2025 California Quillback Rockfish Stock Assessment: Pre-assessment Data Workshop

January 23, 2025

Stock Assessment Team:

Melissa Monk (SWFSC), Brian Langseth (NWFSC), Julia Coates (CDFW)
melissa.monk@noaa.gov, brian.langseth@noaa.gov, julia.coates@wildlife.ca.gov

GMT representative: Thompson Banez
GAP representative: Tim Klassen
STAR panel chair: Cheryl Barnes

Important Dates

Data Deadline: March 31 (Monday)

Pre-STAR Document TOR Check: June 2 (Monday)

Pre-STAR Document Distribution: June 9 (Monday)

STAR panel: June 23-27 (NMFS Santa Cruz lab & virtual)

SSC Post-STAR Report: July 11 (Friday)

Revised Draft Assessment: July 18 (Friday)

SSC GFSC Review: August TBD

SSC & Council review: Sept 18-24 (Spokane, WA)

Engagement opportunities

- Email the STAT members
- Submit any anecdotal information or observations here
  - Will be included in an appendix edited by the GMT and GAP representatives
- STAT is planning two additional engagement calls
  - One recreational and one commercial focused

Outline

1. Overview
   a. Biological background and assessment history
   b. 2025 assessment overview
2. Landings and Discards
3. Fishery Lengths
   a. selectivity time blocks
4. Age compositions
5. Indices
6. Biological information
   a. mortality, growth, weight-length, maturity, fecundity
7. Other data sources

Brief biological background

- Core range from central CA to Alaska
- Adult habitat in deeper nearshore rocky habitat
- High site-fidelity and small home range suggests possible population structure
- Long lived (up to 95 yrs; Yamanaka and Lacko 2001)
- High vulnerability to fishing (Cope et al. 2011)
- Limited evidence of sexual dimorphism (Lenarz and Echeverria 1991)

Assessment history

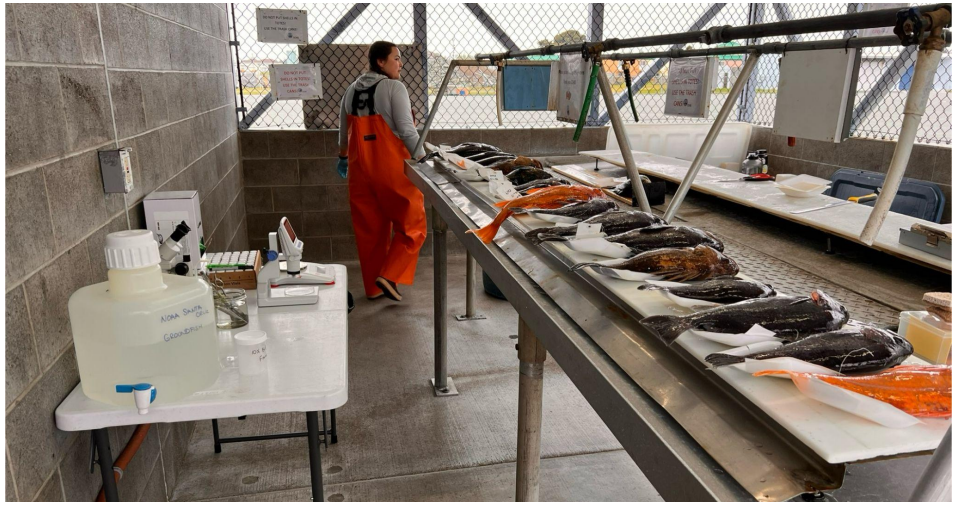
- 2010: First assessed as coastwide stock
  - DB-SRA: Only included catch, pre-specified status (40%)
  - Median coastwide OFL was 14.8 mt in 2010
- 2021: State-specific length-based data moderate assessment
  - Scope of data specified by Terms of References as catch, lengths, and commonly used fishery-independent indices
  - Included catch, length and biological data
  - CA stock status was 14%, with CA OFL of 2.11 mt in 2023
- Full assessment for California stock in 2025

2025 Assessment Overview

- Assessment will be based in Stock Synthesis (SS3)
- California-only model within US
- Benchmark assessment
  - Full exploration of model assumptions and data
- Model parameters
  - Fix some biological parameters: steepness, natural mortality
    - Explore growth estimated within model
  - Estimate recruitment, recruitment deviations, selectivity by fleet and explore blocks

2025 Assessment Overview (continued)

- Data types used
  - Catch data (landings + discard mortality)
  - Length composition data
    - Conditional age-at-length data will be explored for growth
  - Age composition data
  - Indices of abundance
  - Biological data



Proposed Model Structure for 2025

- Single modeled population
  - California
- Fleet structure:
  - One commercial fleet (live and dead combined)
  - One recreational fleet (private/rental (PR) and party/charter (PC) combined)
  - Discards modeled with landings
- Biological structure
  - One sex

Data Sources for 2025

Type	Commercial	Recreational
Catches	1916-1968: Ralston reconstruction 1969-1980: CALCOM reconstruction 1984-2024: PacFIN	1928-1980: Ralston reconstruction 1981-2004: MRFSS 2005-2024: CRFS
Discards		
Lengths		

Note: 2024 data are not available at this time and will be updated for the final model

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Discards	1916-2001: Assumed historical rate 2002-2023: GEMM report estimates	1928-1980: Assumed historical rate 1981-2004: MRFSS (total mortality) 2005-2024: CRFS
Lengths		

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Discards	1916-2001: Assumed historical rate 2002-2023: GEMM report estimates	1928-1980: Assumed historical rate 1981-2004: MRFSS (total mortality) 2005-2024: CRFS
Lengths	1978-2024: PacFIN	1980-2003: MRFSS 2004-2024: CRFS Various other CA rec datasets

Note: 2024 data are not available at this time and will be updated for the final model

Data Sources for 2025 (continued)

Indices	Biological data
Fishery-dependent • PR dockside (CRFS) • PC dockside historical (MRFSS) • PC dockside present (CRFS) Fishery-independent • ROV • CCFRP	Ages for growth estimation • Abrams thesis • Recent CDFW • CCFRP • IPHC FISS • NOAA surveys Size at settlement - Diana Baetscher Maturity/Fecundity - SWFSC collection Weight-Length - where weights measured

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Landings Overview

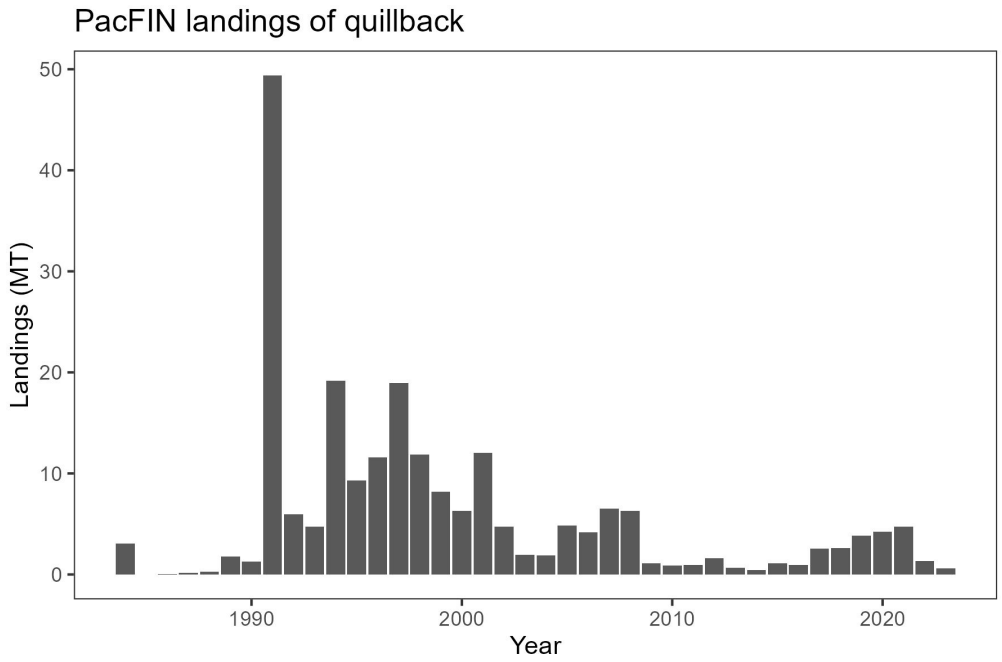
- Commercial landings combined across gears and disposition
  - 99% hook-and-line gear group
  - Disposition (live/dead) have similar lengths
- Recreational mortality combined across modes
  - Similar lengths between modes (private/rental or private/charter) in each district
- Discards added to landings for total mortality
  - Model discards and landings the same
  - Limited discard mortality

Commercial Landings
PacFIN 1984-2023

Landings only

Landings estimated based on sampling catches, determining amount that is quillback, and then expanding out based on total catches

Large value in 1991 from samples in the north that were purely quillback rockfish and expanded by market category



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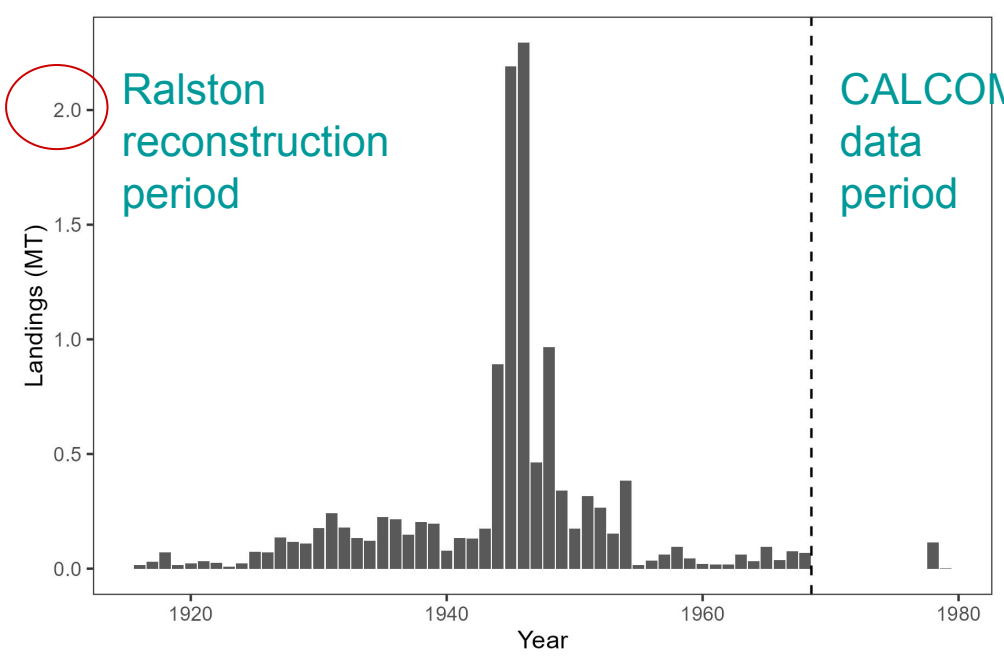
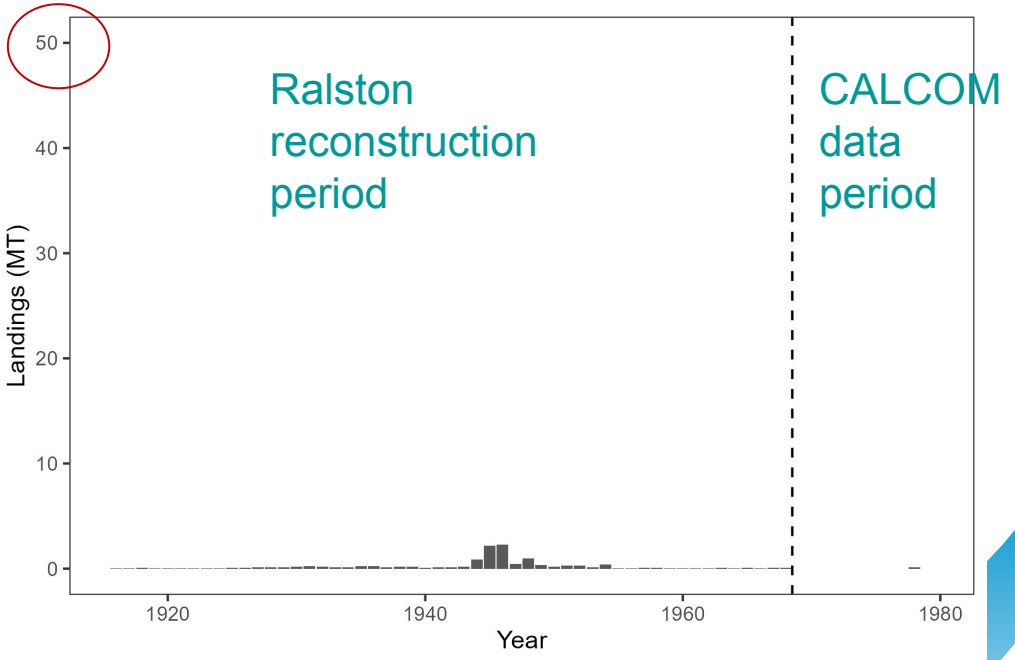
Commercial Landings
Historical Reconstructions 1916-1980

Landings only



If re-scale the y-axis to match PacFIN scale



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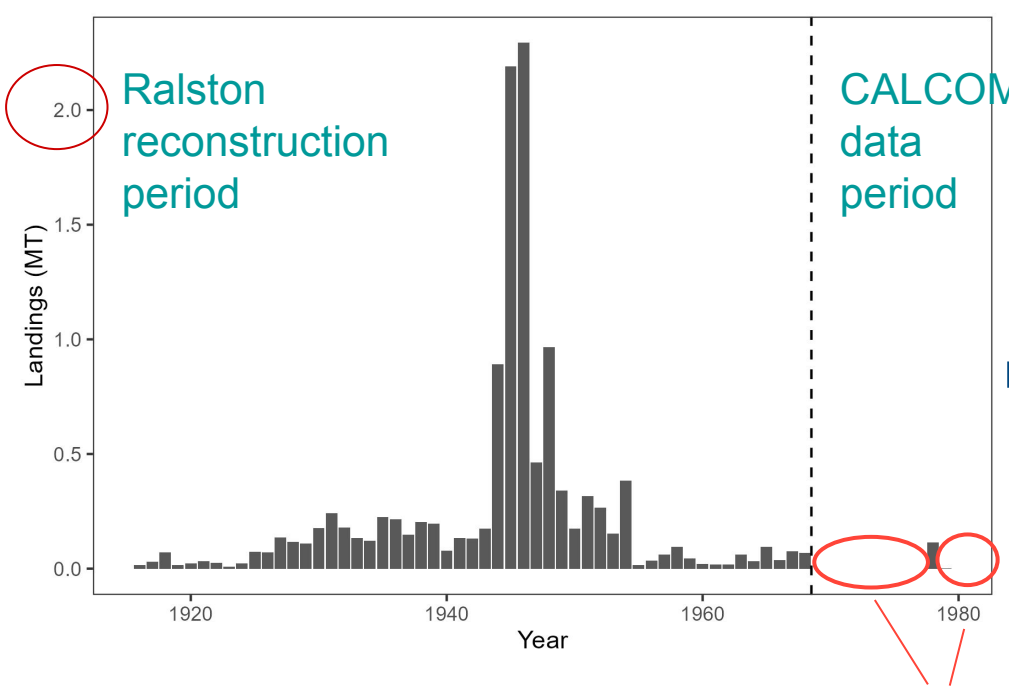

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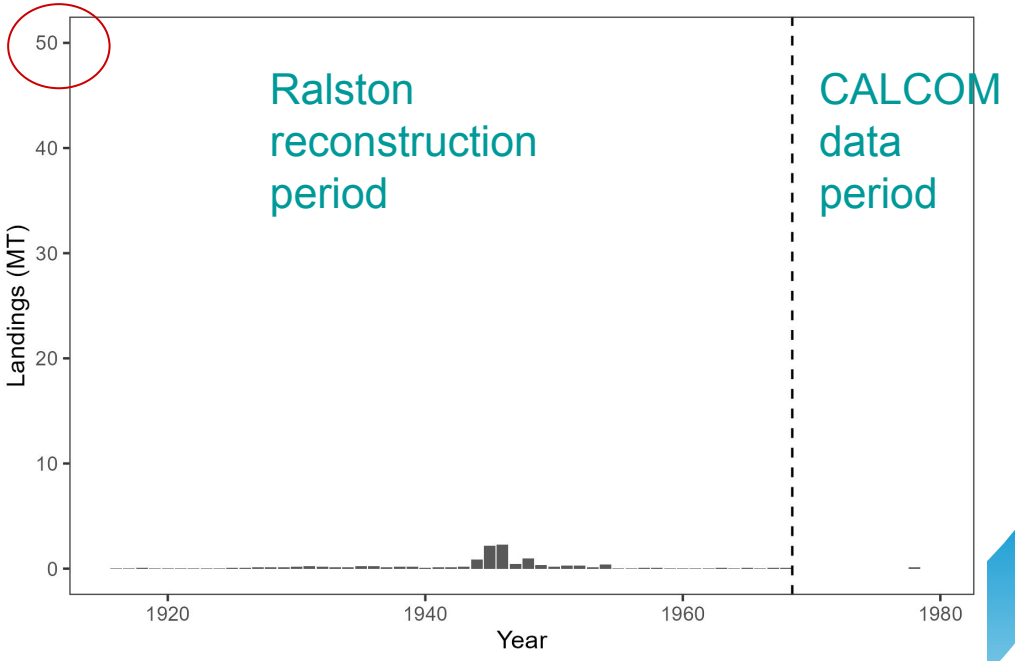

Question: Were no quillback rockfish landed during these years?

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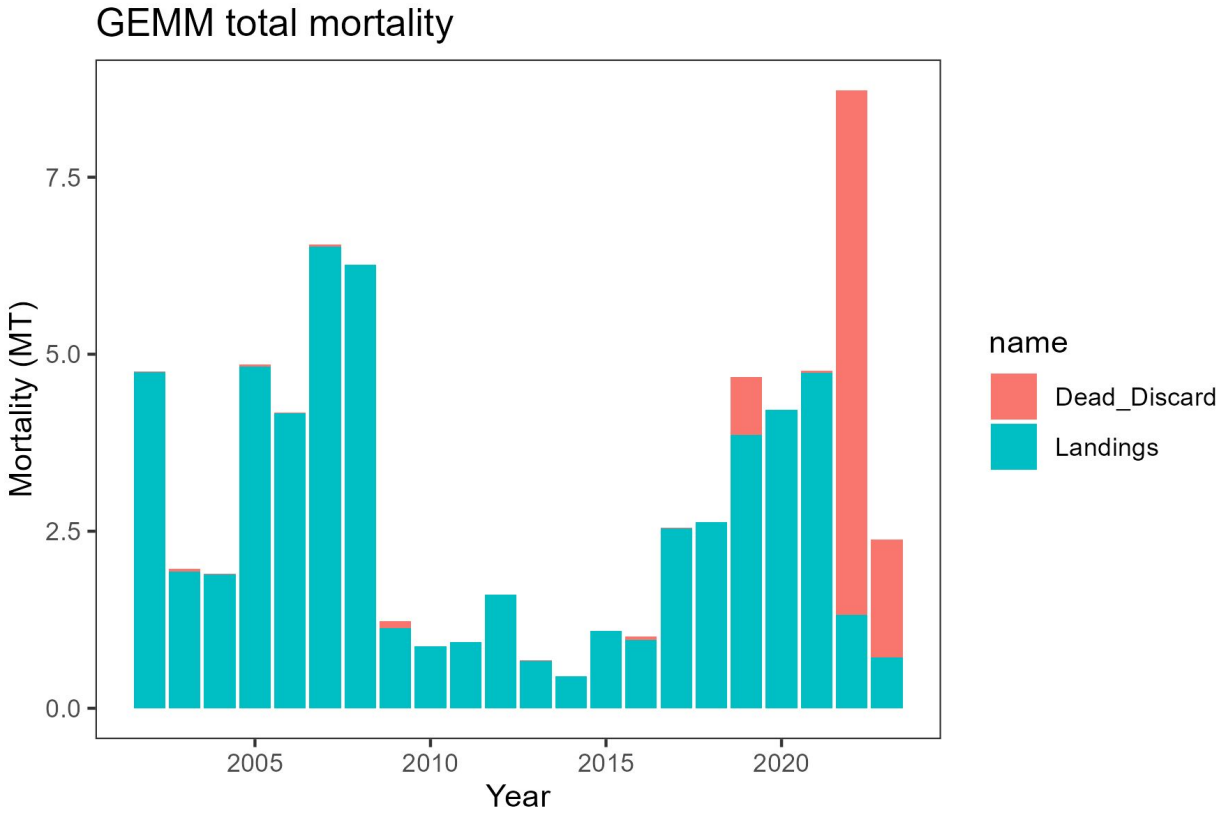
Commercial Discards

GEMM 2002-2023



For 2002-2023:
Discard mortality from the GEMM

For years < 2002:
Apply average rate from Nearshore sector of dead-discards to landings in 2002-2021 (0.25%)

For 2024:
Still exploring

Questions: Was there a lot of discarding in past?
Was 2024 more similar to 2022 or 2023?

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Recreational Total Mortality

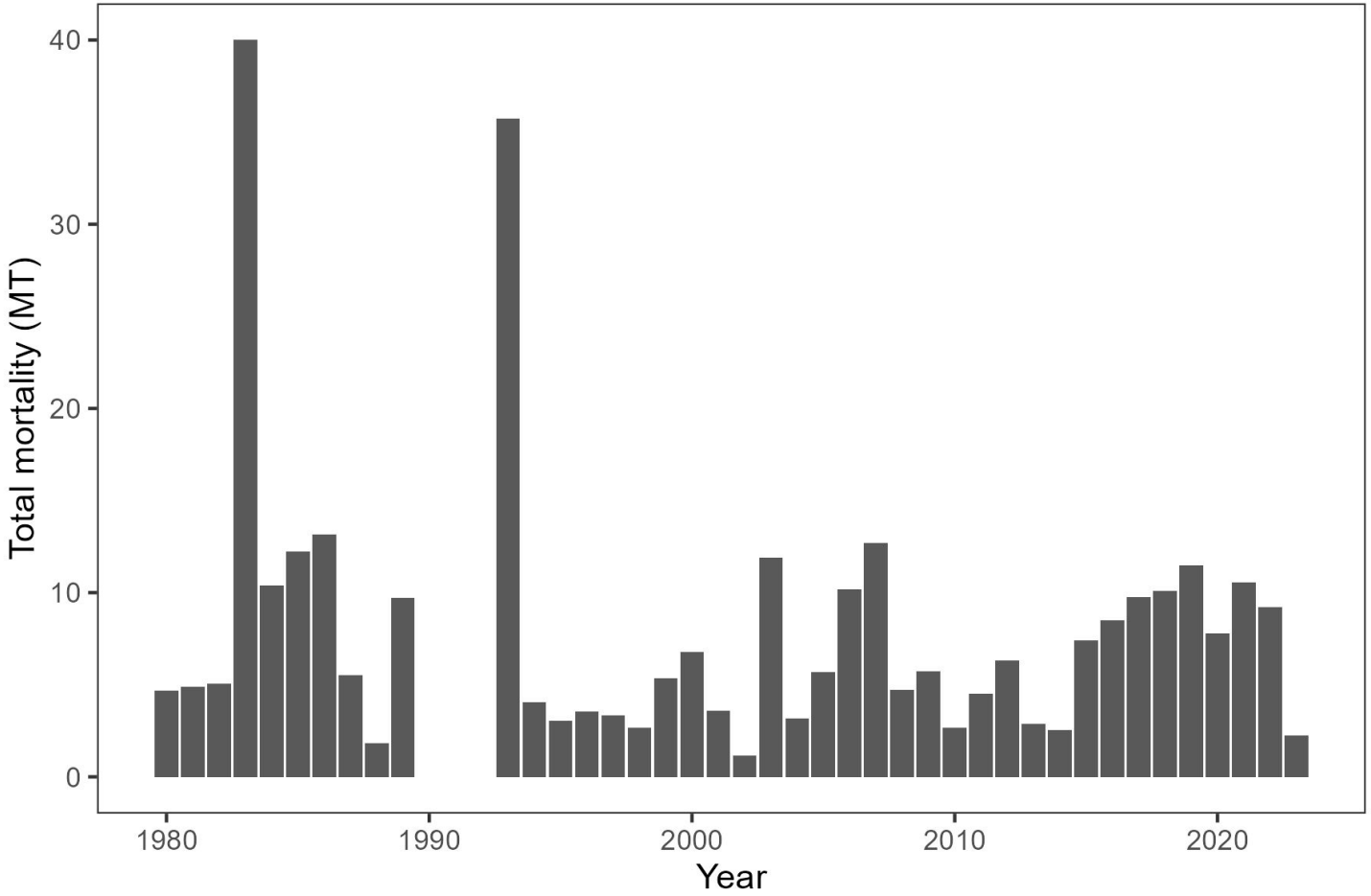
CRFS (2005-2024) & MRFSS (1980-2004)

Total mortality (discards + landings)

- Minimal dead discards

Combine across private/rental (PR) and party/charter (PC) modes

- Lengths are similar



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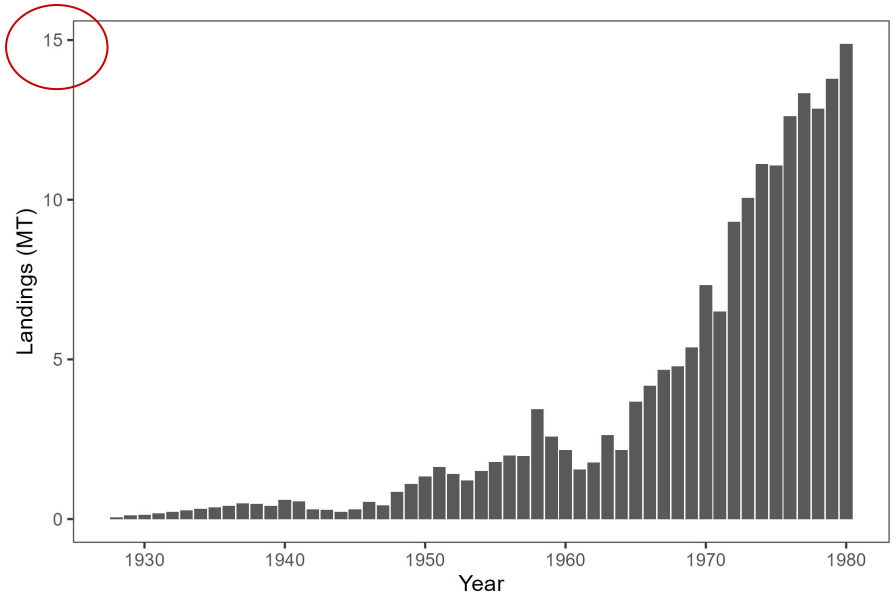
Recreational Landings

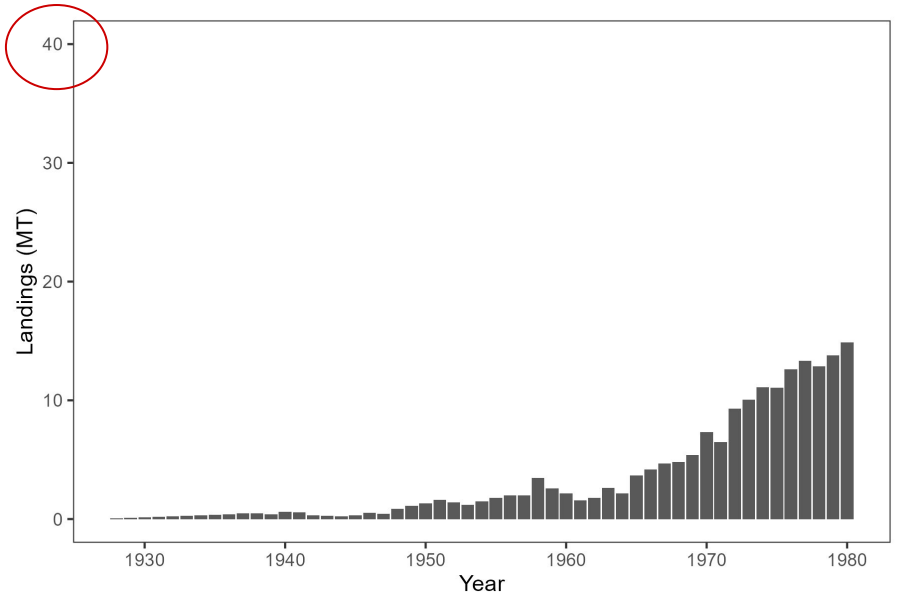
Ralston reconstruction 1928-1980

Landings only

Dead discards will be approximated based on MRFSS data (1.1%)



If re-scale y-axis to match CRFS scale



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List of questions for Landings, Discards

2.1: Were no quillback rockfish landed in commercial landings during blank years between 1969-1980? Are the zeros accurate?

2.2: Was there a lot of discarding in the commercial fleet prior to 2002? In recreational fleet prior to 1980?

2.3: Was fishery in 2024 more similar to 2022 or 2023

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    a. **selectivity time blocks**
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Length data

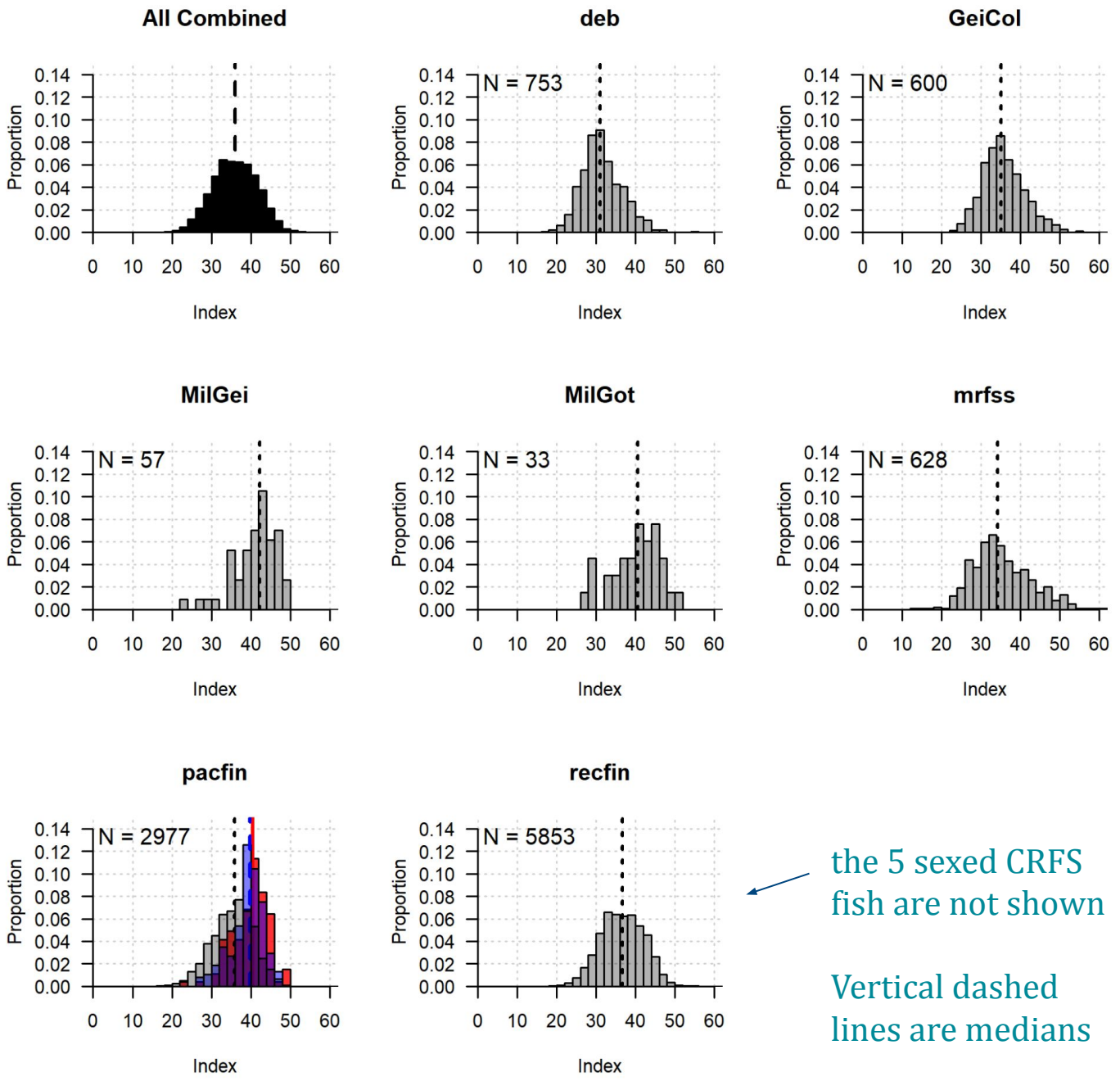
Black indicates data also used in 2021 assessment
Blue indicates new length data for 2025 assessment

Source	Type	Years	# Lengths	Males	Females
Miller and Gotshall	Rec	1959-1960	33		
Miller and Geibel	Rec	1959-1960	57		
MRFSS	Rec	1980-2003	628		
Deb Wilson-Vandenberg	Rec	1987-1998	753		
Geibel and Collier	Rec	1992-1998	600		
CRFS	Rec	2004-2023	5,853	4	1
PacFIN	Com	1978-2023	2,977	187	132
CCFRP	Survey	2017-2024	1,390*		
ROV	Survey	2015, 2020	678		
WCGBTS + Triennial	Biology	1984-2023	27	13	12

*627 tagged and only 1 recapture

Fishery Length Data

- Plan to apply these as length compositions
- Very few sex-specific composition data
- All but pacfin are recreational
- Also have NOAA survey lengths (for biological data), CCFRP lengths (for biological data and index comps), and ROV lengths (for index comps)



the 5 sexed CRFS fish are not shown

Vertical dashed lines are medians

Commercial Fleet Overview

- **Combine commercial fleet across disposition and gear**

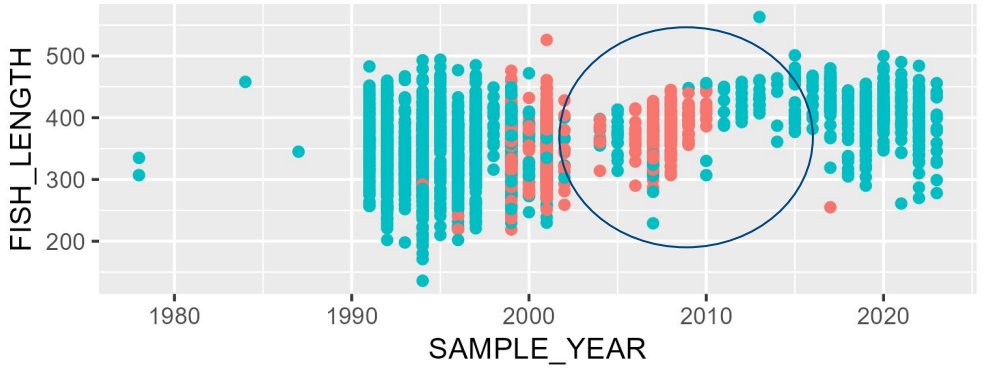
- Landings are divided into live and dead disposition
  - Live and dead have similar length distributions
  - Limited data over time to separate live and dead

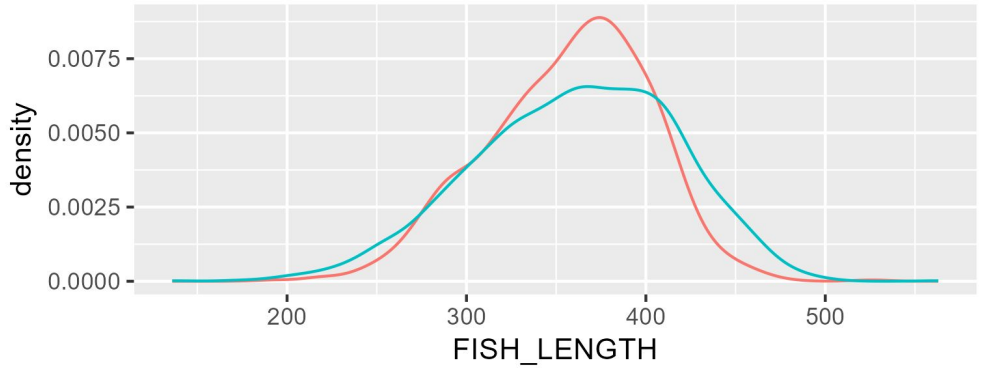
- 99% of landings are from hook-and-line gear group
  - This gear group is comprised of pole (POL) and longline (LGL) gear
  - POL and LGL have similar length distributions

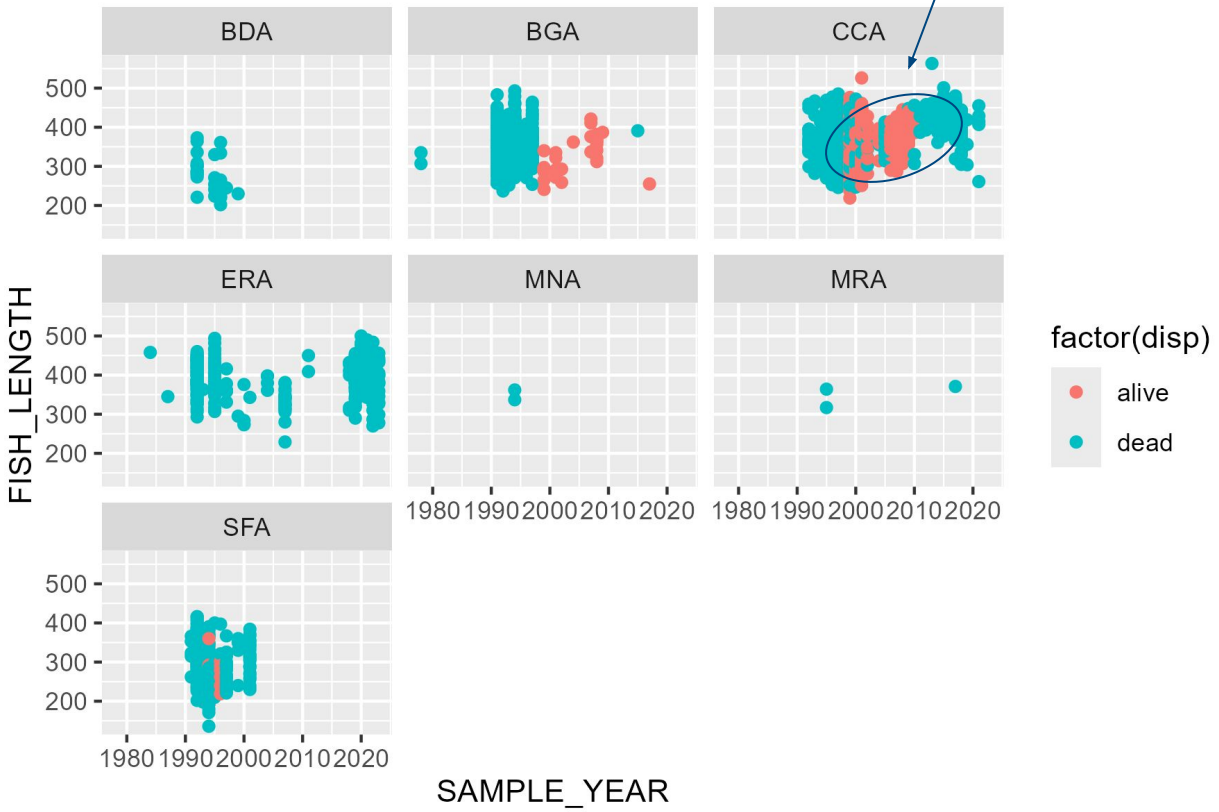
Commercial Lengths by Disposition

Question: Is there a reason why length was increasing 2004-2014?

- Similar live vs dead lengths when available. **Plan to combine**







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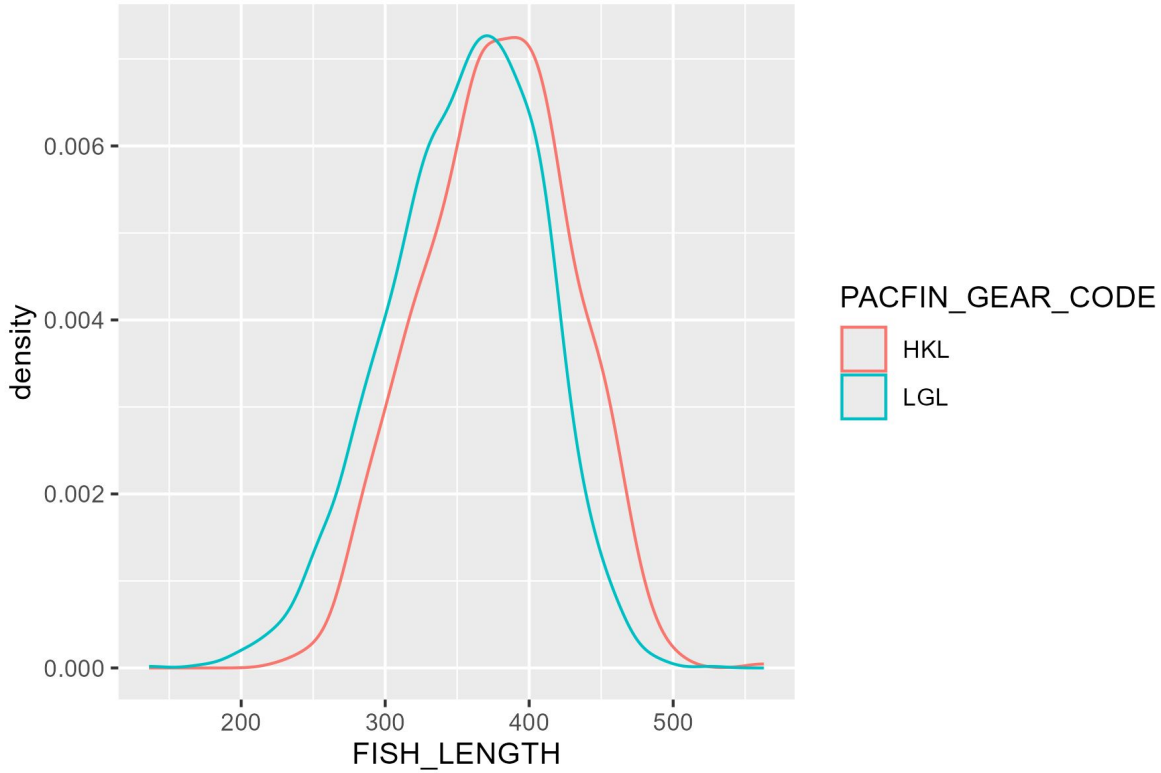
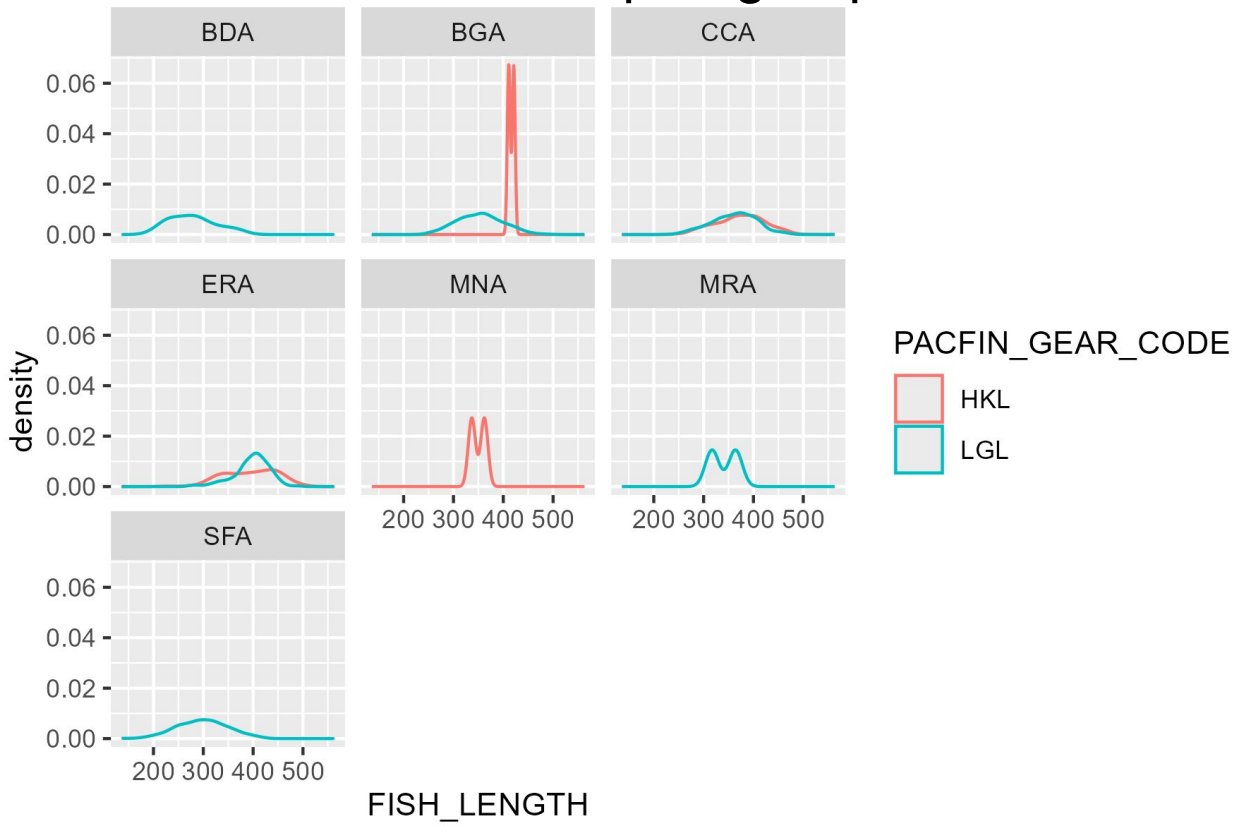
Commercial Lengths by Gear

- Small differences among gears in hook-and-line gear group attributable to differences by area. **Plan to combine gears within gear group**

Some differences overall…

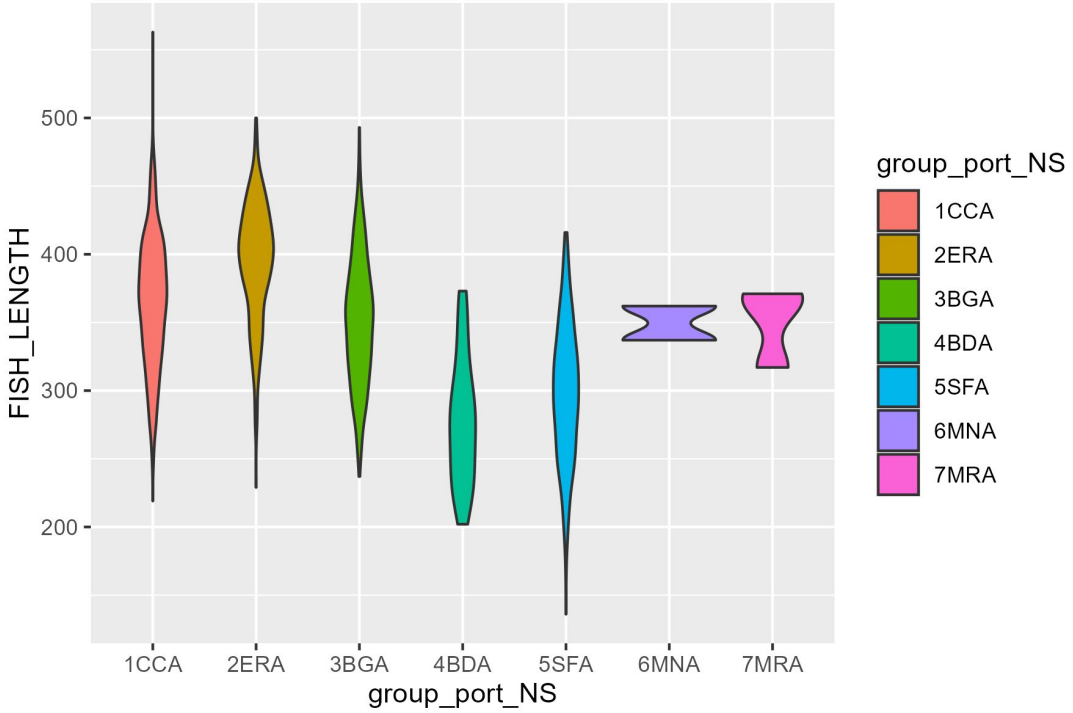


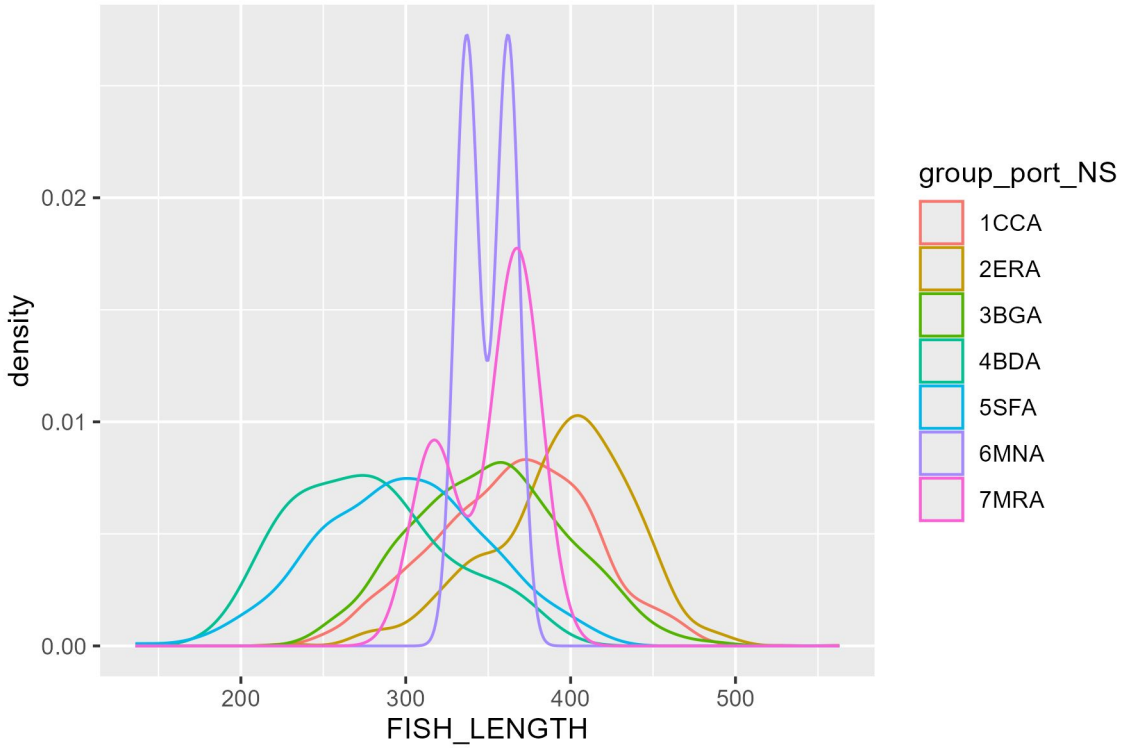
…but similar within same port groups



Commercial Lengths by Area

- Larger fish in the northern areas. **Plan to explore this during modeling**





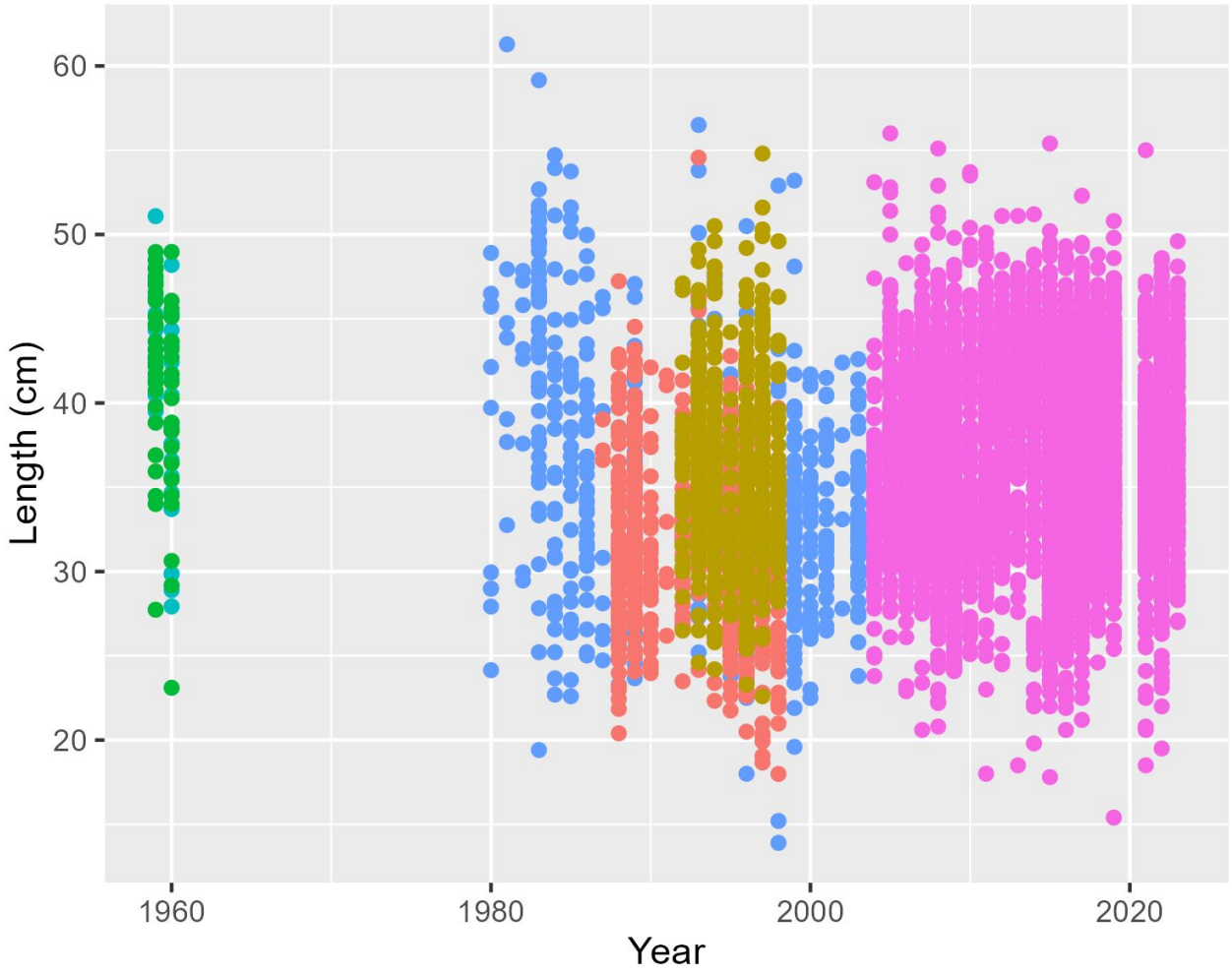
Questions: Are these differences in length due to differences in gears north vs central? Fishing depths? Fishing pressure?

Recreational Fleet Overview

- **Combine recreational fleet across modes**

- Landings are divided into PC (private/charter) and PR (private/rental)
  - PR and PC have similar lengths within areas
  - Differences in lengths between the two more due to differences in where samples from each occur

Recreational Lengths by Data Source



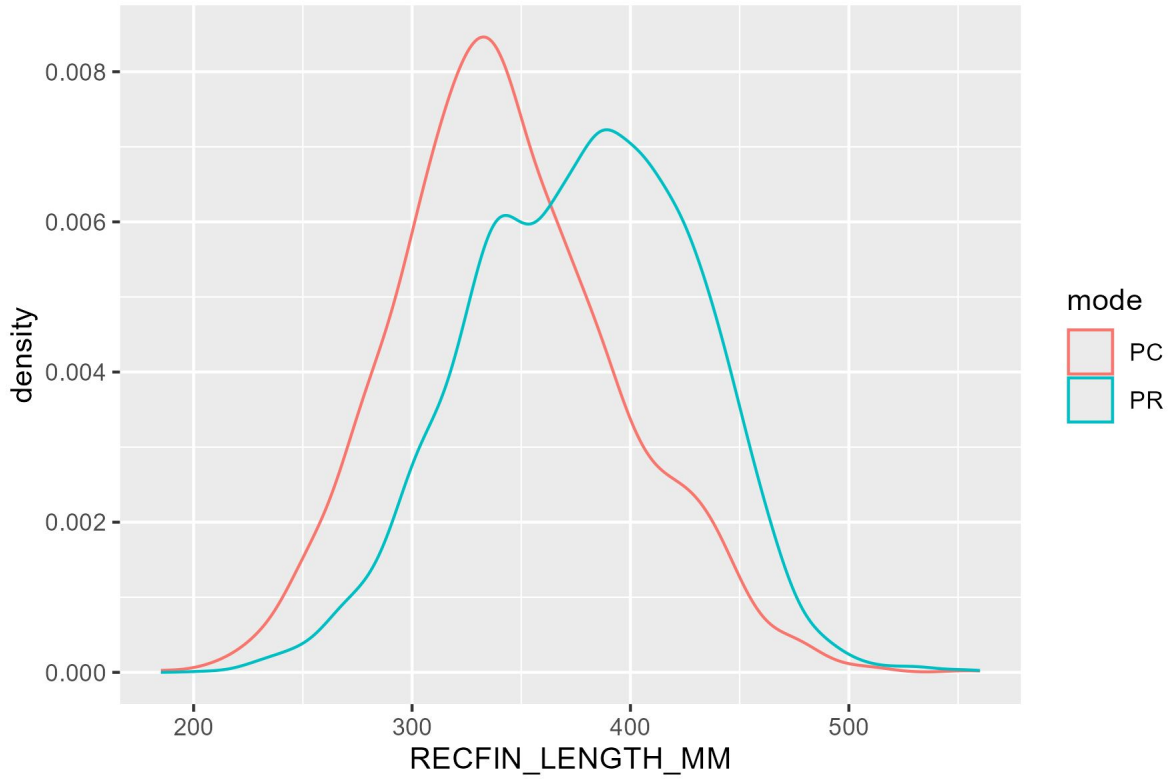
*deb data only PC

*GeiCol data only PR and only in north

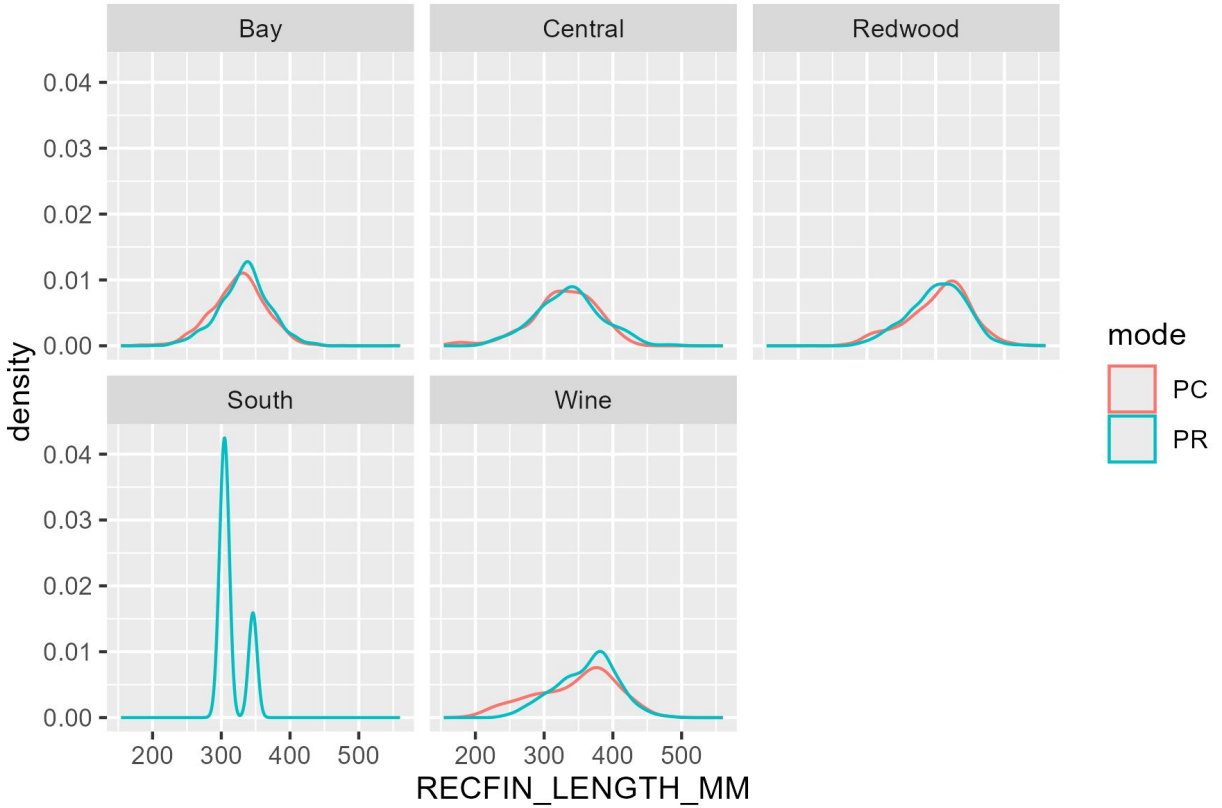
Recreational Lengths by Disposition

- Similar PC vs PR lengths where occur together. **Plan to combine**

Overall differences due to area….



…because modes are similar within same district.



Showing CRFS data but similar pattern in MRFSS data

Recreational Lengths by District

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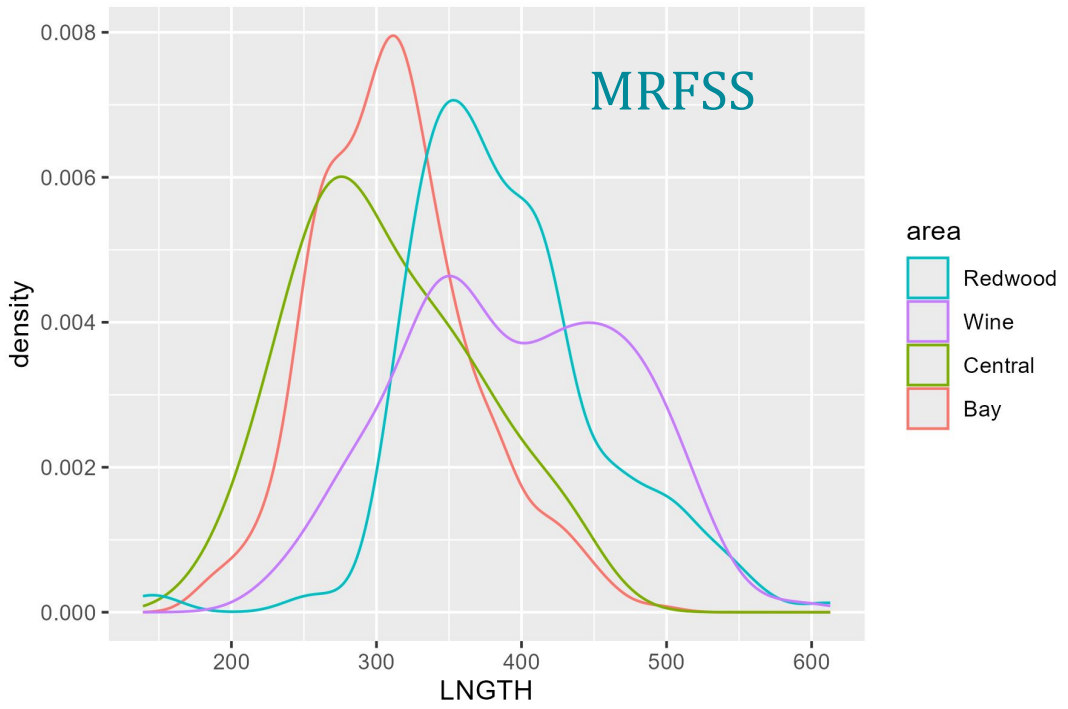

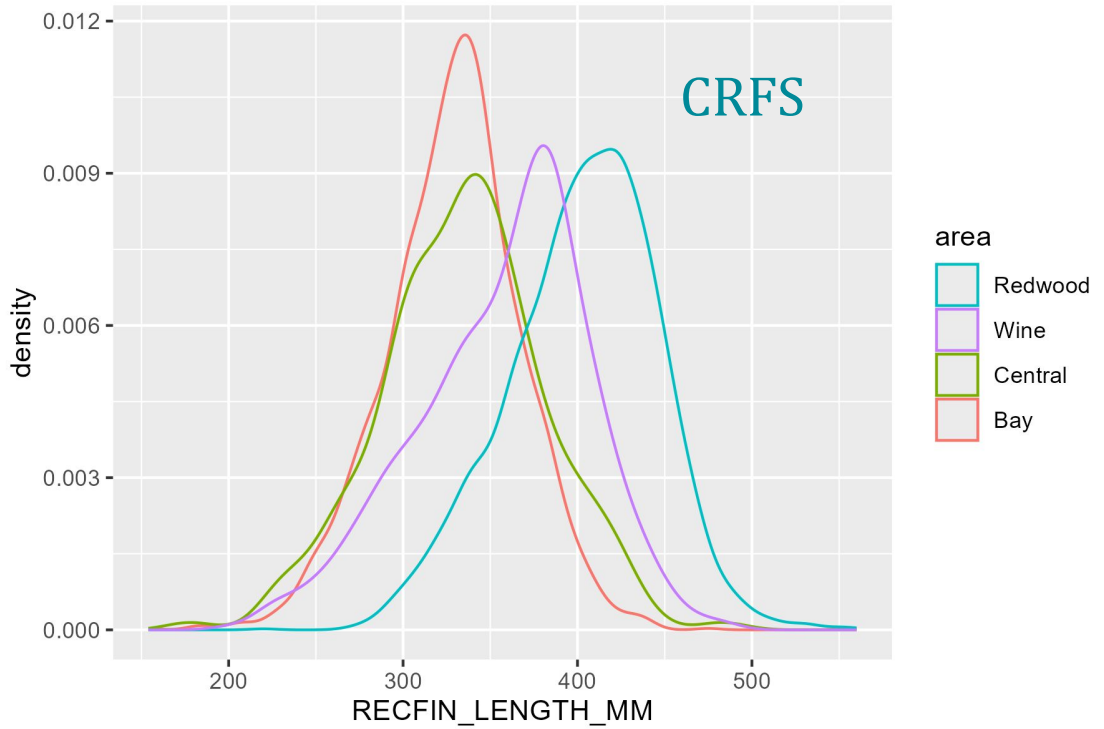

Questions: Are these differences in length due to differences in gears north vs central? Fishing depths? Fishing pressure?

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List of questions for Lengths

3.1: Is there a reason why commercial lengths in Crescent City were increasing 2004-2014?

3.2: Are the differences in lengths in northern vs. central areas due to differences in gears? Fishing depths? Fishing pressure?

Selectivity time blocks

- Time blocks separate out years where lengths from the fishery are expected to be different from other years.
  - Attribute to changes in the fishery rather than changes in biology
  - Each block adds parameters so want to capture major changes

Selectivity time blocks (continued)

- Proposed time blocks for initial exploration

  Commercial:
  - 1916-2002: Beginning block
  - 2003-2013: Corresponding to depth restrictions
  - 2014-2021: Depth changes OR 2018-2021: transferable permits
  - 2022+: Opening up of restrictions

Selectivity time blocks (continued)

- Proposed time blocks for initial exploration

  Commercial:
  - 1916-2002: Beginning block
  - 2003-2013: Corresponding to depth restrictions
  - 2014-2021: Depth changes OR 2018-2021: transferable permits
  - 2022+: Opening up of restrictions

  Recreational:
  - 1928-2000: Beginning block
  - 2001-2016: Period of restrictions
  - 2017-2022: Relaxation of depth restrictions
  - 2023+: Increased restrictions

Question: How to treat 2024 and future years? Will have few lengths. Similar to 2023?

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Age Composition Data

- Composition data reflects trends and patterns across the fleet
  - Useful to inform estimates of recruitment

- Some samples collected through randomized fishery sampling
  - 172 ages sampled during commercial sampling (mostly 2019-2020)
  - None from the CRFS survey

- **Therefore, some exploration for composition, but age data mostly planned to be used to inform estimates of growth**

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Indices of Abundance

Fishery-dependent: All recreational

- Party/charter (CPFV) onboard observer surveys
  - Deb Wilson-Vandenberg survey (1987-1998)
  - CDFW survey (1999-2024)

- Party/charter dockside survey
  - 1980-2024

- Private/rental dockside survey (2004-2024)
  - Consider excluding more recent years due to COVID-19 followed by recreational bag limit changes?
    - 2020 high proportion of unspecified rockfish
    - 2021: 13% unspeciated rockfish
    - 2022: 1 fish sub-bag limit

Indices of Abundance

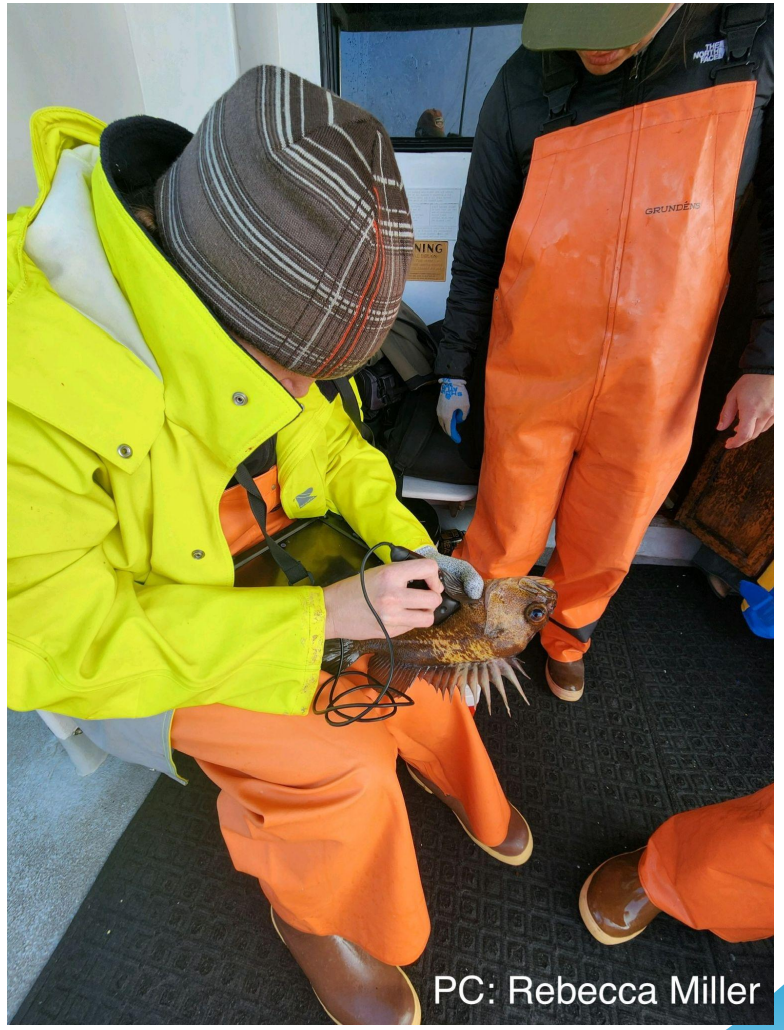
Fishery-independent

Both surveys developed to monitor California's network of Marine Protected Areas

- California Collaborative Fisheries Research Program (CCFRP)
  - Including only the years since the survey expanded to the north coast (2017-2024)
- CDFW Remotely Operated Vehicle (ROV) Survey
  - SSC's Groundfish Subcommittee met in December to review methodologies
    - Additional review planned for March

NOAA surveys not informative for indices

- 6 total positive tows (26 fish) from the WCGBTS, 1 total fish from the Triennial


PC: Rebecca Miller

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    a. **mortality, growth, weight-length, maturity, fecundity**
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PC: Rachel Brooks

Natural Mortality (M)

- Based on maximum age relationship (Hamel & Cope 2022)
  - M = 5.4 / maxAge
  - maxAge = **theoretical** age a fish could attain in absence of fishing

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- Max age values cited most commonly in literature
  - 95 yrs (BC; Yamanaka and Lacko 2001)
  - 90 yrs (SE Alaska; Munk 2001)
- Max age among our CA age samples is 57 (73 if include Washington/Oregon samples)
  - California samples are sparse and recent, and old fish may be fished out

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- Max age among our CA age samples is 57 (73 if include Washington/Oregon samples)
  - California samples are sparse and recent, and old fish may be fished out
- Other values for M range from 0.02 (BC) to 0.12 (Puget sound)

Available Age Data

All quillback otoliths read by the NWFSC CAP lab

911 available ages with length data

671 quillback double reads across all states

Additional Available Age Data (n = 749)

Data Source	Number of ages
CCFRP	152
WCGBTS	21
IPHC Research	5
CDFW collected	182
Abrams research	116
SWFSC cooperative research	135
SWFSC life history collections	114
SWFSC (likely comm.)	27

Growth

Age-at-length by Sex and Project

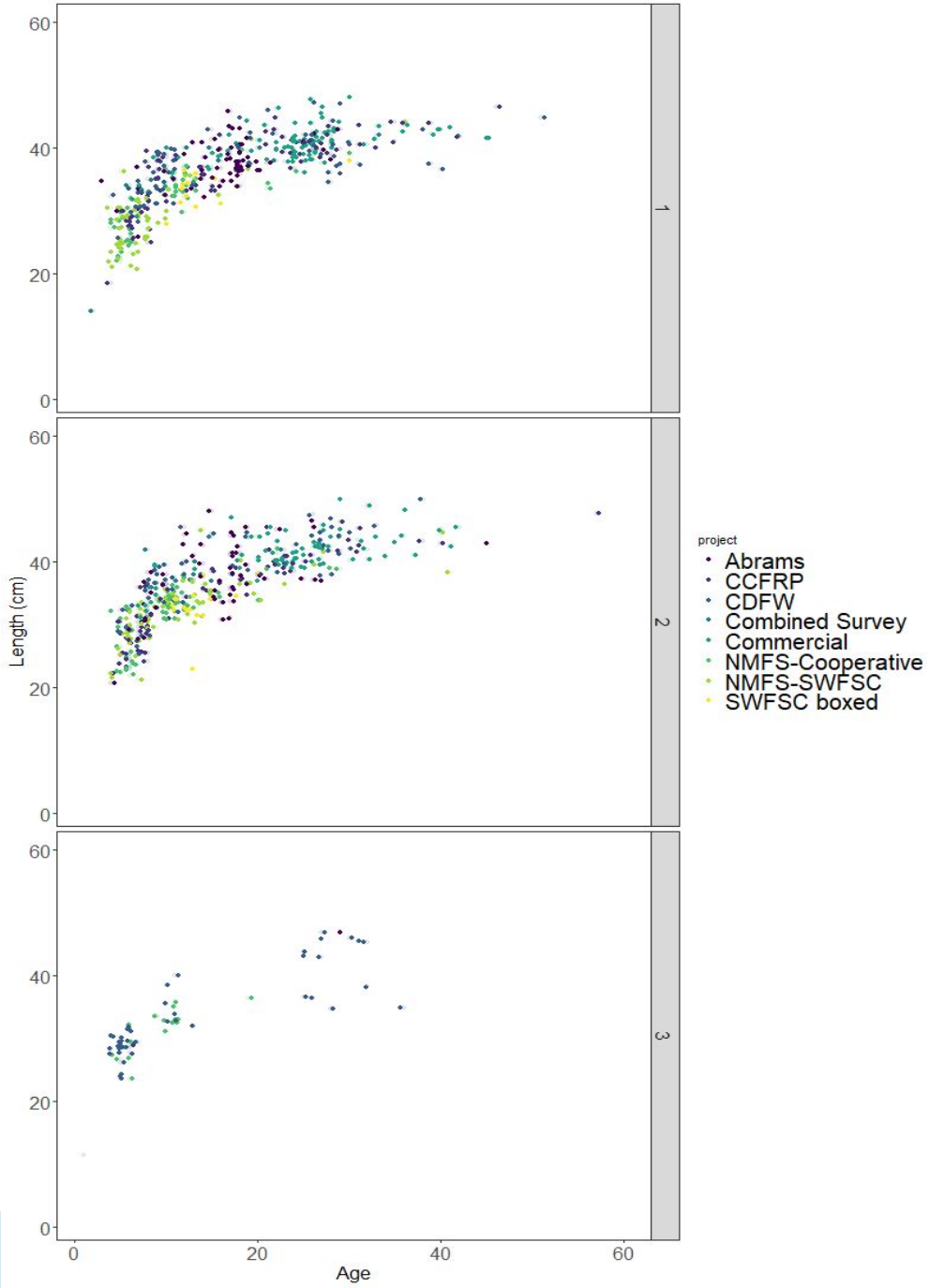
Will explore both external fits and estimation within the model using conditional age-at-length

Sex	# Samples
Male	444
Female	416
Unknown	80

Male

Female

Unsexed



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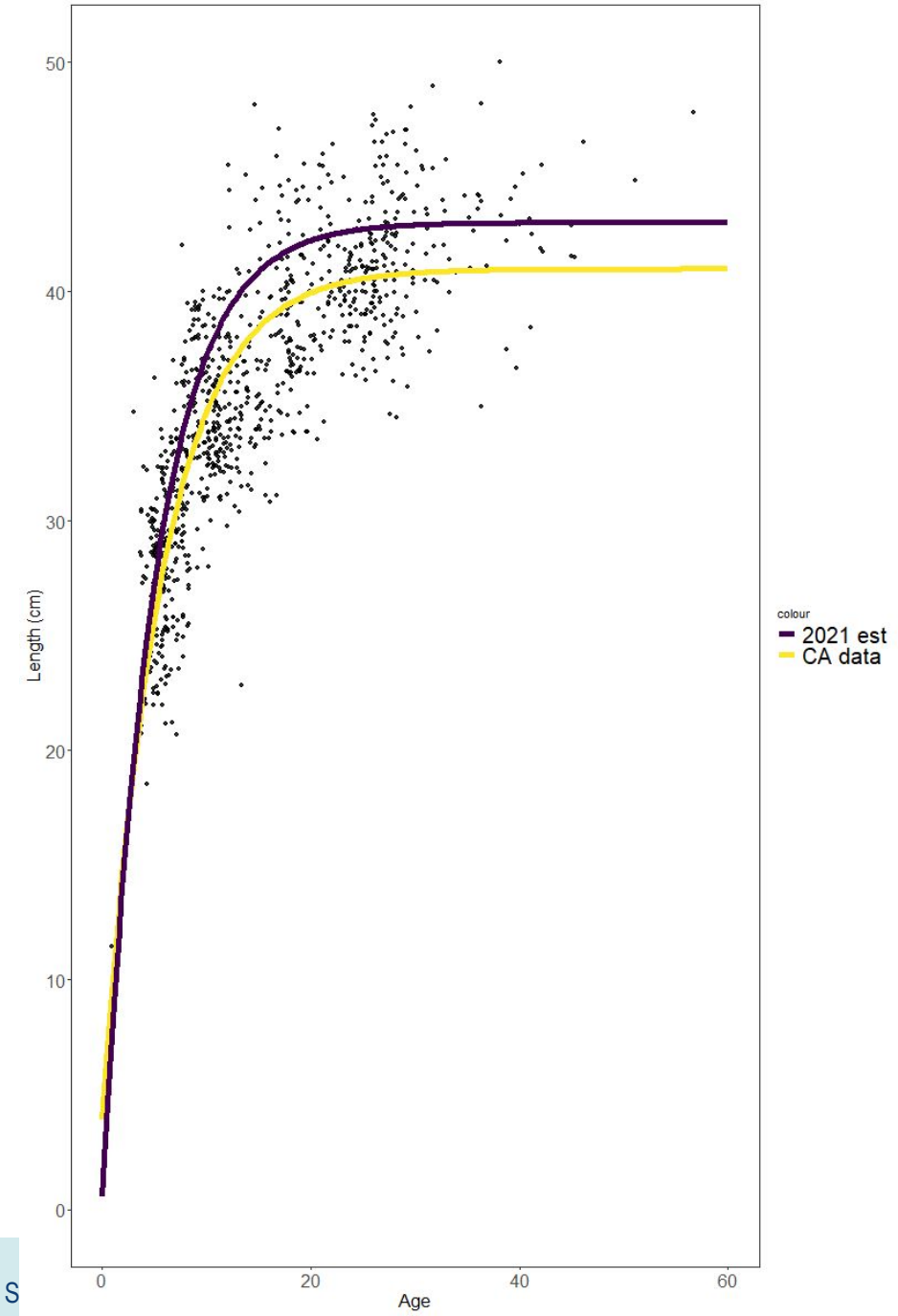
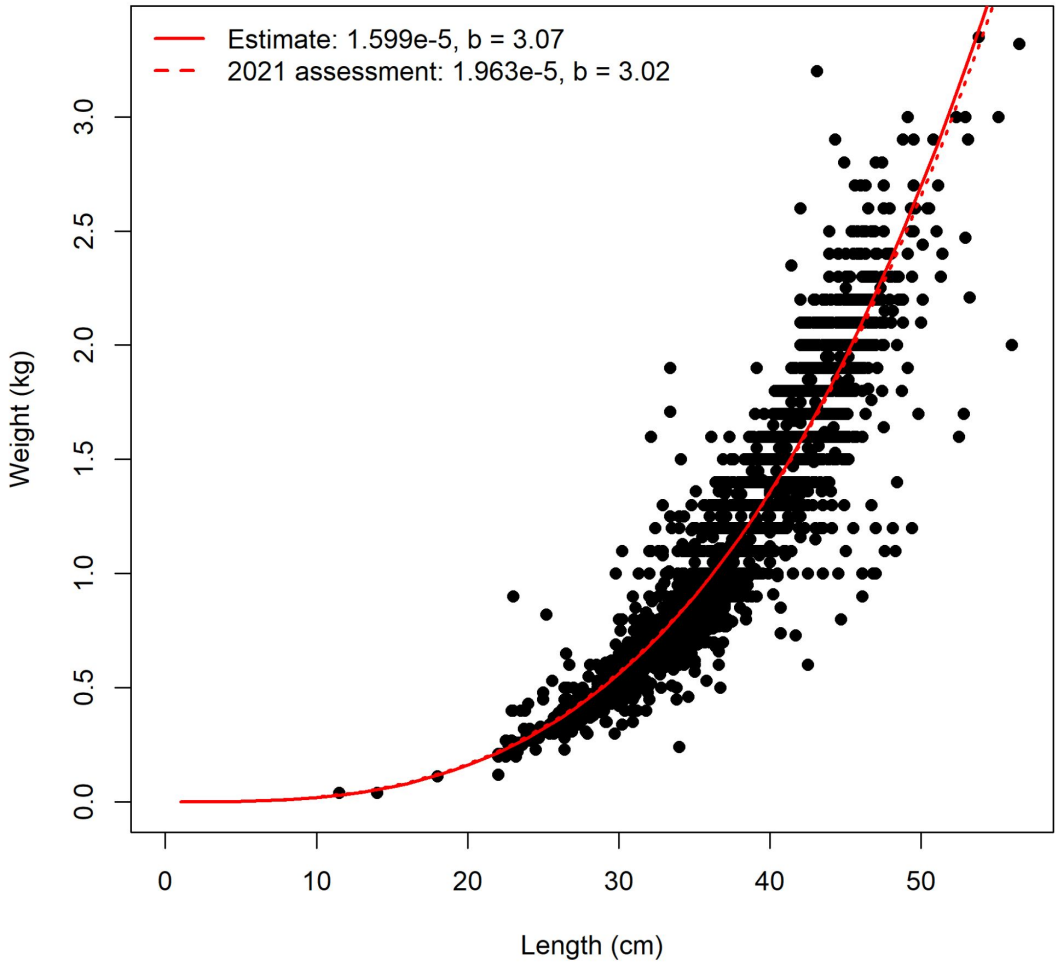


Weight-at-length

- Weight data available for CRFS, MRFSS and Surveys
  - Only 19 fish with sex so combine across sexes
- Plan to update with weighed CCFRP fish

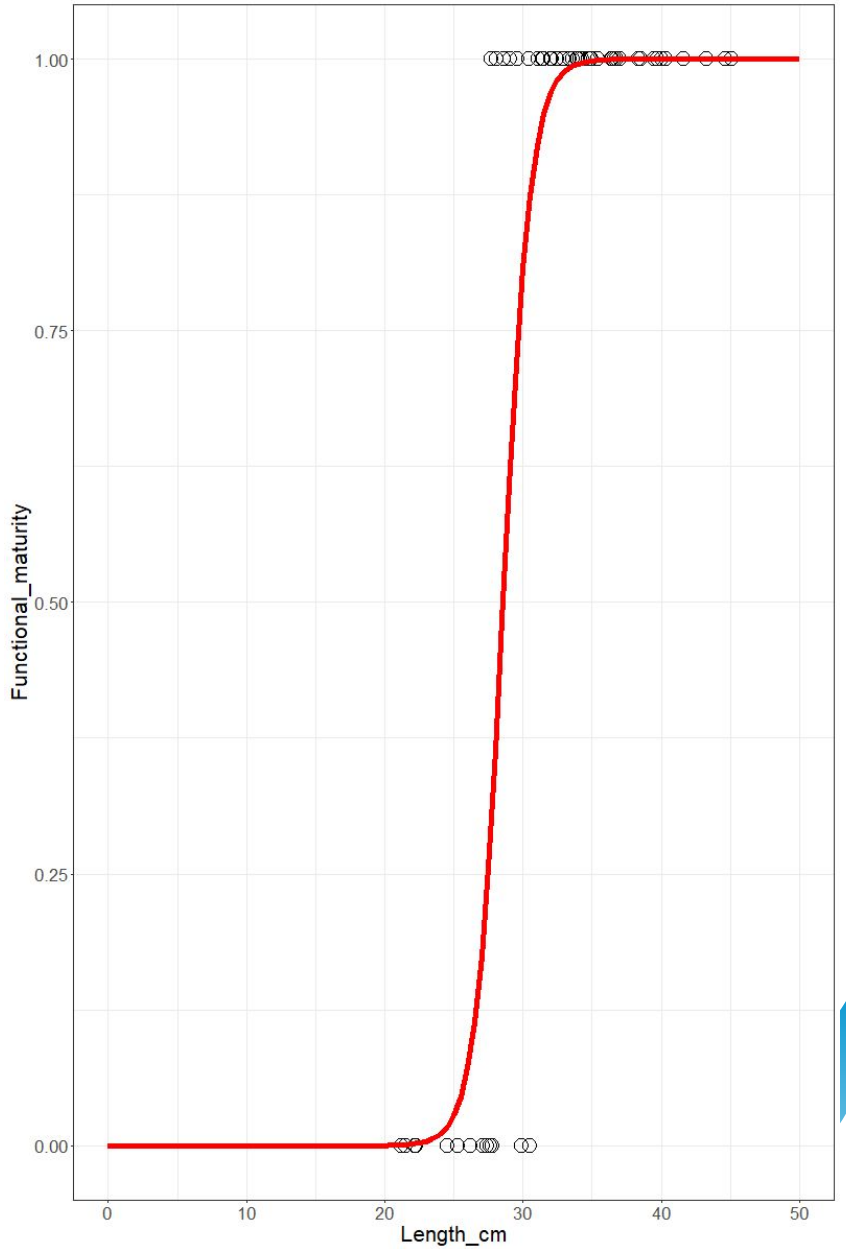


Maturity

- SWFSC collected 66 samples in California
  - Melissa Head (NWFSC) read prepared slides
  - Timing of collection affects certainty
  - **59** samples used to estimate functional maturity
- All 6 fish collected north of Fort Bragg were mature
- $L_{50\%}$ mature estimated as 28.56 cm
  - 95% CI: 27.39 cm, 29.74 cm

Port	Samples
Crescent City	2
Eureka	4
Fort Bragg	16
Bodega Bay	9
Emeryville	28

2021 assessment used an estimate from Oregon $L_{50\%}$ = 29.2 cm



Fecundity

- 2021 assessment used the estimate from Dick et al. 2017
  - 3.93e-07$L^{3.7}$ (based off samples from British Columbia)
- SWFSC collected 28 countable samples in California
- Finalizing egg counting and will compare to the estimates from Dick et al. 2017

Outline

1. Overview
2. Landings and Discards
3. Fishery Lengths
4. Age compositions
5. Indices
6. Biological information
7. **Other data sources**

Other Data Sources Looked at But Not Planned to be Used

- North coast baseline hook-and-line survey; precursor to CCFRP
  - Effort data not collected at the same scale as current CPUE
  - Two years of data could be used for a northern index
  - 78 quillback rockfish observed
- Dive surveys (PISCO, Reef Check)
  - Juvenile quillback not identifiable within KGB complex
- IPHC
  - Very few quillback rockfish in California
  - Some age data used
- Trawl logbook
  - No information on quillback
- Federal non-trawl logbook
  - New as of 2024
- CPFV logbook
  - No quillback-specific information

Question: Are there other data sources we should be considering?

Data sources for closed areas

Aware of and thinking about how the RCAs and other recreational and commercial closures may influence assessment results.

Limited data to inform about fish or fishing in closed areas:

- ROV and CCFRP indices developed to monitor MPAs
- Onboard recreation observations (possibly used to explore depths of fishing, but sparse in the north)

Question: Are there other data sources we should be considering?

List of questions for all sections

2.1: Were no quillback rockfish landed in commercial landings during blank years between 1969-1980? Are the zeros accurate?

2.2: Was there a lot of discarding in the commercial fleet prior to 2002? In recreational fleet prior to 1980?

2.3: Was fishery in 2024 more similar to 2022 or 2023

3.1: Is there a reason why commercial lengths in Crescent City were increasing 2004-2014?

3.2: Are the differences in lengths in northern vs. central areas due to differences in gears? Fishing depths? Fishing pressure?

3.3: How to treat selectivity in 2024 and future years? Will have few lengths. Similar to 2023?

7.1: Are there other data sources we should be considering?

Questions/Comments?

Please feel free to contact the STAT team:

Melissa Monk (SWFSC) - melissa.monk@noaa.gov

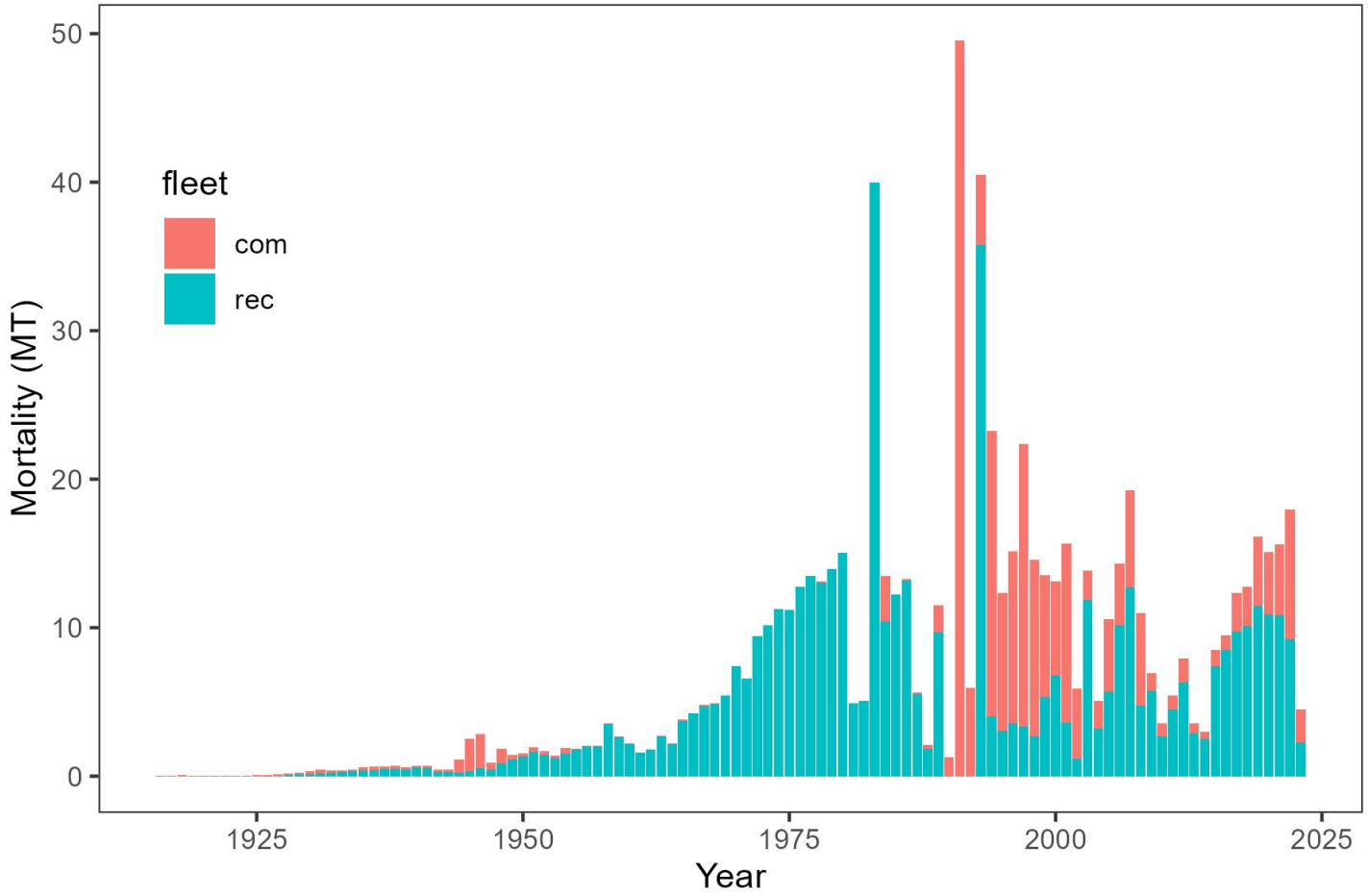
Brian Langseth (NWFSC) - brian.langseth@noaa.gov

Julia Coates (CDFW) - julia.coates@wildlife.ca.gov

Extra slides

Mortality across all sources

Draft values. Final estimates not yet finalized



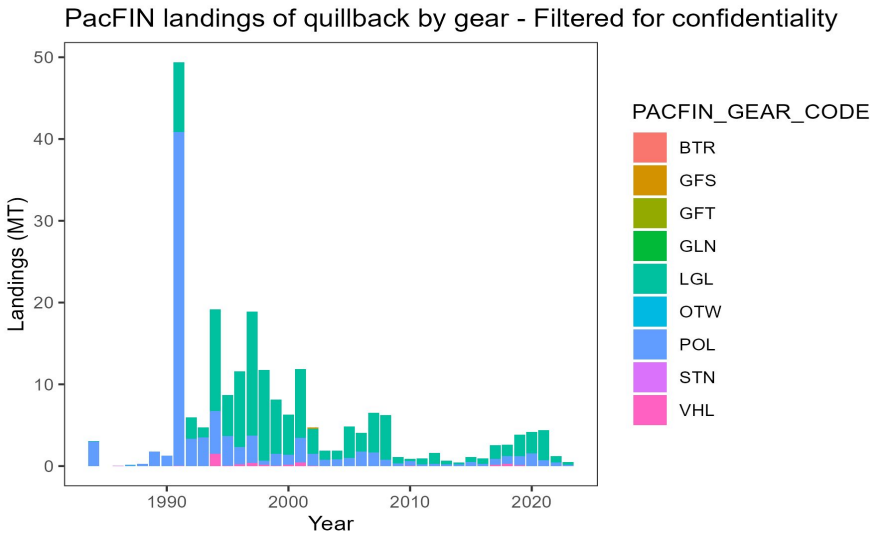
NOAA FISHERIES

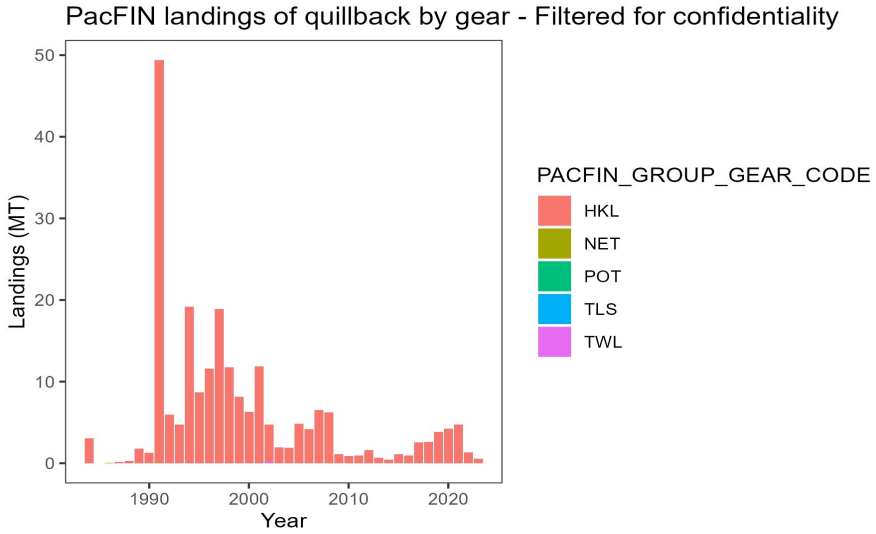
Commercial Landings by Gear

Total landings are calculated based on gear group

HKL gear group is comprised of LGL, POL, and VHL gears

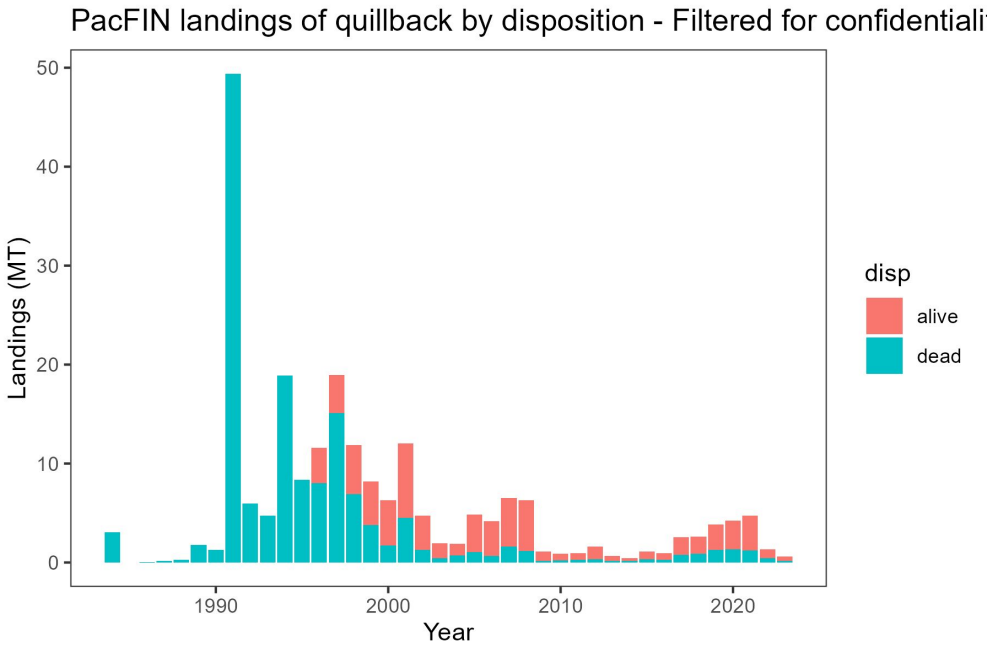
Final values will aggregate over GEAR CODES

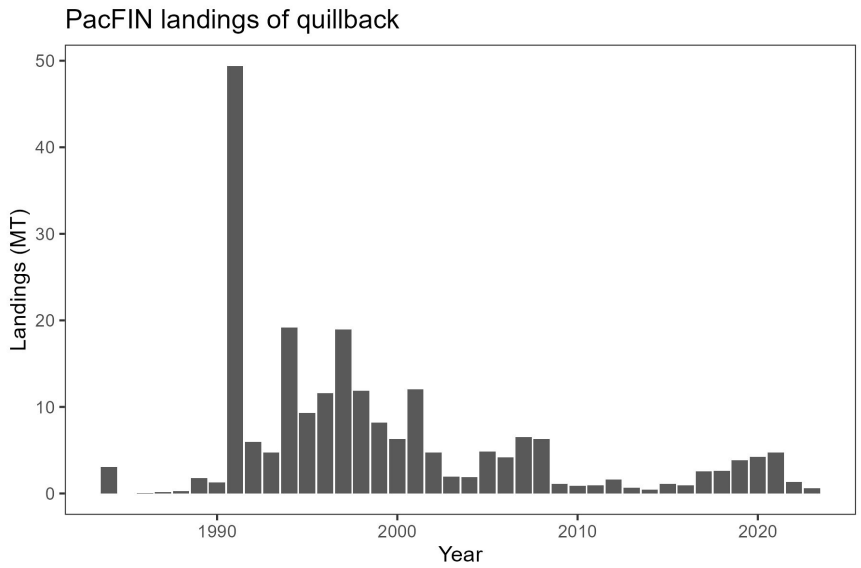




Commercial Landings by Disposition

Similar lengths of fish are caught whether they a ultimately sold live or dead

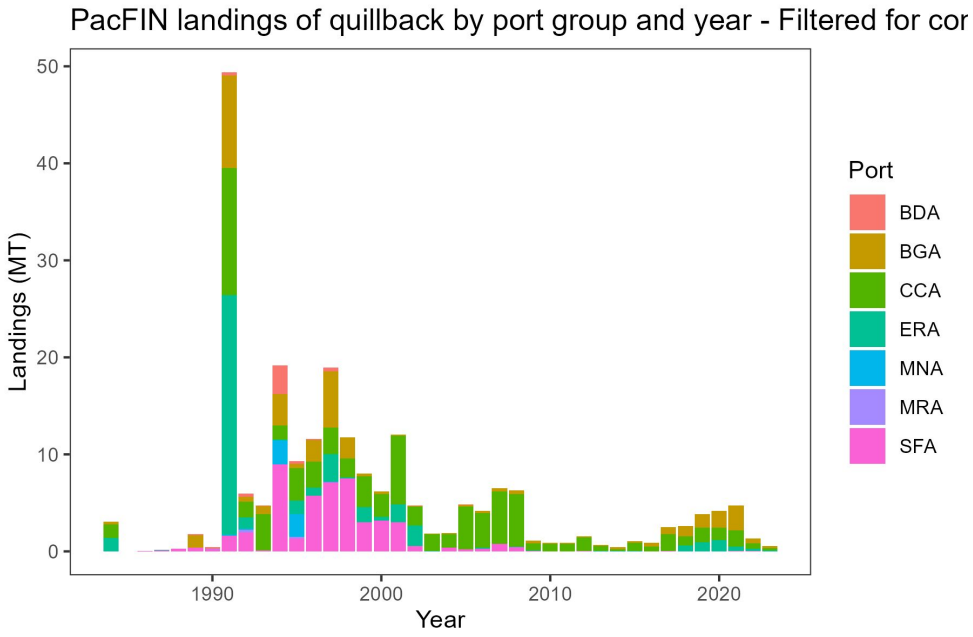


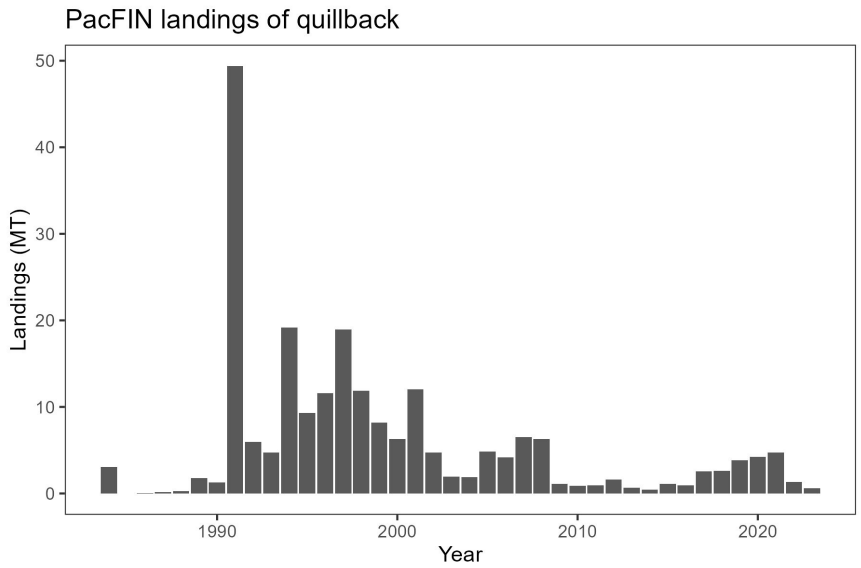


Final values will aggregate over DISPOSITION

Commercial Landings by Port Group

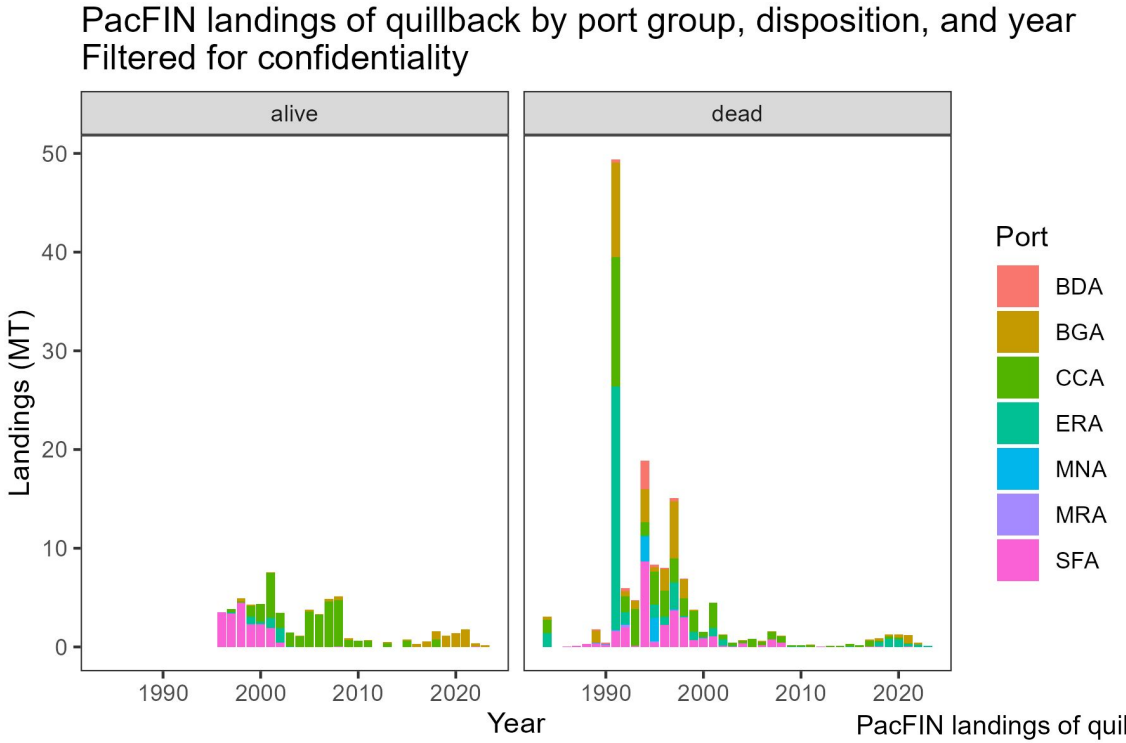
Total landings are calculated based on port group

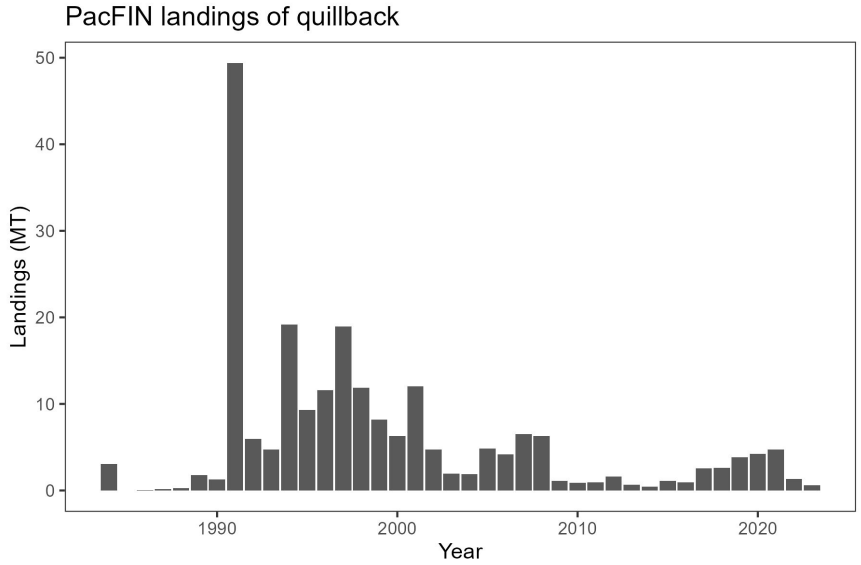




Final values will aggregate over PORT GROUP

Commercial Landings by Disposition and Port Group



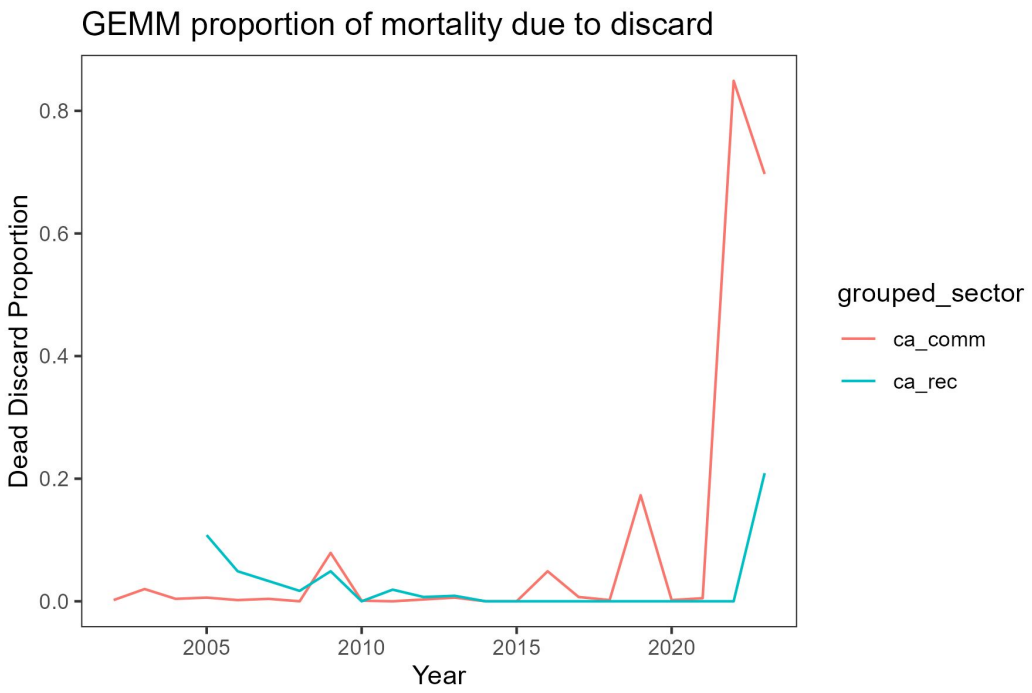


Final values will aggregate over DISPOSITION and PORT GROUP

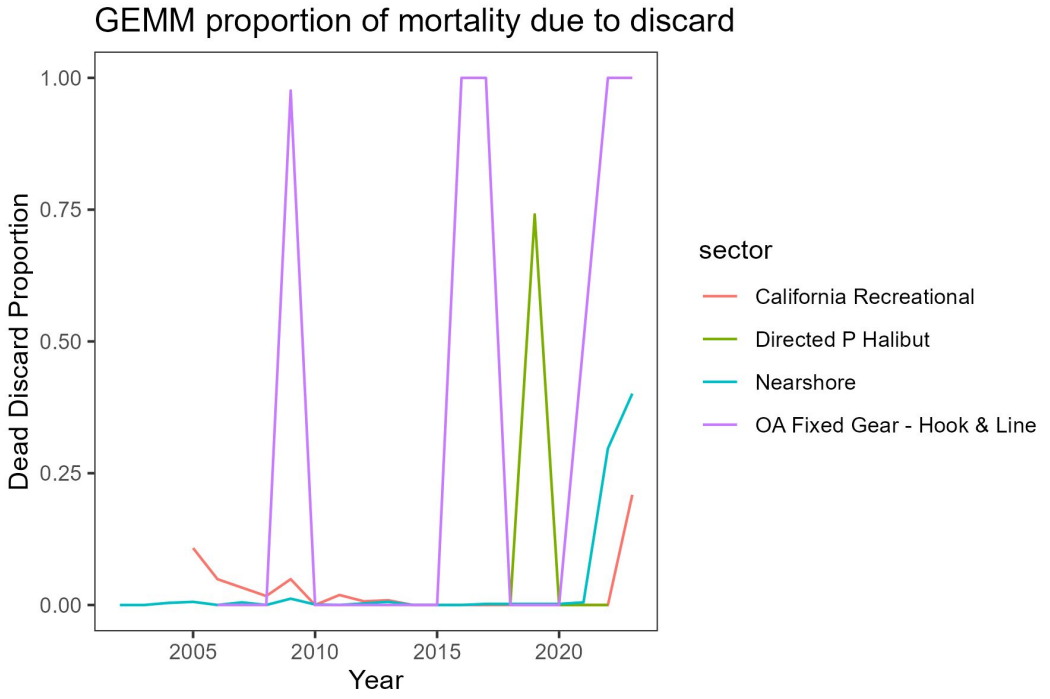
Commercial Discard Proportions

GEMM 2002-2023

Grouped sectors



Sectors with > 1% of total mortality



Commercial Discards Lengths
WCGOP 2002-2022

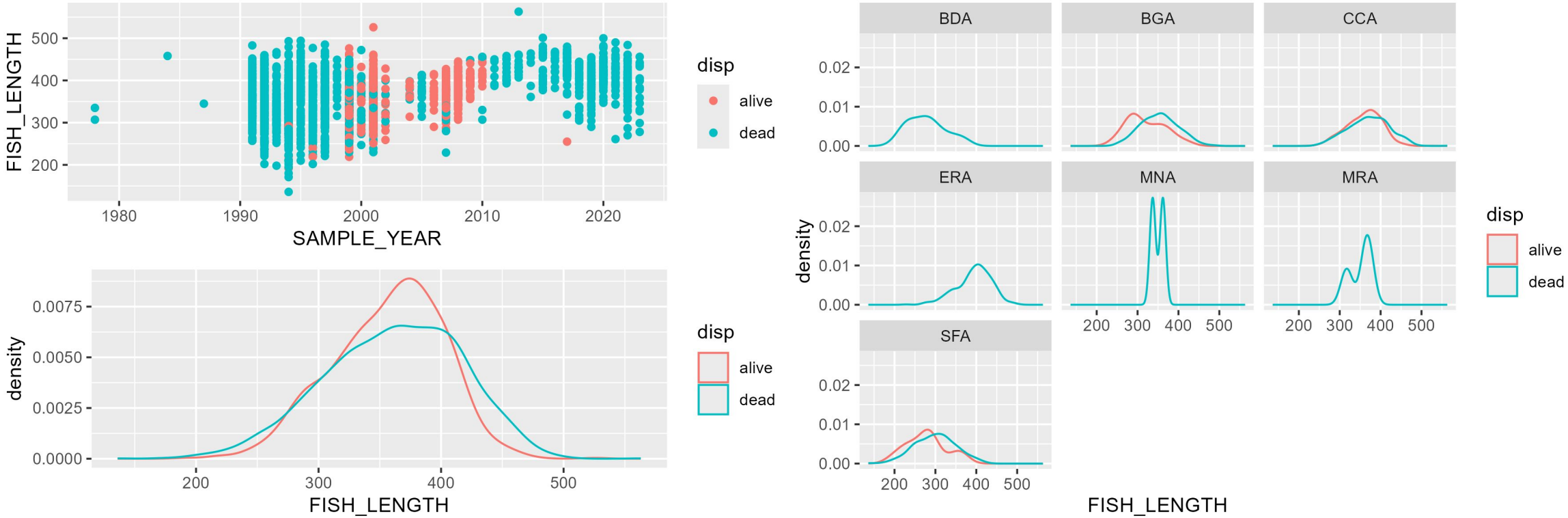
- Discard lengths in 2022 similar to those in PacFIN
  - Rationale in WCGOP is “regulation”

- Limited sample sizes < 2022 consistent with negligible discard amounts for those years
  - Vast majority of WCGOP bio samples are from 2022

- 2023 data available recently but not yet analyzed

Commercial Lengths by Disposition

- Similar live vs dead lengths when available. **Plan to combine**



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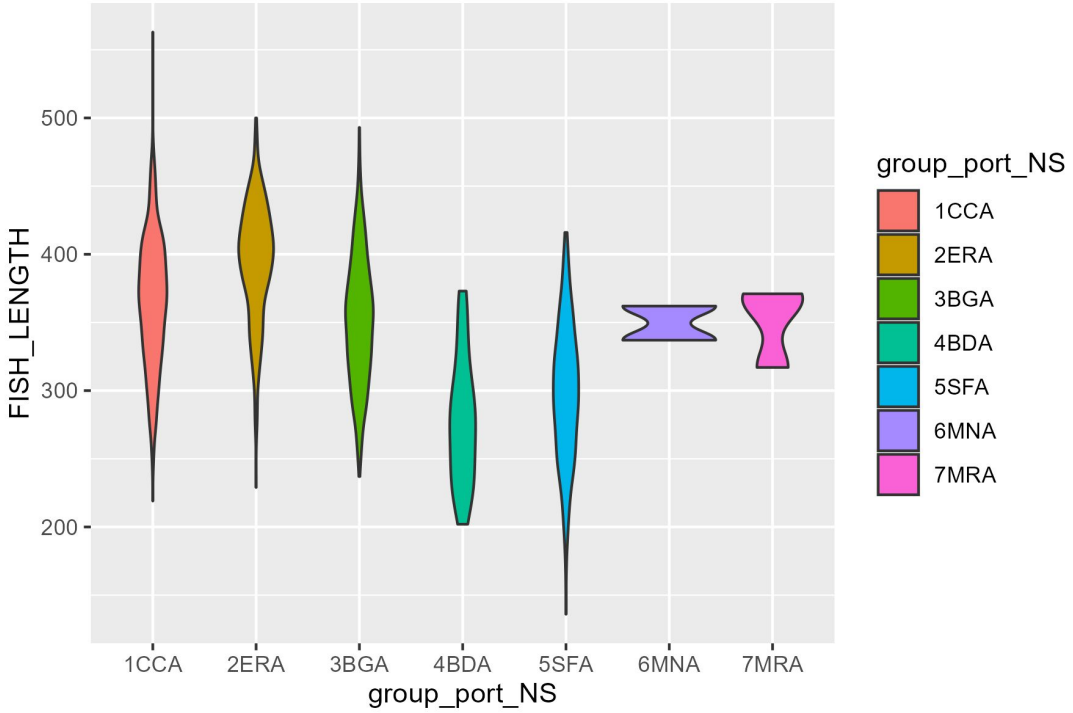
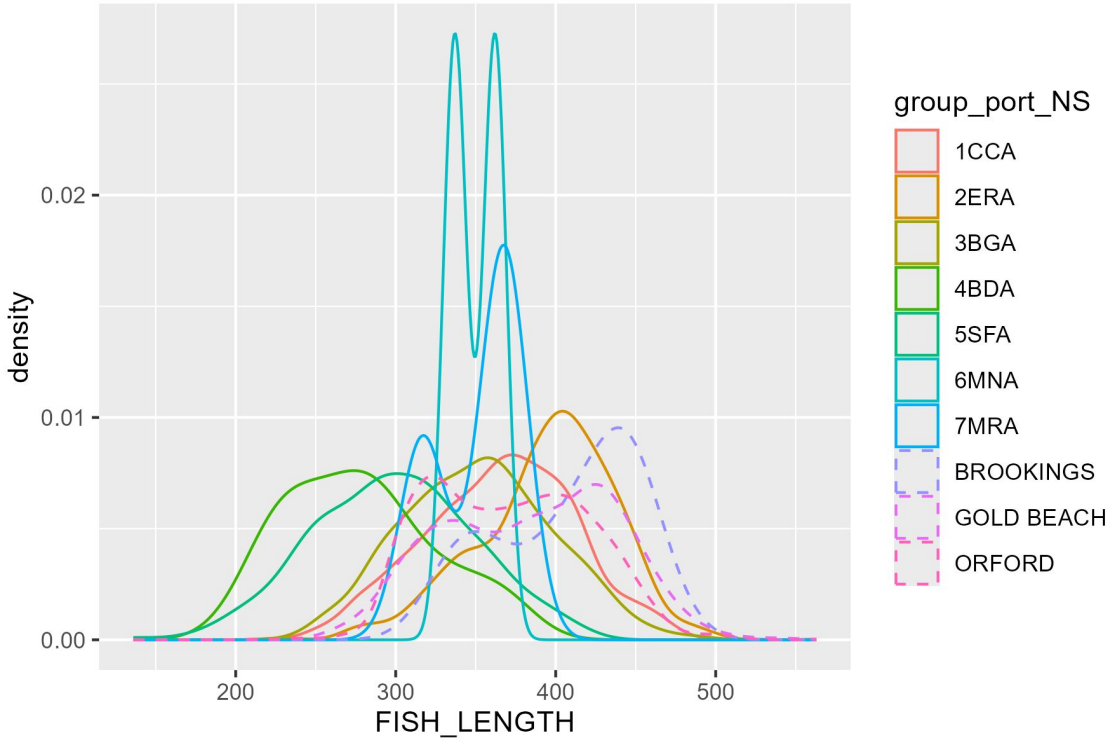
Commercial Lengths by Area

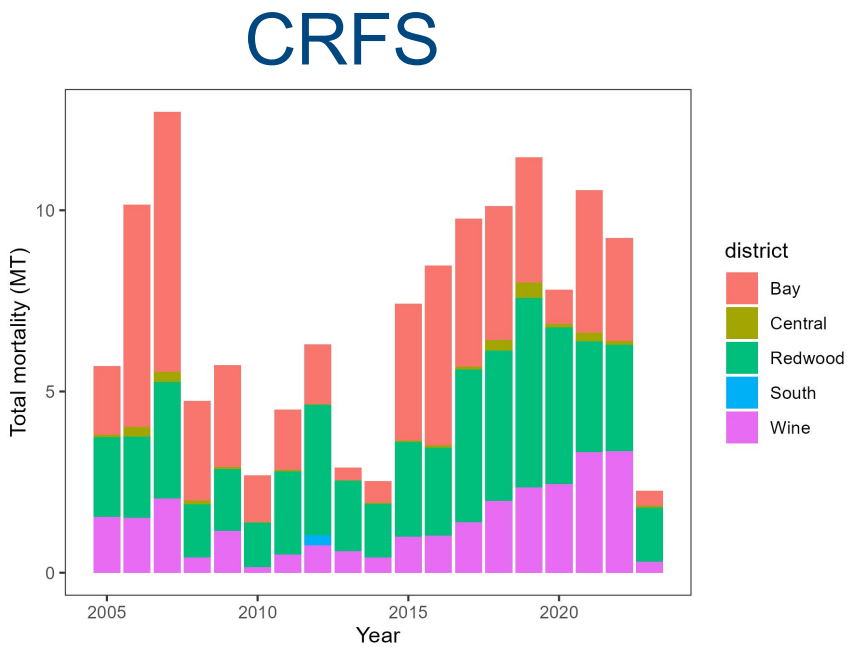
- Larger fish in the northern areas. **Plan to explore this during modeling**

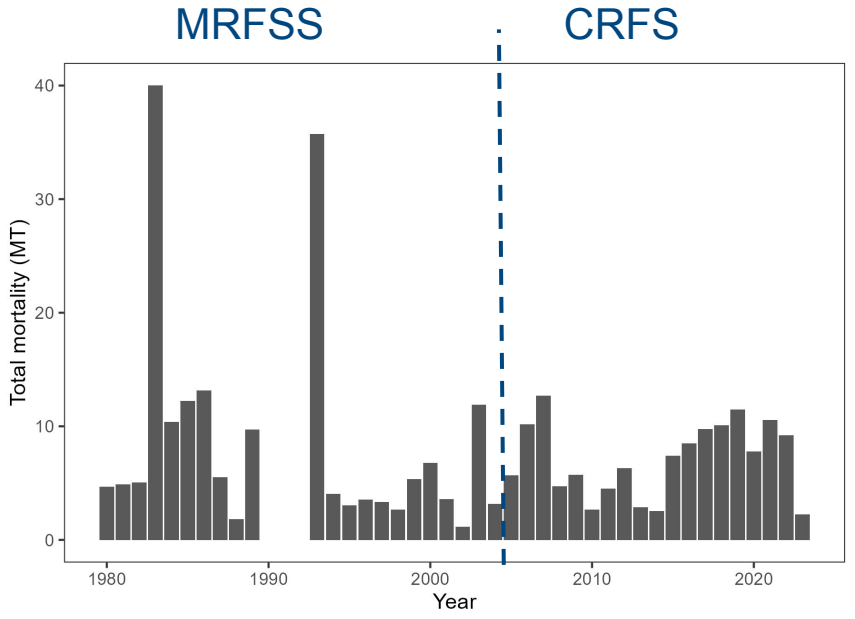




Recreational Landings by District

MRFSS doesn't have district level breakdown





Final values will aggregate over District

Recreational Total Mortality by Mode

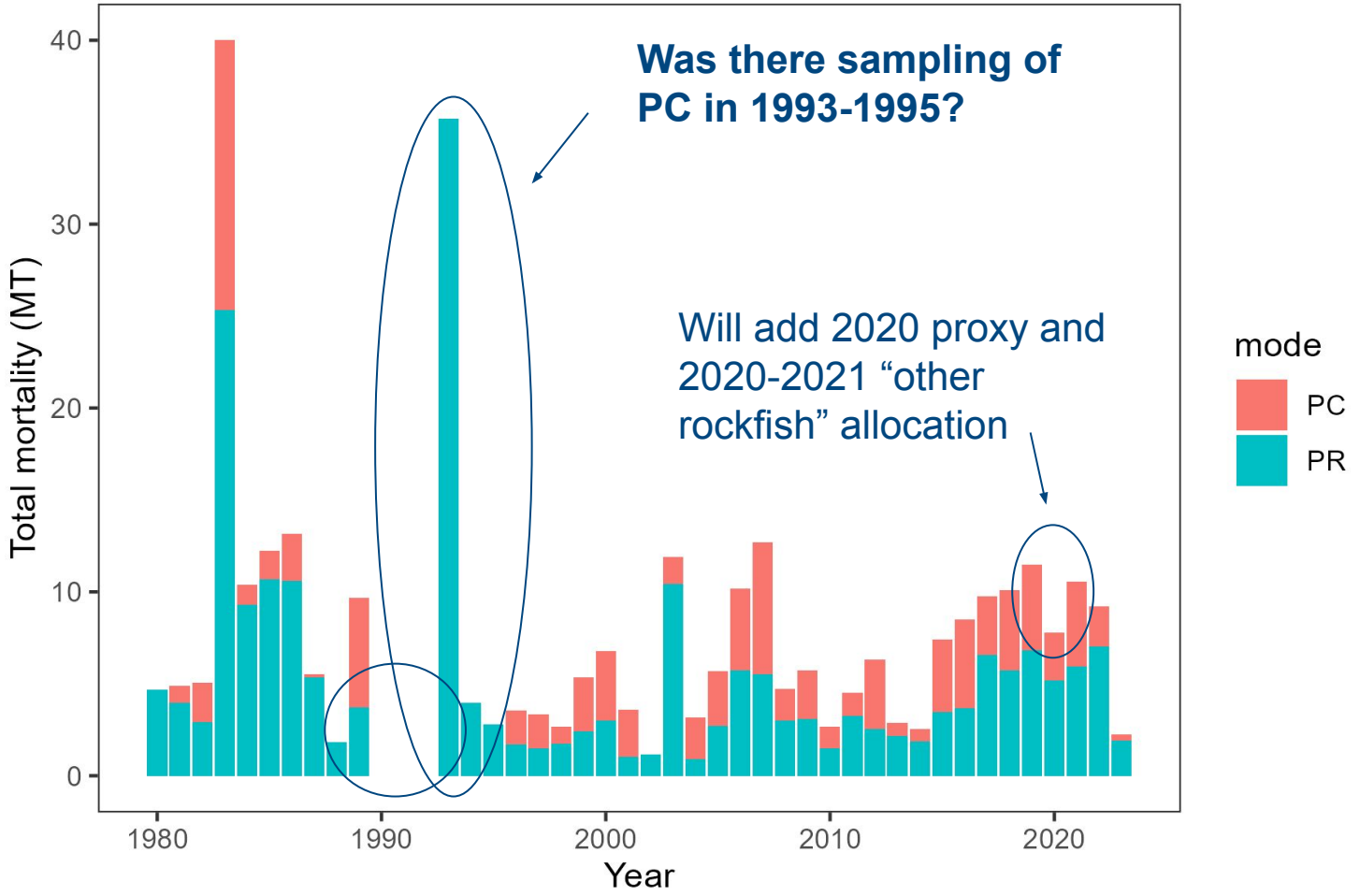
CRFS (2005-2024) & MRFSS (1980-2004)

Discard plus landings

2004 CRFS data is in MRFSS

-Will fill in 1990-1992 gaps
-Will address Covid impacts in 2020 coverage and 2020-2021 sampling

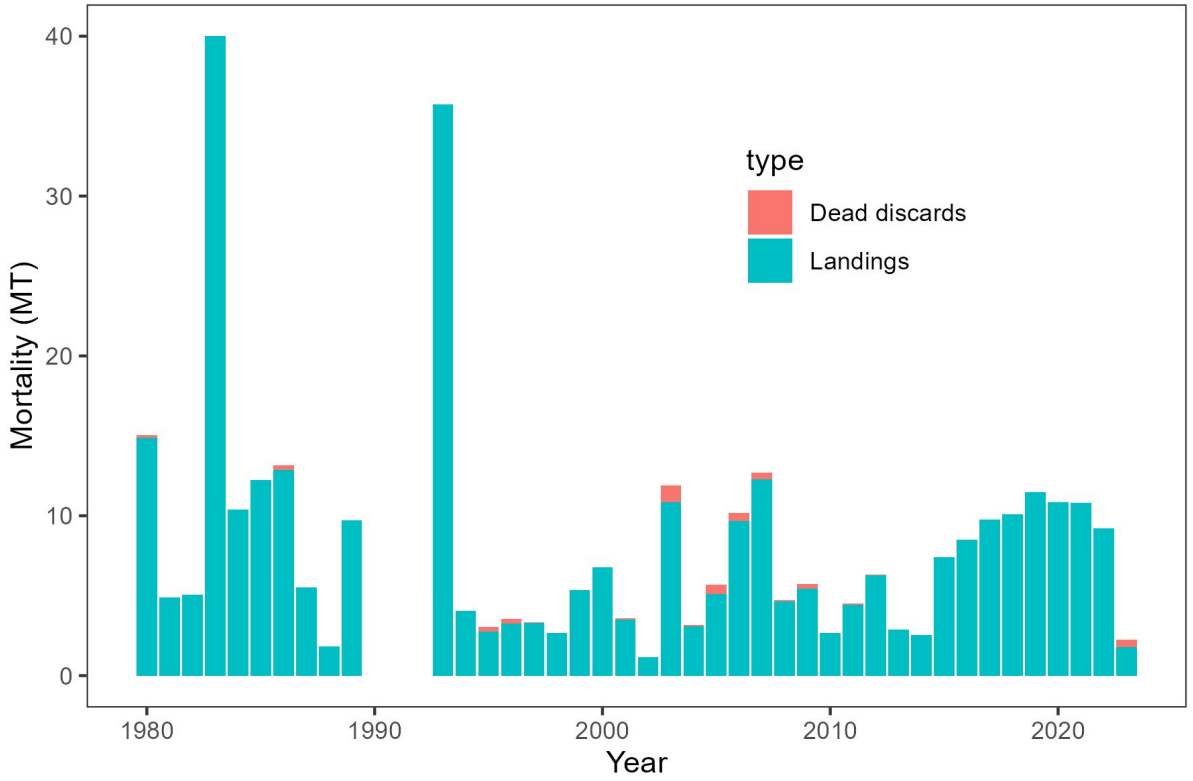
Plan to combine private/rental (PR) and party/charter (PC) modes



NOAA FISHERIES

Recreational Discards

CRFS (2005-2024) & MRFSS (1980-2004)



MRFSS data provides total mortality. Approximate breakdown indicates contributions from dead discards is small (1.1%)

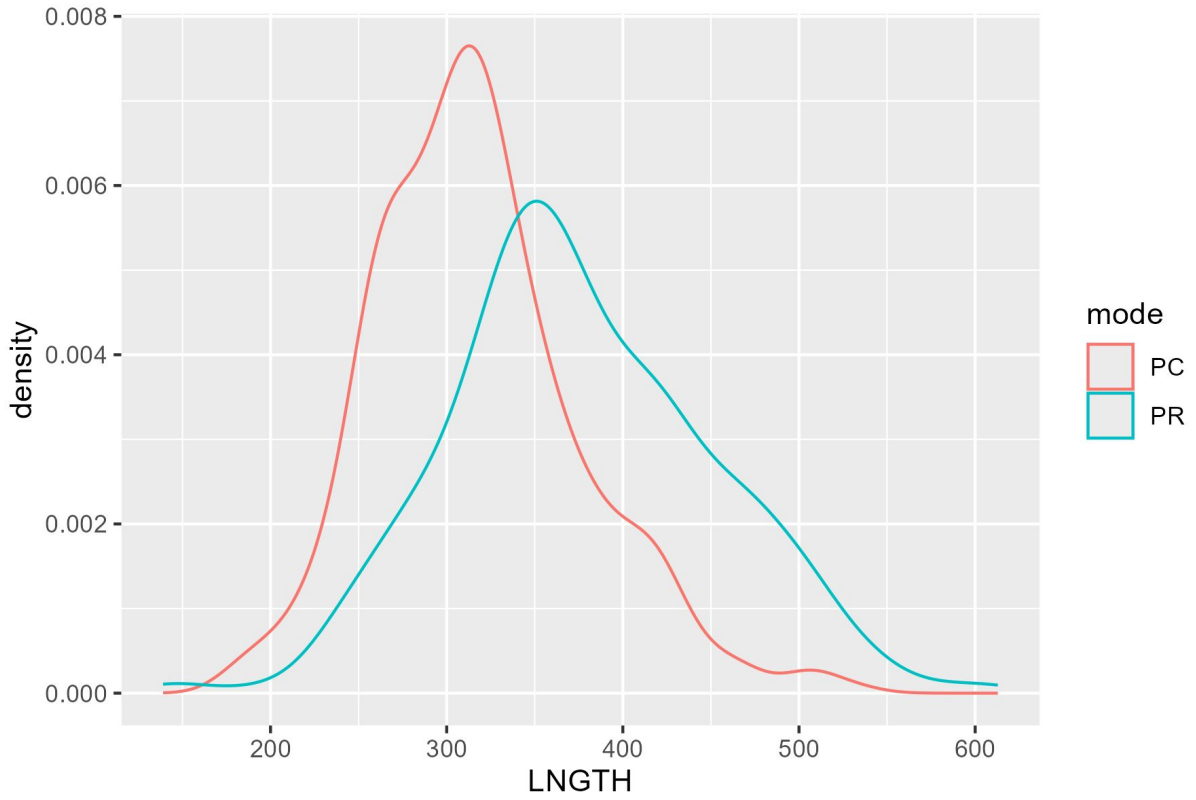
Plan to apply MRFSS rate to historical reconstruction years (1928-1980)

NOAA FISHERIES

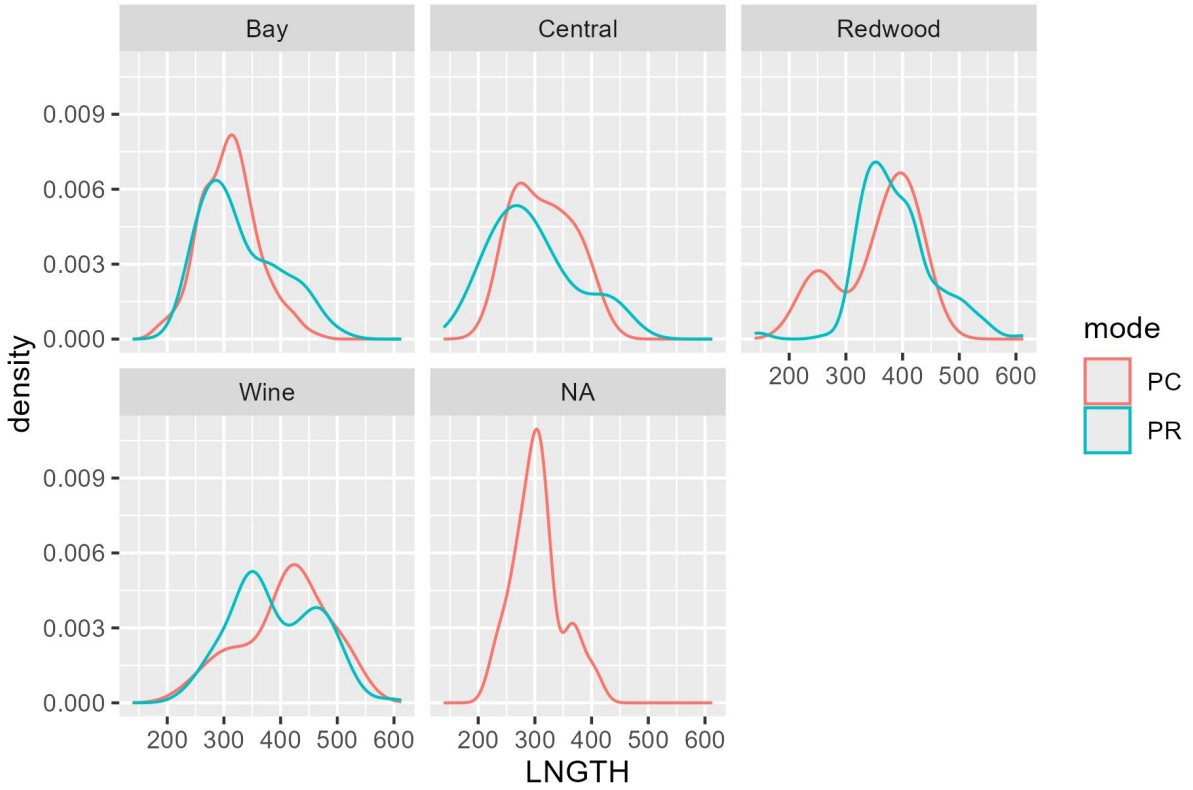
Recreational Lengths by Disposition (MRFSS)

- Similar PC vs PR lengths where occur together. **Plan to combine**

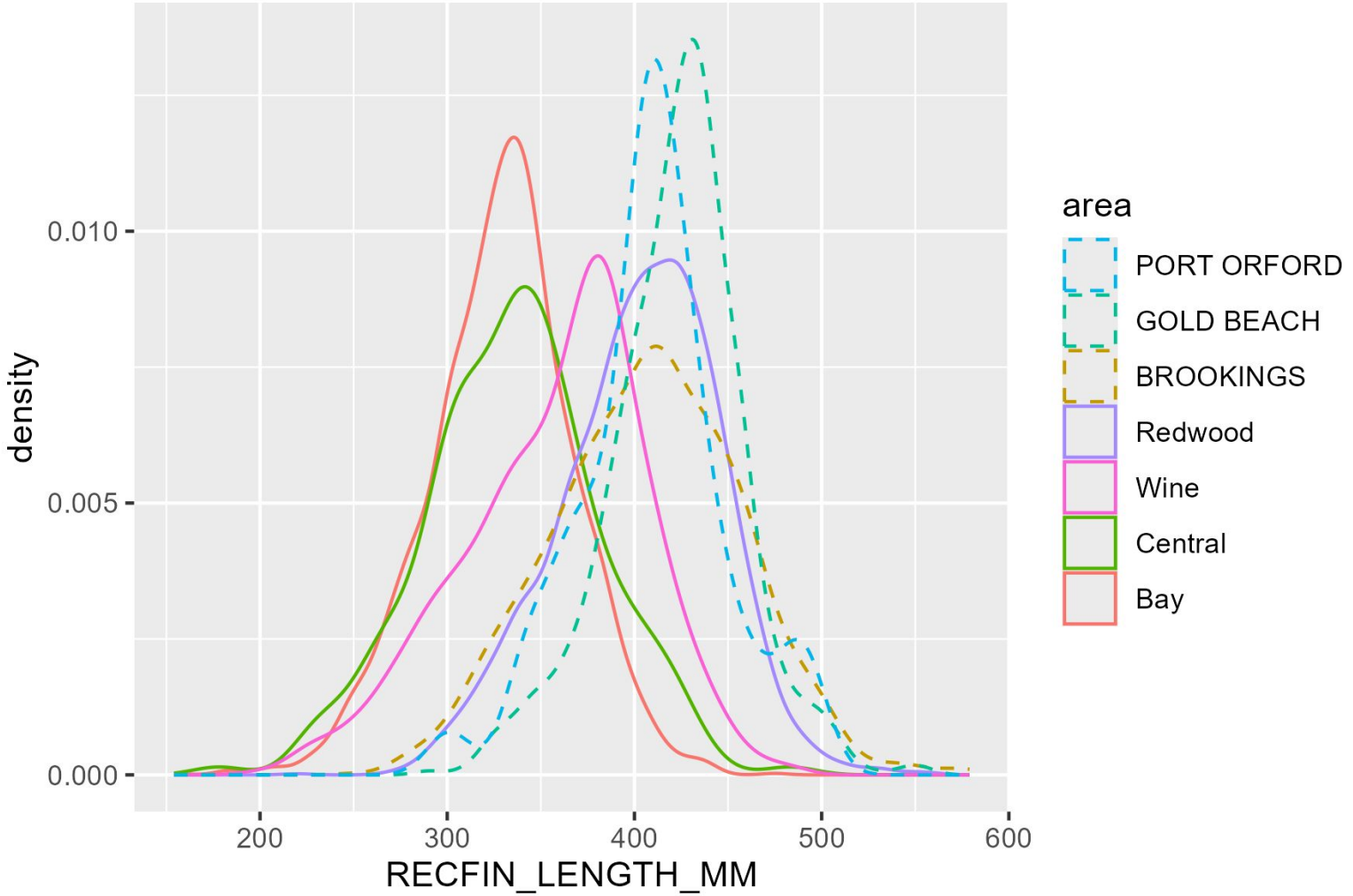
Overall differences due to area….



…because modes are similar within same district.



Recreational lengths by district



Recreational Regulations Summary

1999-2000: Gear restrictions and start of spatial management

2017-2018: Relaxation of depth restrictions

Changed during these two years, stabilizes in 2019

2022: Sub-bag limit of 1 quillback rockfish in January 2022

2023: Prohibited as of August 7, 2023

2024: Depth closures

Additional information available here

Generalized comm. non-trawl RCA boundaries (fm)

Year	South of 40-10	North of 40-10
2002	Closed > 20	
2003	20 - 150 (Nov/Dec shore-150)	27- 150 (Nov/Dec shore-150)
2004-2006	30/20 - 150	30 - 150
2007-2008	30 - 150	30 - 100
2009 - Feb 2014	30 - 150	20 - 100
March 2015 - 2016	30 - 150	30 - 100
2017	30 - 125 (Jan - Jun) 40 - 125 (Jul-Dec)	30 - 100
2018 - 2020	40 - 125	30 - 100
2021 - 2023	40/50 - 125	30/40 - 100
2024	3nm state boundary - 75 fm	3nm state boundary - 75 fm

Additional information available here

Age-at-length data by project