Report of the September 2018 BSAI Groundfish Plan Team meeting

NOAA FISHERIES

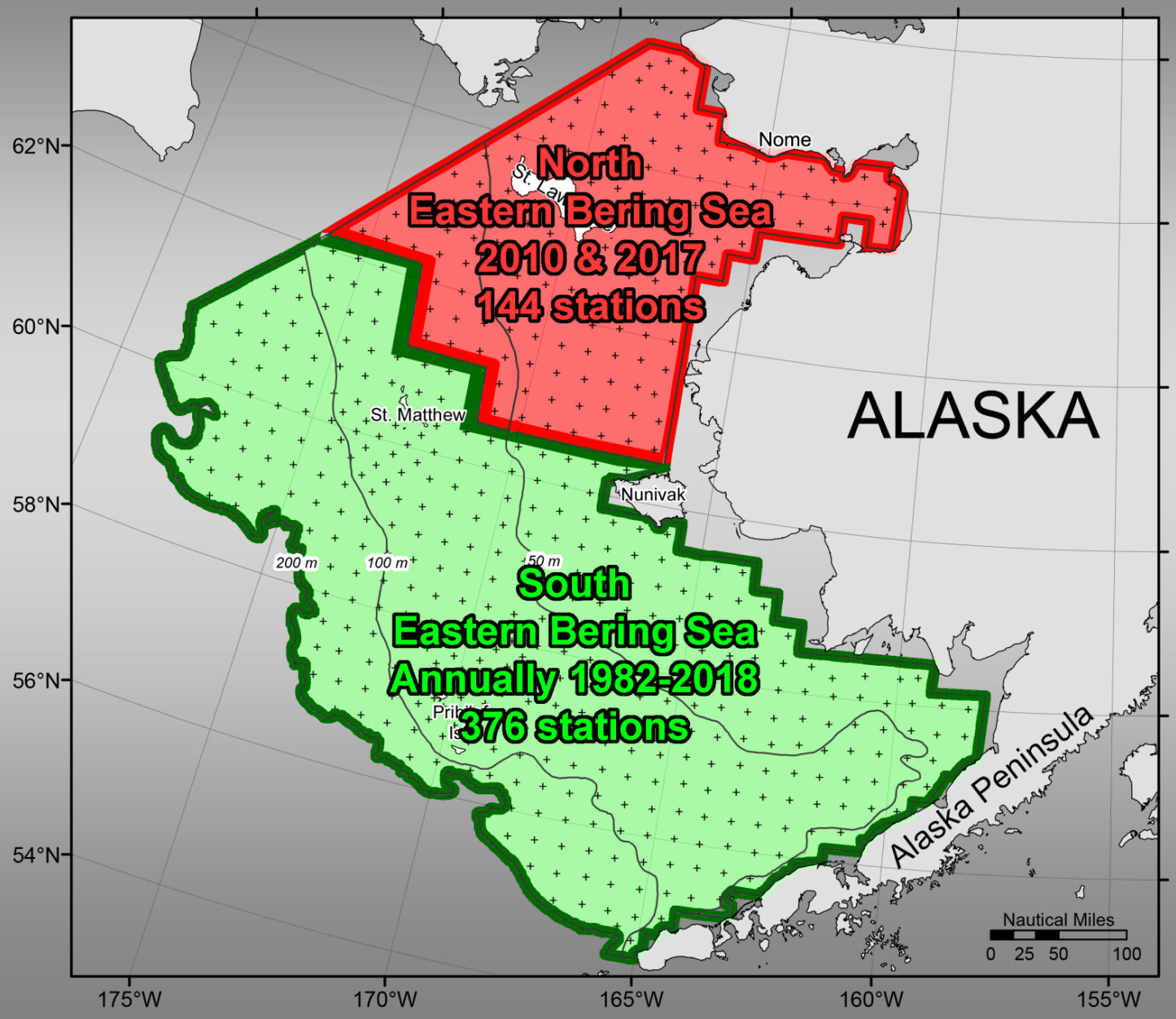
Alaska Fisheries Science Center

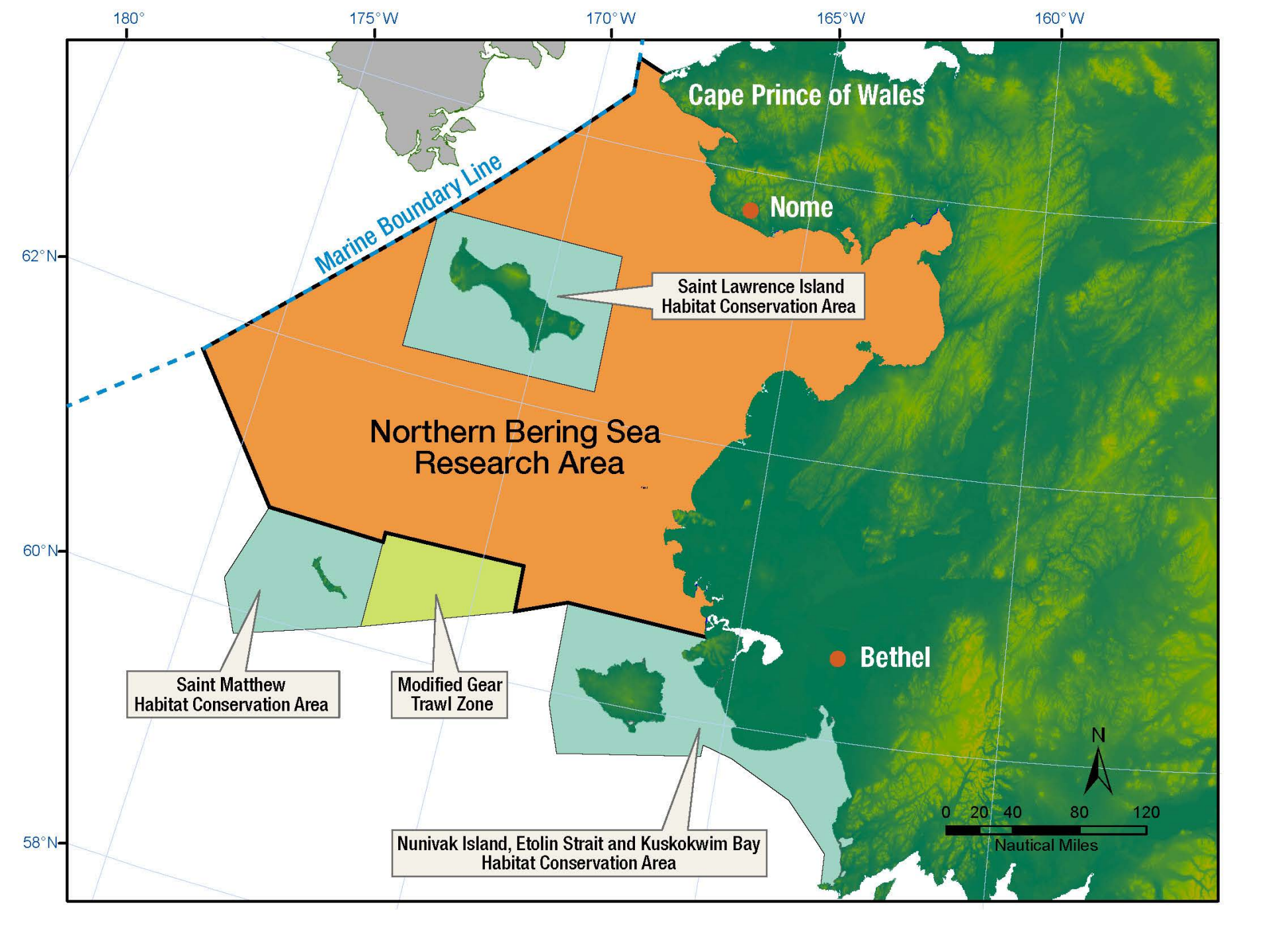
October 2018

Agenda (action items in red)

- EBS pollock
- Flatfish CIE review
- BSAI Atka mackerel
- BSAI BS/RE spatial issues
- Arrowtooth flounder CIE review
- Northern Bering Sea Pacific cod genetics
- EBS Pacific cod
- Greenland turbot
- Flathead sole
- Alaska skate catch estimation
- Approve proposed 2019 and 2020 harvest specifications

Standard Eastern Bering Sea Shelf Surveys




180°
175° W
170° W
165° W
160° W
62° N
60° N
58° N
Cape Prince of Wales
Nome
Marine Boundary Line
Saint Lawrence Island
Habitat Conservation Area
Northern Bering Sea
Research Area
Bethel
Saint Matthew
Habitat Conservation Area
Modified Gear
Trawl Zone
Nunivak Island, Etolin Strait and Kuskokwim Bay
Habitat Conservation Area
N
0 20 40 80 120
Nautical Miles

EBS pollock

- New data for the 2018 assessment includes the following:
  - 2018 EBS bottom trawl
    - Plus NBS?
  - 2 years of AVO
  - 2018 acoustic trawl
    - Note that this year's data are somewhat compromised due to a lag in middle part of survey, and missing an important subarea; options for addressing this include:
      - Re-district index to identical coverage
      - Calibrate on the basis of the relative proportion of biomass from the missing area in other survey years
      - Ignore missing area and inflate variance for 2018
  - 2017 fishery age and weight compositions

EBS pollock

- Assessment plans for this year focus on configuring the model to deal with the NBS component of the stock
- Plan to explore a model with explicit movement between areas, which would require inclusion of the NBS data
- The Team recommends that the author consider including a model in which the data from the EBS and NBS surveys are added together, with appropriate weighting of the variances

Flatfish CIE review

- This agenda item consisted of three parts:
  1. The CIE review itself
  2. Proposed alternative model for yellowfin sole
     - Recommend moving forward with alternative model
  3. Ensemble modeling of northern rock sole
     - Recommend presentation of ensemble approach for NRS in November

BSAI Atka mackerel

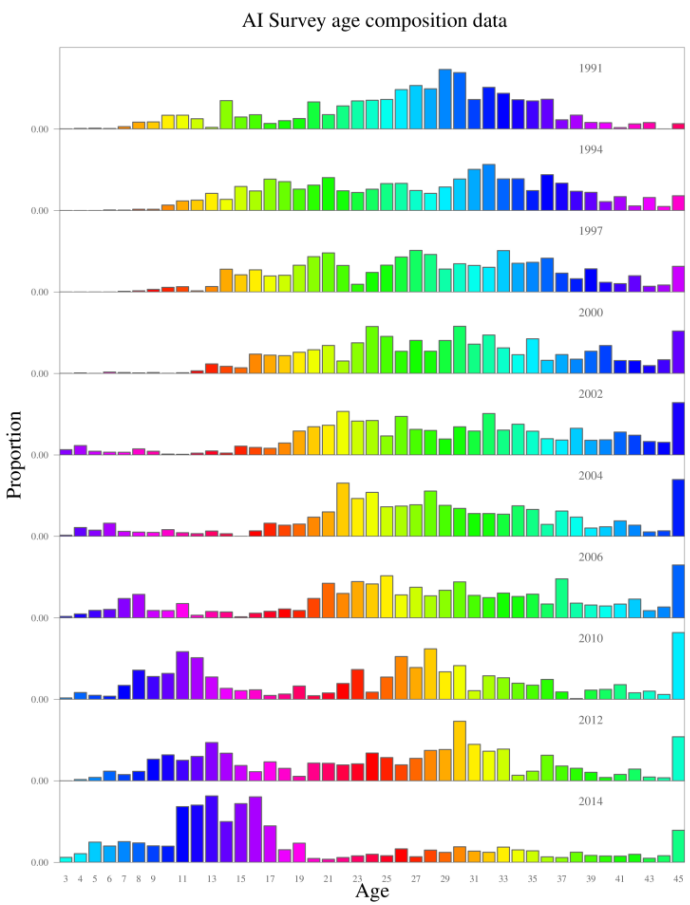
- Response to 6 of 8 items the Plan Team and the SSC had previously recommended regarding the BSAI Atka assessment.
- Team recommended the author's approach to all proposed changes to the assessment for November

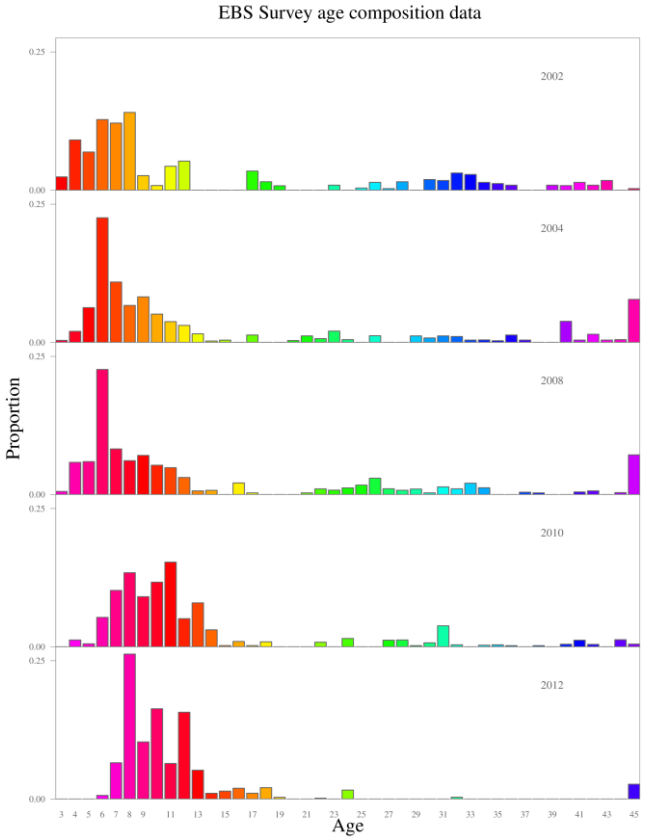
BSAI BS/RE spatial issues

- Options are provided in response to an SSC request to reevaluate the spatial area for the modeled stock
  - Currently, the model is applied to a BSAI-wide stock with a single fishery and two survey indices (AI survey and EBS slope survey)
  - Previously Age-structured model for AI, Tier 5 for EBS (used from 2008 – 2015)

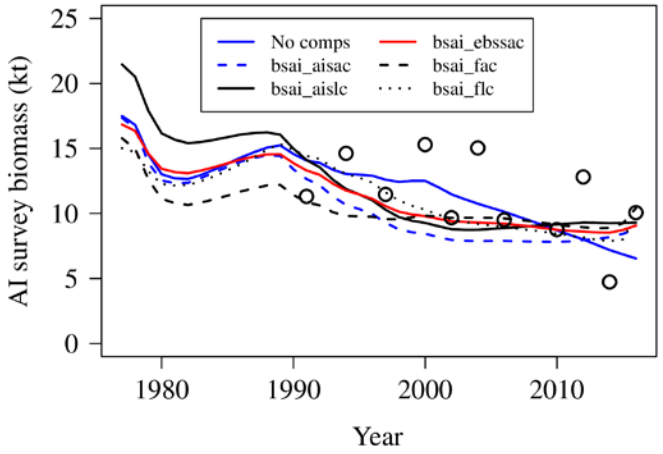
BSAI BS/RE spatial issues

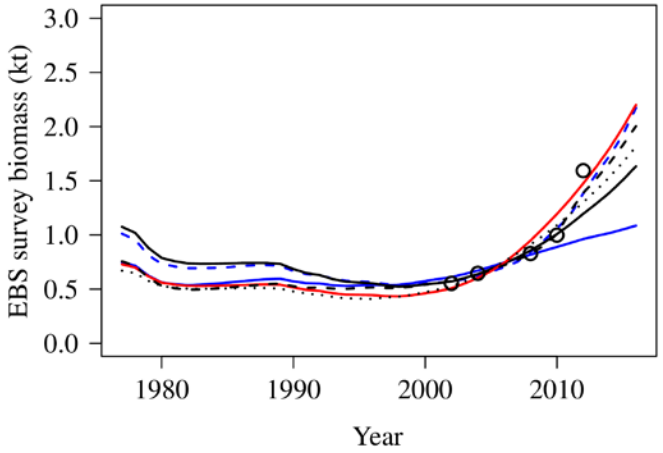
- Differential survey agecomps between areas





BSAI BS/RE spatial issues





- Adding any composition data degrades fit to AI survey biomass series
- Adding any composition data improves fit to EBS survey biomass series

BSAI BS/RE spatial issues

- Recommended alternatives for the November 2018, Plan Team meeting:
  1. Current BSAI model (employed since 2016)
  2. Combination of an age-structured model for the AI with a Tier 5 approach for the BS
  3. Tier 5 considerations for both areas
- The Team also recommends consideration of a two-area approach as outlined above in the future (i.e., beyond 2018)

Arrowtooth flounder CIE review

- Presentation on new models that addressed comments from the Team and the SSC in November and December of 2016, the CIE review in the spring of 2017
- Team endorsed her approach for November

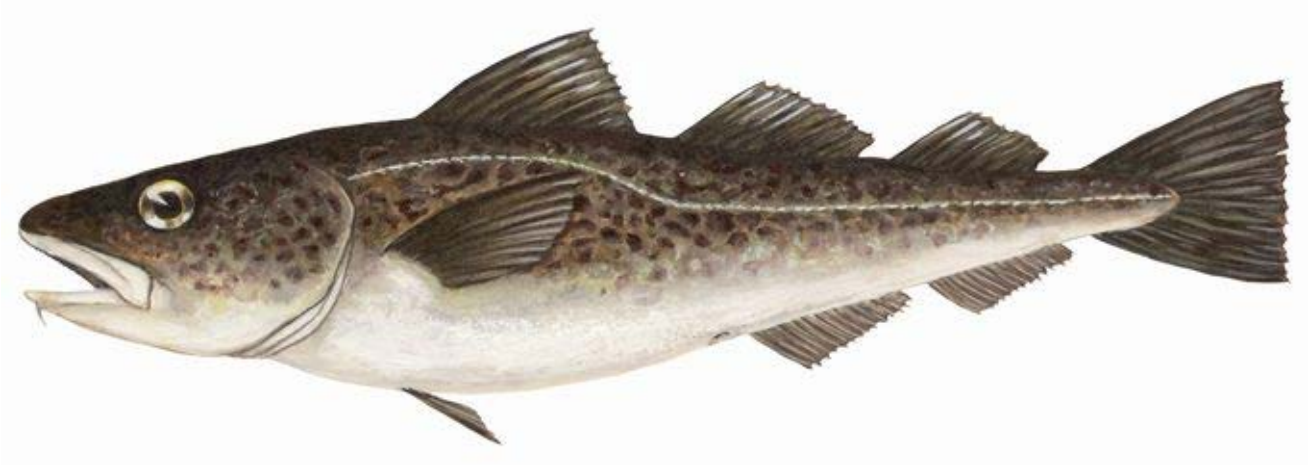
Flathead sole

- Presentation on transitioning the flathead sole-Bering Flounder stock assessment into the SS framework, along with new model options for the 2018 assessment
- Two models recommended by the Team for the November assessment

Genetic analysis of Northern Bering Sea Pacific cod

NOAA FISHERIES
Alaska Fisheries Science Center

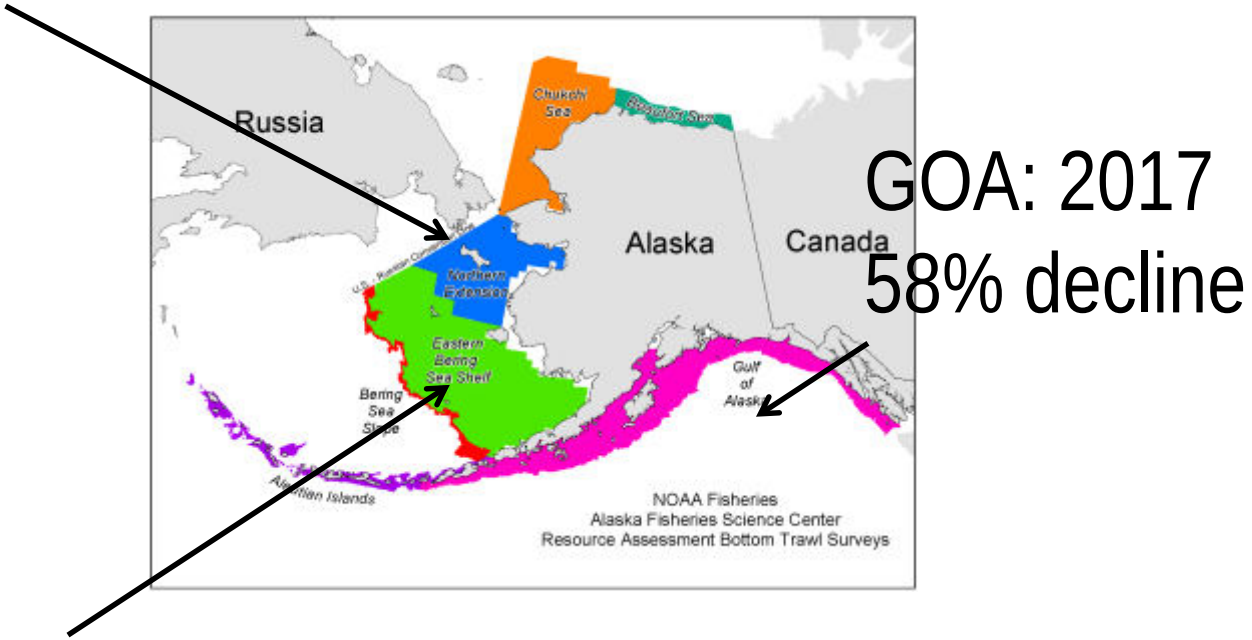
Ingrid Spies
Research Fisheries Biologist
Lorenz Hauser (UW), Carolyn Tarpey (UW, PSMFC), Mike Canino (AFSC)



August 20, 2018

2017: shifts in distribution of Pacific cod

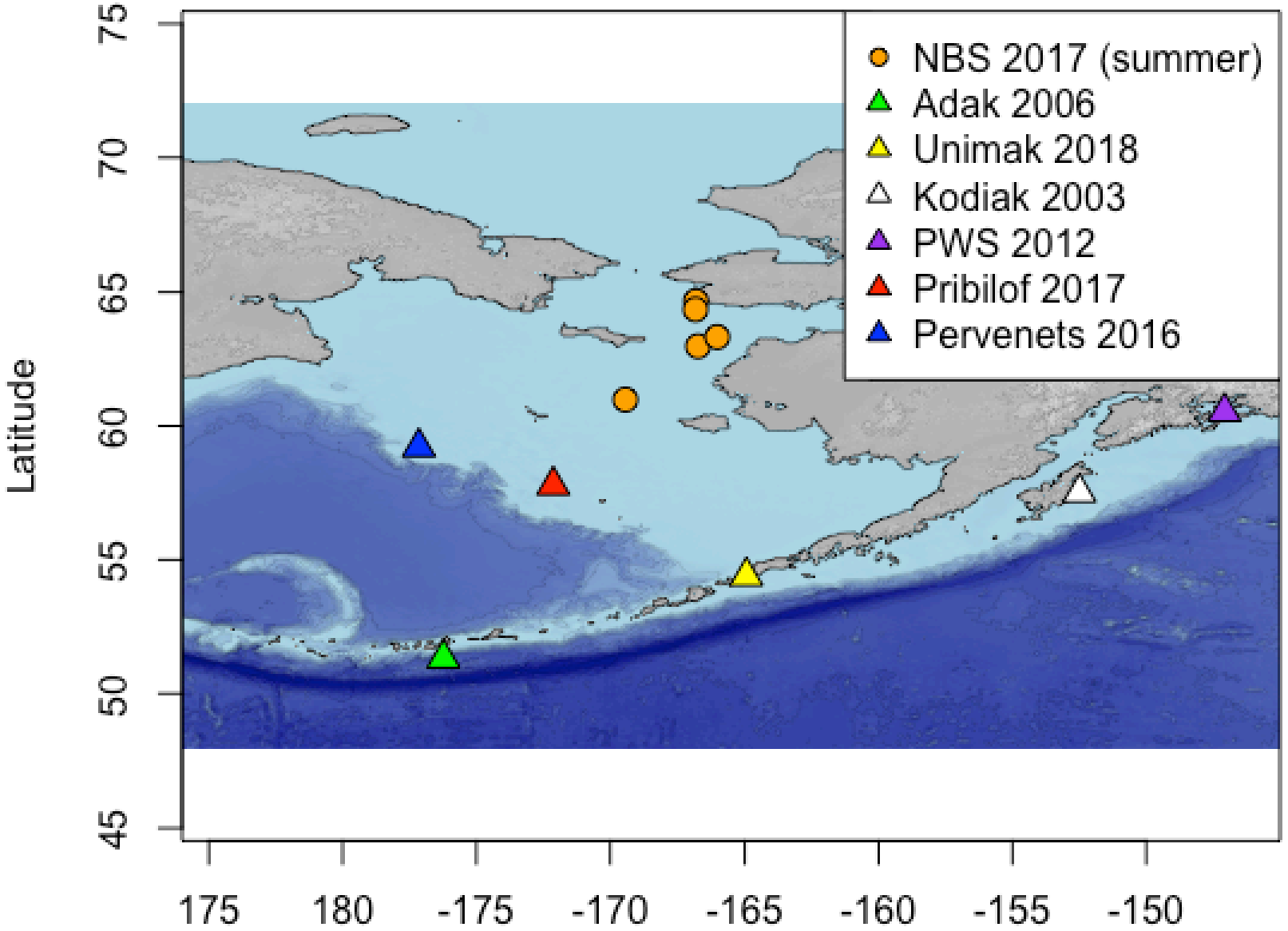
Pacific cod in the NBS increased from 28,425 t to 286,310 t between 2010 and 2017,



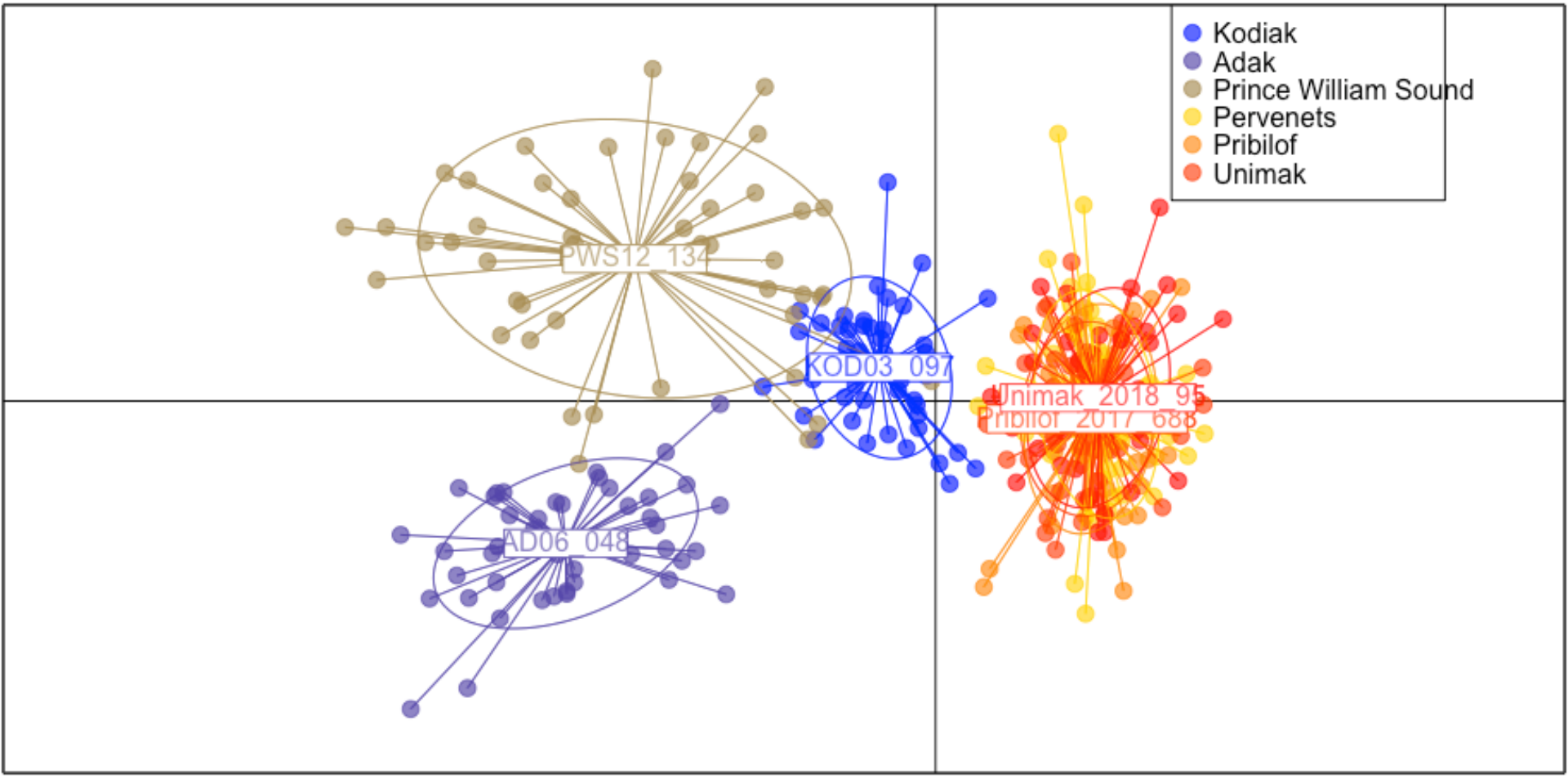
GOA: 2017
58% decline

and decreased in the EBS by 37% since 2016, to 598,260t.

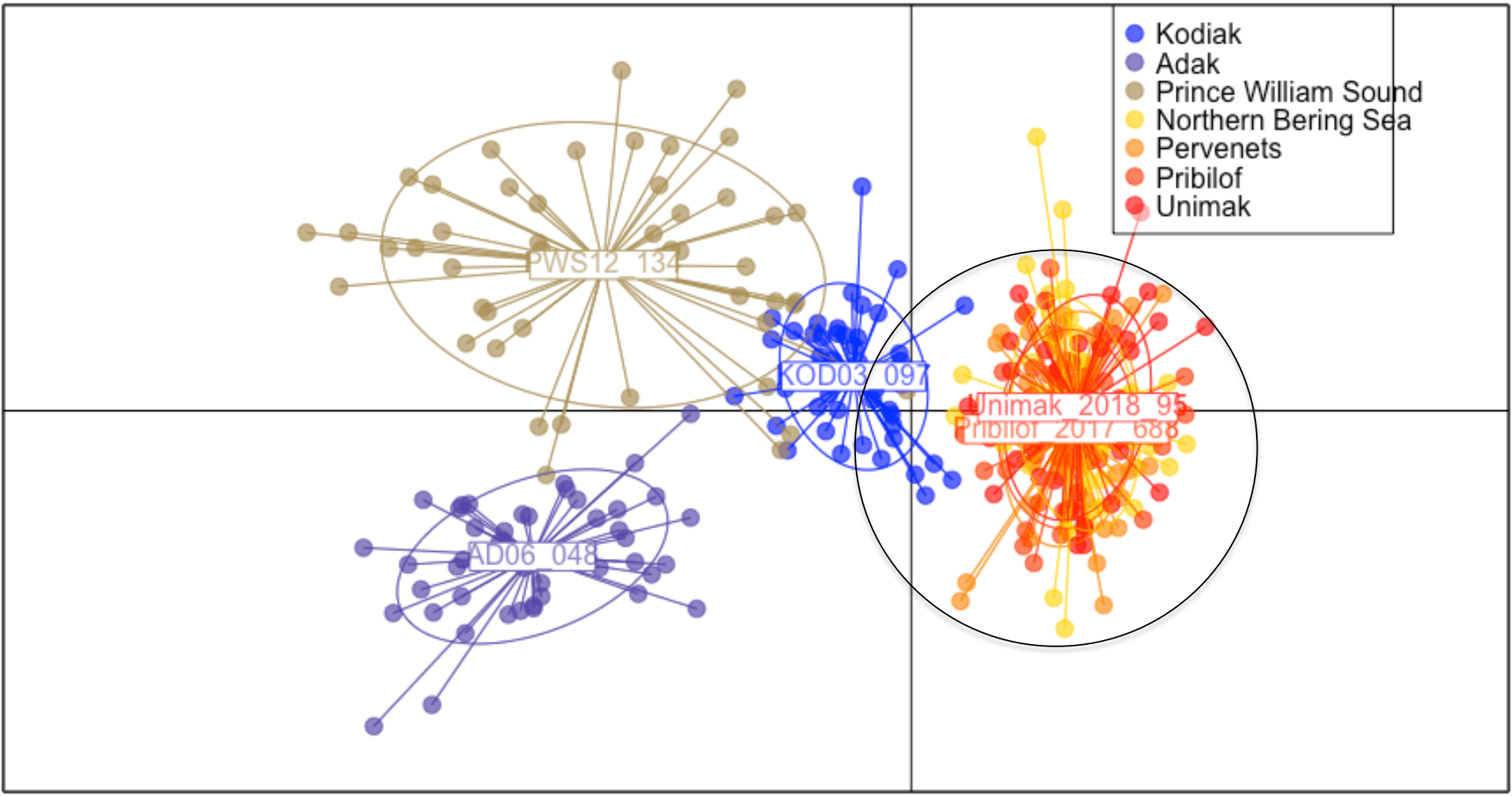
Genetic baselines from six spawning populations



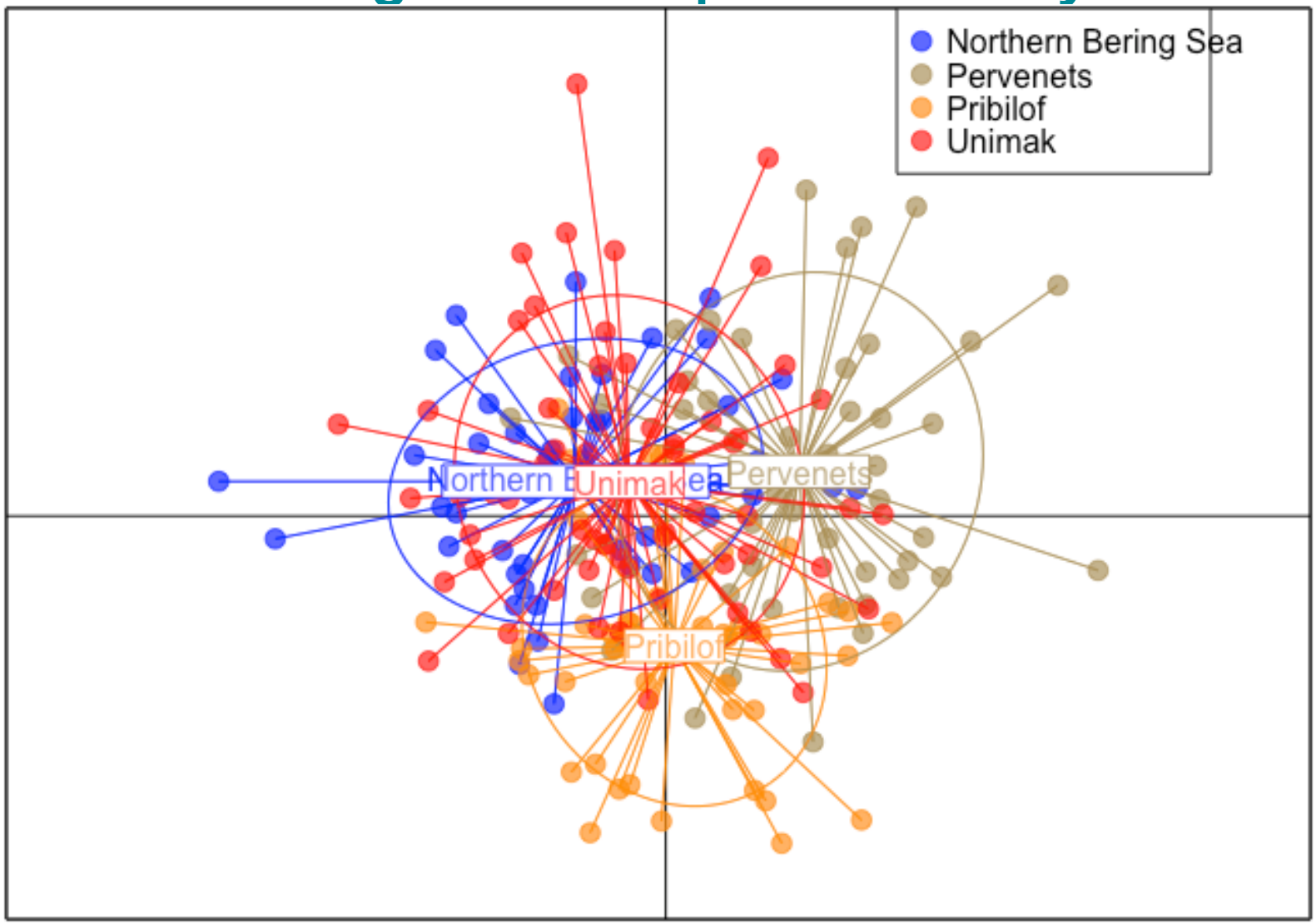
Eastern Bering Sea samples cluster together, separate from Kodiak, Prince William Sound, Adak



Eastern Bering Sea and Northern Bering Sea samples cluster together

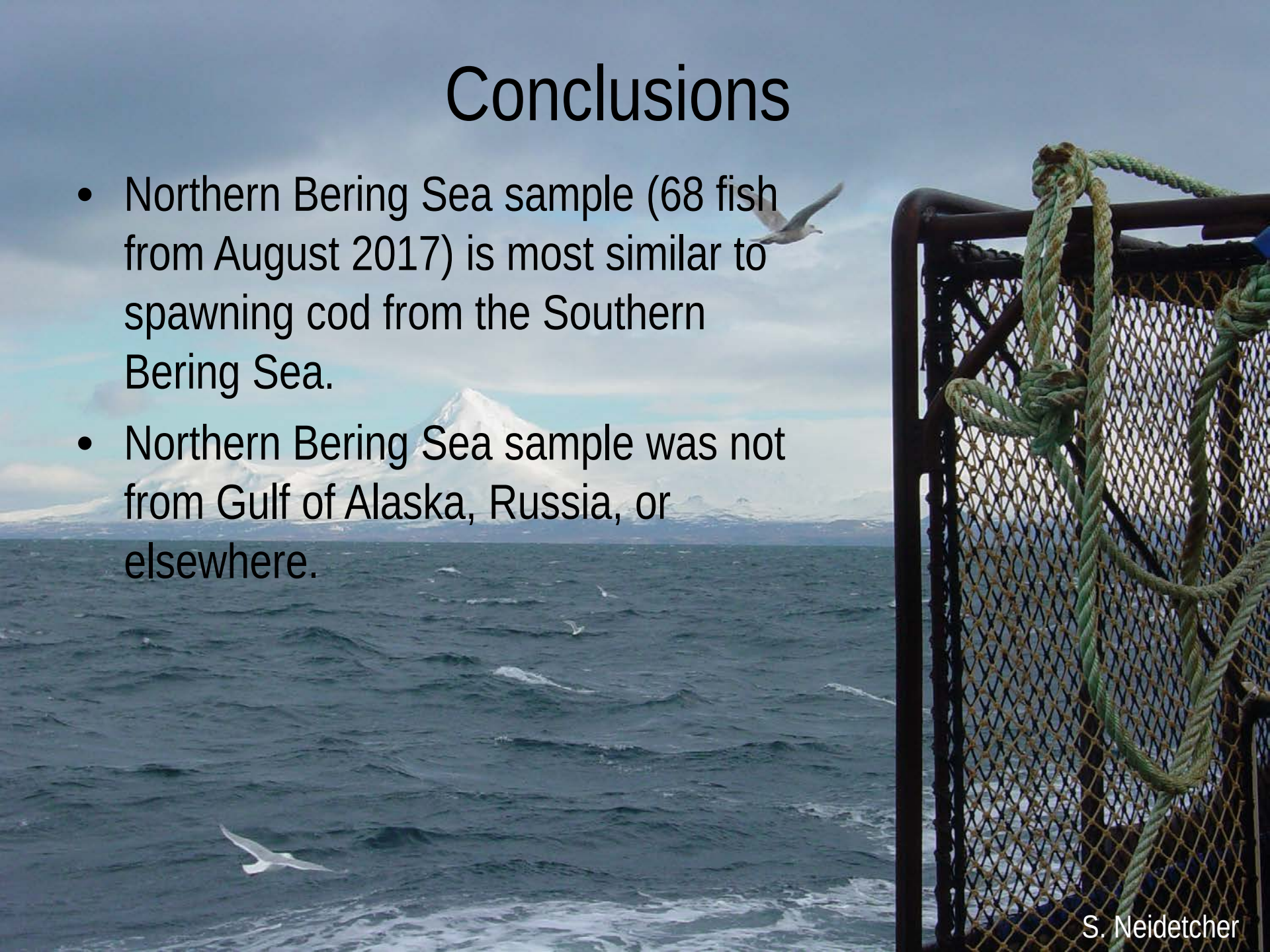


Eastern Bering Sea samples are very similar.



Conclusions

- Northern Bering Sea sample (68 fish from August 2017) is most similar to spawning cod from the Southern Bering Sea.
- Northern Bering Sea sample was not from Gulf of Alaska, Russia, or elsewhere.



EBS Pacific cod 16 models considered

	EBS survey area	EBS survey area	Growth covariates	Growth covariates	Time-vary Q, w/o NBS	Time-vary Q, w/o NBS	Time-vary Q, with NBS	Time-vary Q, with NBS	Previous models	Previous models	Migration	Migration	M covariates	M covariates	Omnibus
Feature	16.6a	16.6b	16.6c	16.6d	16.6e	16.6f	16.6g	16.6h	17.2	17.6	18.1	18.2	18.3	18.4	18.5
Separate Q for EBS survey 1982-1986		x													
K linked to environmental covariate			x												
$Lmin$ linked to environmental covariate				x											
Randomly time-varying EBS Q					x		x			x					
EBS Q linked to environmental covariate						x		x							x
NBS Q and selectivity estimated							x	x							x
Randomly time-varying NBS Q							x	x							
Adjust timing of fishery and survey									x	x					
Prior distribution for M									x	x					
Flat-topped double normal selectivity									x	x					
Randomly time-varying fishery selex									x	x					
Harmonic mean composition weighting									x	x					
Randomly time-varying survey selex										x					
Randomly time-varying $Lmin$										x					
EBS-NBS migration											x	x			x
Randomly time-varying migration											x				x
Migration linked to environ. covariate												x			
M linked to environmental covariate													x	x	x
Age-varying M														x	x
Block-specific steepness estimated															x

EBS Pacific cod

			EBS survey							
Category	Model	Comp. N	1982-1986	1987-2017	Fishery ages	NBS	Areas	Env. var. 4	Env. var. 5	Env. var. 6
Base model	16.6	mean=300	yes	standard	no	no	1	n/a	n/a	n/a
EBS survey area	16.6a	mean=300	no	expanded	no	no	1	n/a	n/a	n/a
EBS survey area	16.6b	mean=300	yes	expanded	no	no	1	n/a	n/a	n/a
K covariates	16.6c	mean=300	yes	standard	no	no	1	fsh_cndtn	n/a	n/a
K covariates	16.6d	mean=300	yes	standard	no	no	1	bttm_tmp	n/a	n/a
Time-vary *Q*, w/o NBS	16.6e	mean=300	yes	standard	no	no	1	n/a	n/a	n/a
Time-vary *Q*, w/o NBS	16.6f	mean=300	yes	standard	no	no	1	NPI	n/a	n/a
Time-vary *Q*, with NBS	16.6g	mean=300	yes	standard	no	yes	1	n/a	n/a	n/a
Time-vary *Q*, with NBS	16.6h	mean=300	yes	standard	no	yes	1	NPI	n/a	n/a
Previous models	17.2	no. hauls	yes	standard	yes	no	1	n/a	n/a	n/a
Previous models	17.6	no. hauls	yes	standard	yes	no	1	n/a	n/a	n/a
Migration	18.1	mean=300	yes	standard	no	yes	2	n/a	n/a	n/a
Migration	18.2	mean=300	yes	standard	no	yes	2	NPI	bnthc_frgr	brd_brdng
M covariates	18.3	mean=300	yes	standard	no	no	1	fsh_cndtn	n/a	n/a
M covariates	18.4	mean=300	yes	standard	no	no	1	ntrtn_dfct	n/a	n/a
Omnibus	18.5	mean=300	yes	standard	no	yes	2	NPI	ntrtn_dfct	n/a

EBS Pacific cod, why so many models?

Four requested by Team or SSC

Six address need to address the NBS survey including some covariates…

Five others suggested by AFSC colleagues

Model averaging methods developed

EBS Pacific cod selected as “Ensemble”

EBS Pacific cod

- The Plan Team recommends to not consider models with linkages to environmental covariates for further review in 2018 …future…and include NBS considerations
- Team recommended NBS survey extension again in 2019
  - And future years as needed
- Ten-fold increase in the Pacific cod biomass in the NBS and distributional shifts between 2010 and 2017 important to understand and monitor
- Team recommended models that included data from northwestern EBS and NBS areas
- Team recommended investigating model-based approaches to estimate a consistent time-series for the NBS survey given that the survey design changed in 2018

Greenland turbot

- Presentations on Greenland turbot:
  1. Completion of the stock structure template
     - With respect to issues of stock structure and spatial management, the Team recommends a rating of “little or no concern” for Greenland turbot
  2. Stock assessment:
  - For November, the Team recommends that the author bring forward the following models:
    - 16.1
    - 16.1b with selectivity estimated
    - 16.1b with environmental covariates included to help explain selectivities

Alaska skate catch estimation

- Presentation on investigation into improving catch estimations for individual species in the BSAI skate complex
- Uncertainty in skate ID by observers on longline vessels, primarily in the Pacific cod fishery
- Observers do not ID soft-snout skates (*Bathyraja* spp) to species when they are not in-hand, since they are difficult to correctly ID without closely examining small anatomical characteristics
- Up to 80% of skates are recorded as soft-snout skate, whereas most stiff-snout skate species do get ID'd to species by observers
- In the CAS, most skates get lumped into the "other skate" category
- Problem in the AK skate model, where there is a need to know the AK skate catch

Alaska skate catch estimation

- The Team recommends that, although this method appears to be a major improvement, the issue of how species composition may be affected by depth should be examined before the method is adopted
  - This could be addressed by a simple look at the observer data to see if depth-related differences in species composition exist
  - The November assessment should therefore include an examination of skate stratification by depth in the observer data

Approve proposed 2019/2020 specs (no squid)

Species	Area	2017 OFL	2017 ABC	2017 TAC	Catch as of 12/31/2017	2018 OFL	2018 ABC	2018 TAC	Catch as of 9/8/2018	2019 and 2020 OFL	2019 and 2020 ABC	2019 and 2020 TAC
Pollock	EBS	3,640,000	2,800,000	1,345,000	1,359,274	4,797,000	2,592,000	1,364,341	1,294,454	4,592,000	2,467,000	
	AI	43,650	36,061	19,000	1,507	49,289	40,788	19,000	1,748	37,431	30,803	
	Bogoslof	130,428	60,800	500	186	130,428	60,800	450	9	130,428	60,800	
Pacific cod	BS	284,000	239,000	223,704	222,814	238,000	201,000	188,136	142,502	201,000	170,000	
	AI	28,700	21,500	15,695	12,258	28,700	21,500	15,695	10,906	28,700	21,500	
Sablefish	BS	1,499	1,274	1,274	1,159	2,887	1,464	1,464	1,422	4,576	2,061	
	AI	2,044	1,735	1,735	590	3,917	1,988	1,988	457	6,209	2,798	
Yellowfin sole	BSAI	287,000	260,800	154,000	132,266	306,700	277,500	154,000	97,101	295,600	267,500	
Greenland turbot	BSAI	11,615	6,644	4,500	2,834	13,148	11,132	5,294	1,765	13,540	11,473	
	BS	n/a	5,800	4,375	2,712	n/a	9,718	5,125	1,614	n/a	10,016	
	AI	n/a	844	125	122	n/a	1,414	169	151	n/a	1,457	
Arrowtooth flounder	BSAI	76,100	65,371	14,000	6,518	76,757	65,932	13,621	4,528	75,084	64,494	
Kamchatka flounder	BSAI	10,360	8,880	5,000	4,503	11,347	9,737	5,000	2,814	12,022	10,317	
Northern rock sole	BSAI	159,700	155,100	47,100	35,214	147,300	143,100	47,100	27,513	136,000	132,000	
Flathead sole	BSAI	81,654	68,278	14,500	9,149	79,862	66,773	14,500	8,262	78,036	65,227	
Alaska plaice	BSAI	42,800	36,000	13,000	16,492	41,170	34,590	16,100	21,453	38,800	32,700	
Other flatfish	BSAI	17,591	13,193	2,500	4,133	17,591	13,193	4,000	5,871	17,591	13,193	
Pacific Ocean perch	BSAI	53,152	43,723	34,900	32,544	51,675	42,509	37,361	25,524	50,098	41,212	
	BS	n/a	12,199	11,000	8,987	n/a	11,861	11,861	4,024	n/a	11,499	
	EAI	n/a	10,307	7,900	7,803	n/a	10,021	9,000	6,370	n/a	9,715	
	CAI	n/a	8,009	7,000	6,868	n/a	7,787	7,500	6,767	n/a	7,549	
	WAI	n/a	13,208	9,000	8,886	n/a	12,840	9,000	8,363	n/a	12,449	
Northern rockfish	BSAI	16,242	13,264	5,000	4,699	15,888	12,975	6,100	5,286	15,563	12,710	
Blackspotted/Rougheye Rockfish	BSAI	612	501	225	205	749	613	225	190	829	678	
	EBS/EAI	n/a	306	100	71	n/a	374	75	45	n/a	414	
	CAI/WAI	n/a	195	125	134	n/a	239	150	145	n/a	264	
Shortraker rockfish	BSAI	666	499	125	161	666	499	150	147	666	499	
Other rockfish	BSAI	1,816	1,362	875	831	1,816	1,362	845	763	1,816	1,362	
	BS	n/a	791	325	261	n/a	791	275	145	n/a	791	
	AI	n/a	571	550	570	n/a	571	570	618	n/a	571	
Atka mackerel	BSAI	102,700	87,200	65,000	64,449	108,600	92,000	71,000	54,474	97,200	84,400	
	EAI/BS	n/a	34,890	34,500	34,267	n/a	36,820	36,500	21,435	n/a	33,780	
	CAI	n/a	30,330	18,000	17,749	n/a	32,000	21,000	20,077	n/a	29,350	
	WAI	n/a	21,980	12,500	12,433	n/a	23,180	13,500	12,962	n/a	21,270	
Skates	BSAI	49,063	41,144	26,000	31,892	46,668	39,082	27,000	13,517	44,202	36,957	
Sculpins	BSAI	56,582	42,387	4,500	5,342	53,201	39,995	5,000	4,173	53,201	39,995	
Sharks	BSAI	689	517	125	142	689	517	180	85	689	517	
Squids	BSAI	6,912	5,184	1,342	1,996	6,912	5,184	1,200	1,456			
Octopuses	BSAI	4,769	3,576	400	281	4,769	3,576	250	160	4,769	3,576	
Total	BSAI	5,110,344	4,013,993	2,000,000	1,951,439	6,235,729	3,779,809	2,000,000	1,726,580	5,936,050	3,573,772	

Sources: 2017 OFLs, ABCs, and TACs and 2018 OFLs and ABCs are from harvest specifications adopted by the Council in December 2016 and December 2017, respectively; 2017 catches through December 31, 2018 catches through September 8, 2018 from AKR Catch Accounting.