BSAI Alaska plaice - partial
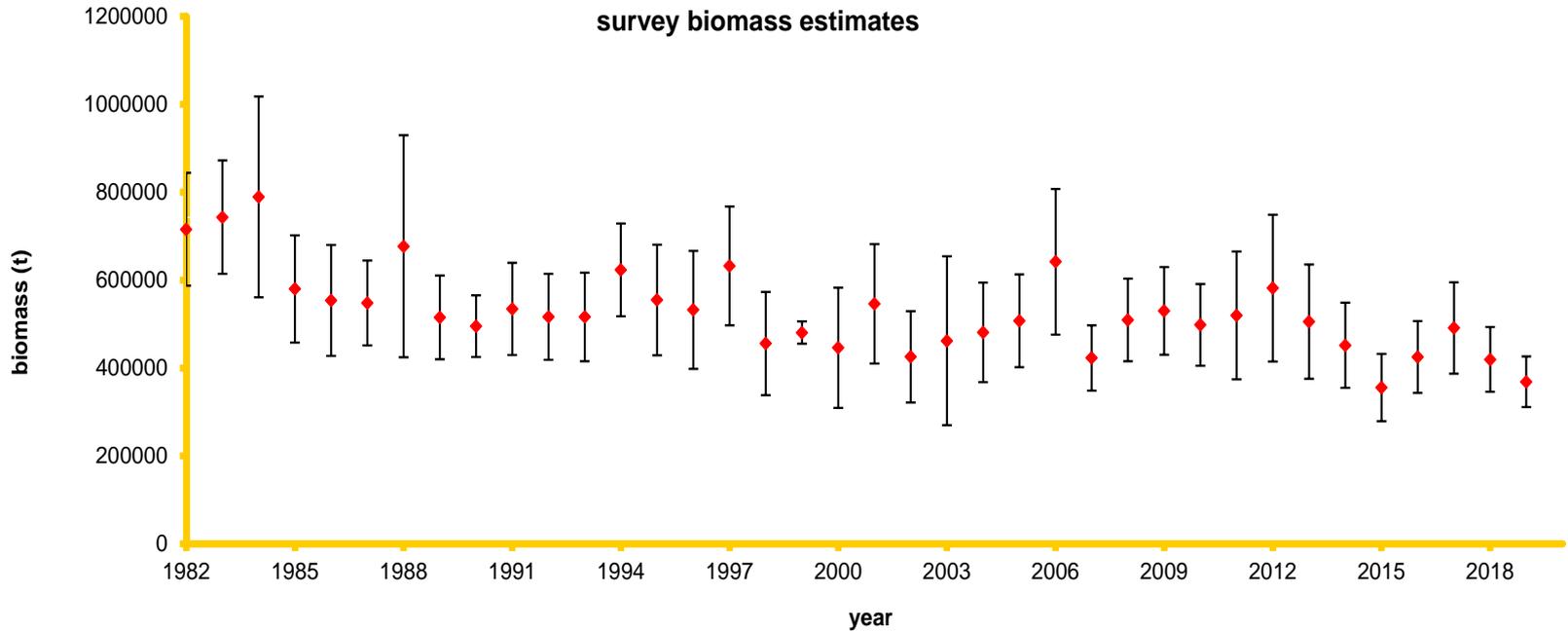

Olav A. Ormseth
Alaska Fisheries Science Center
NPFMC Groundfish Plan Team meeting, November 2020
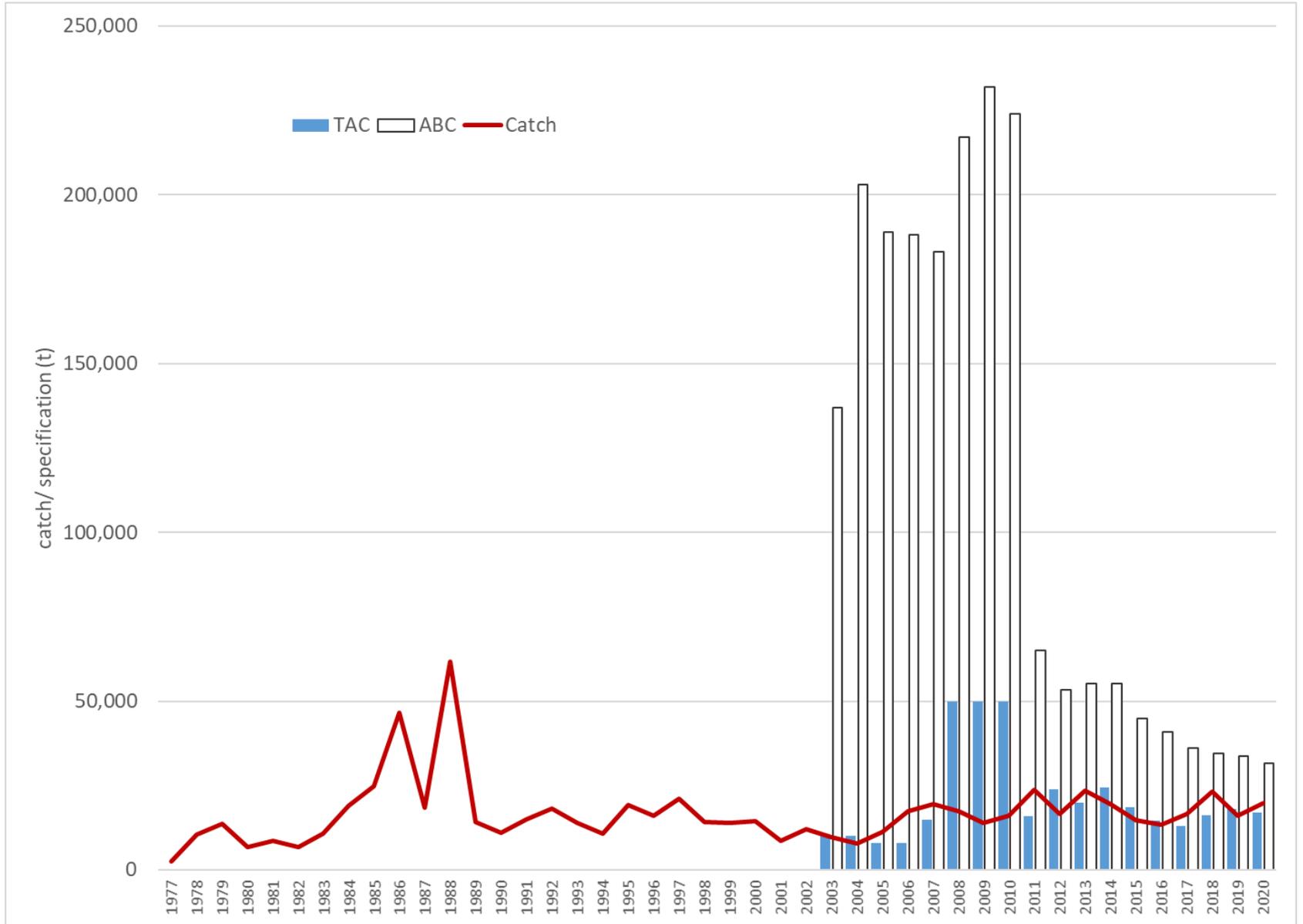
highlights

- new author (Olav Ormseth)

- full assessments in odd years

- Alaska plaice are nontargets but retention is high

- Alaska plaice biomass slowly declining
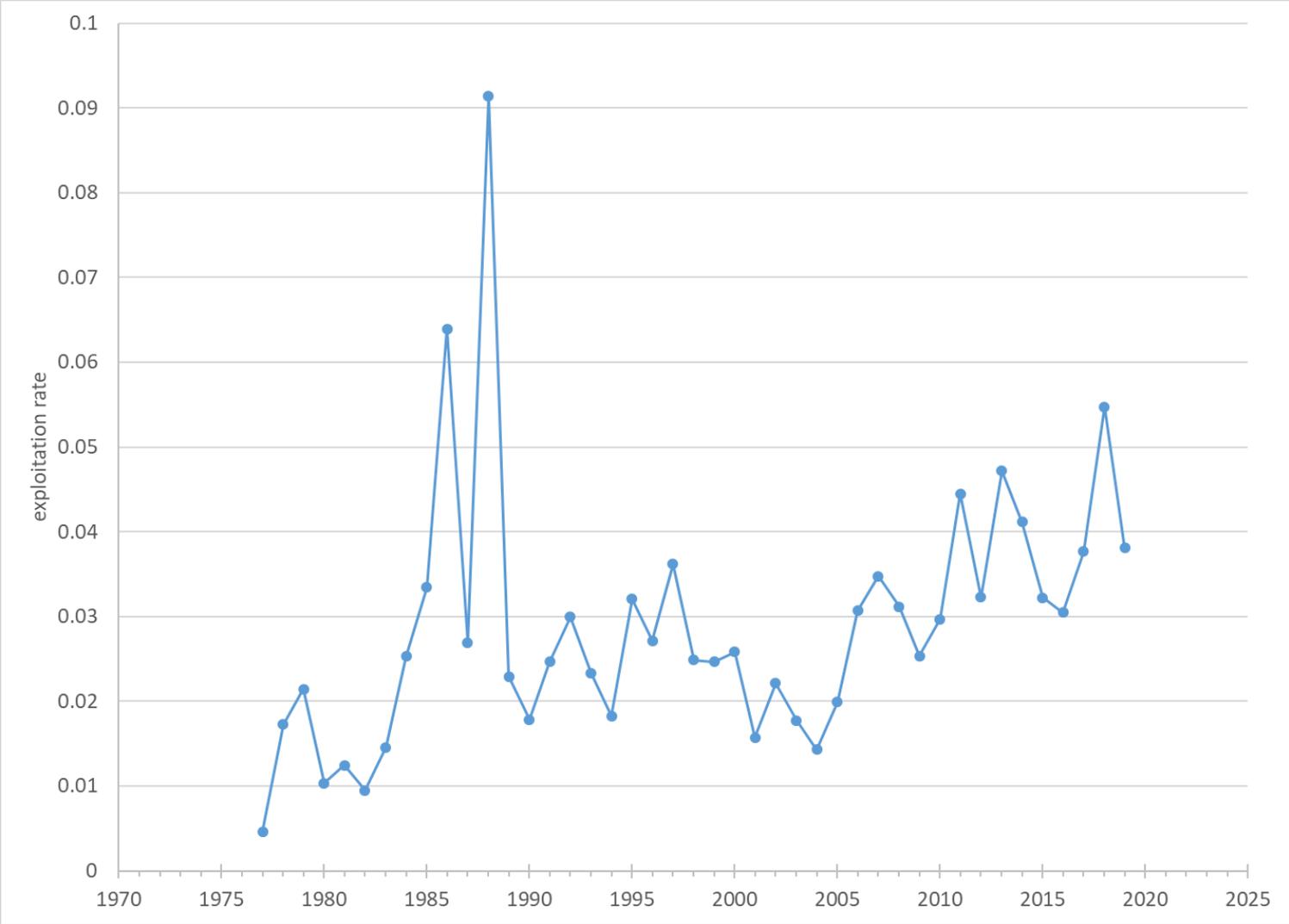
- 2020 projection model run almost matches Tom's…

survey biomass

survey biomass estimates

catch

exploitation rate

AK plaice harvest recommendations

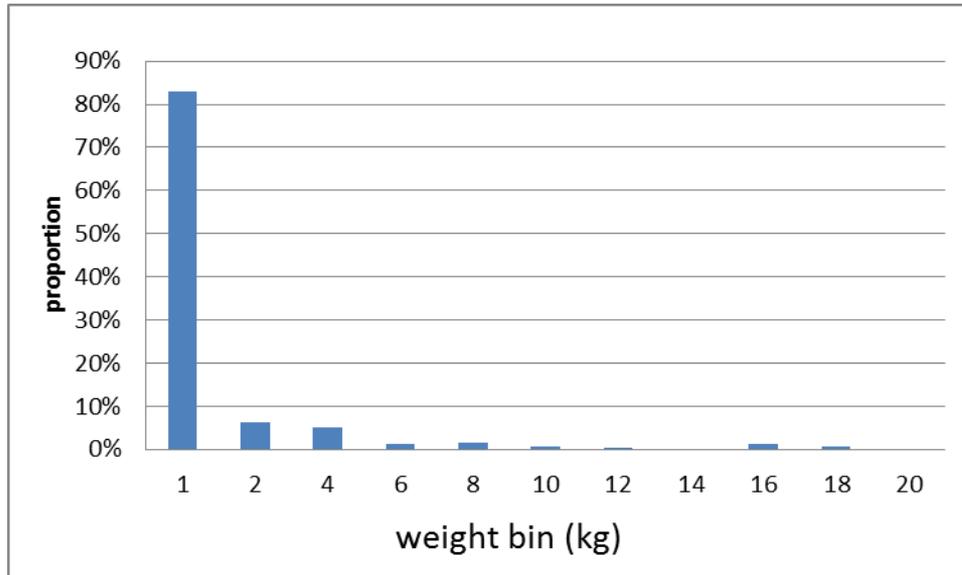| Quantity	As estimated or *specified last* year for: 2020	2021	As estimated or *recommended this* year for: 2021	2022
M (natural mortality rate)	0.13	0.13	**0.13**	0.13
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	428,800	435,700	**427,587**	430,164
Female spawning biomass (t)	170,800	161,000	**166,528**	160,150
$B_{100\%}$	333,300	333,300	**335,172**	335,172
$B_{40\%}$	133,300	133,300	**134,069**	134,069
$B_{35\%}$	116,600	116,600	**117,310**	117,310
F_{OFL}	0.15	0.15	**0.160**	0.160
$maxF_{ABC}$	0.125	0.125	**0.132**	0.132
F_{ABC}	0.125	0.125	**0.132**	0.132
OFL (t)	37,600	36,500	**37,924**	36,928
maxABC (t)	31,600	30,700	**31,657**	30,815
Status	As determined *last* year for: 2018	2019	As determined *this* year for: 2019	2020
Overfishing	no	n/a	No	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

BSAI octopus
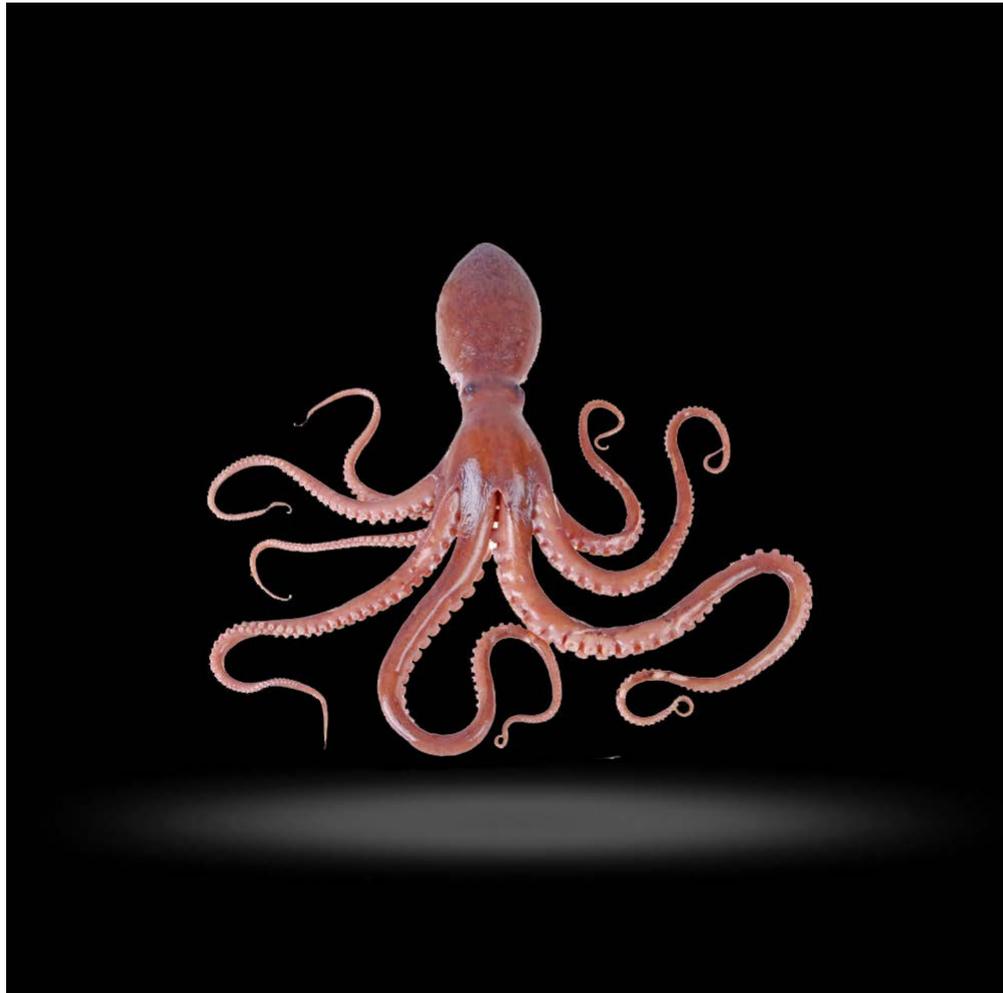
Olav A. Ormseth
Alaska Fisheries Science Center
NPFMC Groundfish Plan Team meeting, November 2020

highlights
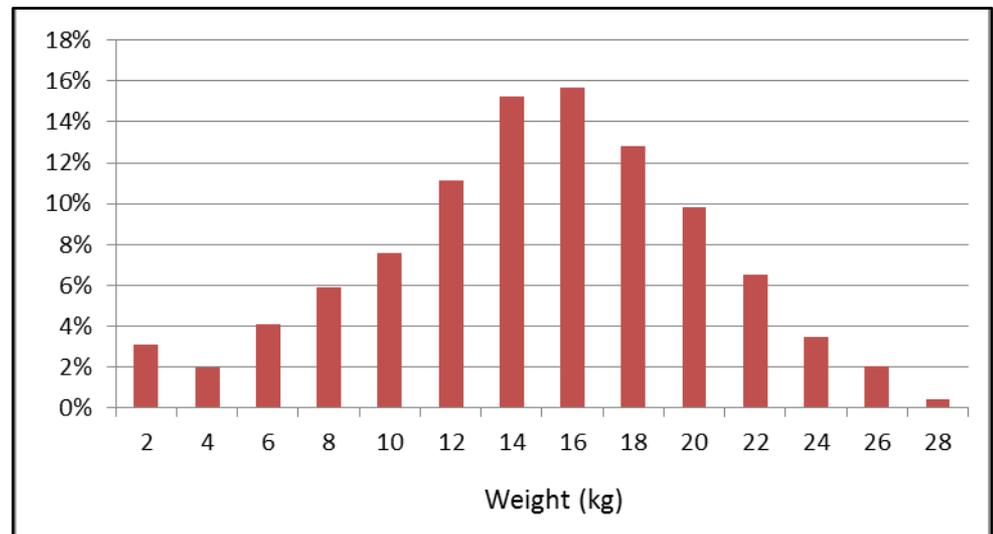
- harvest recs based on Pacific cod predation rate (thru 2015)

- same recs as in 2018 (i.e. new diet data not incorporated)

- 2020 catch* is highest in time series

- catch increasing in east and central Aleutians

- risk table is included
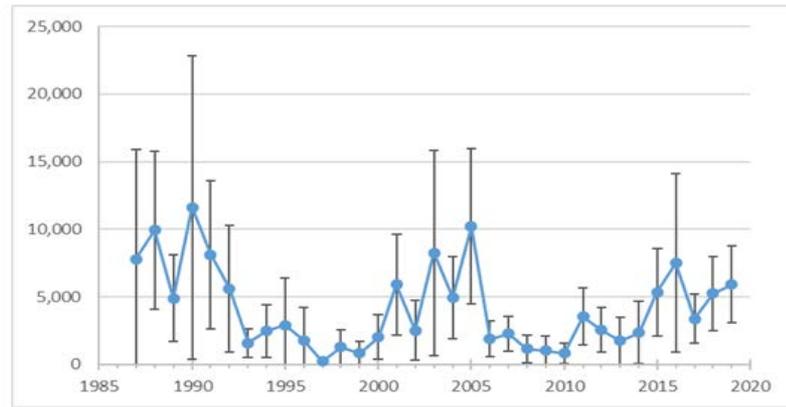
size comp, survey vs fishery

survey

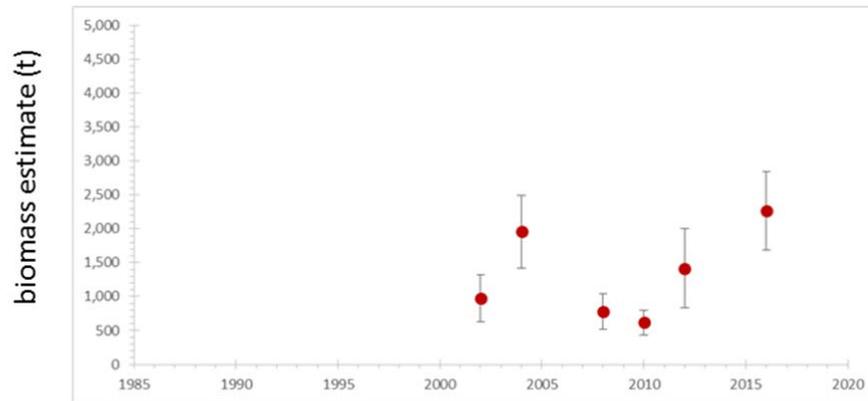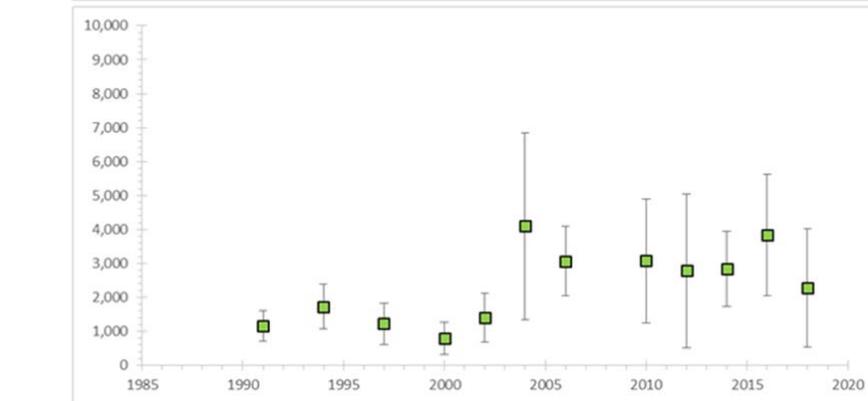pot gear

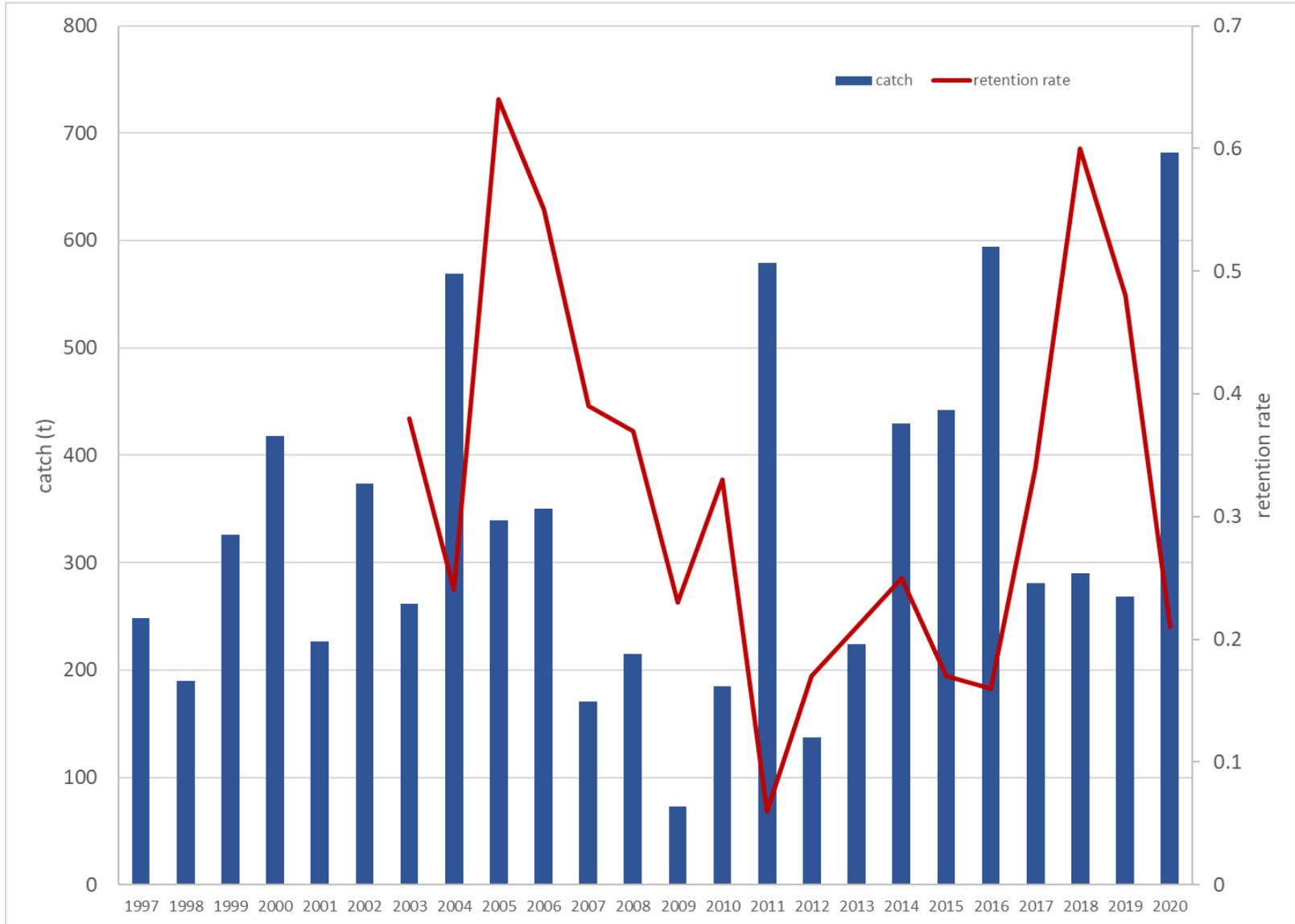# octopus survey biomass estimates (all species)

EBS shelf

EBS slope

Aleutian Islands

octopus catch & retention

octopus catch by area

octopus harvest recommendations (identical to 2018)

Quantity	As estimated or *specified last year* for: 2020	2021	As estimated or *recommended this* year for: 2021	2022
Tier 6 (consumption estimate)				
OFL (t)	4,769	4,769	4,769	4,769
ABC (t)	3,576	3,576	3,576	3,576
Status	As determined *in last year* 2017	2018	As determined *this* year for: 2019	2020
Overfishing	n/a	n/a	n/a	n/a

risk table

Assessment-related considerations	Population dynamics considerations	Environmental/ ecosystem considerations	Fishery Performance considerations
Level 1: Normal	Level 1: Normal	Level 1: Normal	Level 1: Normal

- **octopus are very data-limited**
- **no reduction from max ABC recommended**

BSAI skate complex

Olav A. Ormseth
Alaska Fisheries Science Center
NPFMC Groundfish Plan Team meeting, November 2020

highlights

1) no major developments

2) Alaska skate model results very similar to 2018 model run

3) bycatch of skates is decreasing (a lot)

4) biomass of skates is decreasing (some)

5) exploitation rate of Bering skate decreasing

overview

1) responses to Plan Team & SSC comments

2) skate complex overview & status

3) incidental catches of skates

4) Alaska skate assessment

5) other skates assessment

6) harvest recommendations

responses to comments - general

SSC comments on the use of risk tables
The SSC made lengthy recommendations regarding the use of risk tables in the minutes of their December 2019 meeting, which can be accessed at https://www.npfmc.org/meeting-minutes/. For brevity, the comments are not repeated in this document.

Response: This document complies with the clarifications and expectations reflected in the SSC's recommendations regarding the risk table.

responses to comments - specific

Combined Plan Team and SSC comments, 2018 & 2019

Because the BSAI skate assessment alternates between a full assessment in even years and a partial assessment in odd years, comments from the Plan Teams and SSC accumulate for 2 years before they are addressed in a full assessment. The following list of recommendations from the December 2019 SSC minutes encapsulates this agglomeration, so the following is intended as a response to the comments from both groups:

Comment: Explore the implications of using a random effects models for aggregates of species with different life histories and vital parameters.

> *Response*: This assessment includes a comparison of 2 approaches for estimating Other Skate (i.e. all skates except the Tier 3 Alaska skate) biomass using the random-effects (RE) model. The analyses were performed using (1) biomass and uncertainty data for the complex in aggregate and (2) biomass and uncertainty data for each species separately, with the resulting biomass estimates combined to create a single biomass estimate for the complex. While the point estimates of biomass were very similar between these approaches, the uncertainty was much larger for the latter approach where RE models were run for each species separately. Separate runs of the RE model were considered important for calculating species-specific exploitation rates, but the harvest recommendations are based on the RE model run in aggregate.

Comment: Conduct sensitivity runs to examine potential biases in ageing.

> *Response*: Previous assessments explored alternative models using differing assumptions regarding maximum age. A more thorough analysis of ageing bias has yet to be explored.

responses to comments - specific

Comment: Consider whether separating Alaska skate from the skate complex is advisable to avoid potential undue exploitation on the other skate species.

>*Response*: This approach to management of skates has previously been explored by the Plan Team (c. 2011). At that time it was determined that the conservation concern was insufficient to warrant splitting the complex. Overall exploitation of the Other Skates group remains low. The 2018 assessment suggested that the exploitation of individual species in the Other Skate group (specifically Bering skate and big skate) has the potential to be of concern, but the available data suggest that Bering and big skate populations are not negatively impacted. In any case, skate management would need to occur at the individual species level to reliably prevent undue exploitation. Much of this discussion is also mooted due to the lack of species-specific catch accounting in the BSAI, which would make an Other Skates ACL unenforceable.
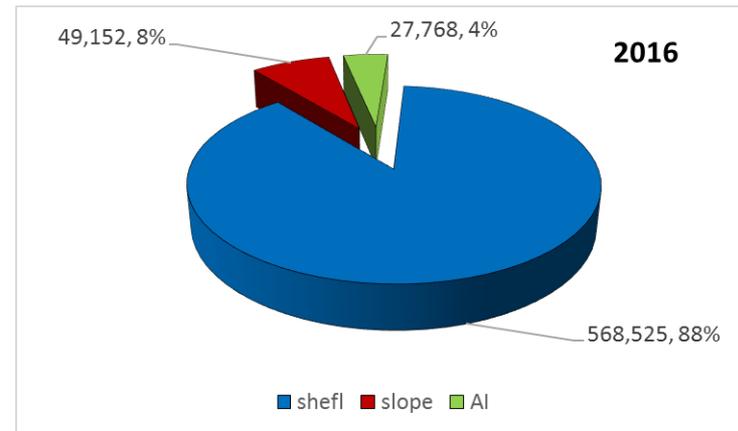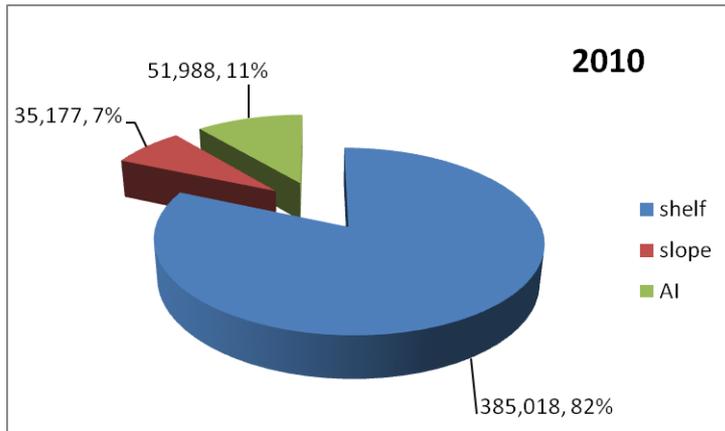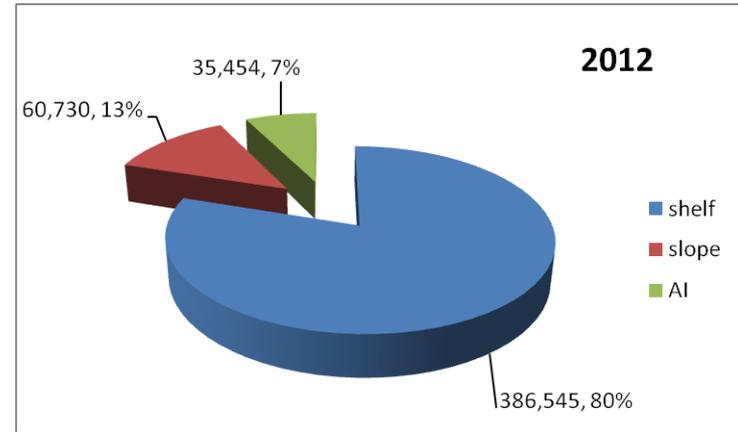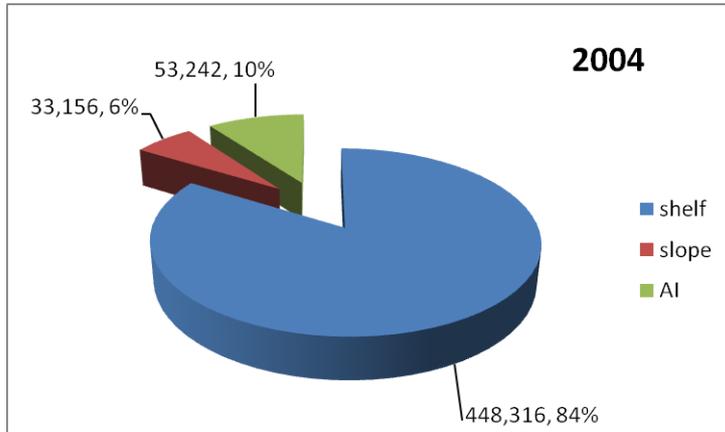
Comment: Fill out/update a stock-structure template for the skate complex.

>*Response*: A stock structure template was completed for the BSAI skate complex in 2012 that focused on the complex rather than individual species. Genetic analyses published in 2019 provide information that will be useful for updating the information regarding the population structure of Alaska skate, but this has not yet been completed.
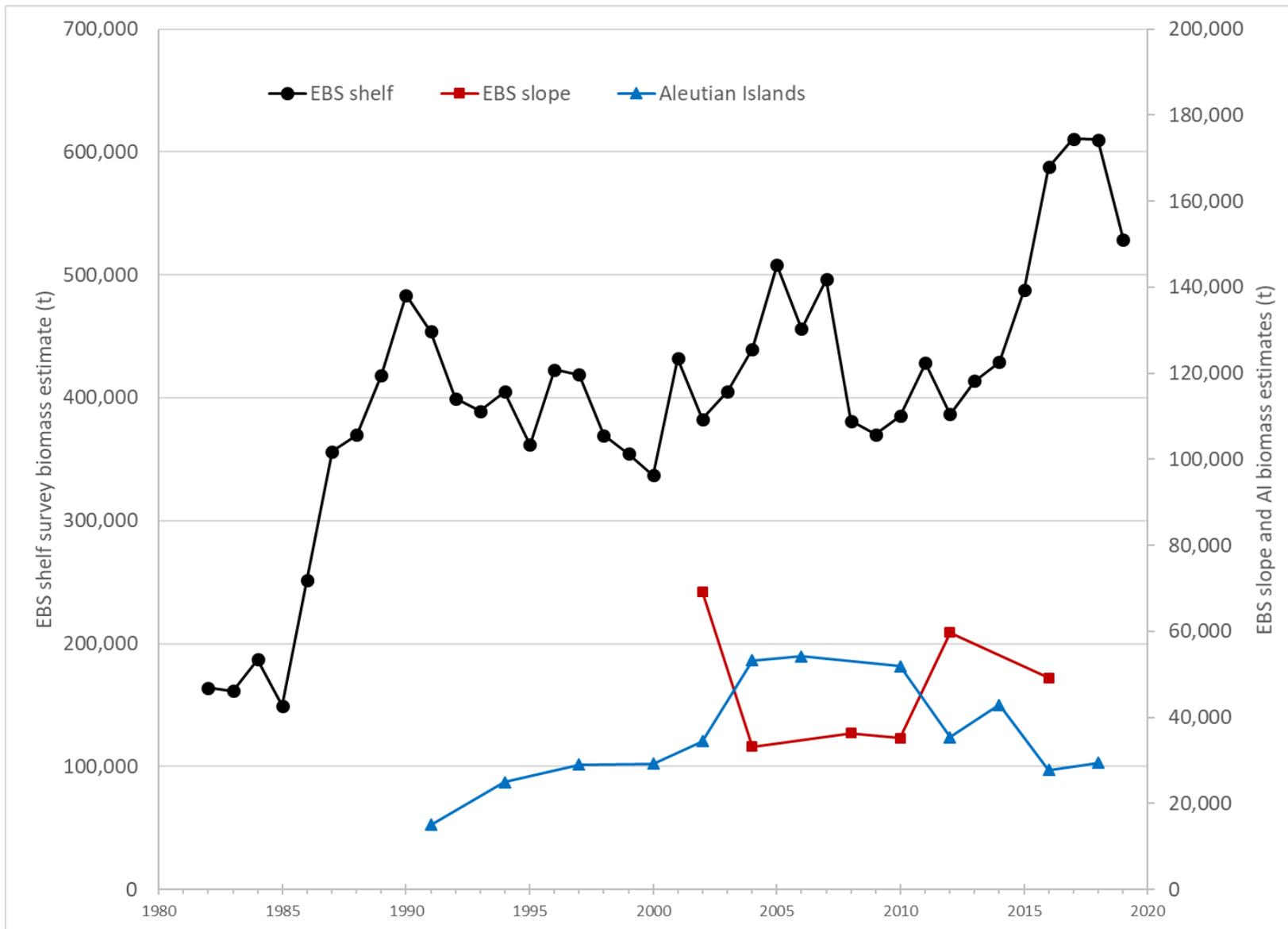
Comment: Work to integrate IPHC longline data into the assessment.

>*Response*: The spatial coverage of the IPHC and AFSC longline surveys does not correspond to the spatial distribution of Alaska skate, so those data are not useful for the Alaska skate population model. The IPHC data does have the potential to supplement our understanding of species in the Other Skates group but have not yet been incorporated into the assessment.
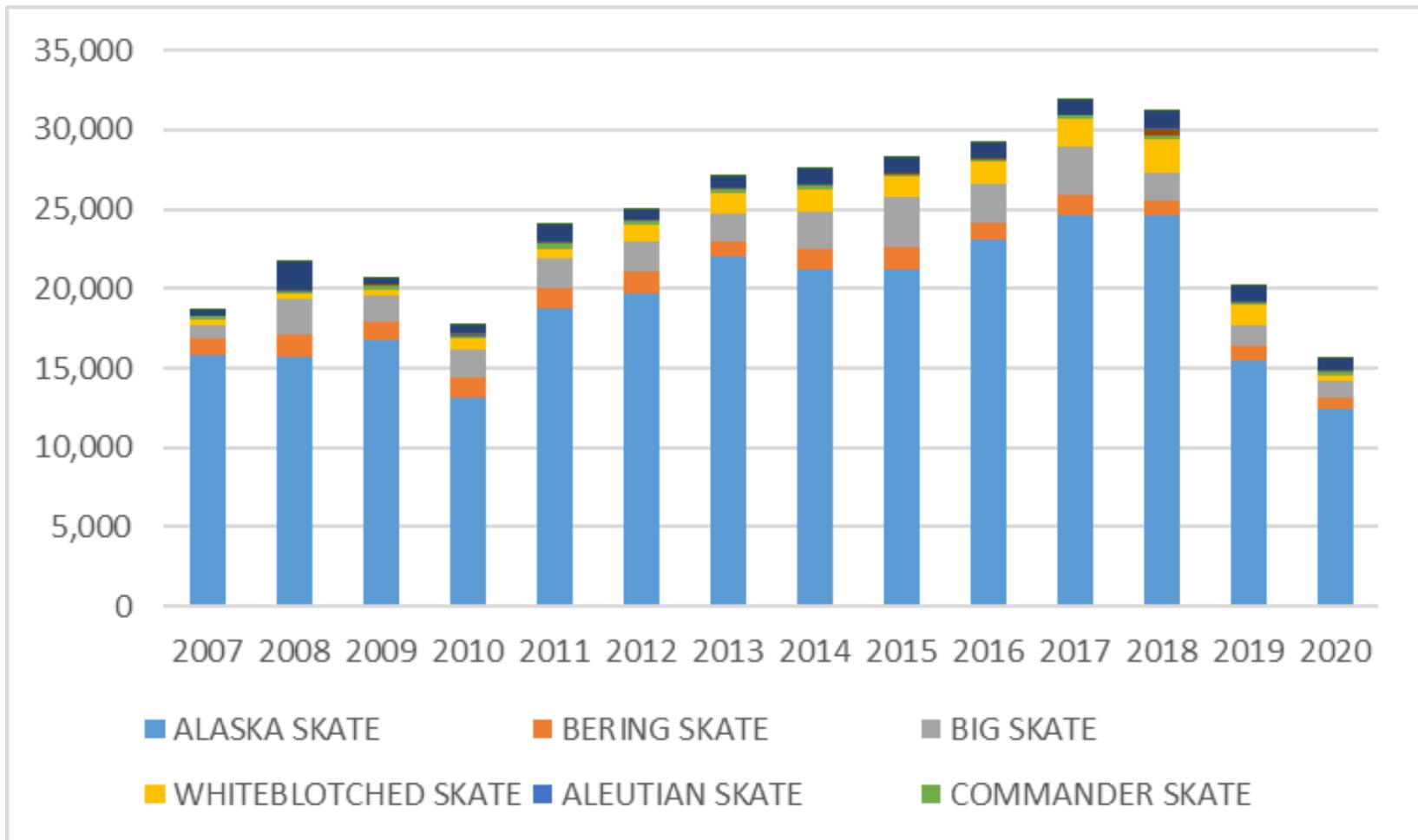
BSAI species composition
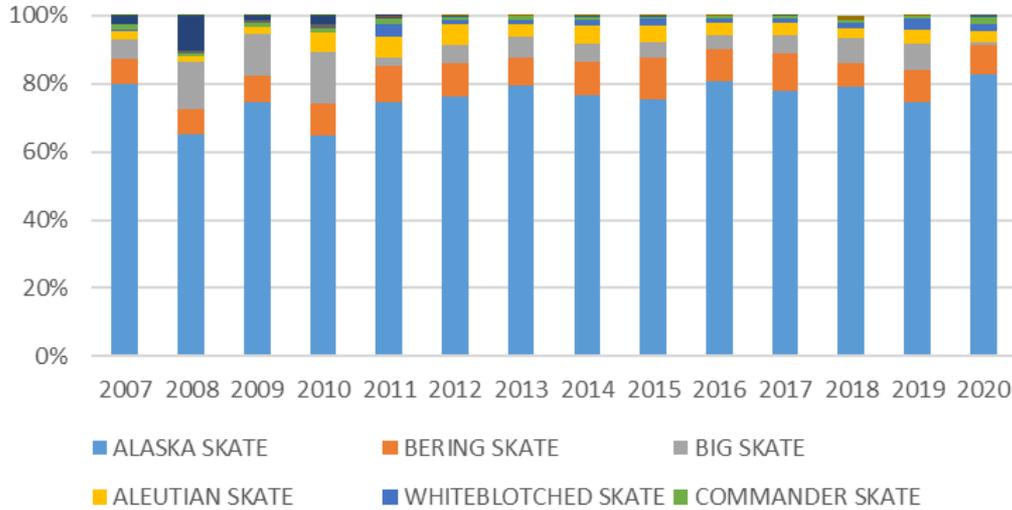

Legend: Alaska, Aleutian, whiteblotched, Bering, big, commander, leopard, roughtail, mud, whitebrow, deepsea, butterfly

BSAI biomass distribution

skate complex biomass – trawl surveys

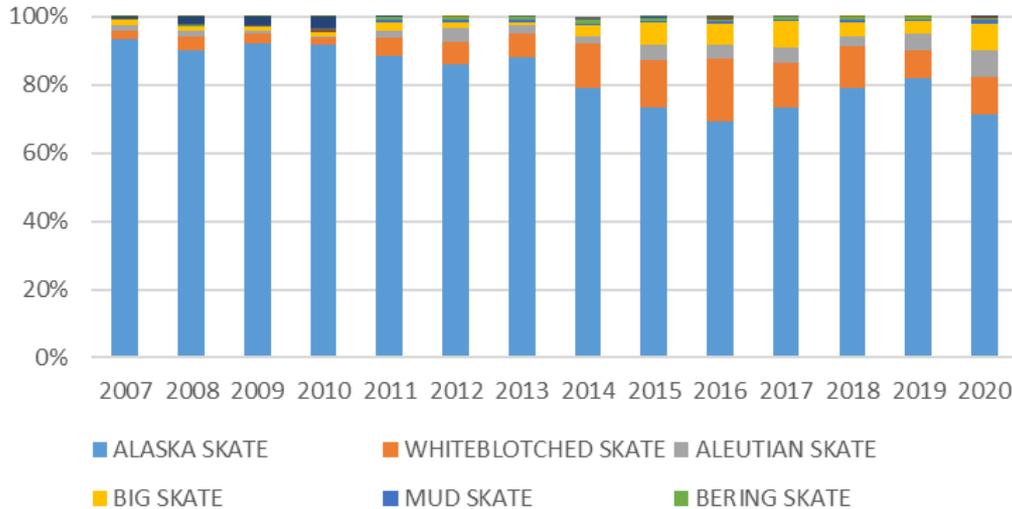# BSAI skate catch - by area
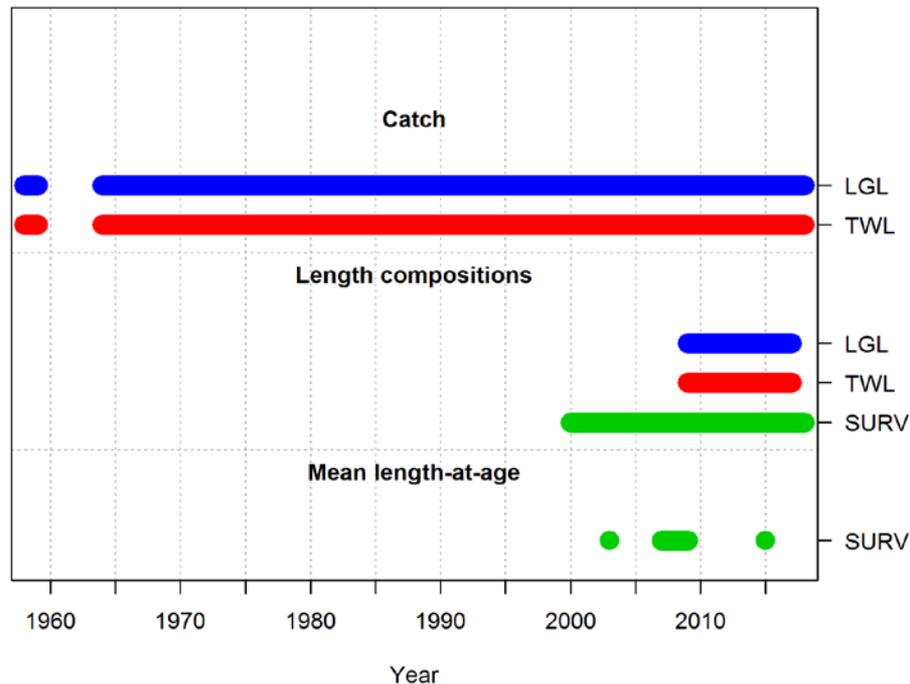
BSAI skate catch – species composition
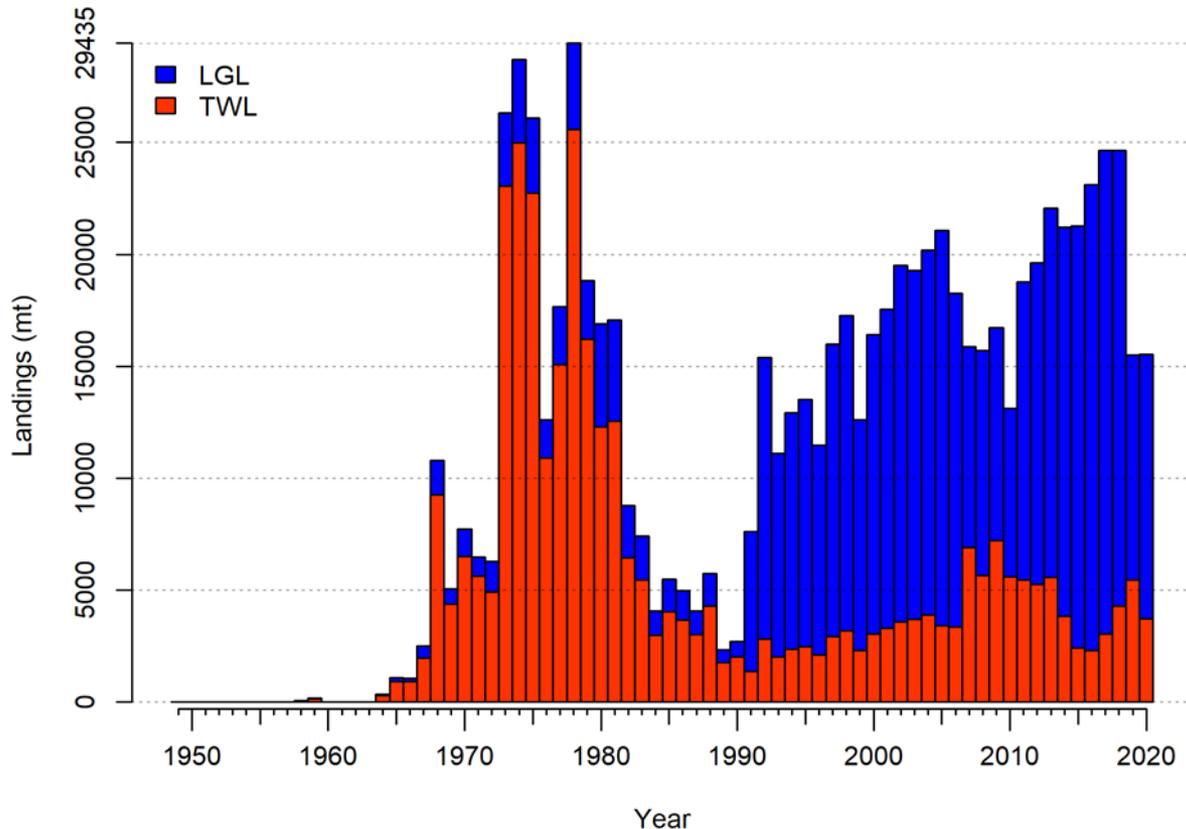
BSAI skate catch species composition by gear

Alaska skate assessment

- same model as in 2018 (14.2), no alternative models
- uses Stock Synthesis 3.23
- begins in 1950; most data begin 1999
- devs from average recruitment (h fixed at 1)
- fixed par: M, L/W, $L_{50\%}$, σR, q
- double-normal selectivity
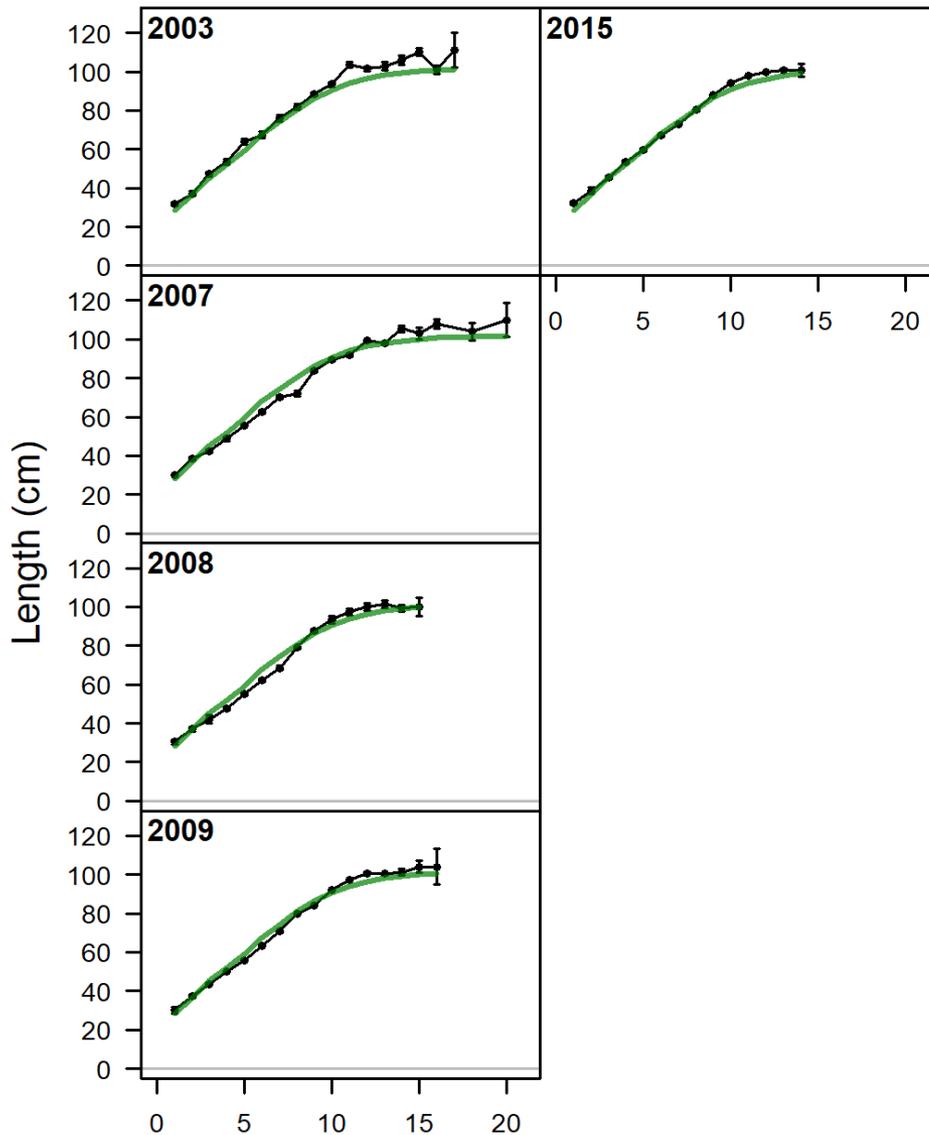- no age comps; age-length 2003, 2007-2009, 2015

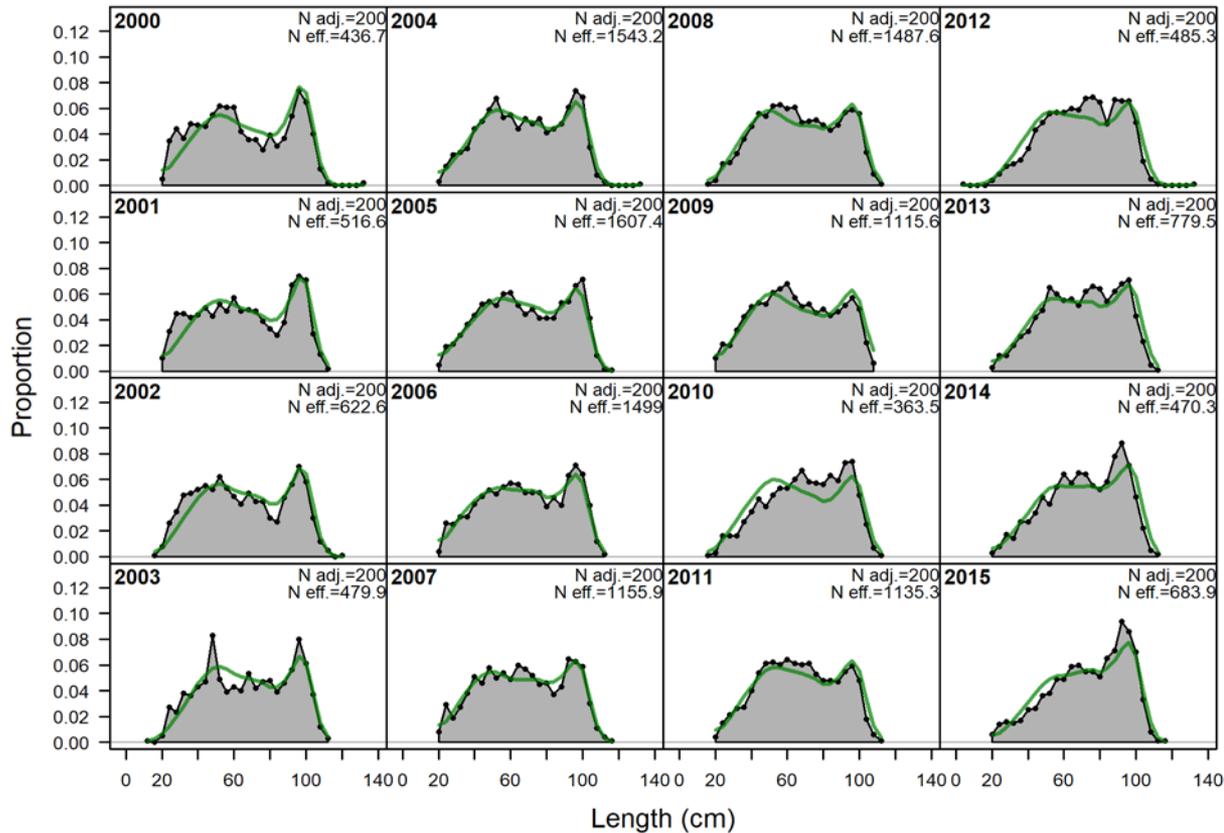# Alaska skate assessment - catch

- 2 fisheries (longline & trawl)
- 1954-1996: derived from "Other Species" catch
- 1997-2006: skate-specific catch, survey species composition
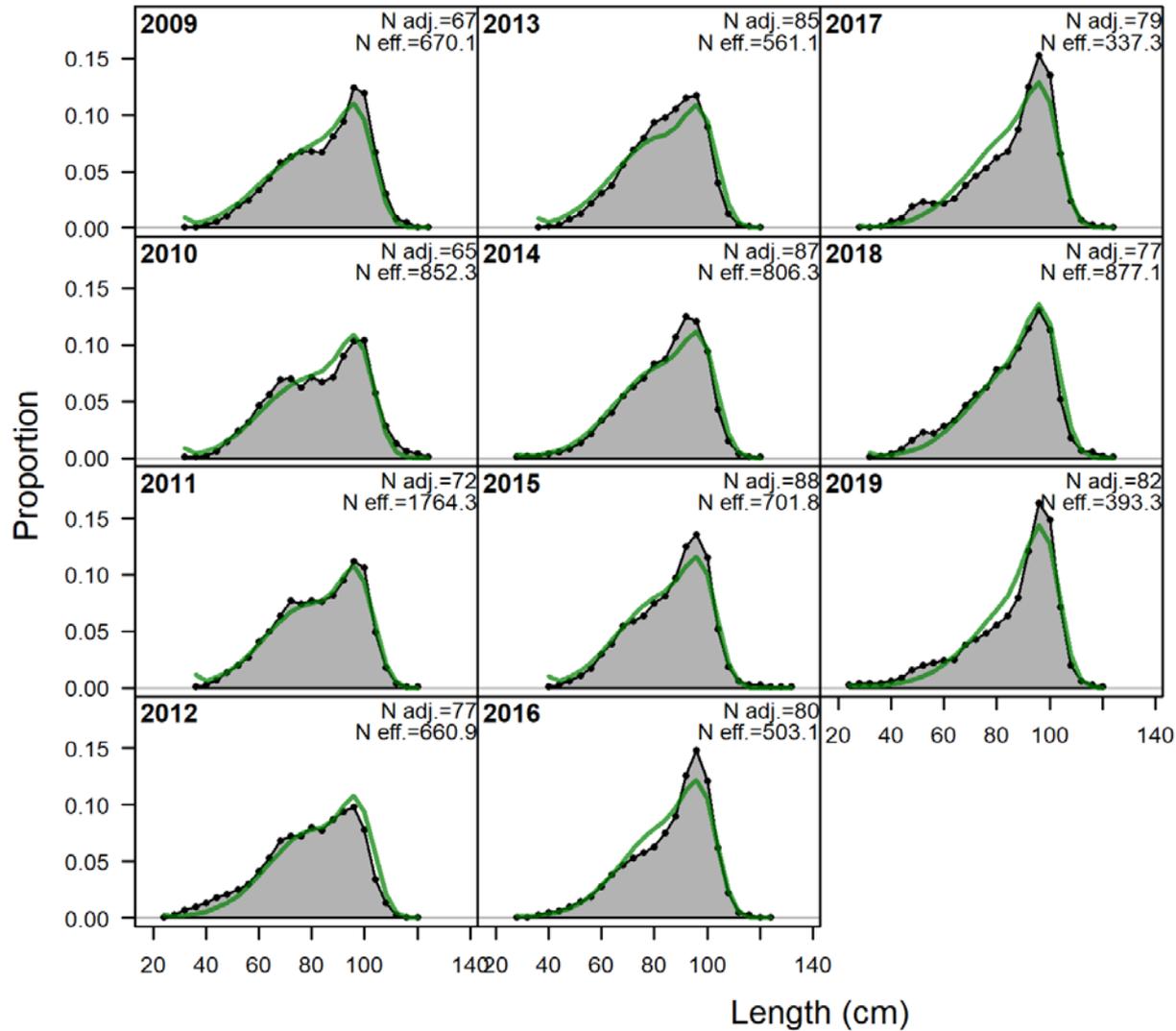- 2007-2020: skate-specific catch, observer species composition

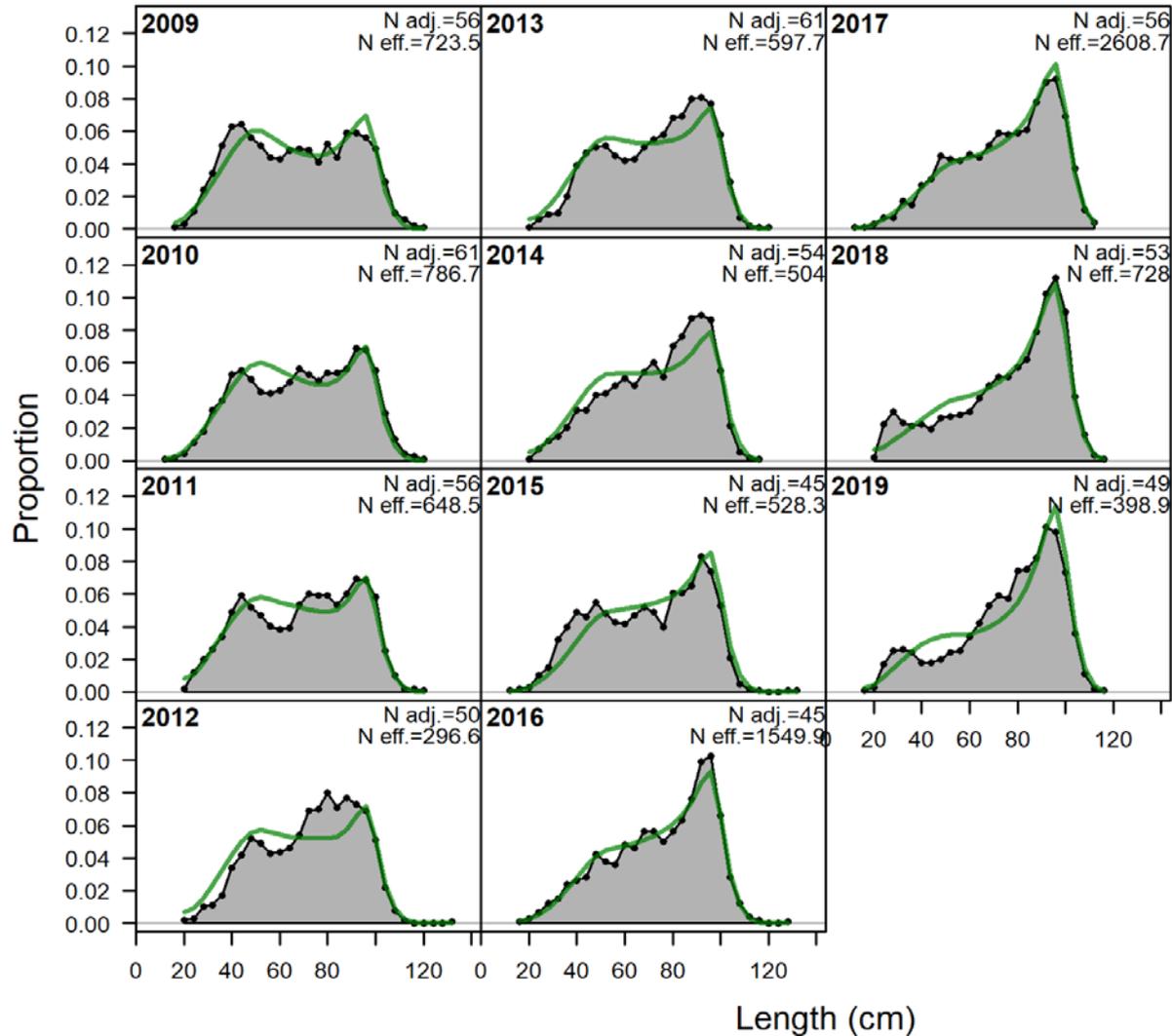AK skate model fits –

length at age

AK skate model fits – survey length comp

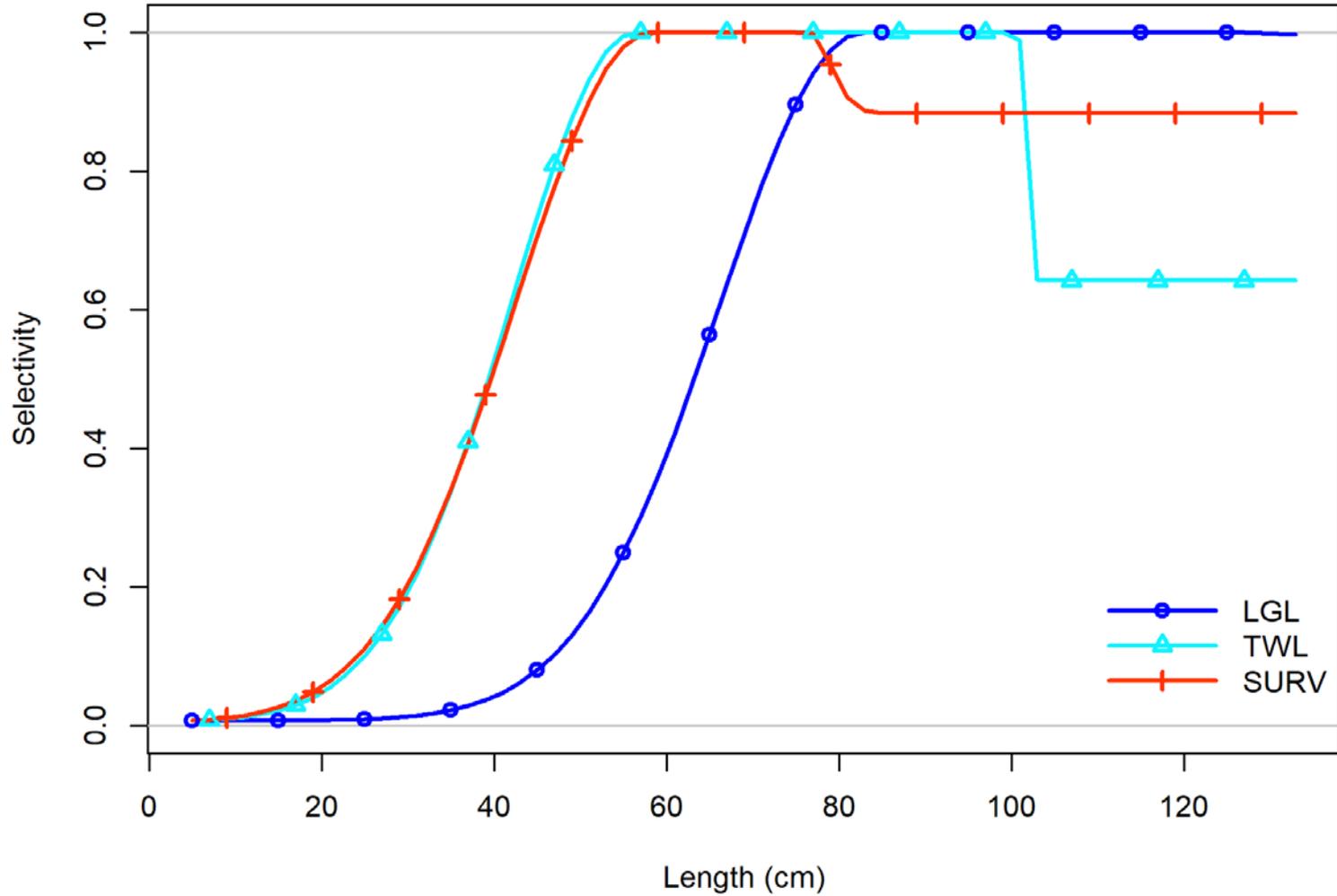# AK skate model fits – LL length comp

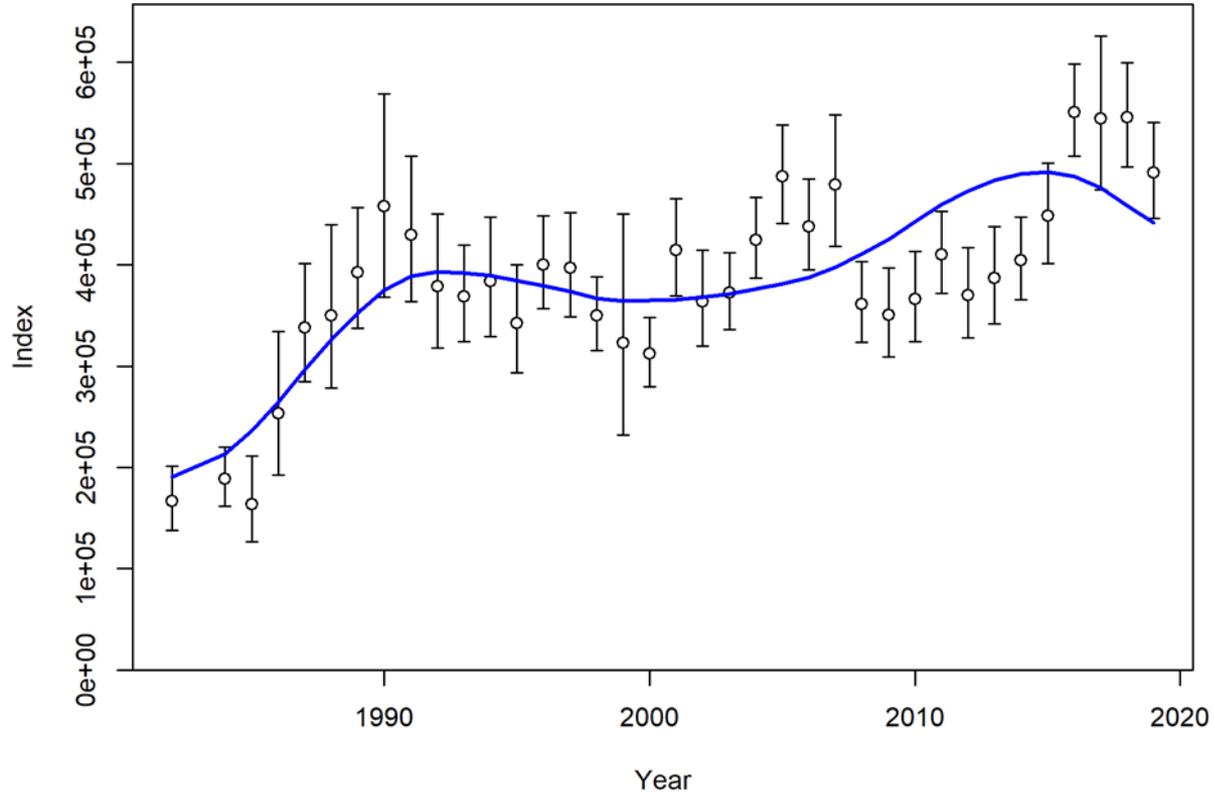# AK skate model fits – trawl length comp

AK skate model - selectivity

Length-based selectivity by fleet in 2020

AK skate model fits – survey biomass

AK skate model retrospective analysis
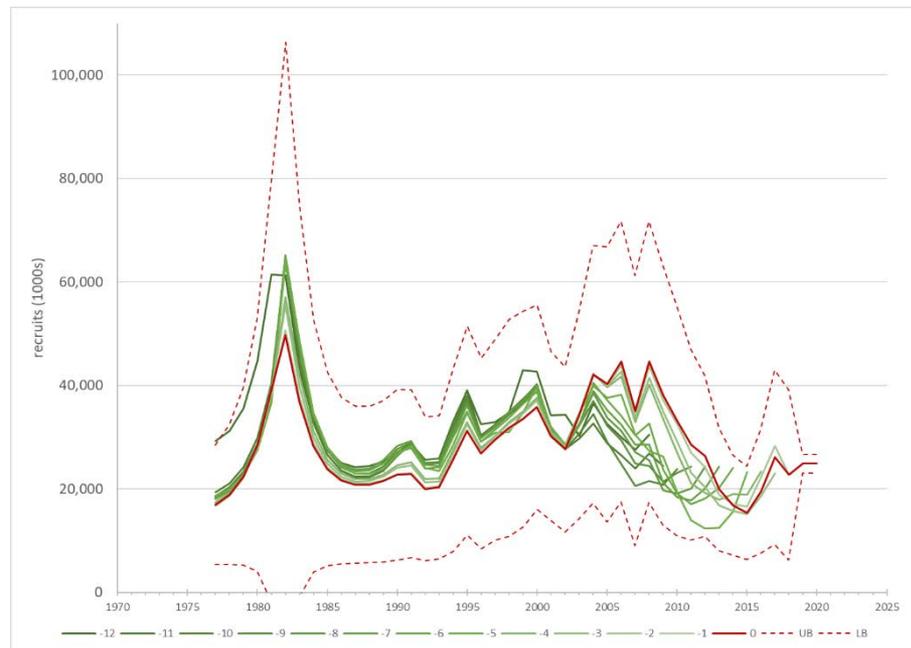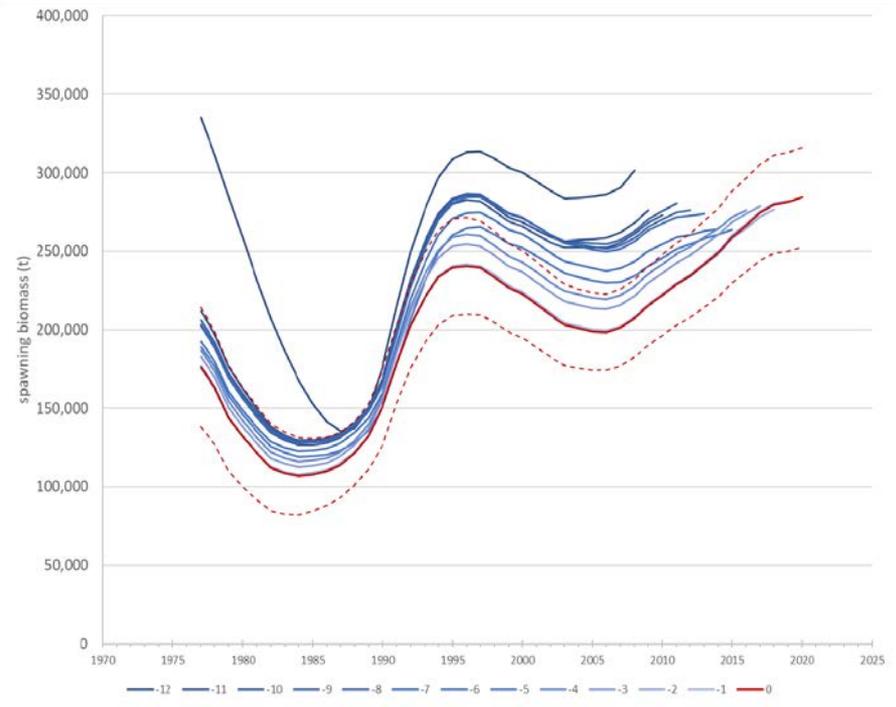
Alaska skate model retrospective bias diagnostics			
	$\rho_{\text{rev Mohn}}$	$\rho_{\text{Woods Hole}}$	RMSE
spawning biomass	0.135	0.150	0.165
recruitment	0.004	0.033	0.195

AKSK model results – spawning biomass

Spawning output with ~95% asymptotic intervals
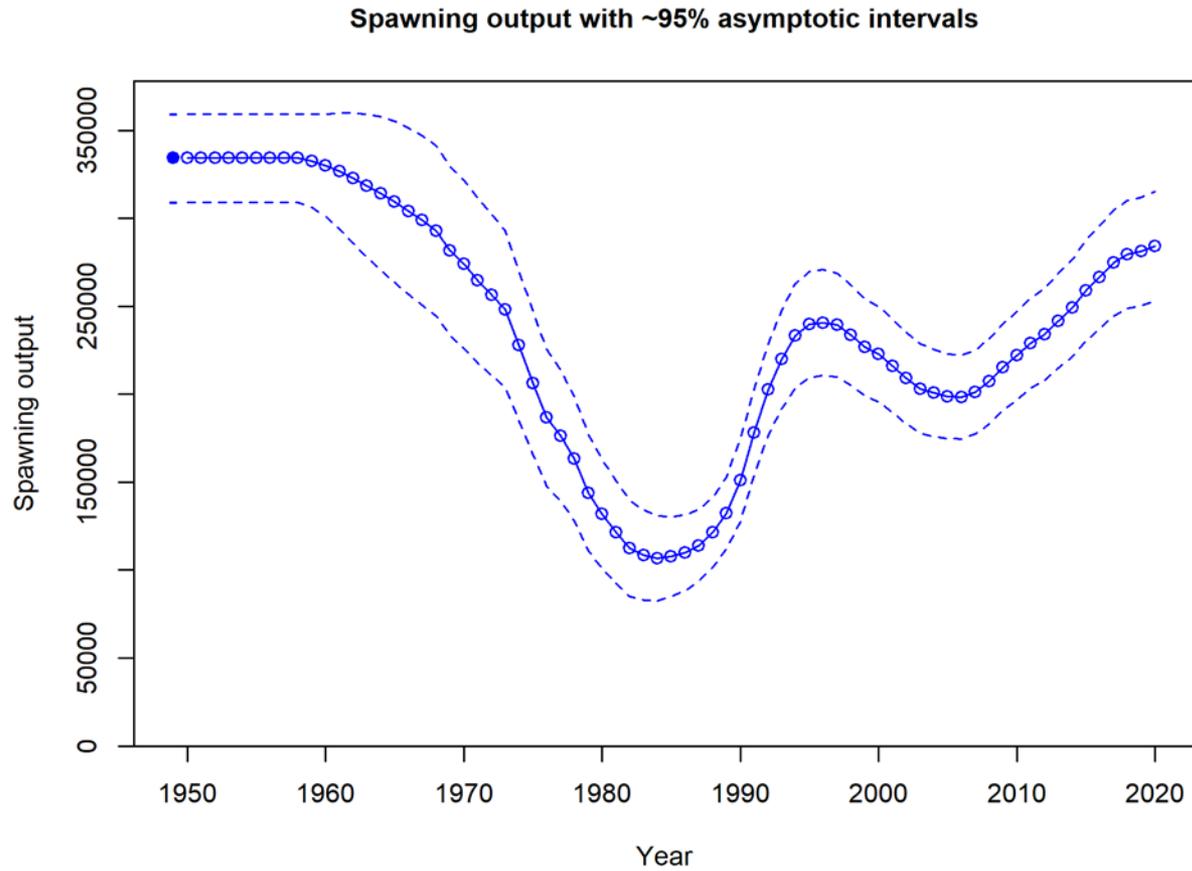
AKSK model results - recruitment

AKSK model results – numbers at age
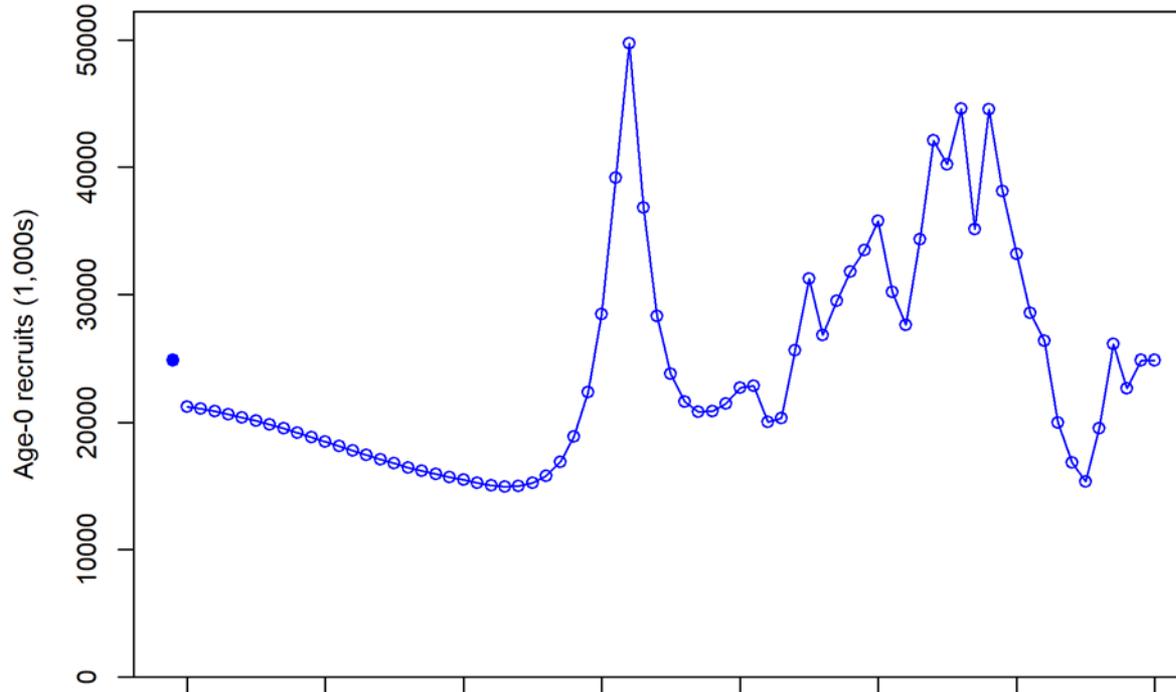
AKSK model results – phase plane
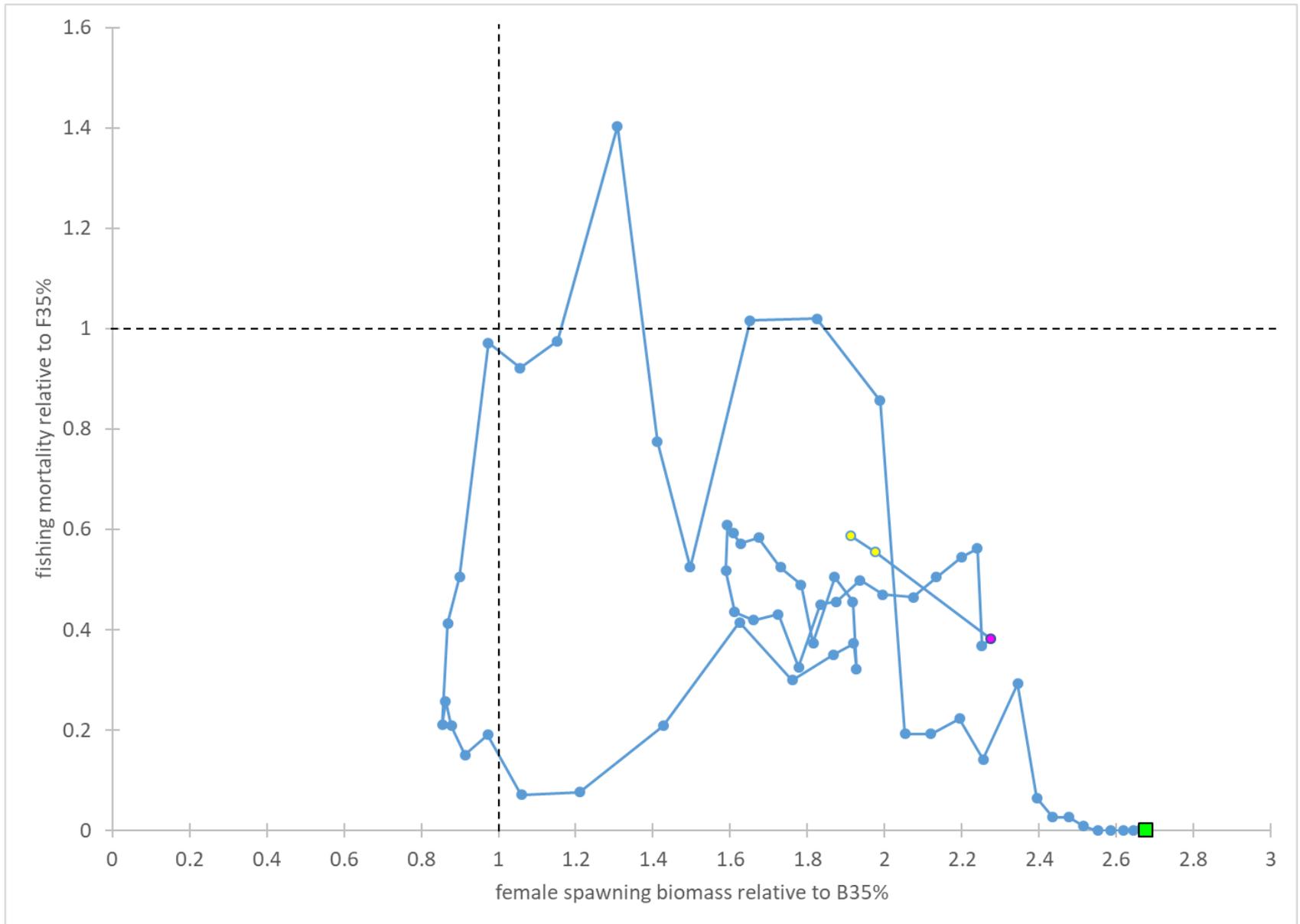
AK skate – harvest recs

| Alaska skate harvest recommendations				
	As estimated or specified *last* year for:		As estimated or recommended *this* year for:	
Quantity	2020	2021	2021*	2022*
M (natural mortality rate)	0.13	0.13	0.13	0.13
Tier	3a	3a	3a	3a
Projected total (age 0+)	491,974	478,477	504,691	484,731
Female spawning biomass (t)				
Projected	117,973	114,985	123,390	119,498
$B_{100\%}$	177,761	177,761	178,425	178,425
$B_{40\%}$	71,105	71,105	71,370	71,370
$B_{35\%}$	62,217	62,217	62,449	62,449
F_{OFL}	0.094	0.094	.092	.092
$maxF_{ABC}$	0.081	0.081	.079	.079
F_{ABC}	0.081	0.081	.079	.079
OFL (t)	37,813	36,310	38,580	36,655
maxABC (t)	32,559	31,264	33,219	31,560
ABC (t)	32,559	31,264	33,219	31,560
	As determined *last* year for:		As determined *this* year for:	
Status	2018	2019	2019	2020
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

"other skate" biomass – EBS shelf
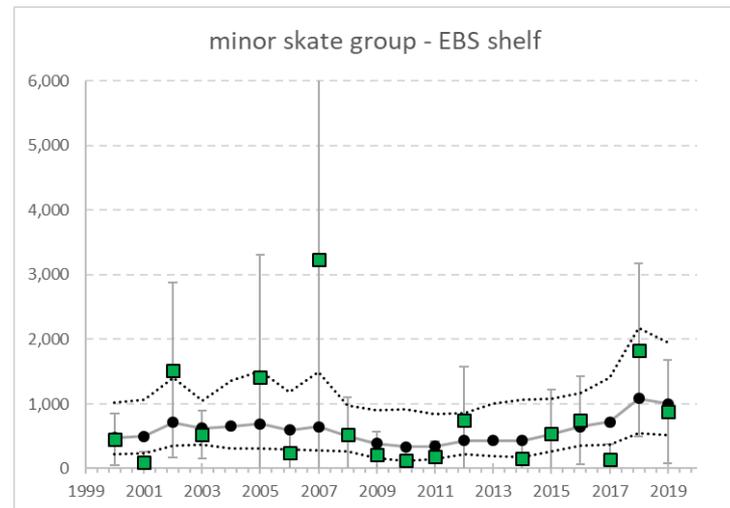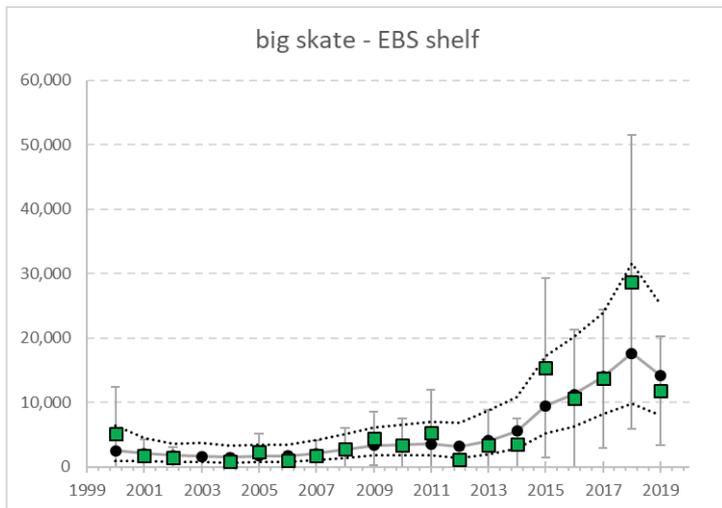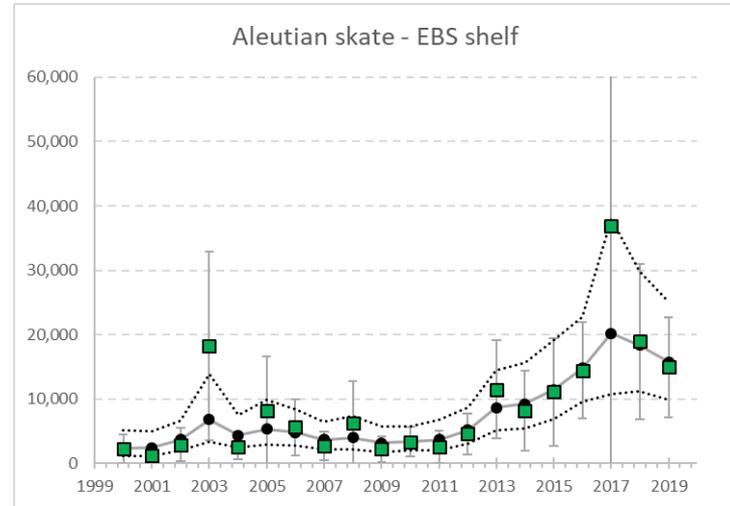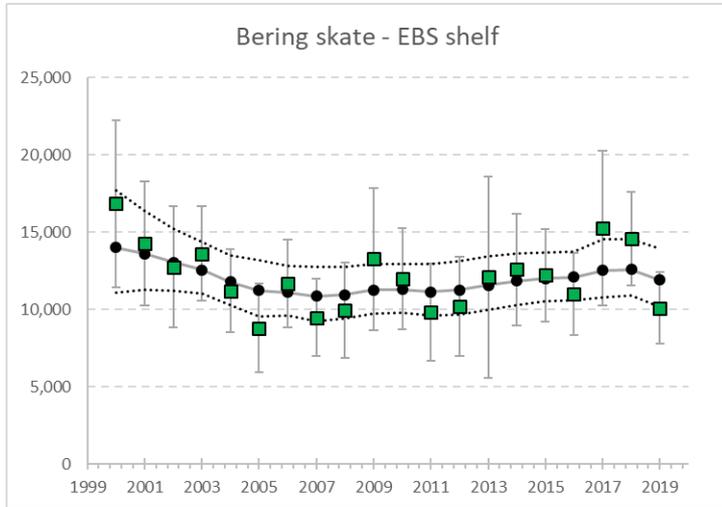
"other skate" biomass – EBS slope
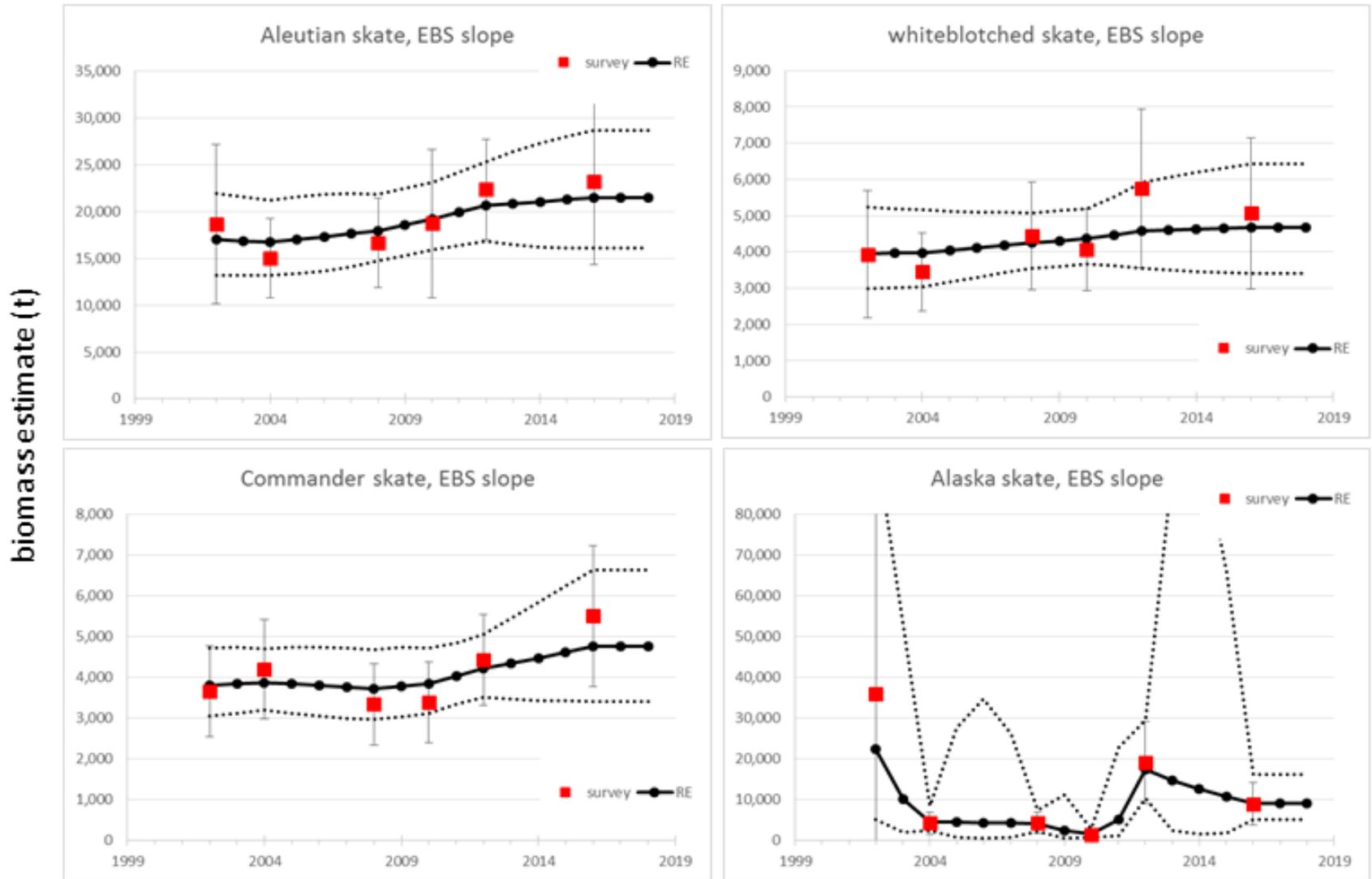
"other skate" biomass – EBS slope
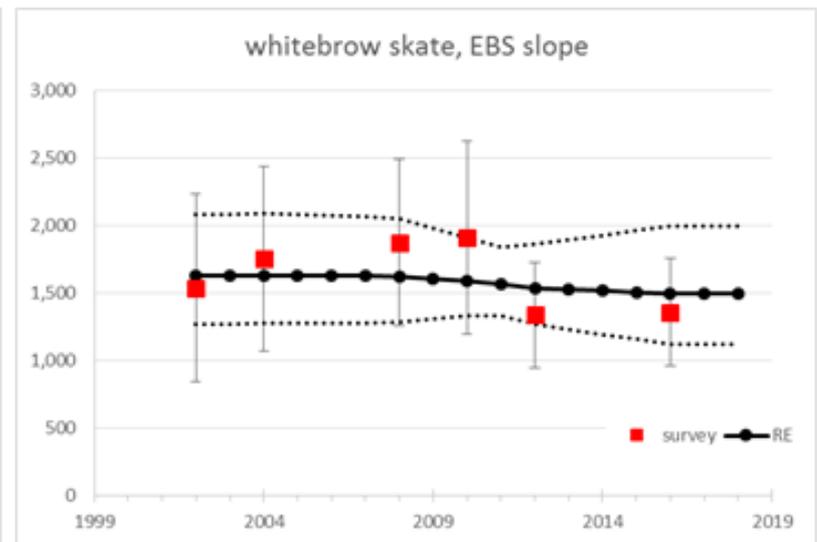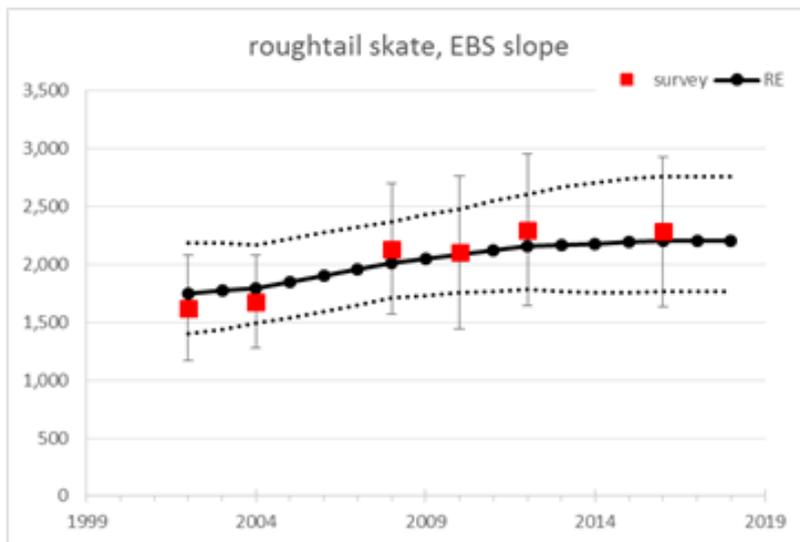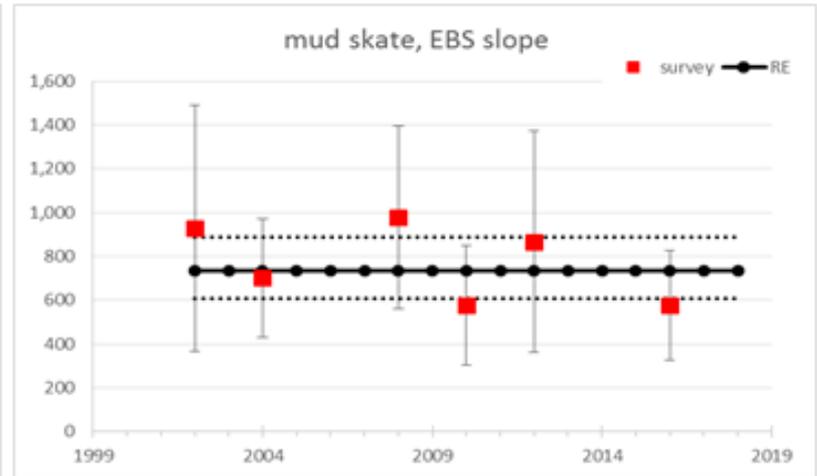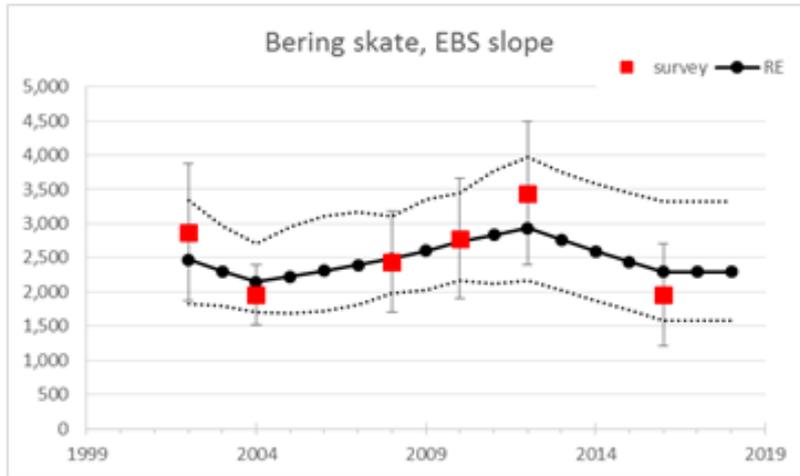
"other skate" biomass – Aleutian Islands
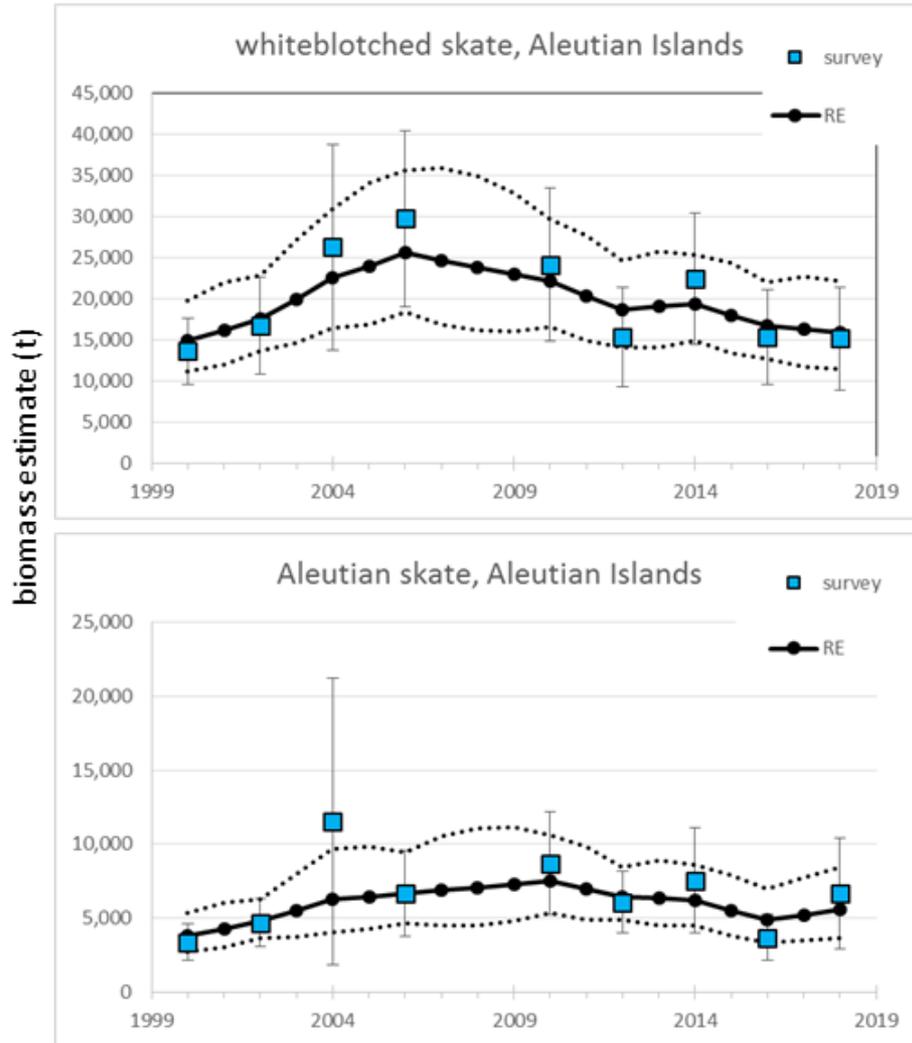
"other skate" biomass – Aleutian Islands

Bering skate exploitation rates

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
biomass	13,373	13,537	13,931	14,070	14,060	14,301	14,444	14,574	14,529	14,446	14,889	14,947	14,277
catch	742	2,270	1,662	564	1,897	1,858	1,738	2,300	3,122	2,456	3,057	1,795	1,288
expl rate	**0.06**	**0.17**	**0.12**	**0.04**	**0.13**	**0.13**	**0.12**	**0.16**	**0.21**	**0.17**	**0.21**	**0.12**	**0.09**
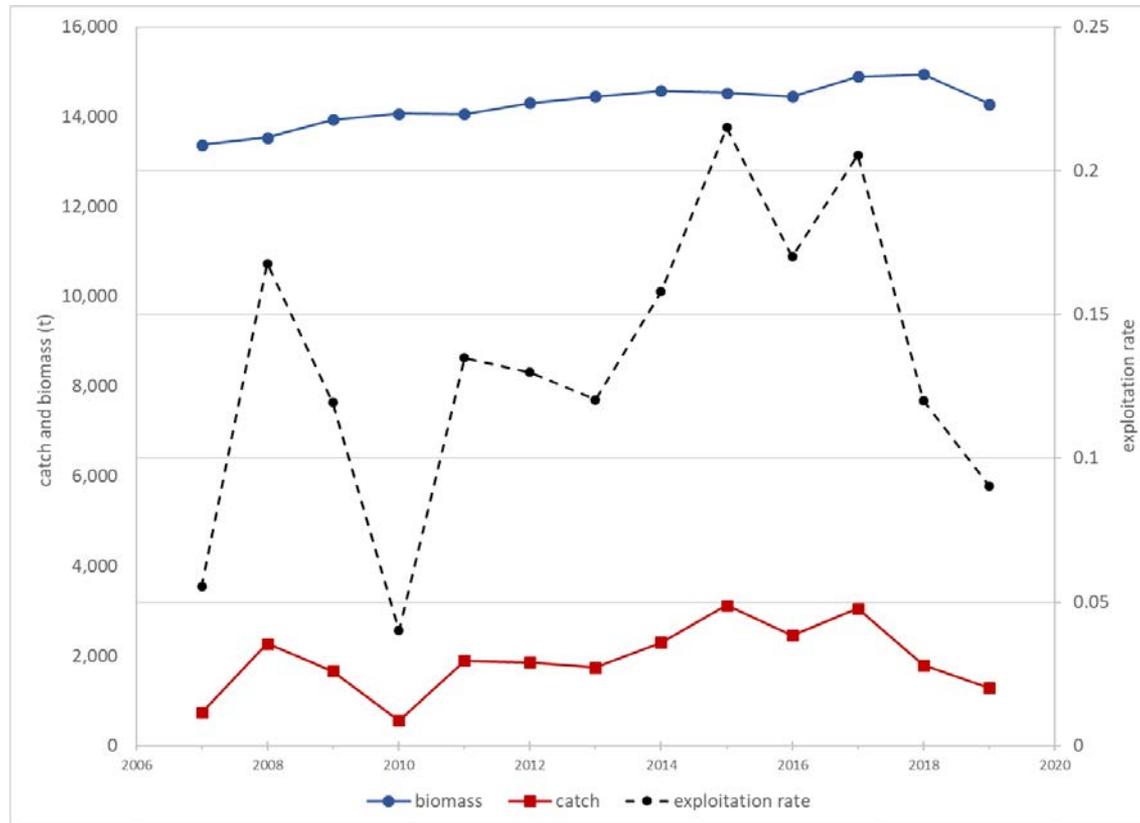
- decrease in biomass
- decrease in catch
- still a concern and will continue to monitor

RE model comparison
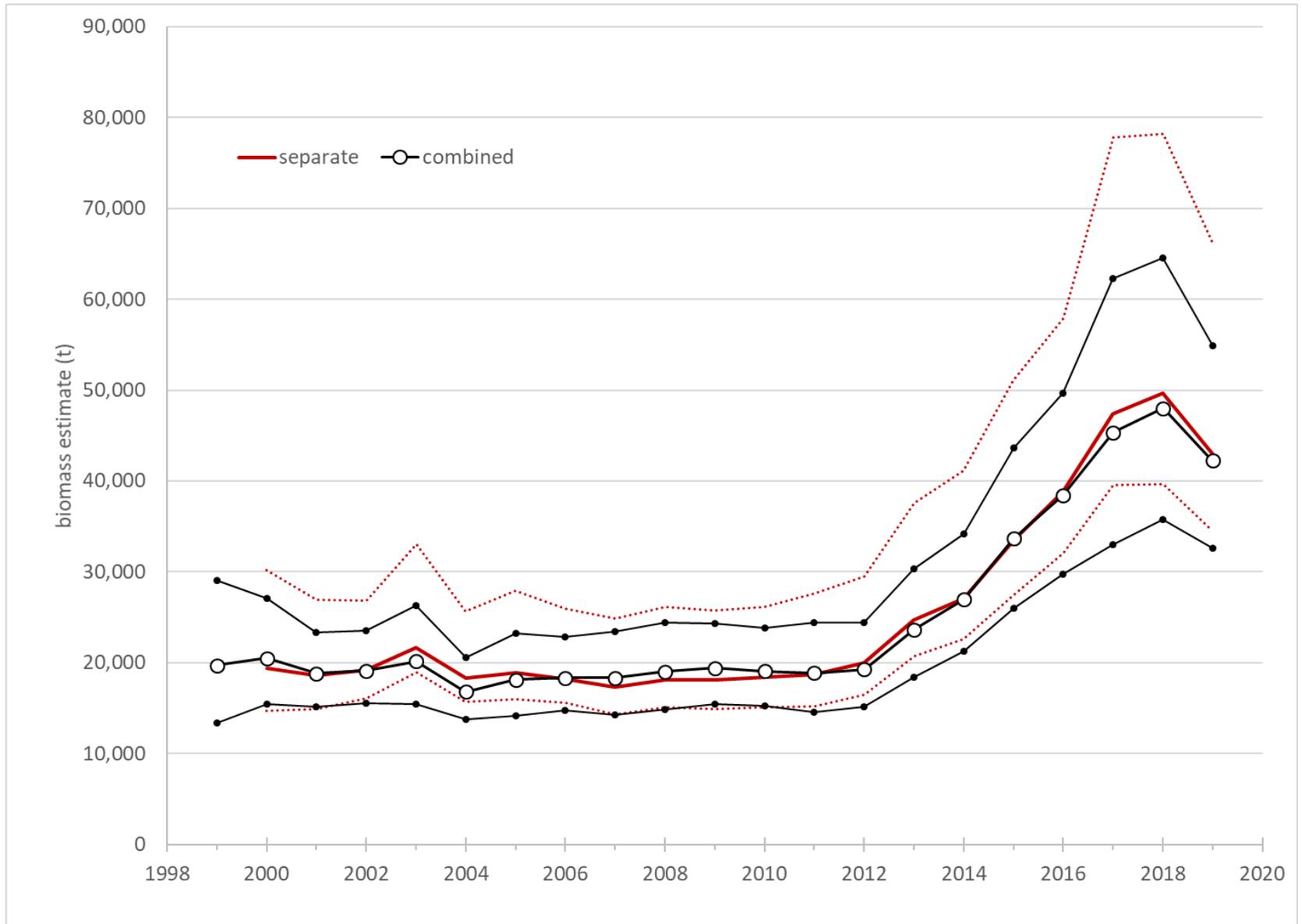
harvest recommendations- Other Skates

	other skate harvest recommendations			
	As estimated or specified last year for:		As estimated or recommended this year for:	
Quantity	2020	2021	2021	2022
M (natural mortality rate)	0.1	0.1	0.1	0.1
Tier	5	5	5	5
Biomass (t)	119,787	119,787	107,174	107,174
F_{OFL}	0.10	0.10	0.10	0.10
$maxF_{ABC}$	0.075	0.075	0.075	0.075
F_{ABC}	0.075	0.075	0.075	0.075
OFL (t)	11,979	11,979	10,717	10,717
maxABC (t)	8,984	8,984	8,038	8,038
ABC (t)	8,984	8,984	8,038	8,038
	As determined *last* year for:		As determined *this* year for:	
Status	2018	2019	2019	2020
Overfishing	No	n/a	No	n/a

harvest recommendations - complex

aggregate harvest recommendations for the BSAI complex				
	As estimated or specified *last* year for:		As estimated or recommended this year for:	
Quantity	2020	2021	2021	2022
OFL (t)	49,792	48,289	49,297	47,372
maxABC (t)	41,543	40,248	41,257	39,598
ABC (t)	41,543	40,248	41,257	39,598

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ ecosystem considerations*	*Fishery Performance considerations*
Level 1: no increased concerns	Level 1: no increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

- No reduction from max ABC is recommended

risk table

Assessment considerations

The model for Alaska skate appears to be rather stable, as results have not changed much over the last few assessments. There is limited retrospective bias. As a result, there are no assessment concerns for Alaska skate. The Other Skate group is managed under Tier 5, so is by definition data-limited. There are no assessment concerns for that group. A continuing concern is the lack of EBS slope data, but that is unlikely to be resolved soon and does not affect the risk assessment because very little skate biomass is observed on the shelf. Rated Level 1, normal.

risk table

<u>Population dynamics considerations</u>
The biomass of Alaska skates is remarkably stable. The biomass of Other Skates, in particular Aleutian skate and Bering skate, has been decreasing in recent years. However, the populations are still above the long-term average, so at this point that are no concerns. Rated Level 1, normal.

risk table

Environmental/Ecosystem considerations (contributed by Ebett Siddon)
The BSAI skates complex contains multiple stocks including the whiteblotched skate in the Aleutians, the Alaska skate common over the shelf, the Bering skate over the outer shelf, and a more diverse mix over the slope. Skates are mobile, demersal animals that are fairly ubiquitous (although there is depth stratification in the species composition) and are generalists in terms of prey. Limited knowledge of these species is available to identify stock-specific indicators. Therefore, indicators of ecosystem status are considered with respect to benthic productivity more generally.

Summary for Environmental/Ecosystem considerations:

- *Summer bottom temperatures and spatial extent of the cold pool were average, indicating a cooler thermal experience for flatfish stocks;*

- *Prey abundance (motile epifauna) remained above the long-term mean in 2019, although decreased 10% from 2018, indicating sufficient prey availability;*

- *Benthic forager biomass (potential competitors) remained below the long term mean in 2019, suggesting a reduction in prey competition from this guild;*

- *Apex predator biomass (potential competitors) increased slightly from 2018 to 2019 and remains at the long term mean.*

Proper evaluation of risk is difficult for a data-limited stock. However, the available data suggest there are no apparent ecosystem concerns--level 1.

risk table

Fishery performance

Skates are a bycatch species and the amount of harvest depends on skate abundance and the behavior of target fisheries. Skate catches declined in 2019 and 2020, perhaps as a result of changes in the Pacific cod fishery.