SEDAR 80 Caribbean Queen Triggerfish St. Thomas/St. John modeling process

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CFMC SSC Meeting

Overview of Data and Assessment Goals

St. Thomas/St. John Data

- **Fishery dependent** commercial trap removals, effort, and TIP observed length compositions
- **Fishery independent** index of abundance (density) and observed length composition from diver survey by year (Reef Visual Census, RVC)
- **Cooperative** life history studies for locally informed growth, maturity, and mortality

The SEDAR 80 Caribbean Queen Triggerfish Assessment goal is to develop a stock assessment model using a data-limited approach similar to those approved for SEDAR 46 (Queen Triggerfish) or SEDAR 57 (Spiny Lobster).

Notes From our Last Meetings

The May 2023 SSC meeting involved a review and discussion of December 2022 Meeting recommendations to explore:

- equilibrium catch assumptions and grouped historical landings
- dome-shaped selectivity
- variability in growth
- composite length composition
- index weights
- model input reweighting
- fishery ind. index corroboration
- parameter estimability

Modeling Decisions/Suggestions Made During our Last Meeting

- **Pool commercial length comps** across years due to market driven catch size
- Setting **steepness equal to 1** (parameter estimability)
- Remove trap index due to market driven catch and retain RVC index (**index corroboration**)
- **Commercial dome-shaped selectivity**
- **Informing initial F** with available historical information before 2000 (equilibrium catch assumptions)

Data Overview

- Commercial landings (annual) and composite length composition
- RVC index and observed length composition by year

Estimated Parameters

- **Unfished recruitment (R0)**
- **Selectivity parameters**
- **Initial F (2000)**

Fixed Parameters

- Growth
- Natural Mortality
- Maturity
- Steepness

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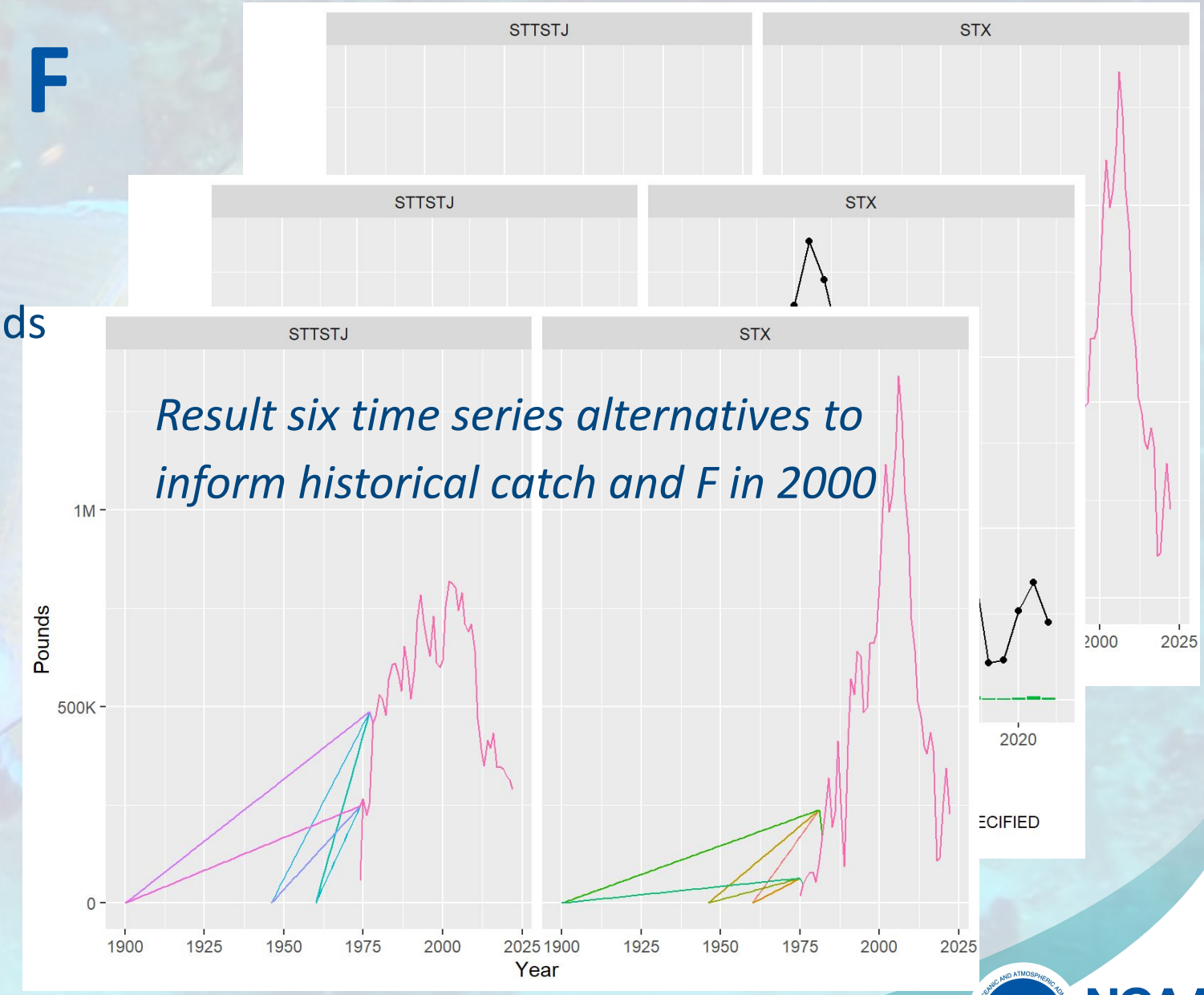
Informing Initial F

- Back calculations for total landings
- Stacked bar plot of annual pounds for USVI species groupings with overlay line of total catch.
  - STT: 12%; 0.09 CV
  - STX: 3%; 0.26 CV

- Back calculations for total landings of species group.



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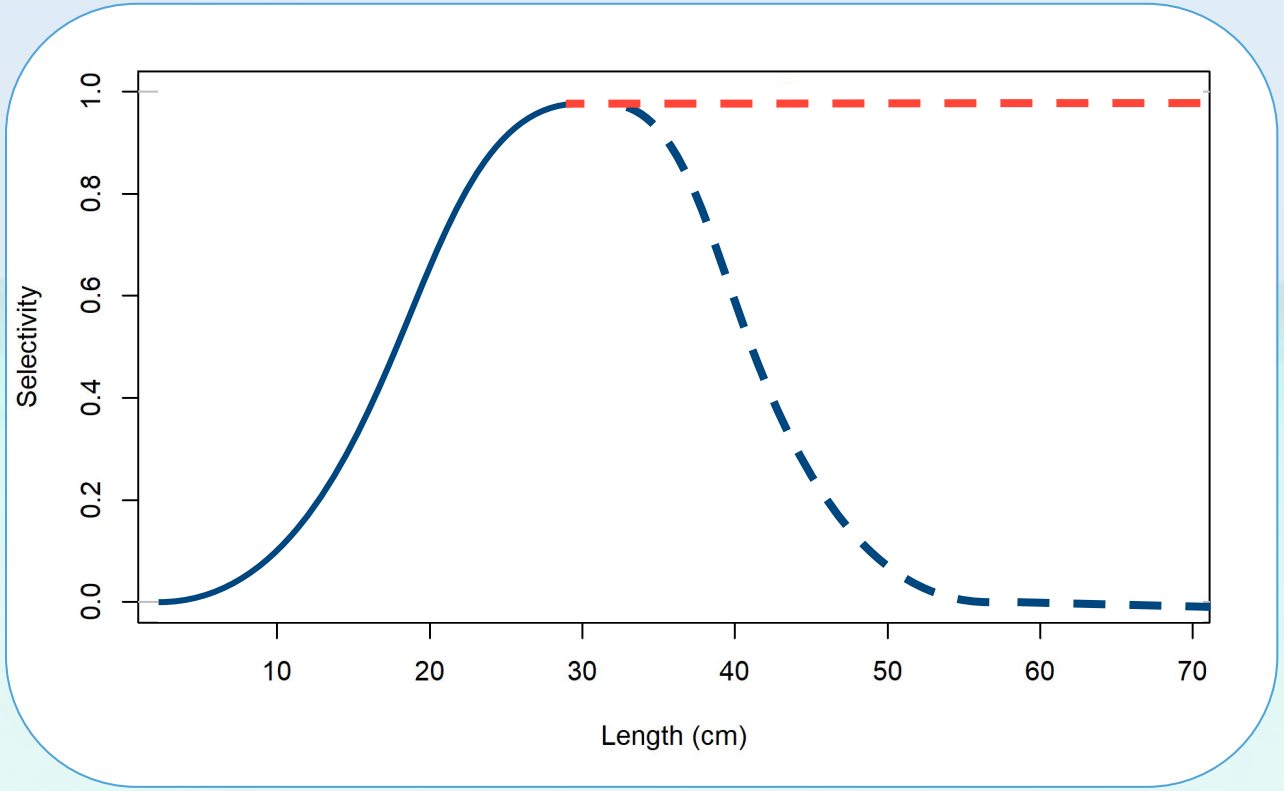
Commercial Dome-Shaped Selectivity



After a certain size, all fish are selected (available and retained)

Larger fish are unavailable to the gear or returned to the water

RVC Maximum 46 cm
TIP Maximum 66 cm

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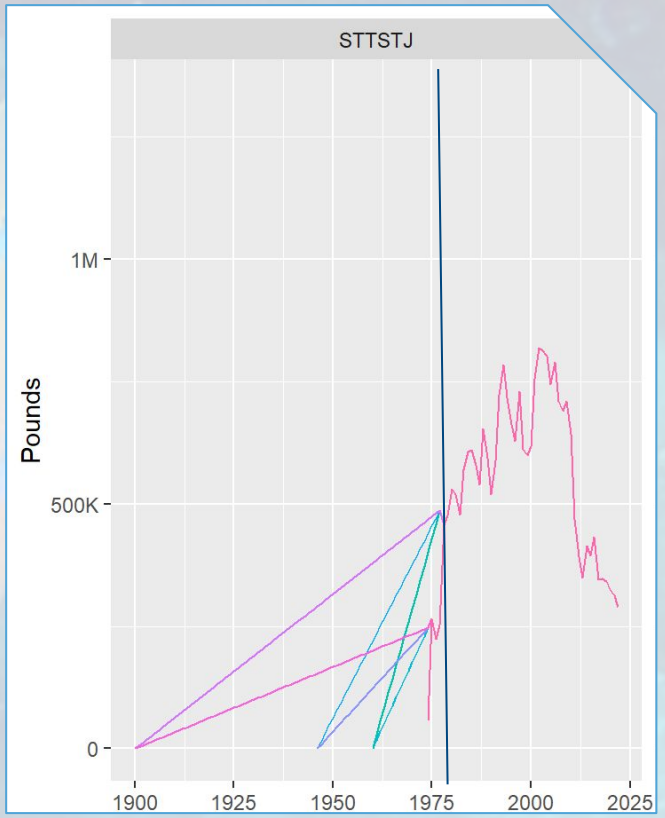
New Decisions

- Initial F informed by six historical catch series alternatives
- Commercial selectivity descending limb
- RVC selectivity of largest fish (flat-topped?)

Initial F Informed by Six Historical Catch Series Alternatives

Backcalculation years	Virgin SSB	F_{2000}	lnR0
1945-1977	299.505	1.86063	6.18203
1945-1974	299.306	1.81572	6.18136
1960-1977	299.305	1.84265	6.18136
1860-1974	298.867	1.8069	6.1799
1900-1977	301.166	1.97108	6.18756
1900-1974	300.366	1.91018	6.1849



Options:

- Use a midpoint (1.869) across the six alternative runs as a prior
- Use a midpoint (1.869) across the six alternative runs as a fixed value
- use the full range to evaluate uncertainty with an ensemble

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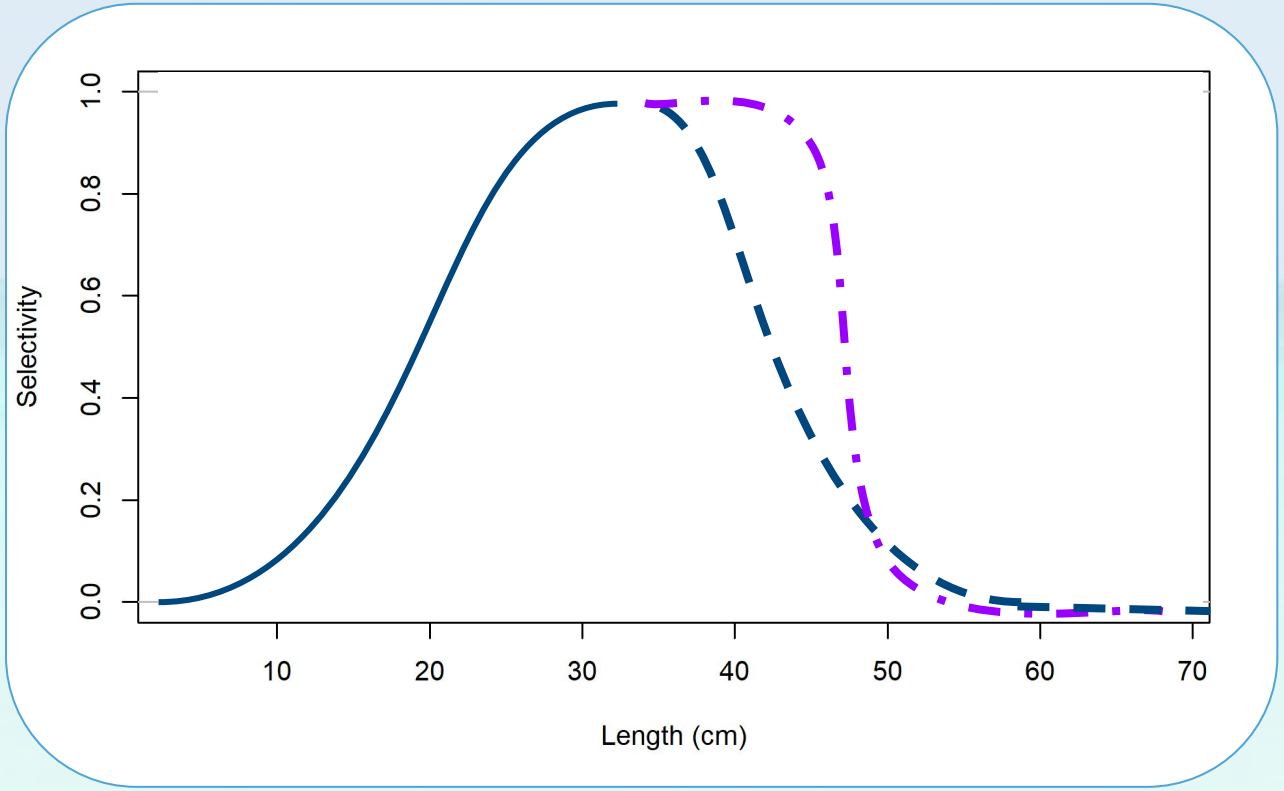
Commercial Dome-Shaped Selectivity

Larger fish are unavailable to the gear or returned to the water.



The maximum limit varies

The maximum limit is quite fixed

Approach:

- Fix selectivity of largest fish to zero
- How does it approach zero?
  - Fix or use prior on top width
  - Fix or use prior on descending slope

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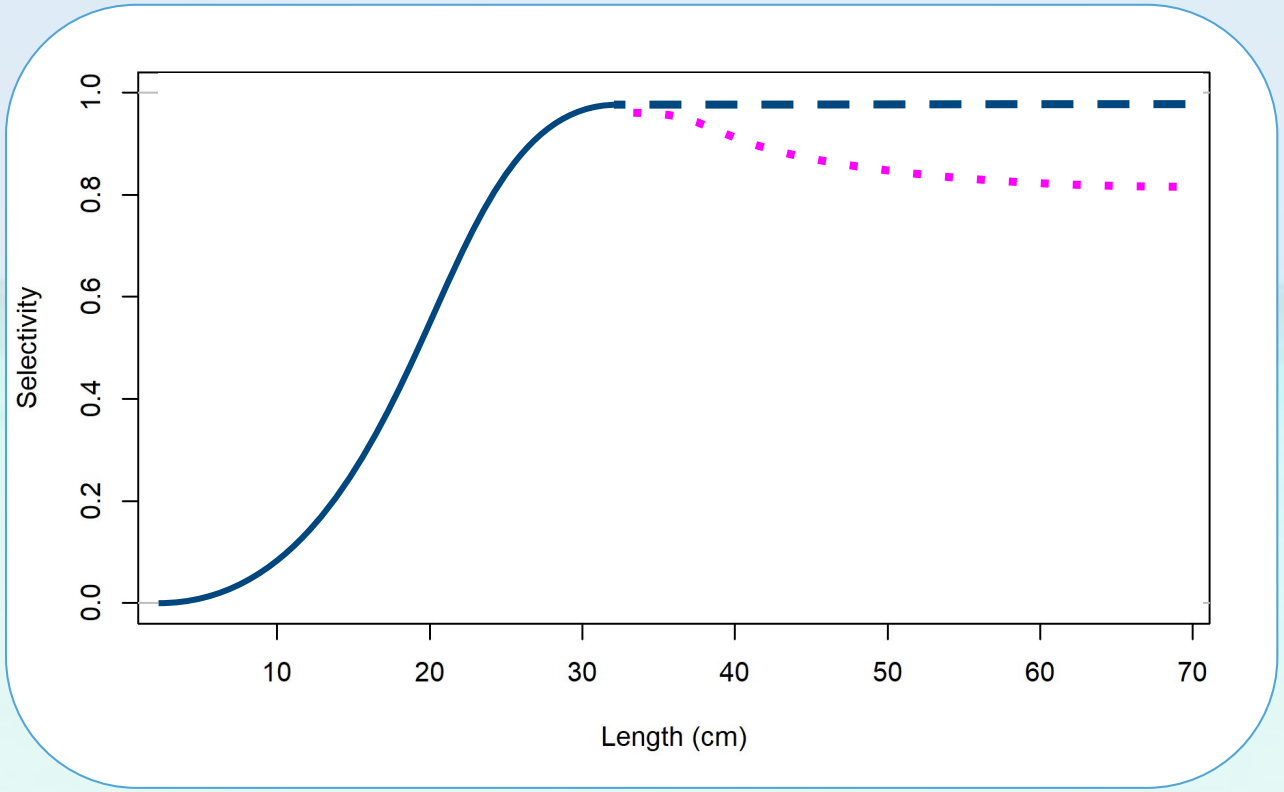
RVC Flat-Top

Model estimates flat-topped selectivity, but deeper surveys observed larger fish compared to the habitats surveyed in the RVC



Flat-top selectivity

Dome-selectivity

Approach:

- Allow the model to be flat-topped
- Explore levels of doming in sensitivity runs

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Path Ahead

- ABC control rule tier guidance
- Characterizing uncertainty

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Which Tier Are We In?

Tier 2: Data Moderate	
Condition for Use, MSY, SDC	Data-moderate approaches where two of the three time series (catch, stage composition, and index of abundance) are deemed informative by the assessment process, and the assessment can provide MSST, MFMT, and PDF of OFL.
ABC	Same as Tier 1, but variation of the PDF of OFL (σ) must be greater than 1.5 σ_{min} (in principle there should be more uncertainty with data-moderate approaches than data-rich approaches).
Tier 3: Data Limited: Accepted Assessment Available	
Condition for Use	Relatively data-limited or out-of-date assessments
MSY	MSY proxy = long-term yield at proxy for F_{MSY}
SDC	MFMT = F_{MSY} proxy MSST = 0.75* SSB_{MFMT} or proxy OFL = Catch at MFMT
ABC	ABC determined from OFL as reduced (buffered) by scientific uncertainty[4] and reflecting the acceptable probability of overfishing[2] a. Where the buffer is applied to the PDF of OFL when the PDF is determined from the assessment (with $\sigma \geq 2\sigma_{min}$) **OR** b. Where ABC = buffer * OFL, where buffer must be ≤ 0.9

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Characterizing Uncertainty

Approach depends on Tier:

Sensitivity

- Length at age CV
- Initial F
- Steepness
- Natural mortality
- Remove index
- Com. selectivity descending
- RVC selectivity doming

Profiles

- R0
- Natural mortality

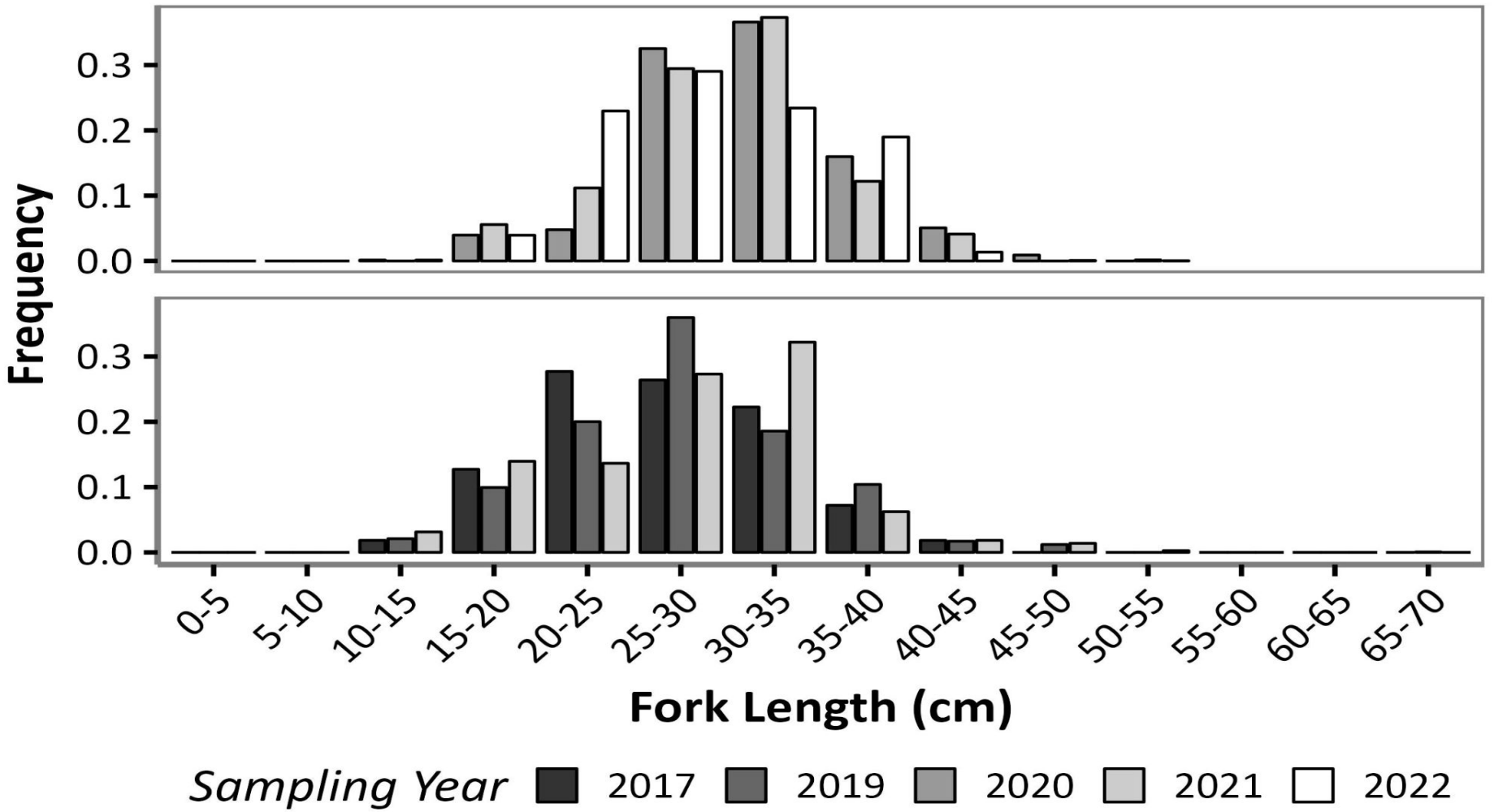
Projections

- Landings through 2022
- Reference points

Notes

- Confirming decisions/suggestions made during our last meeting (super year TIP, fix steepness, remove commercial index, commercial dome shaped selectivity)
- New decisions (initial F, commercial descending width, RVC flat-top)
- Path ahead (uncertainty and control rule guidance)

NCRMP (RVC) and DCRMP size comps



DCRMP

NCRMP (RVC)

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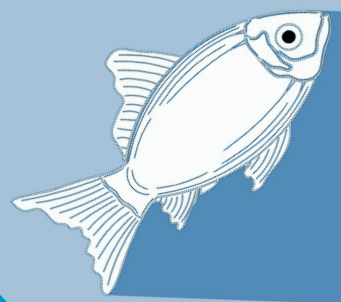

Questions?
¿Preguntas?