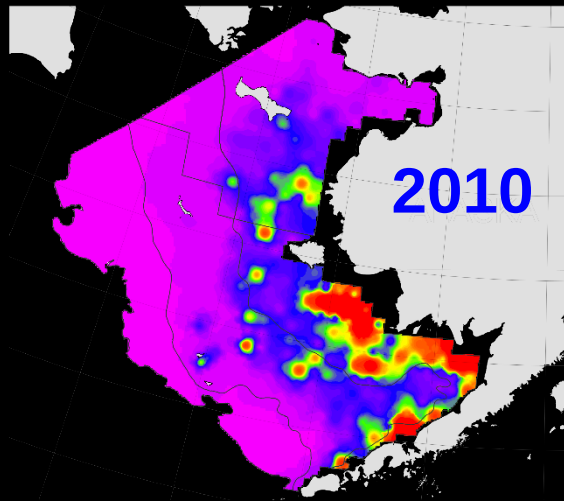
NEBS Abundance

1.1 billion

-7% from 2017 (1.2 billion)



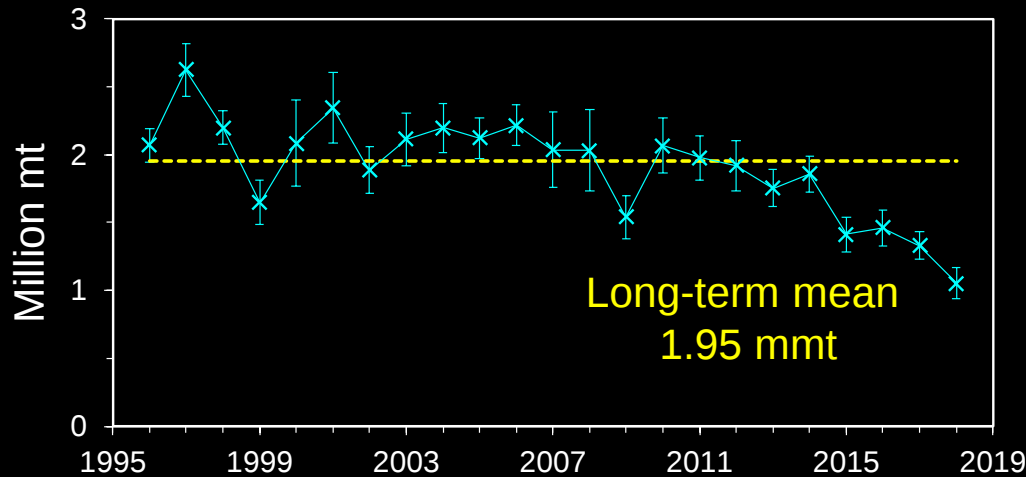
Yellowfin distribution by catch weight



kg/ha

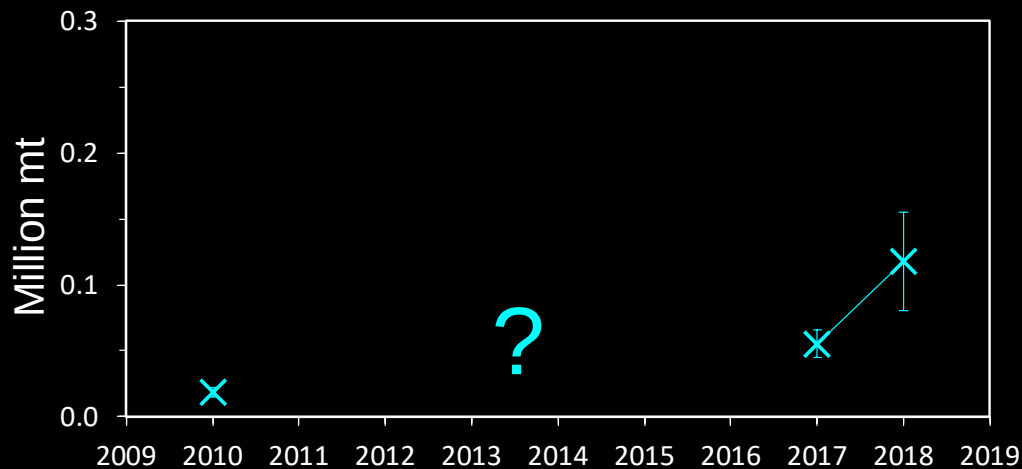
Poor survey
coverage <30 m

SEBS & NEBS Northern rock sole



SEBS Biomass
1.05 mmt

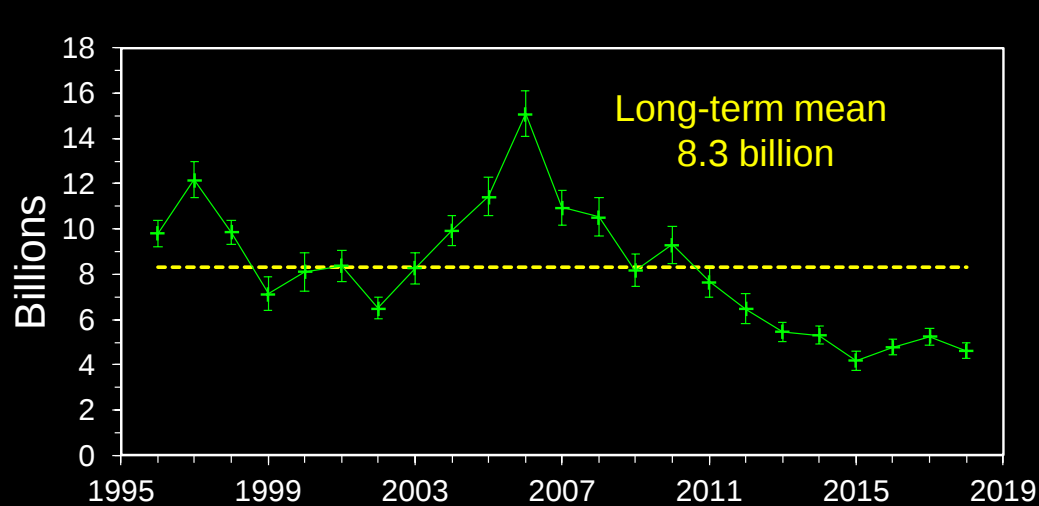
-21% from 2017 (1.33 mmt)



NEBS Biomass
118K mt

+113% from 2017 (55K mt)

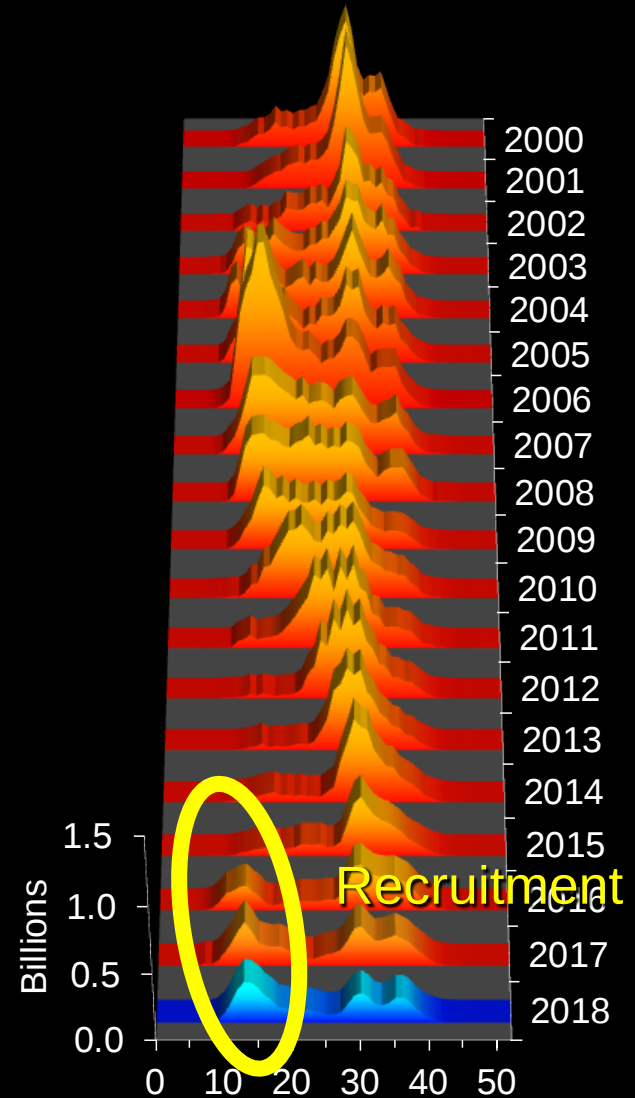
SEBS Northern rock sole



SEBS Abundance

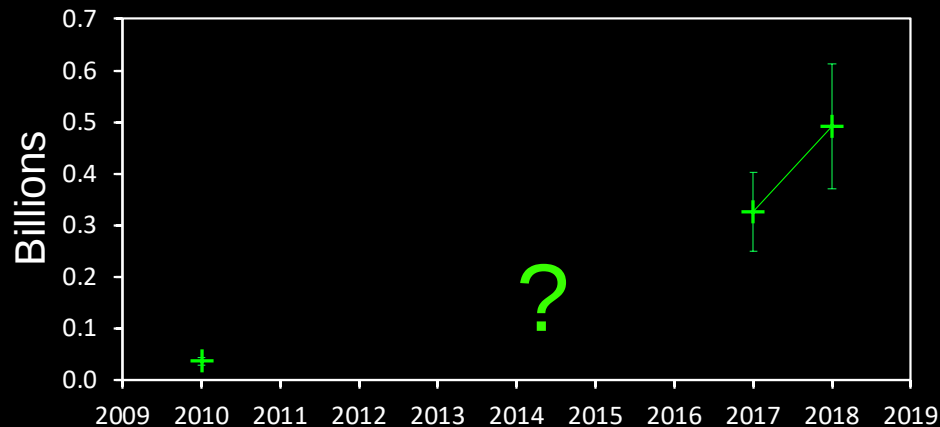
4.63 billion

-12% from 2017 (5.26 billion)



NEBS Northern rock sole

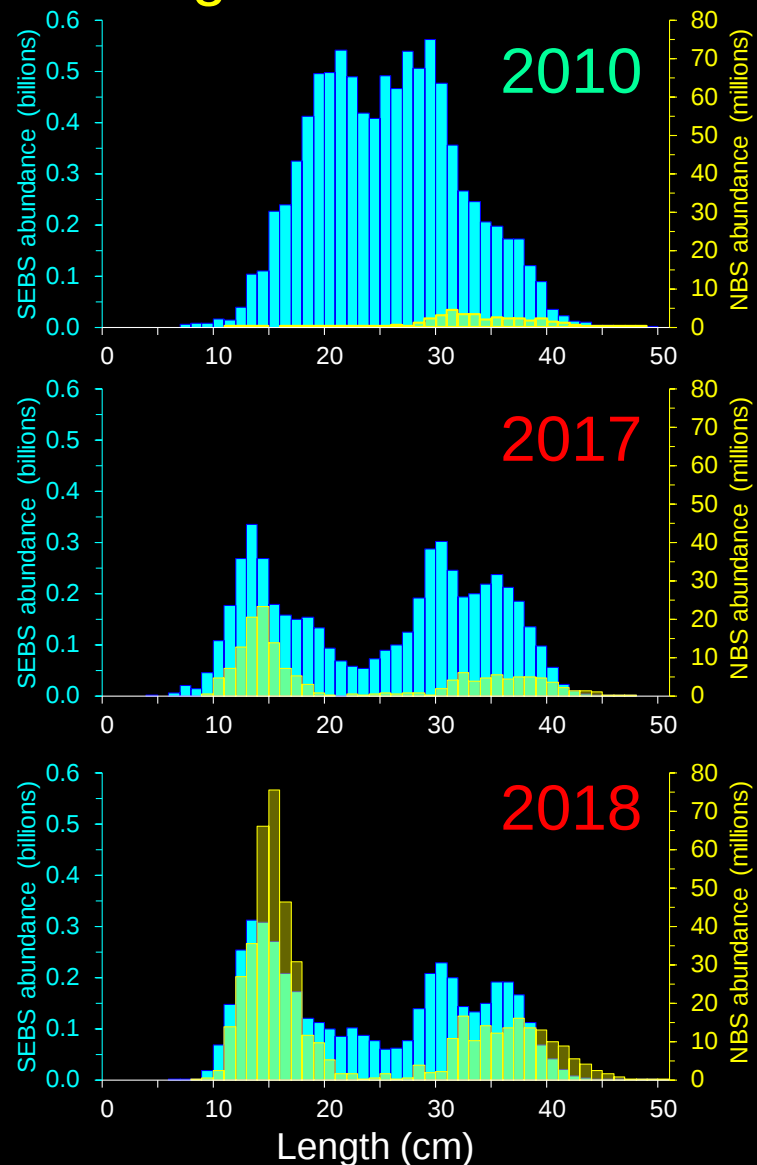
Juveniles recruiting



NEBS Abundance

491 million

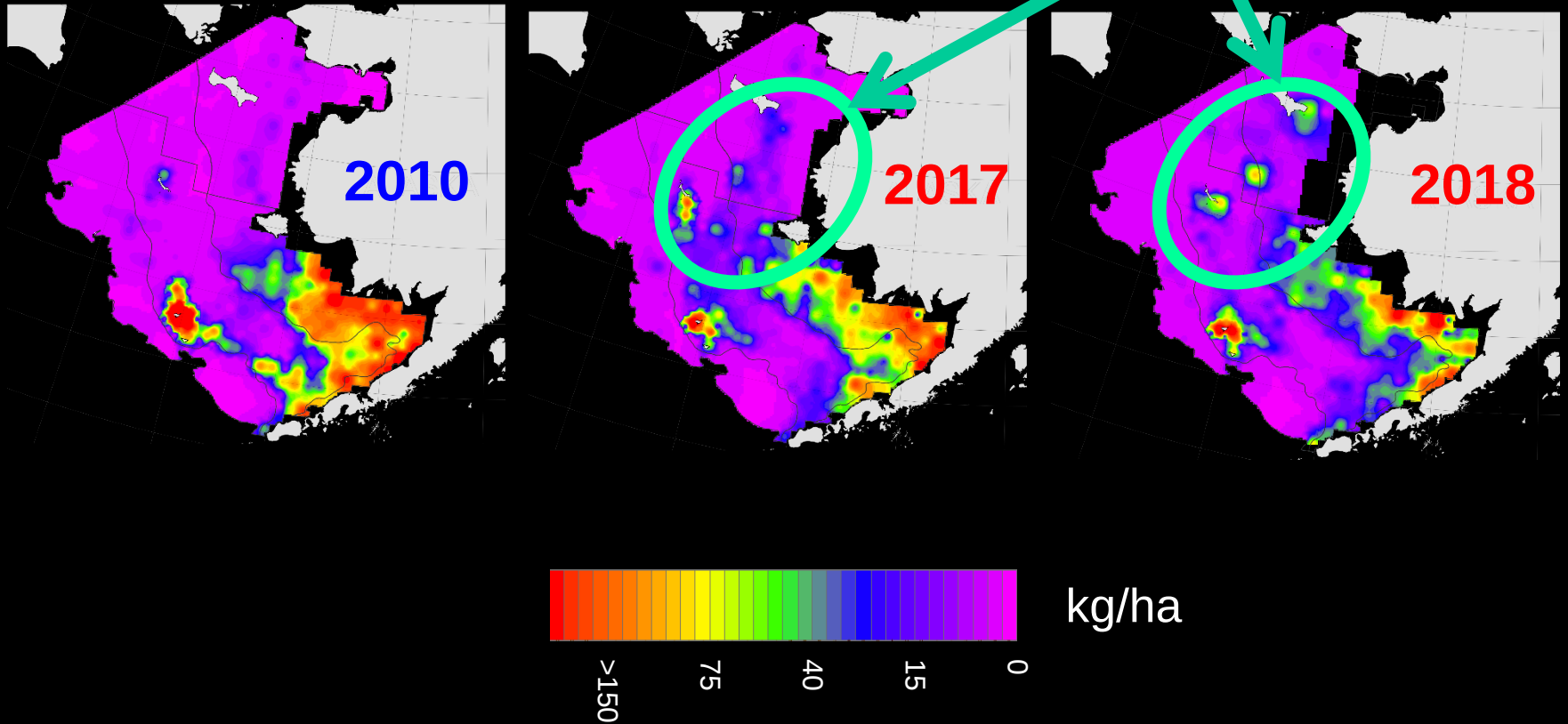
+51% from 2017 (326 million)



Northern rock sole distribution



recruitment



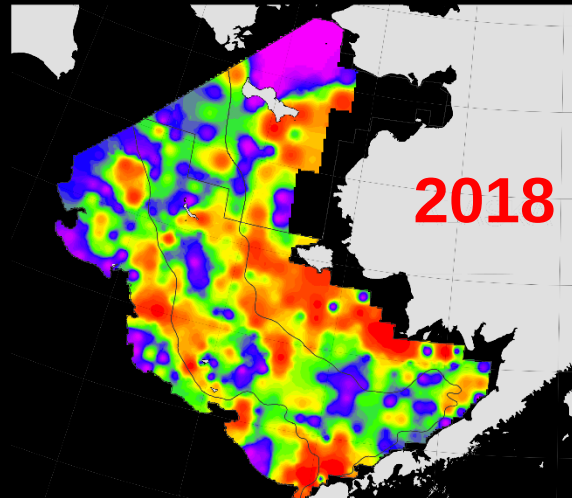
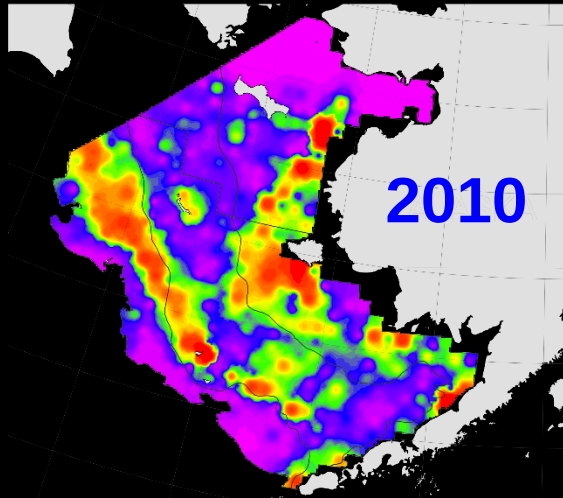
Other 2018 survey results

SEBS

NEBS

Taxon	Year	SEBS				NEBS			
		Biomass mt		Abund. X1000		Biomass mt		Abund. X1000	
Arrowtooth fl.	2017	424,194		742,123		-		-	
	2018	511,192	21%	1,086,953	46%	852		1,056	+
Kamchatka fl.	2017	48,084		111,180		99		93	
	2018	44,000	-8%	93,721	-16%	758	663%	548	487%
Greenland turbot	2017	21,519		10,518		62		94	
	2018	18,017	-16%	7,361	-30%	1,116	1703%	685	627%
Pacific halibut	2017	126,684		52,718		15,022		4,220	
	2018	125,702	-1%	50,416	-4%	18,397	22%	4,607	9%
Flathead sole	2017	538,018		2,099,347		83		180	
	2018	492,623	-8%	2,329,667	11%	510	516%	1,028	470%
Bering fl.	2017	27,404		122,044		20,712		239,346	
	2018	12,995	-53%	61,152	-50%	30,025	45%	275,082	15%
Alaska plaice	2017	491,050		666,201		336,841		438,662	
	2018	419,509	-15%	569,754	-14%	274,543	-18%	310,564	-29%
Alaska skate	2017	544,657		118,976		82,399		18,497	
	2018	545,994	0%	126,778	7%	116,835	42%	27,670	50%

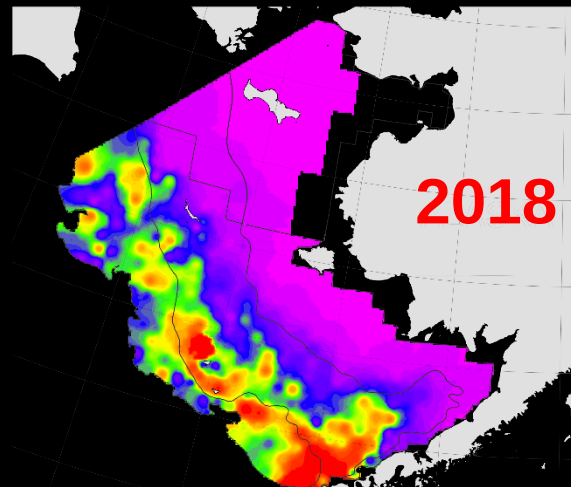
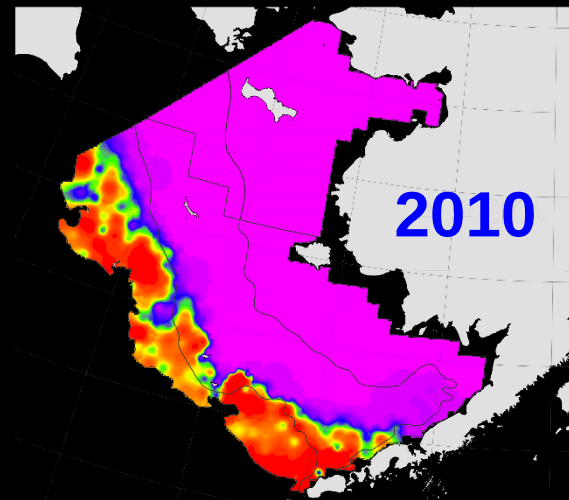
Distributions of sub-Arctic species



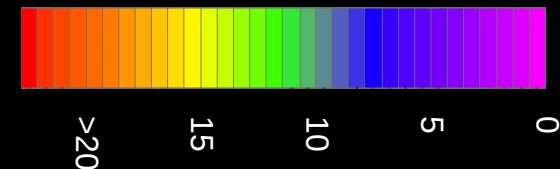
Alaska skate



kg/ha

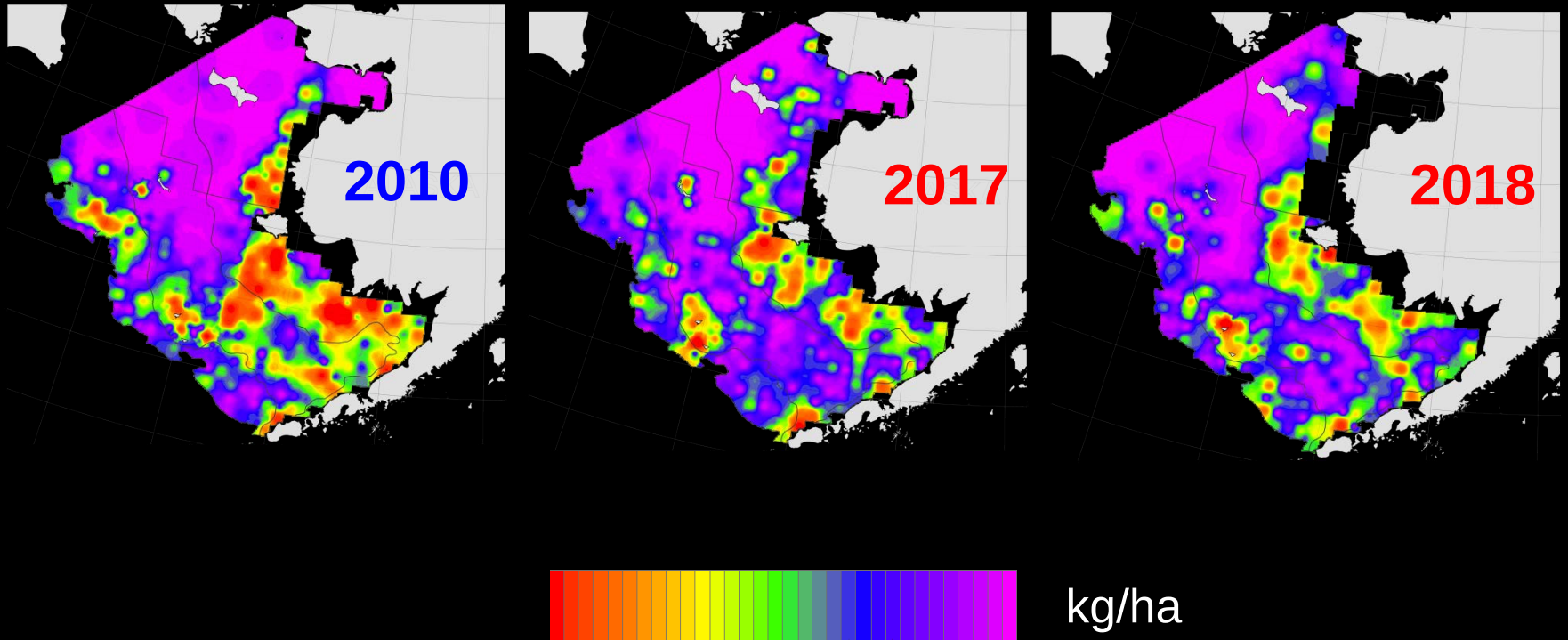


Arrowtooth fl.

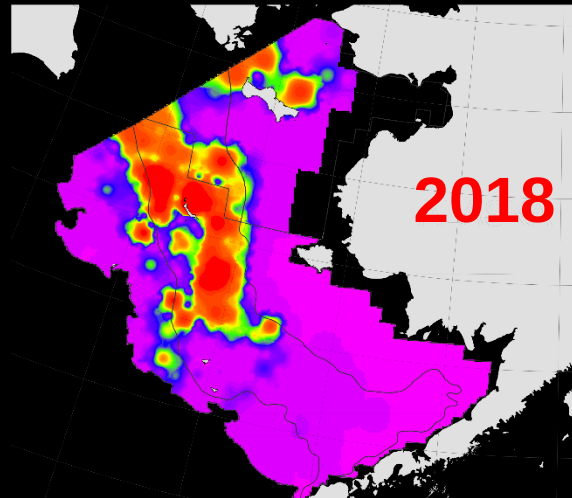
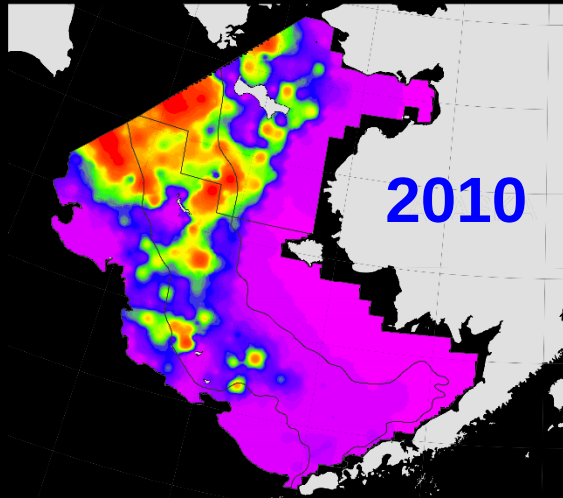


kg/ha

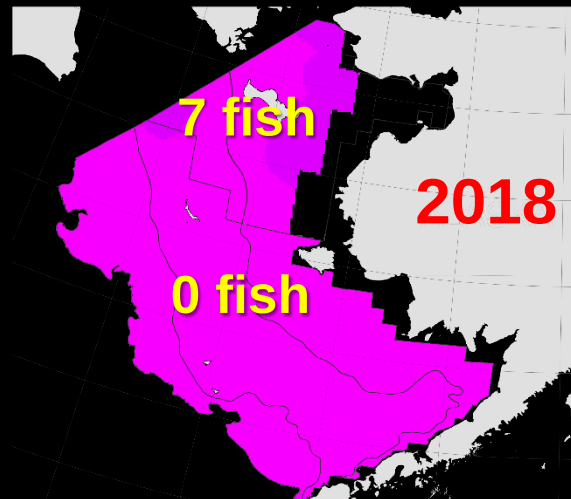
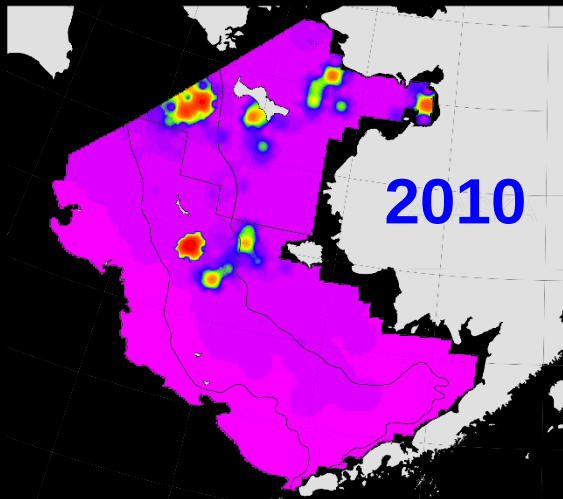
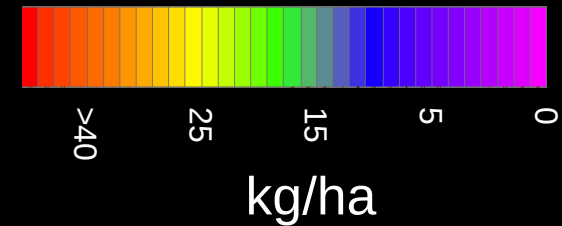
Pacific halibut distribution



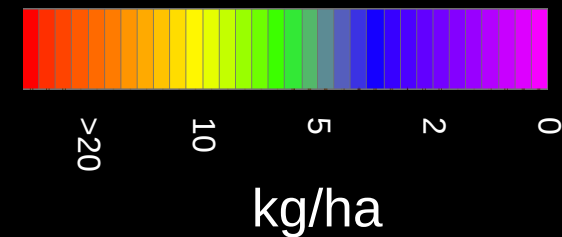
Distributions of Arctic species



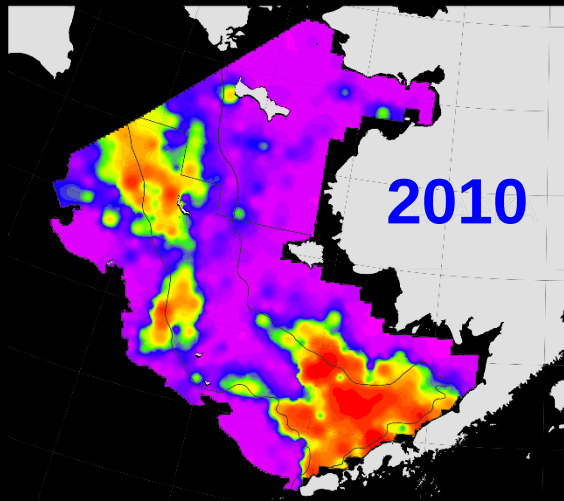
Snow crab



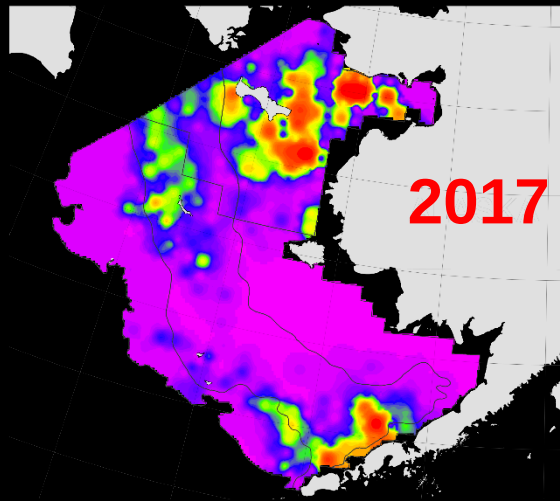
Arctic cod



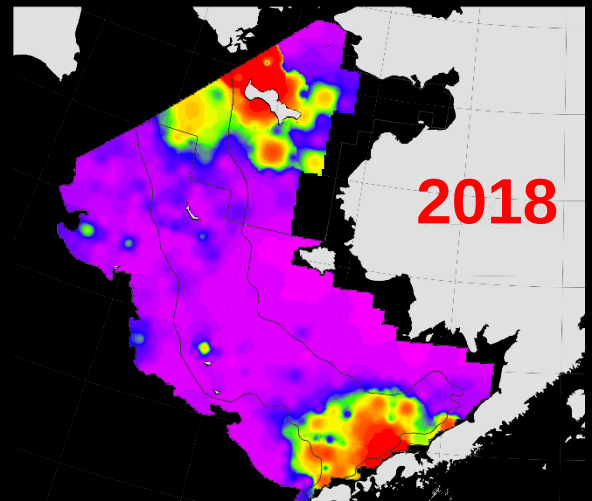
Jellyfish distribution



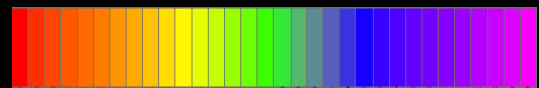
2010



2017



2018



>150 75 40 15 0

kg/ha

General summary

- NEBS surveys 2010 & 2017-18 offer cold/warm snapshots
- Sub-Arctic species expanding, dispersing and recruiting (spawning?)
- Arctic species retracting
- Next planned standard NBS survey in 2019
- Long-term biennial monitoring of NBS necessary



Unknowns

- Anomaly, transition or anomalous is “new normal”?
- Will 2019 be warm or cold year?
- Extent of winter sea ice, migration, mortality, survival in NEBS or under ice?
- Population stock structure (western or eastern Bering Sea?)
- NEBS survey funding beyond 2019

Implications

- Impact of large influx of pelagic consumers into the NBS ecosystem?
- Combine surveys? **EBS** = SEBS + NEBS
- Management of EBS fisheries?