GOA Shark Assessment

Cindy Tribuzio, Katy Echave,
Cara Rodgveller
Auke Bay Laboratories, AFSC
Beth Matta REFM, AFSC

Responses to PT/SSC Comments

- Major comments (paraphrased):
  - Do the risk table
  - [Pacific Sleeper Shark]
    - Stock structure and genetics
      - Ongoing, >400 samples collected in prep for genomics
      - Stock structure doc pending genetics work
    - Catch by numbers
      - Updated 2010 - 2019, unlikely to get back to 2003
      - Analyses ongoing
    - Projects to estimate age and improve catch estimation
      - Pilot ageing study ongoing, proposal submitted to NPRB
      - Multiple projects ongoing to investigate improving catch estimation

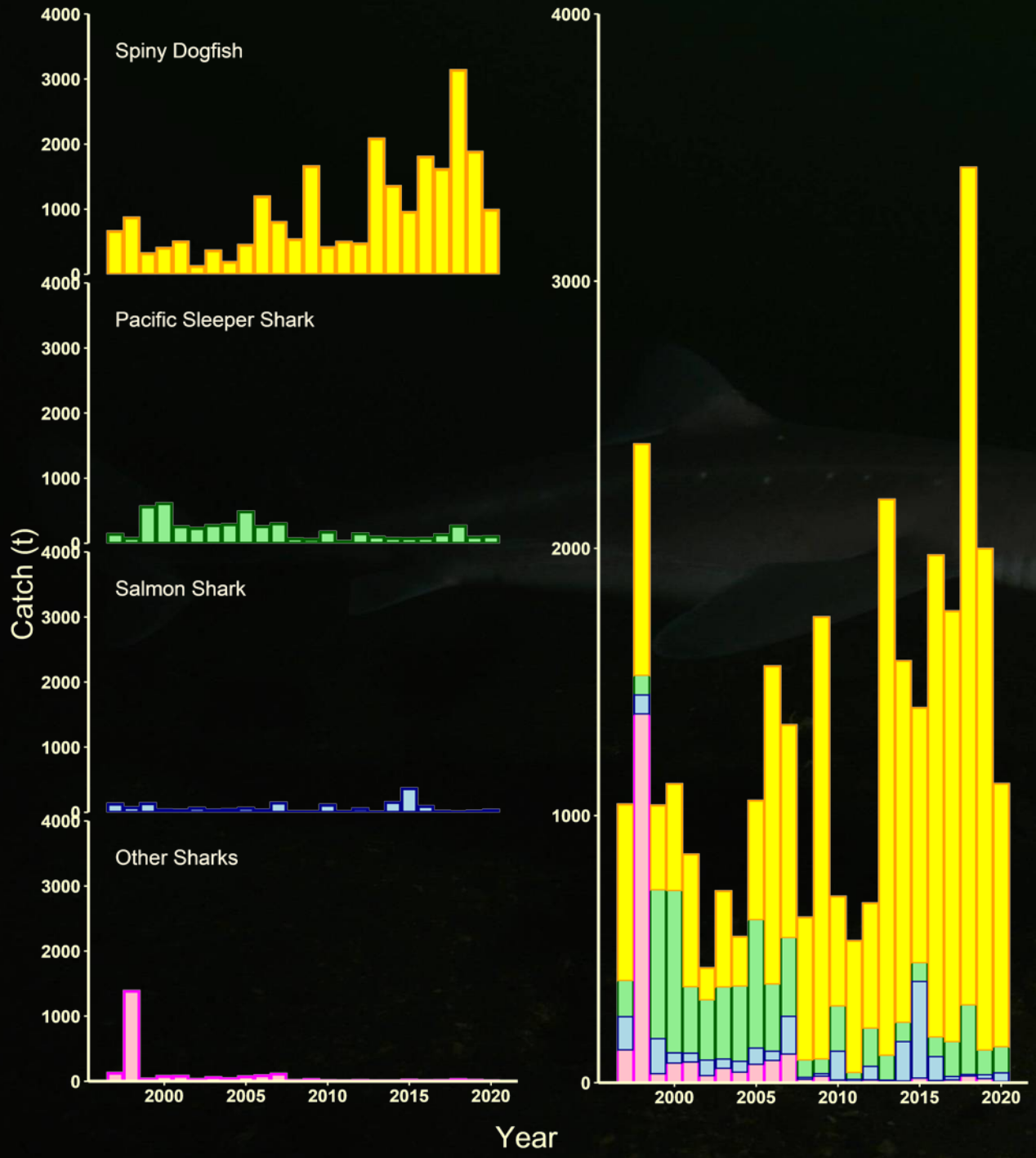
Responses to PT/SSC Comments

- Major comments (paraphrased):
  - Create working group to examine 649/659 biomass, catch estimation, and catch accounting in federal assessments
    - PCCRC funded MS student is exploring the incorporation of multiple surveys using VAST or other techniques
    - Working group delayed pending results
  - [Spiny Dogfish]
    - VAST – see above
    - Uncertainty around q
      - This was addressed in Appendix 20A of the 2018 GOA shark SAFE

GOA Sharks

- Changes to input data:
  - Updated catch data through 2020 (as of Oct 13, 2020)
  - Updated data from AFSC trawl, AFSC longline, IPHC longline and ADF&G surveys
  - Updated random effects biomass

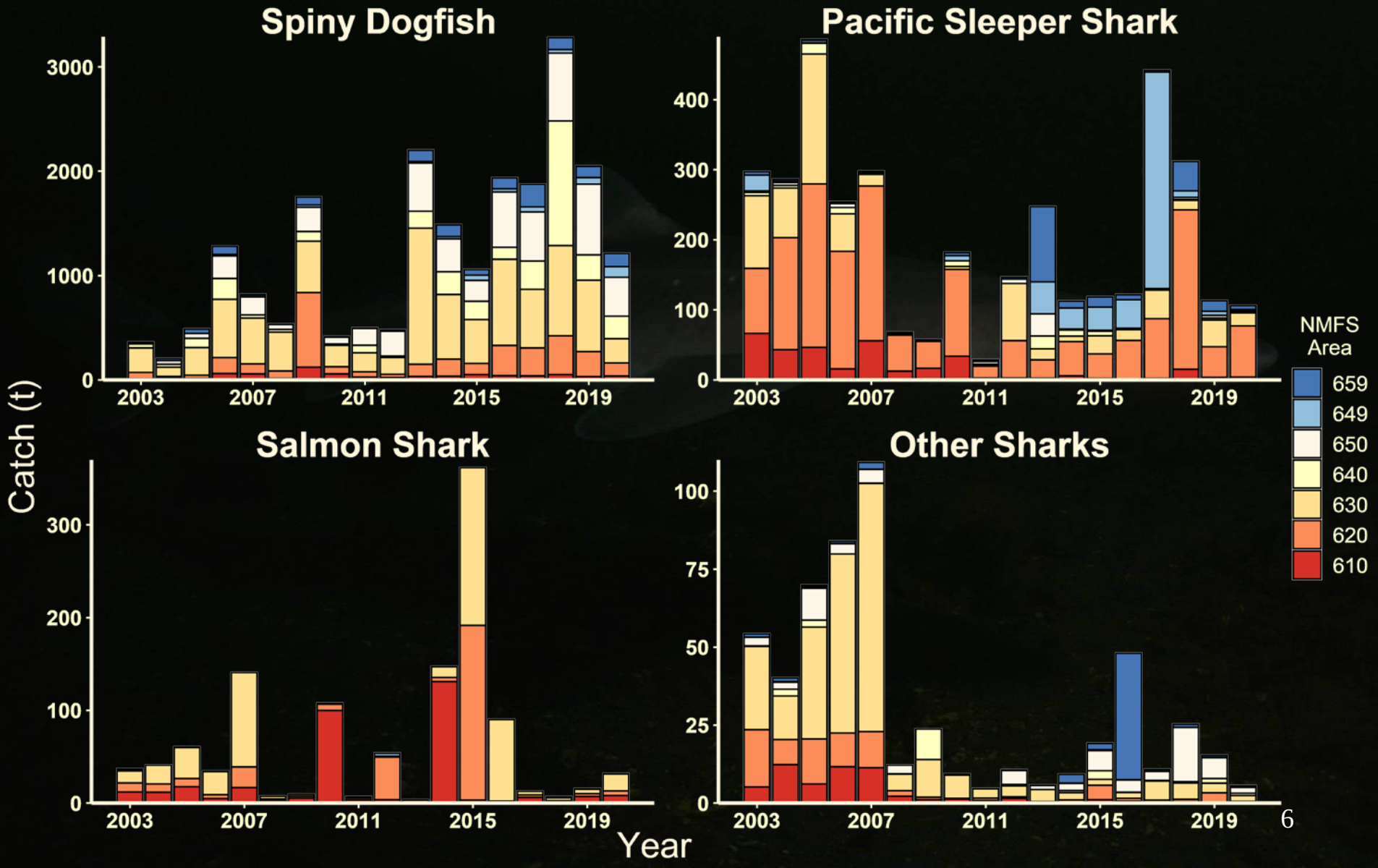
- Changes to assessment methodology
  - NONE!!!



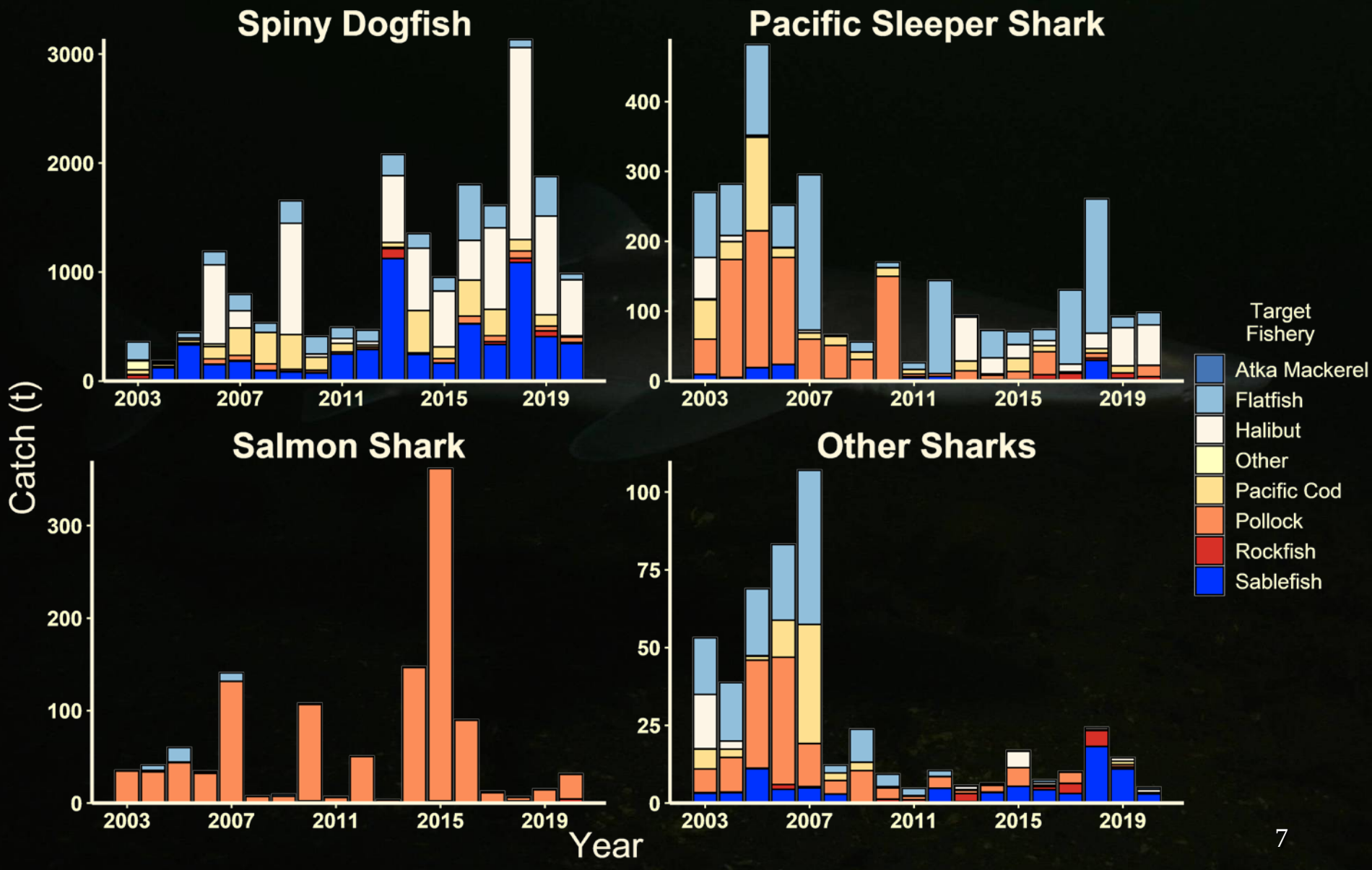
Species-Specific Catch

- 2018 was big
- PSS one haul in flatfish
- SD 3 large hauls in May
- SD autumn more ubiquitous
- OS mostly blue sharks

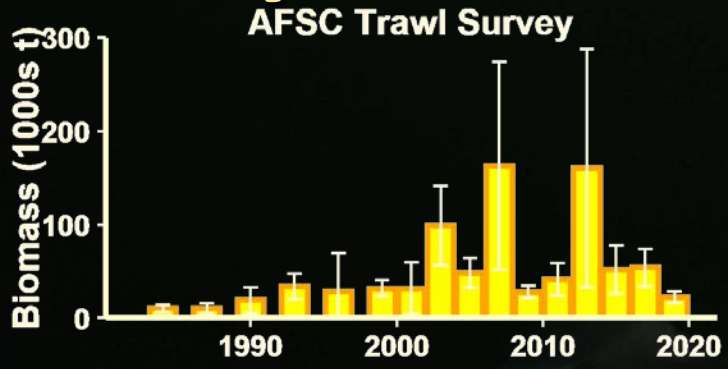
Catch by Area

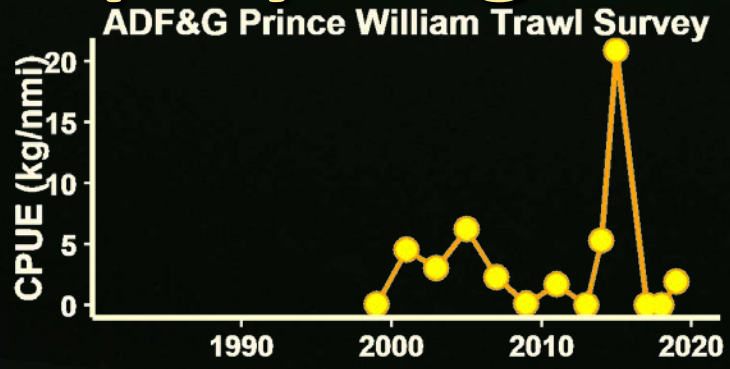


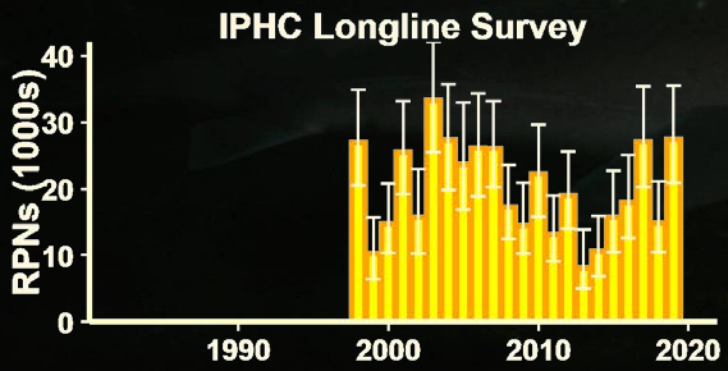
Catch by Target Group

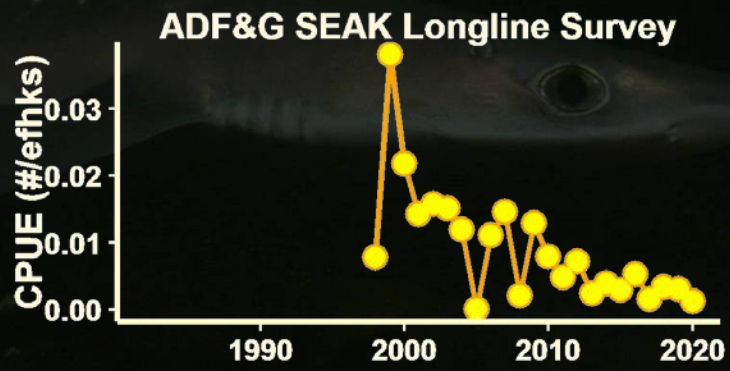


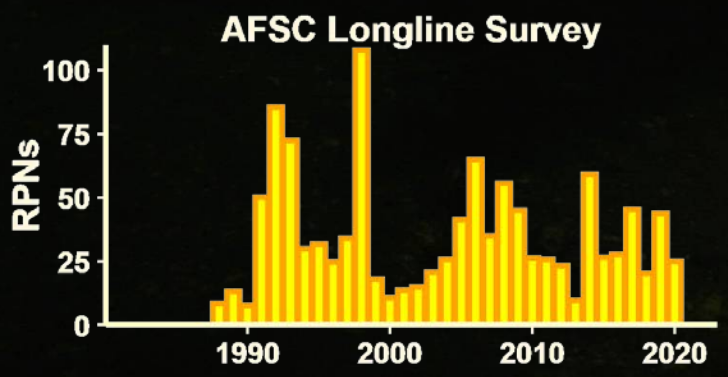
Survey Indices – Spiny Dogfish



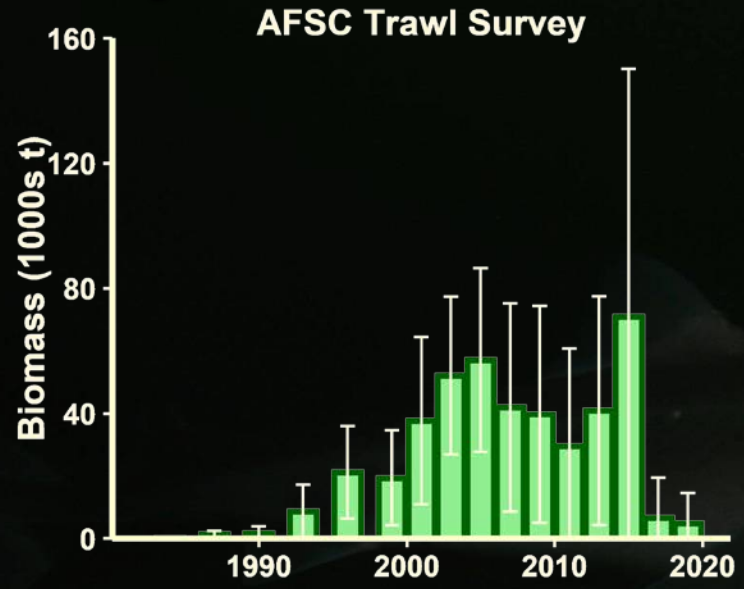


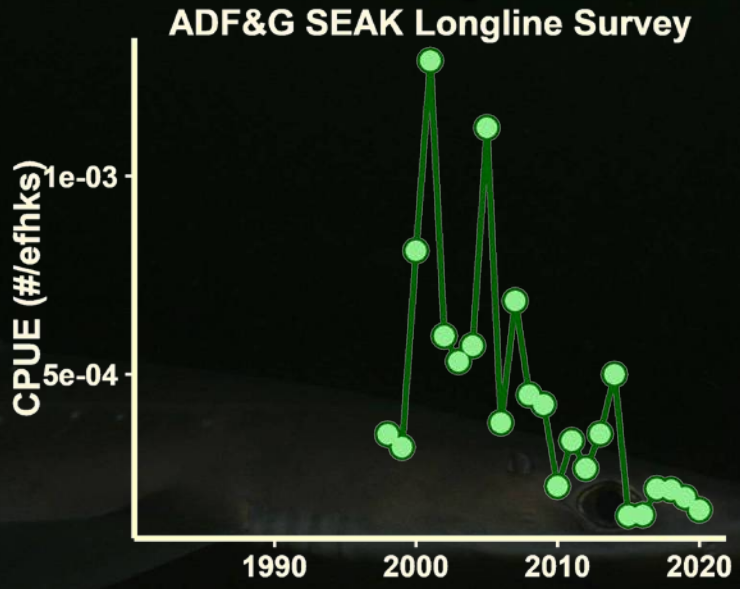


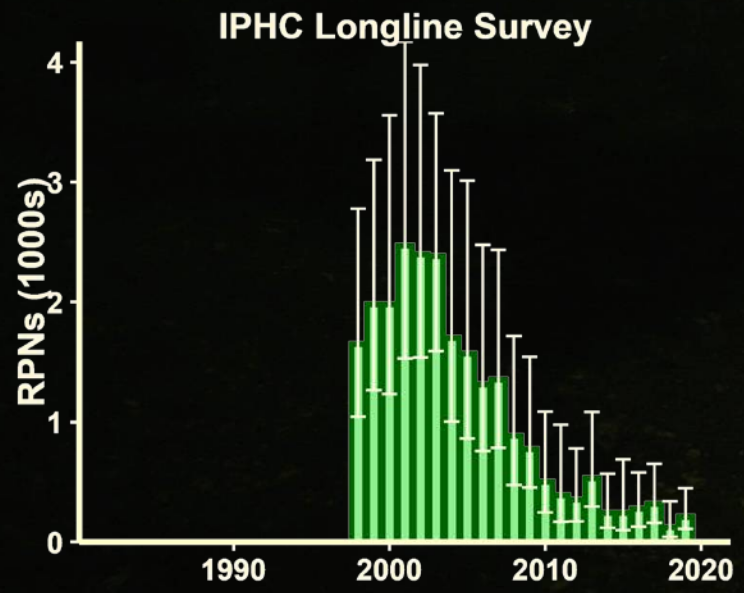




Survey Indices – Pacific Sleeper Shark

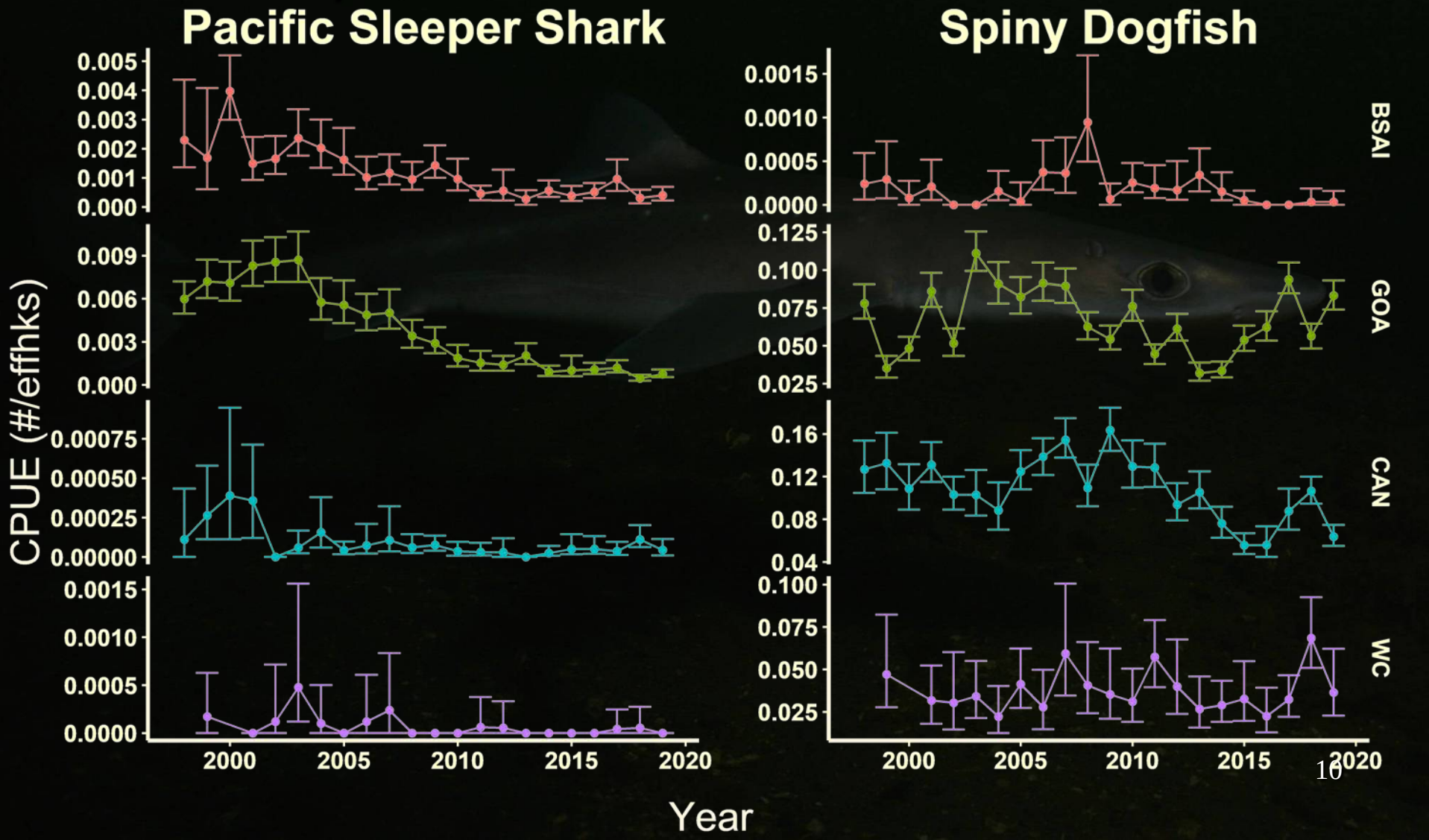




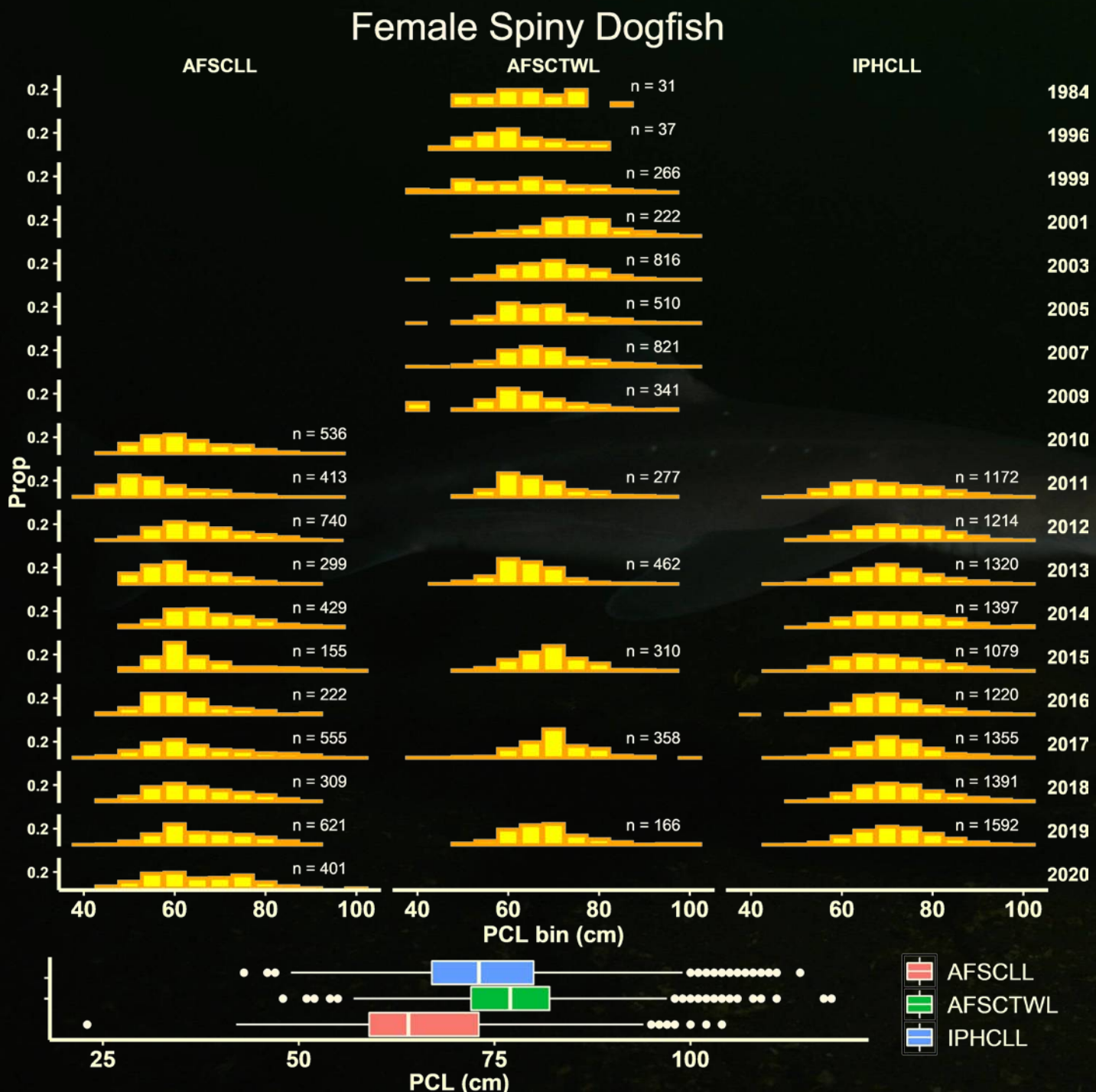


IPHC Survey – Coastwide

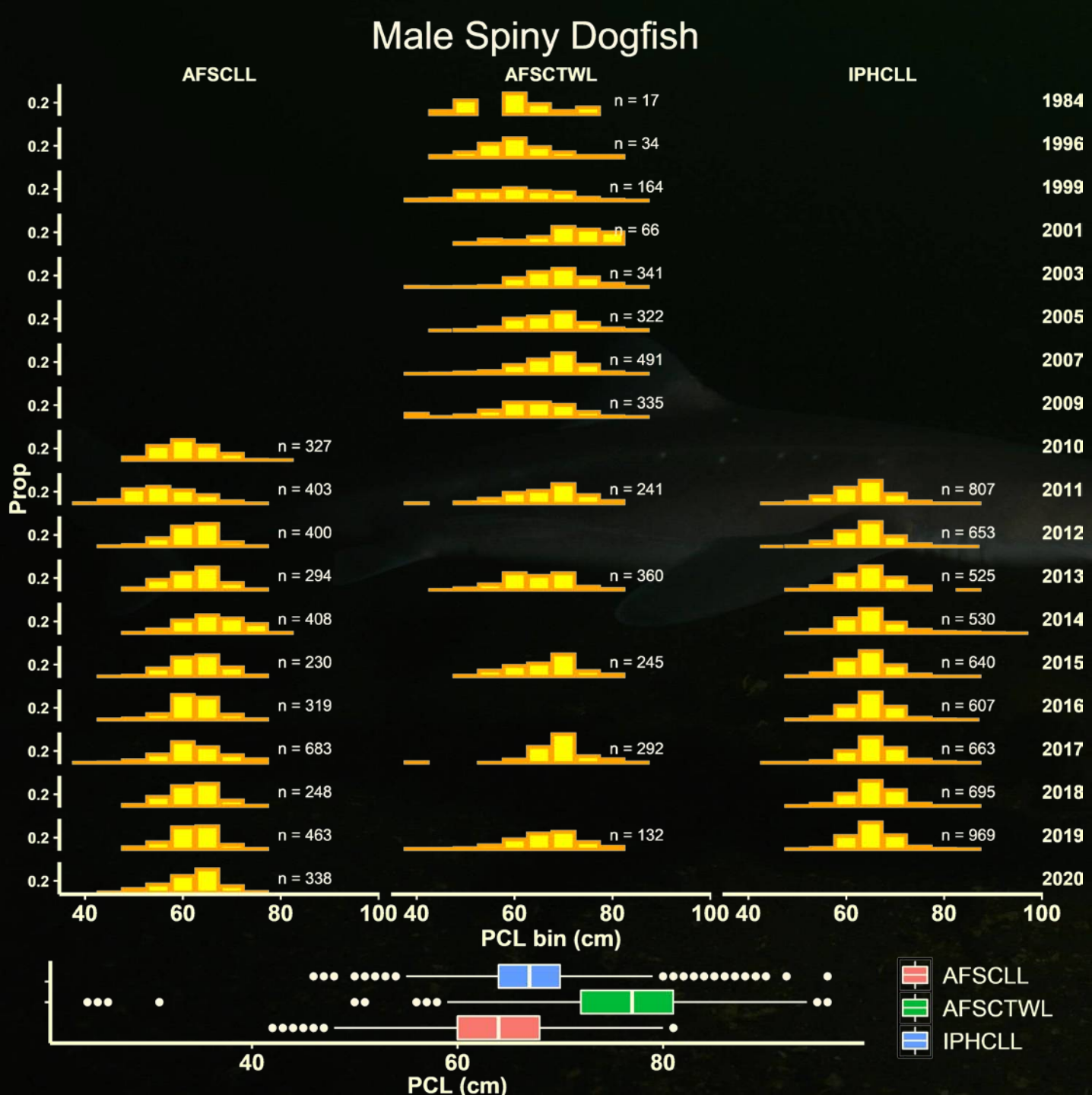
- CPUE only



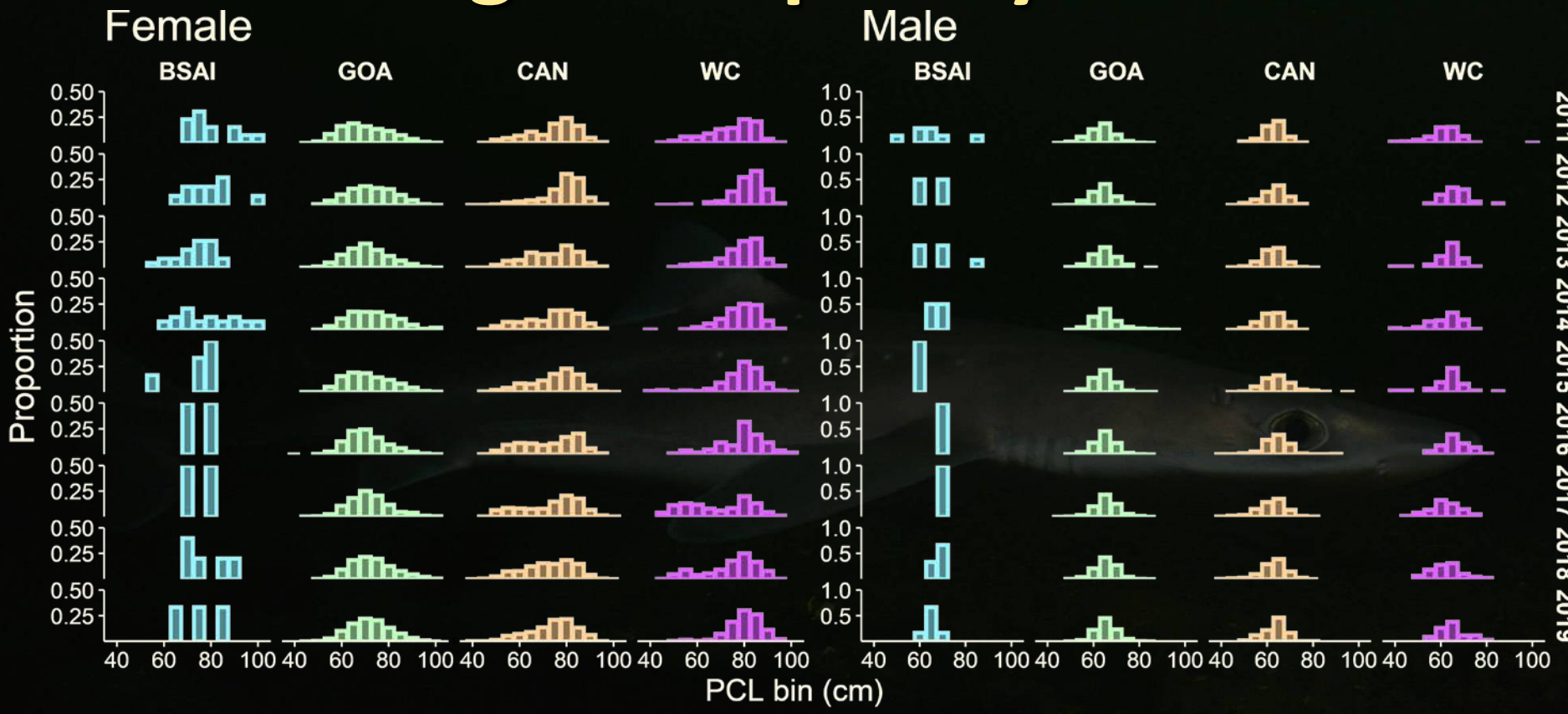
Length Frequency Data

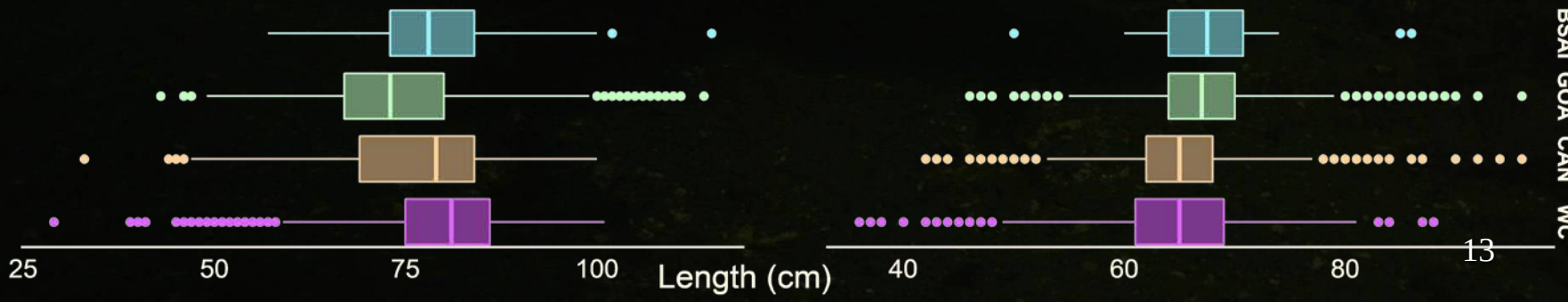


Length Frequency Data

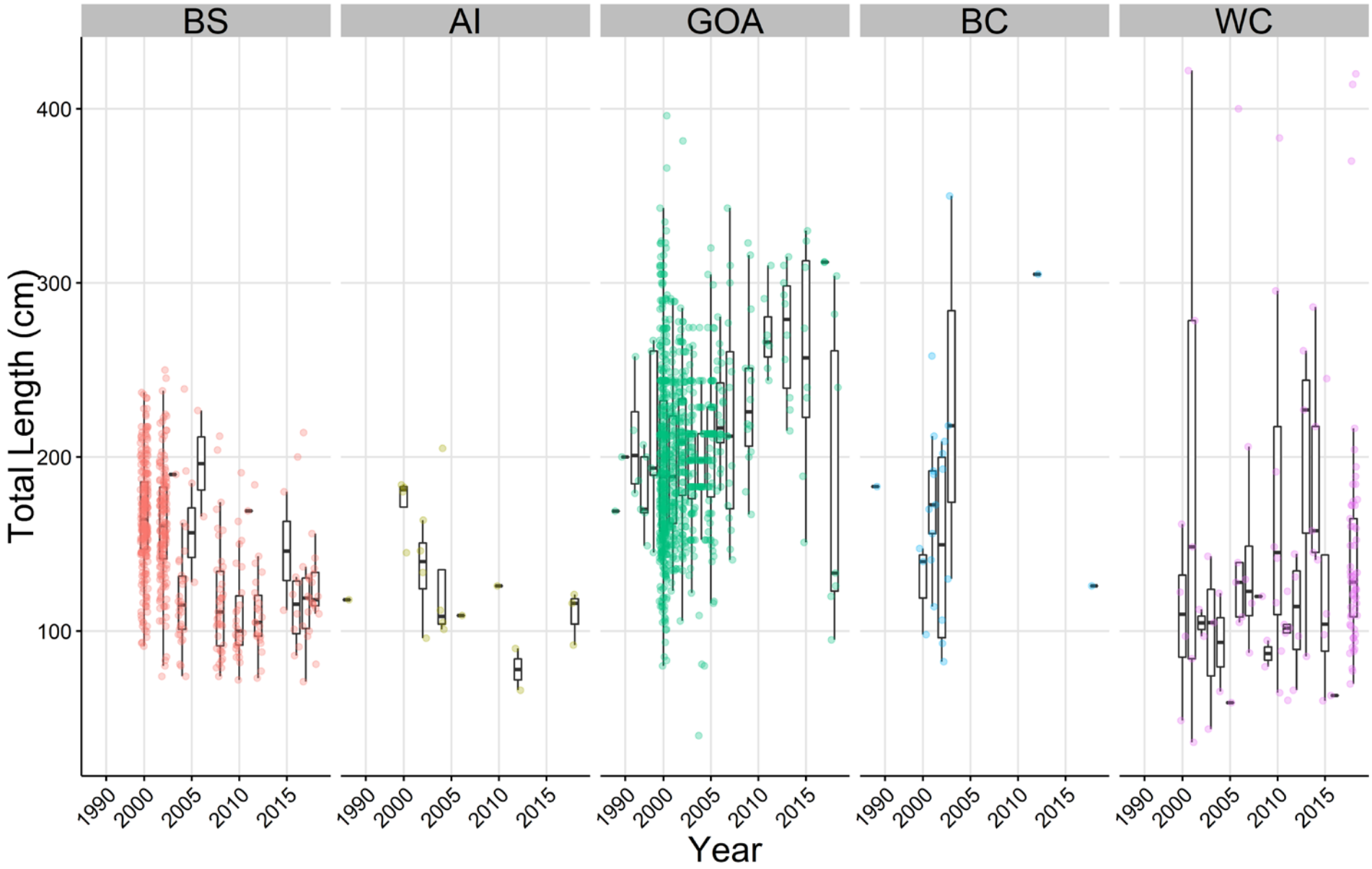


Length Frequency Data



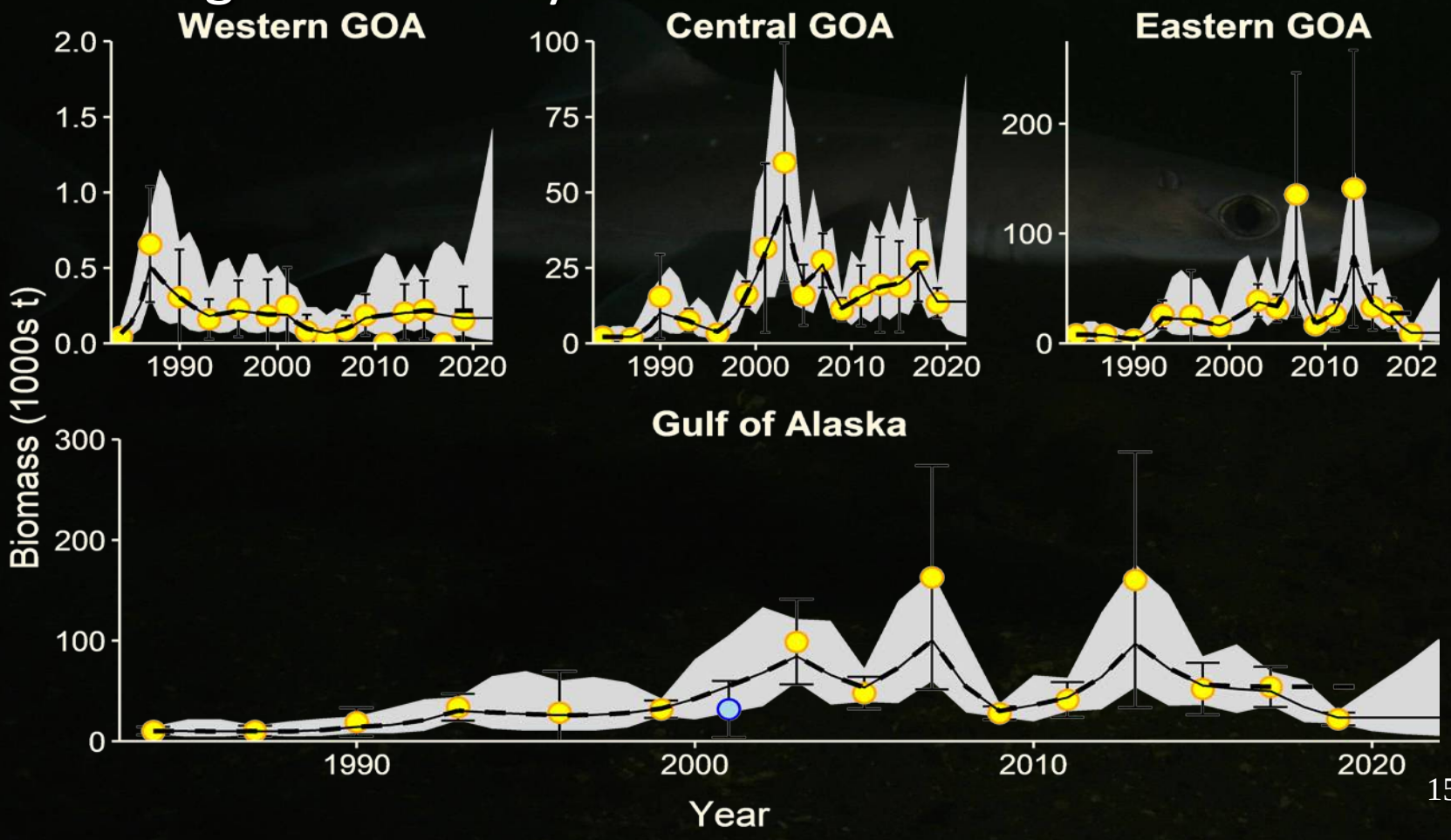


Length Frequency Data - PSS

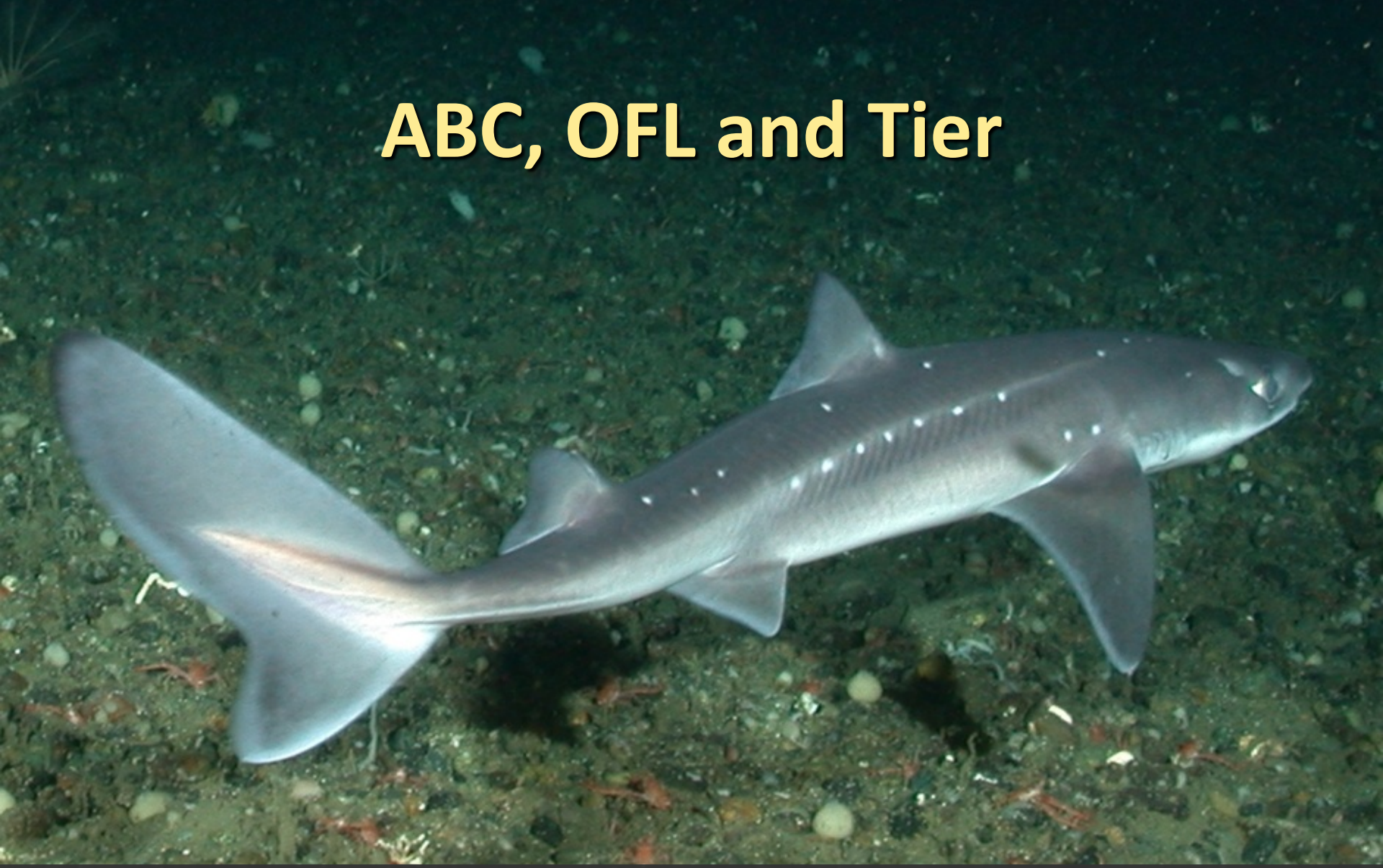


Random Effects Biomass

- Spiny dogfish only
  - Fit separately trawl survey data by area, to account for missing 2001 survey in EGOA



ABC, OFL and Tier



- ABC/OFL set for complex as a whole as sum of the individual species

Harvest Recommendations Spiny Dogfish

- Model 15.3A
  - q = 0.21
  - $B_a = B_{RFX}/q$
  - $F_{OFL} = F_{max} = 0.04$ (demographic)
  - $OFL = F_{OFL} * B_a$

Reminder:
ABC = 0.75OFL

Parameter	
Random Effects	23,289
Biomass (B_{RFX})	(10,066 – 53,880)
Adj Biomass (B_a)	110,900
F_{OFL}	0.04
F_{ABC}	0.03
OFL	4,436
ABC	3,327

Harvest Recommendations Everything Else

- Model 11.0 (Status quo)
  - Tier 6
  - $OFL = \bar{C}_{1997-2007}$

Species	ABC (t)	OFL (t)
Pacific Sleeper Shark	234	312
Salmon Shark	52	70
Other Sharks	141	188
Total Tier 6	427	570

Spiny Dogfish	As estimated or specified last year for:		As estimated or recommended this year for:	
Quantity	2020	2021	2021	2022
M (natural mortality rate)	0.097	0.097	0.097	0.097
Tier	5	5	5	5
Biomass (t)	54,301	54,301	23,289	23,289
F_{OFL}	0.04	0.04	0.04	0.04
$maxF_{ABC}$	0.03	0.03	0.03	0.03
F_{ABC}	0.03	0.03	0.03	0.03
OFL (t)	**10,343**	10,343	**4,436**	4,436
maxABC (t)	7,757	7,757	3,327	3,327
ABC (t)	**7,757**	7,757	**3,327**	3,327

Pacific sleeper, salmon and other sharks				
Tier	6	6	6	6
OFL (t)	570	570	**570**	570
maxABC (t)	427	427	427	427
ABC (t)	427	427	**427**	427

Total Complex				
OFL (t)	**10,913**	**10,913**	**5,006**	**5,006**
ABC (t)	**8,184**	**8,184**	**3,755**	**3,755**

Risk Table

- Assessment – related considerations
  - Tier 5 model incorporates life history and accounts for productivity of the stock
  - Model is based trawl survey, does not sample species well
  - Unobserved catch is a concern, primarily state salmon fisheries
  - Tier 5 considered Level 1

Assessment-related considerations
Level 2: Substantially increased concerns

Risk Table

- Assessment – related considerations
  - Tier 6 model does not incorporate any biology or trend information
  - Sharks are low productivity species, potentially highly vulnerable to overfishing
  - Catch scalars are high risk
  - Tier 6 species are considered Level 2

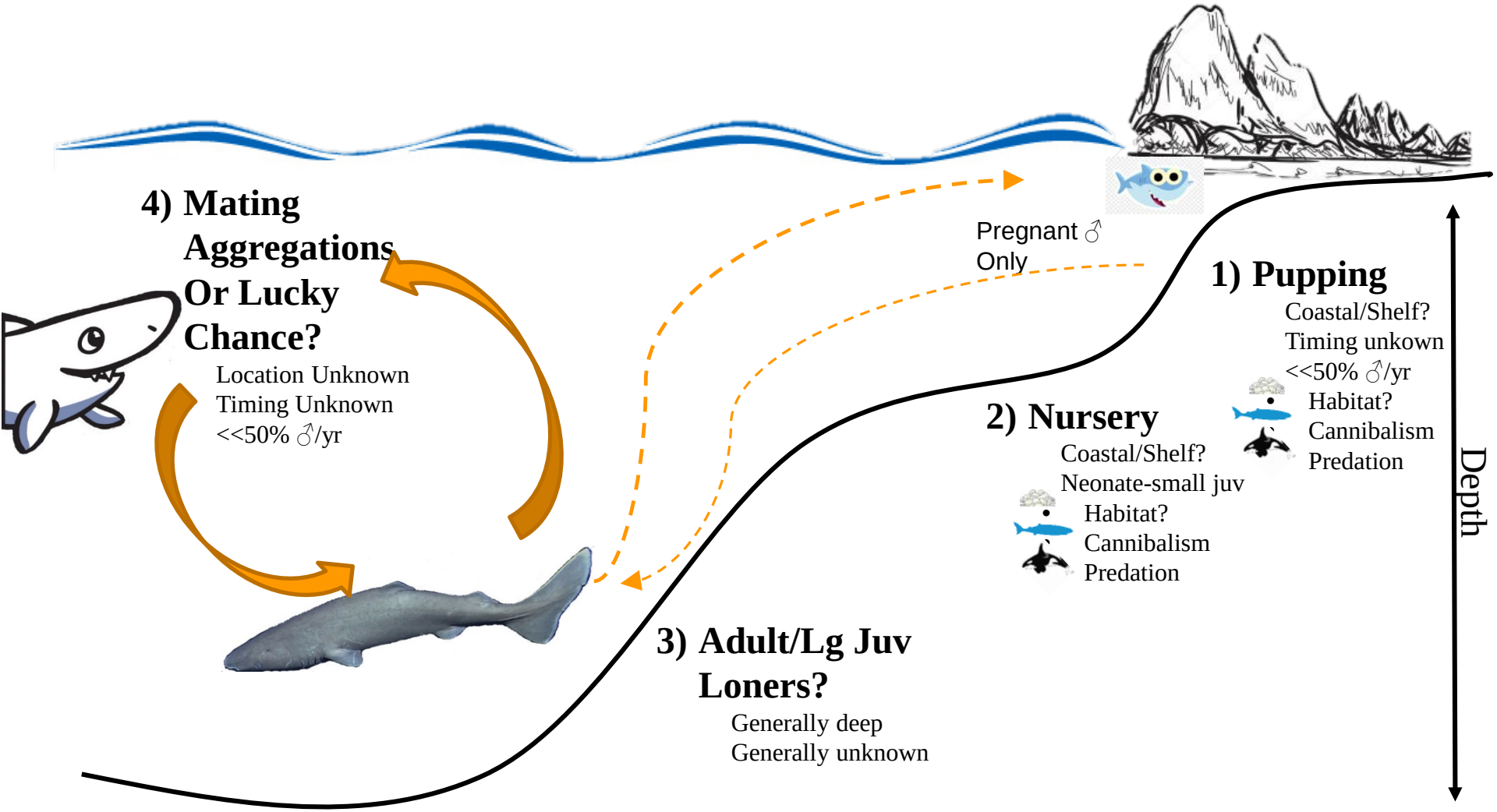
Assessment-related considerations
Level 2: Substantially increased concerns

Risk Table

- Population dynamics considerations
  - Spiny dogfish trends are highly variable with no apparent trend
  - Pacific sleeper shark indices trending downward, or remaining at low levels
  - Unclear if current levels are “low”, or if the peaks in the early years were unusual
  - Spiny dogfish Level 1, Pacific sleeper sharks Level 2

Assessment-related considerations	***Population dynamics considerations***
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns

Why are we worried about these trends?



Risk Table

- Environmental/Ecosystem considerations
  - Foraging conditions considered average
  - Prey availability may shift as a result of climate, however, sharks can prey switch easily
  - All species are highly mobile and can move to or avoid temperatures as needed
  - No clear linkages

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ ecosystem considerations*
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns

Risk Table

- Fishery performance considerations
  - Non-targeted, discarded species
  - Mean catch per trip
    - Increasing for spiny dogfish since 2003, primarily in longline Pacific halibut and Pacific cod fisheries
    - Increasing for Pacific sleeper shark since 2017 in longline Pacific halibut fishery
  - Shark catch has not limited other fisheries

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ ecosystem considerations*	*Fishery performance considerations*
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

Risk Table

- Unclear how to score a complex when different species score differently
- Do not recommend any ABC reductions at this time
- A number of projects ongoing to inform on these categories and improve assessments
  - Ageing, improving catch estimates, genetics and stock structure, tagging, data-limited methods

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ ecosystem considerations*	*Fishery performance considerations*
Level 2: Substantially increased concerns	Level 2: Substantially increased concerns	Level 1: no increased concerns	Level 1: no increased concerns

Questions???

Photo: RACE Survey Team