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Status of Yellowtail Rockfish North of 40°10’ N. in 2025

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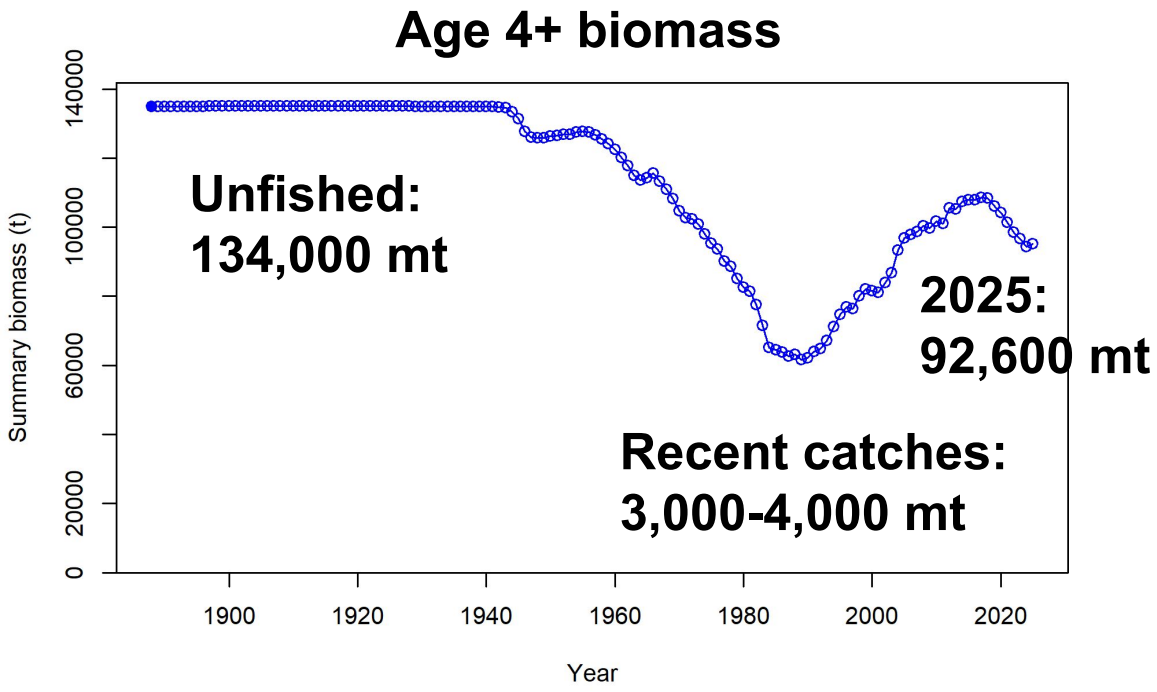
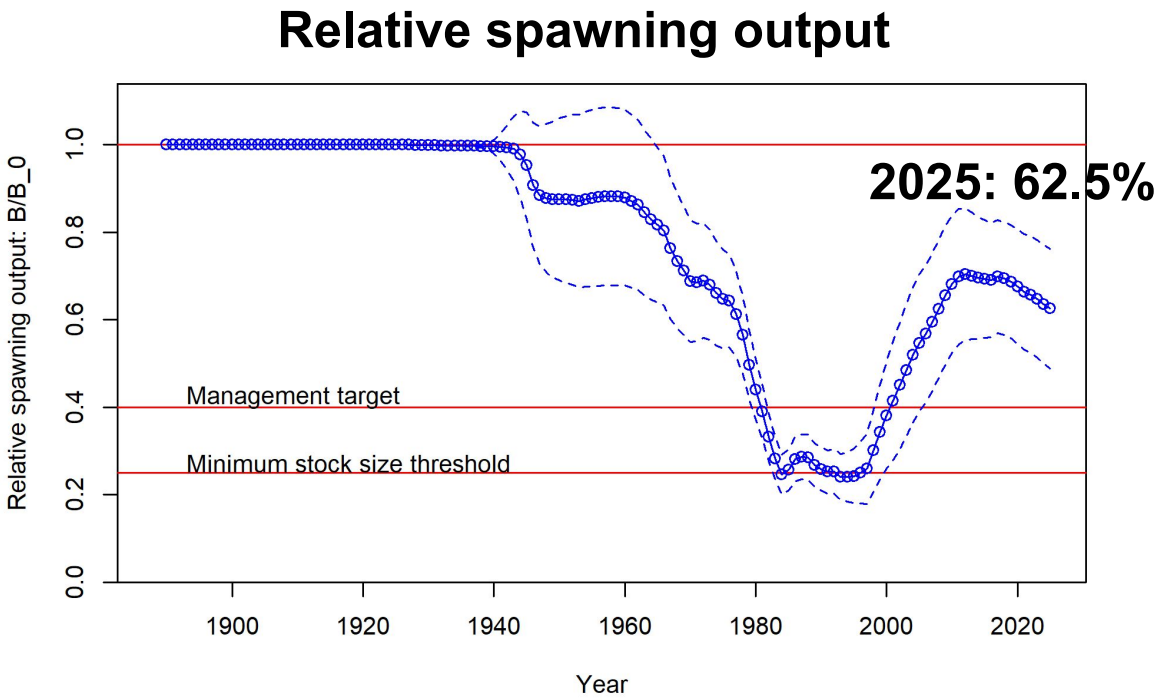
Key assessment outputs





- Catch + length + age + index integrated model (using SS3)
- Model fits composition data reasonably well, index fits are more of a mixed bag

Model summary

Data

- 3 fishery fleets
  - Commercial, at-sea, rec
  - All with age and length data
  - Majority of catch from commercial
- 3 traditional surveys
  - Triennial (length and age)
  - WCGBTS (length and CAAL)
  - OR/WA combined H&L (length)
- 1 recruitment survey: SMURFs

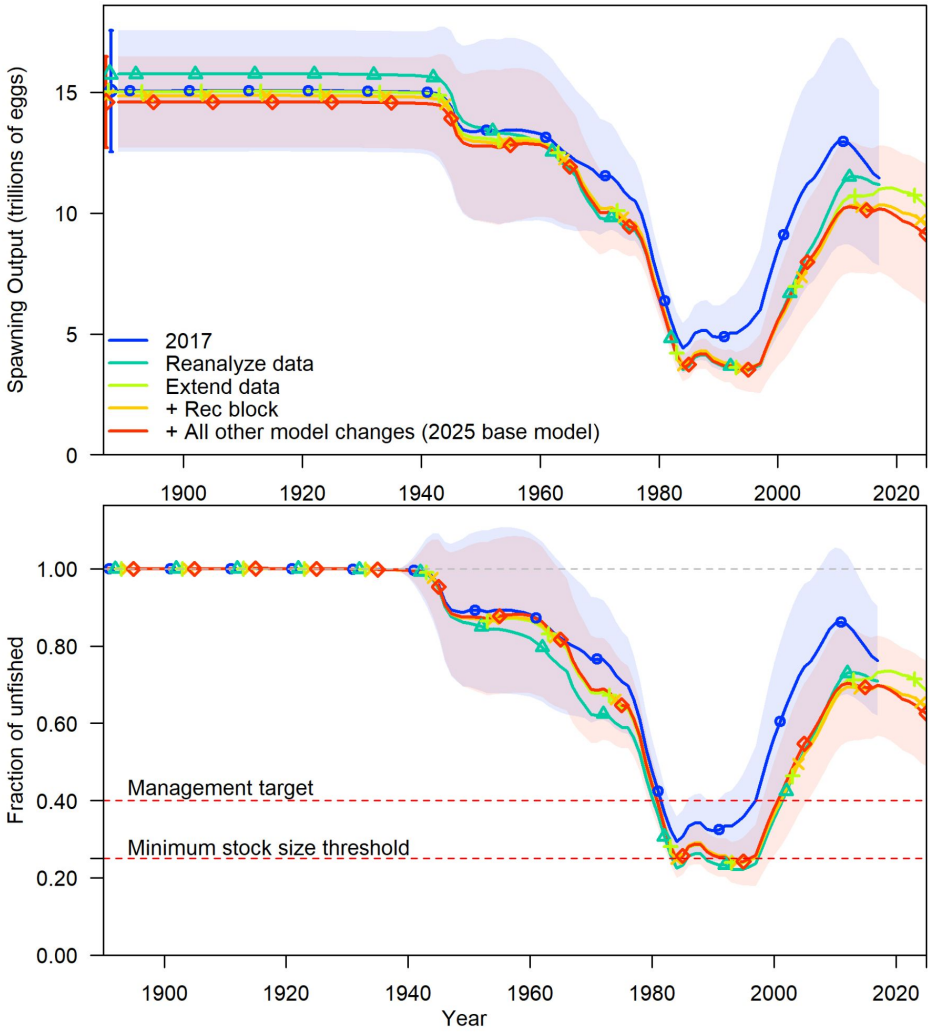
Model

- Sex-specific mortality and growth estimated
  - Male-skewed sex ratio at older ages
- Trawl gears have asymptotic selectivity
- H&L gears dome-shaped
  - Recreational selectivity is sex-specific

Changes for 2025

- Reanalysis of all data sources (including doing a catch-weighted expansion of PacFIN data)
- Discards added to catch rather than modeled using retention
- Added foreign landings from 1960s and 1970s
- New Oregon recreational reconstruction
- Single recreational fleet
- New recruitment and hook & line survey indices
- Sex-specific recreational selectivity, new selectivity blocks
- Change from length-based to age-based maturity

Bridging



Largest changes from:

- Catch-weighting ("expanding") PacFIN age data (vs. "raw")
- Incorporating 8 new years of data
- Selectivity blocking

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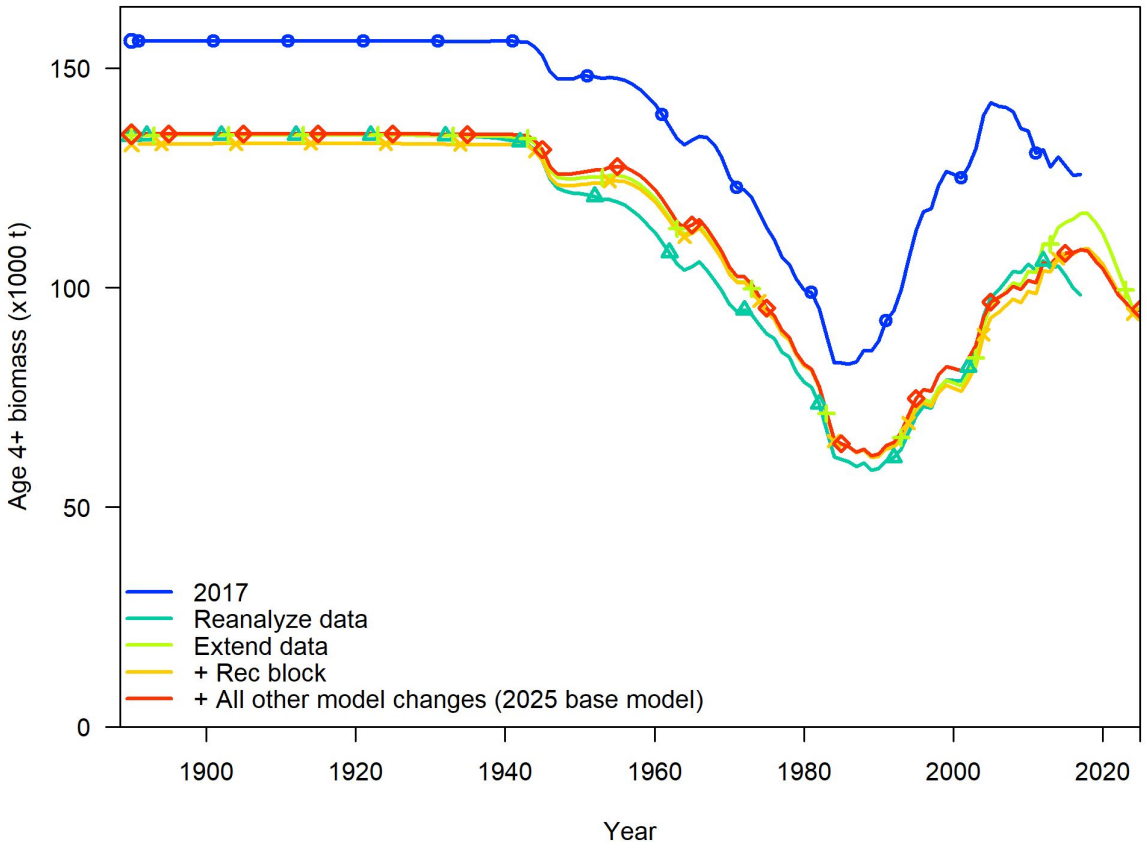

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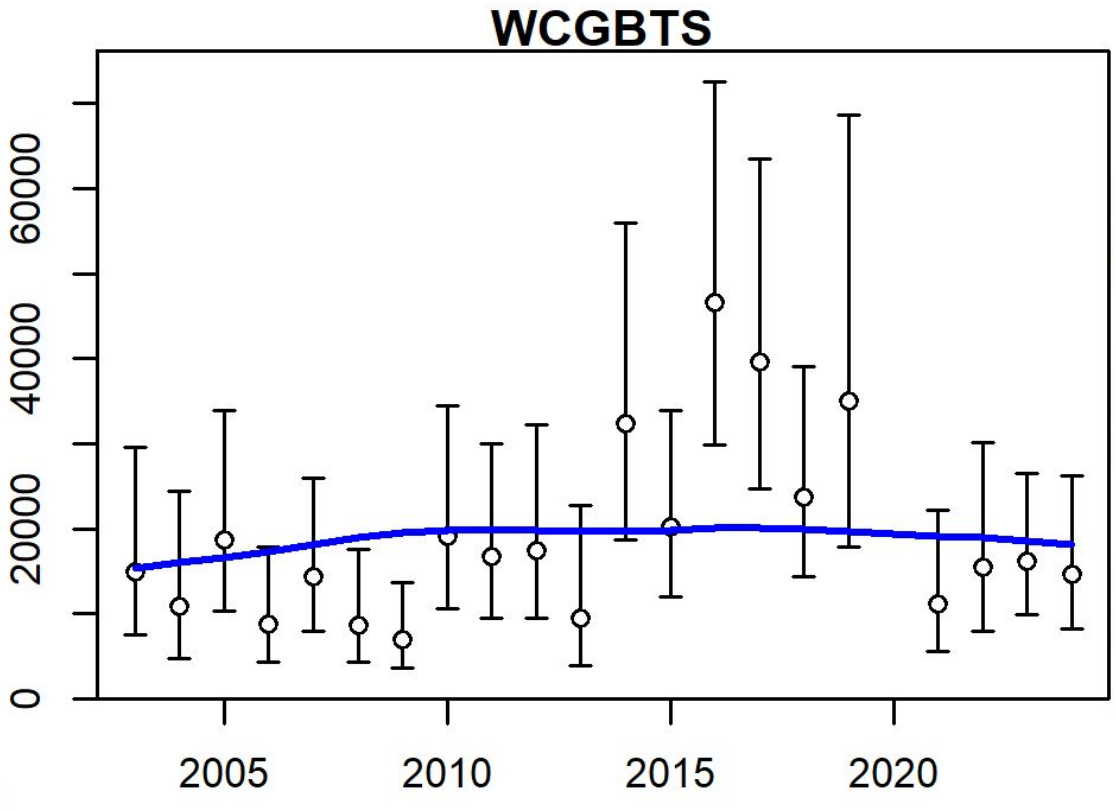
Model struggles to capture elevation in WCGBTS index from 2014-2019



- Robust evidence for large year class in 2008 only supports muted population increase
- WCGBTS pulls M down
- Survey trend matches a preliminary fishery-dependent index

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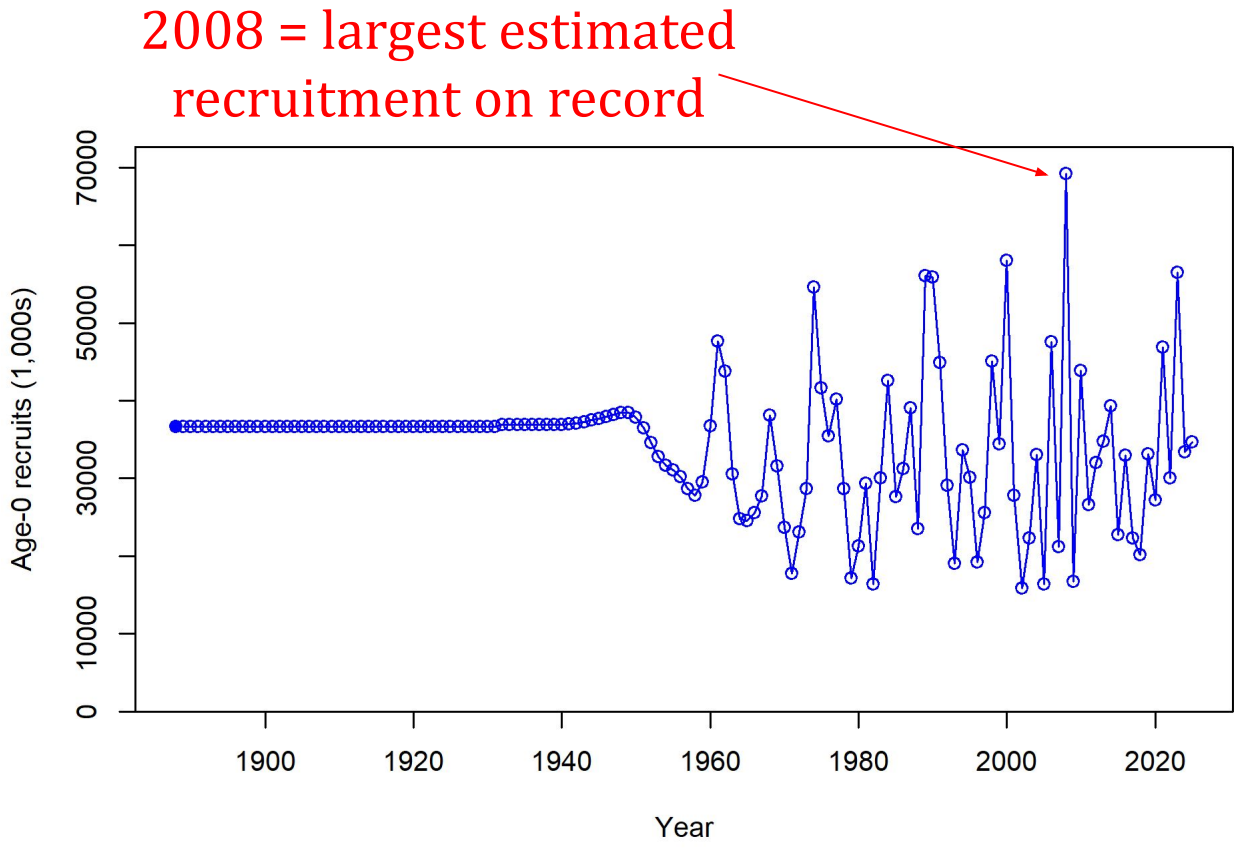

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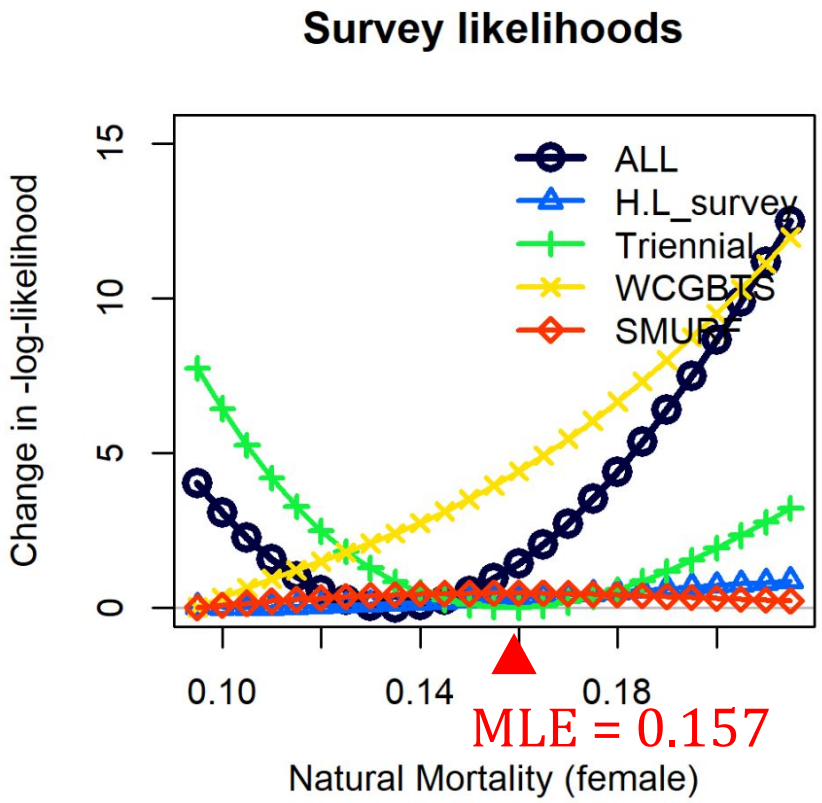

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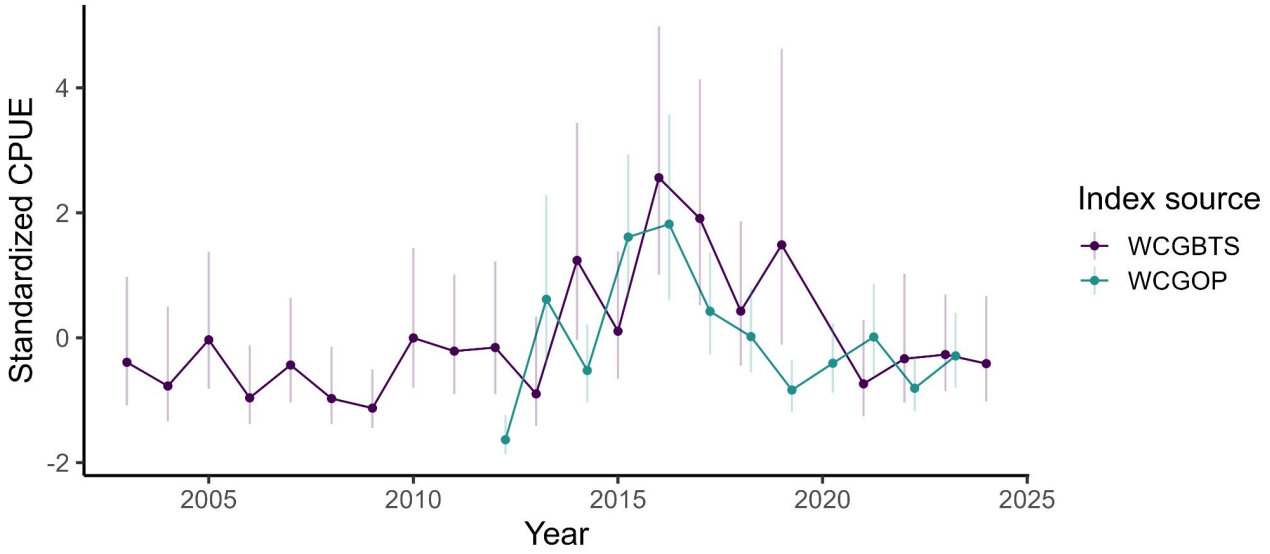

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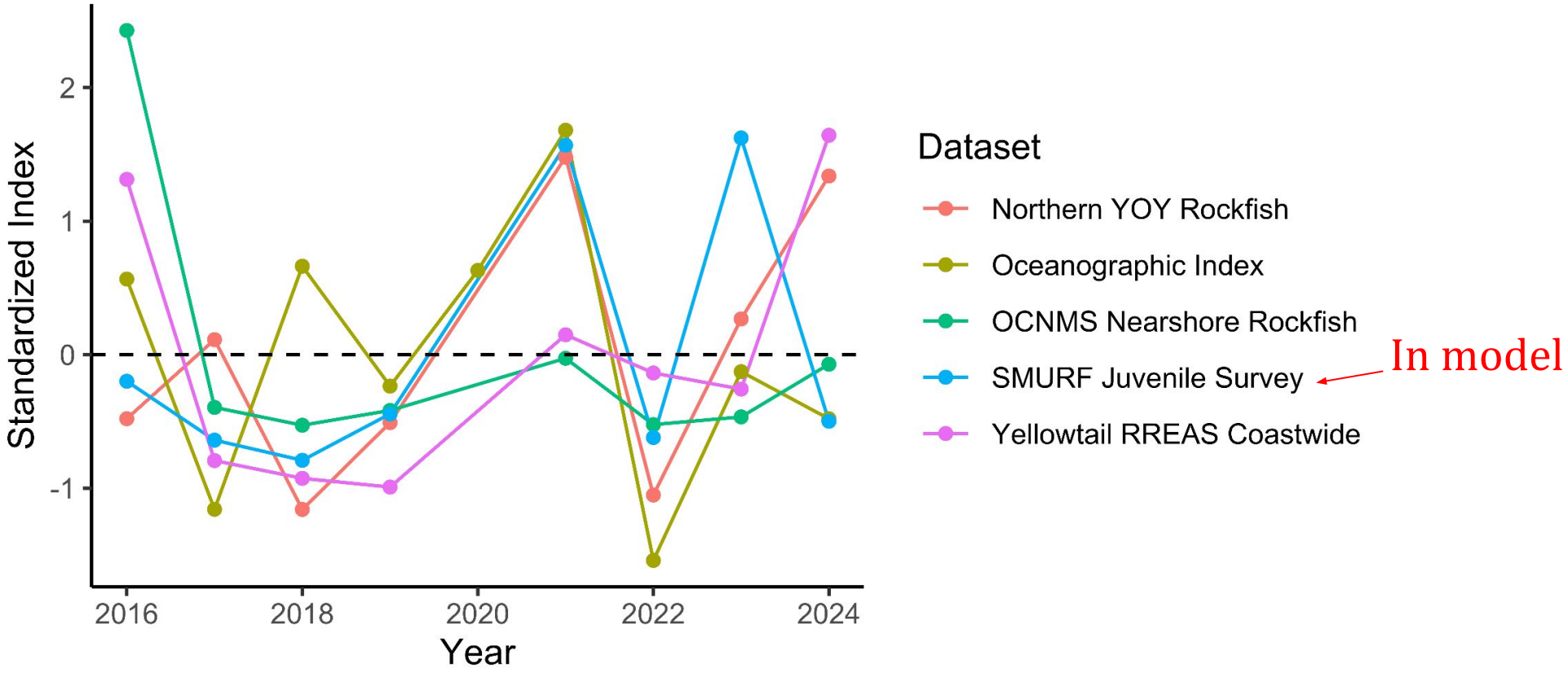
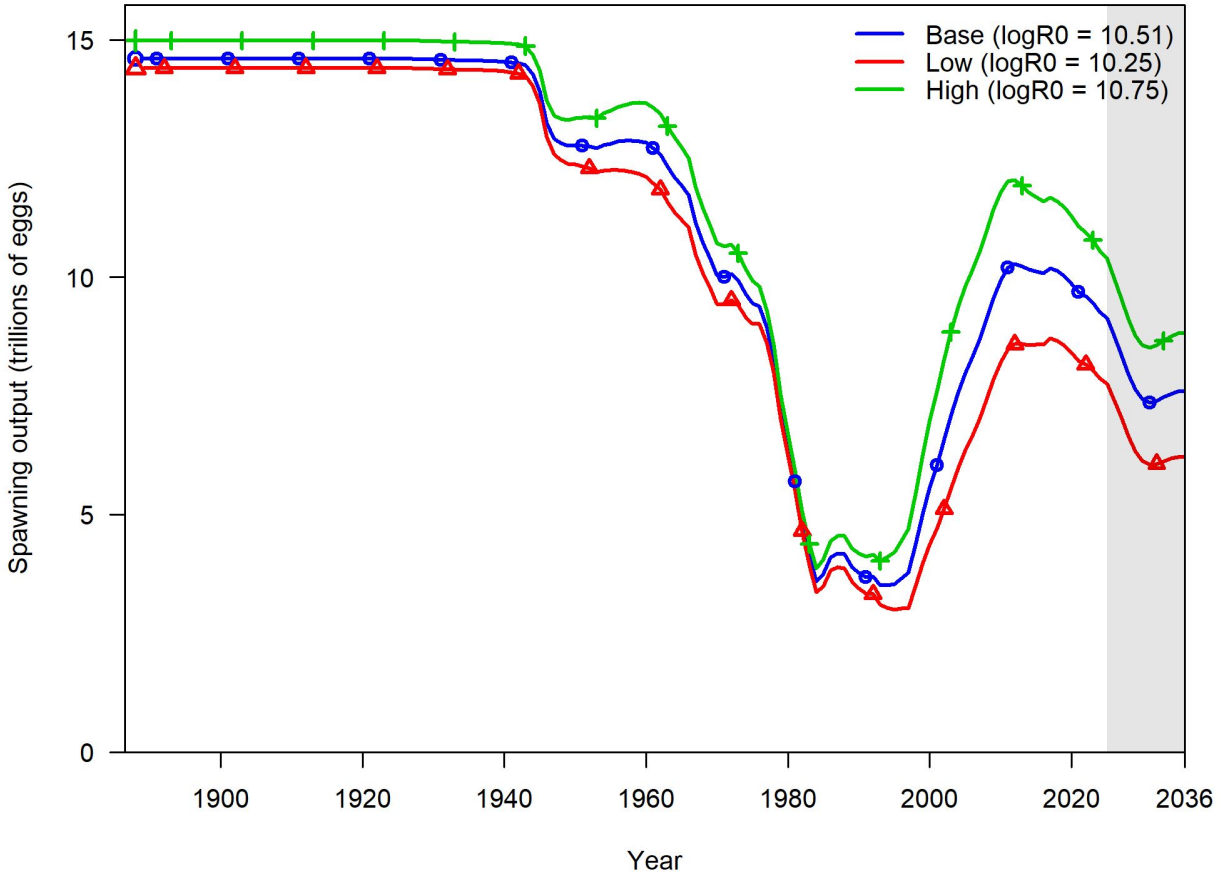
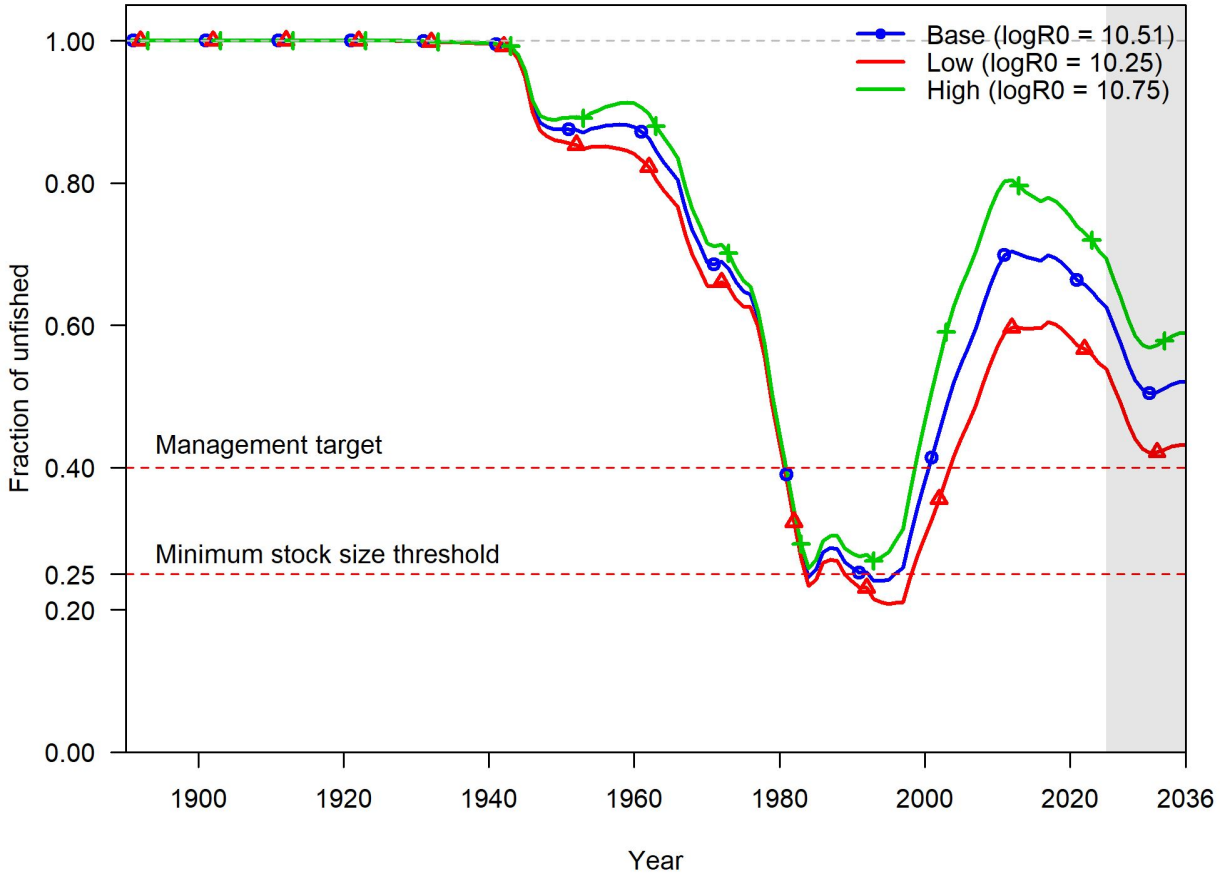
Early evidence for elevated recruitment in 2021



Axis of uncertainty: unfished recruitment





Risk Table

Ecosystem and environmental conditions	Assessment data inputs	Assessment model fits and structural uncertainty
• Recruitment: unfavorable to neutral conditions • Habitat: Neutral • Prey: Most available evidence suggests adequate forage for yellowtail in 2024 and recent years. Caveat: low krill in 2023 acoustic surveys. • Predators: no trend in abundance for 6 of 7 predators in the last 5 yrs • Competitors: Some potential for hake competition for krill, but highly uncertain.	• Catch reconstruction is reliable for a rockfish • More age data than almost any groundfish. Shoreside age data dating back to the 1970s. • Age data are generally fit well with simple selectivity assumptions. Some mild issues with commercial (shoreside) length data. • Species-specific maturity and fecundity; maturity data collected over the last ~10 years • Bottom trawl survey may not be reliable way to generate index for midwater rockfish • New exploration of early life history and hook and line surveys • Generally a target species with most catch landed, only limited bycatch	• Steepness fixed at meta-analysis prior. • Well-informed sex-specific estimates of natural mortality, unfished recruitment, and growth • Good fits to abundant composition data with fairly simple selectivity assumptions and fleet structure • Model generally misses an increase in the WCGBTS from 2014-2019. • Numerically stable model, MCMC posteriors are similar to MLE • Most sensitivity model runs are well within the asymptotic confidence interval of the base model
Level 2	**Level 1**	**Level 1(+)**

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Thank you!

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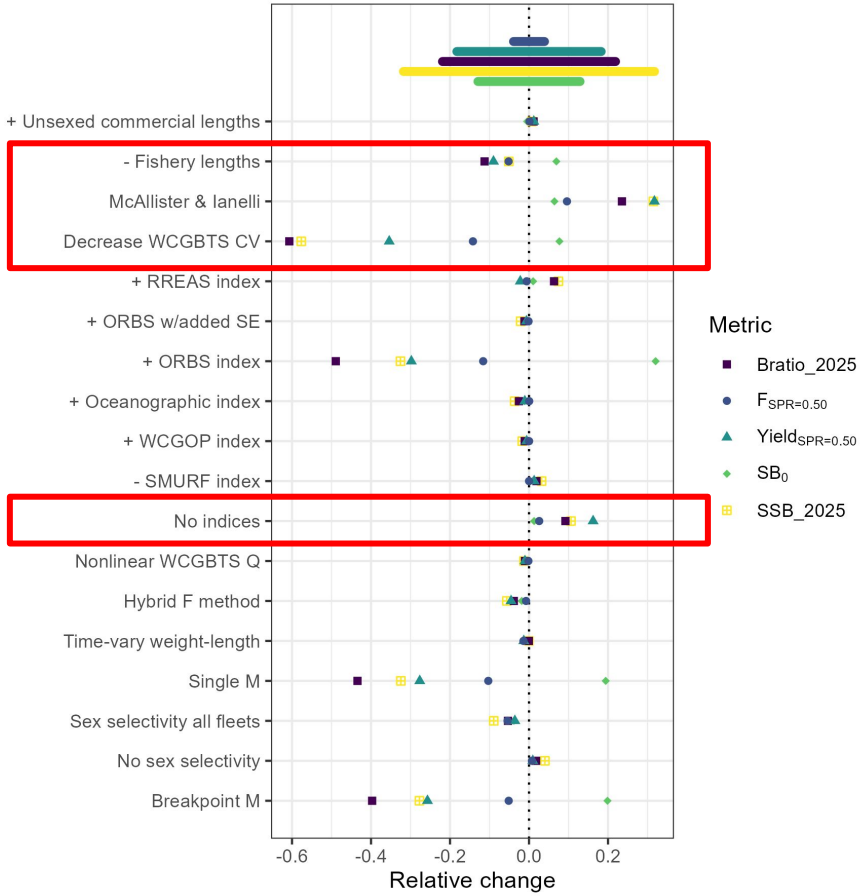

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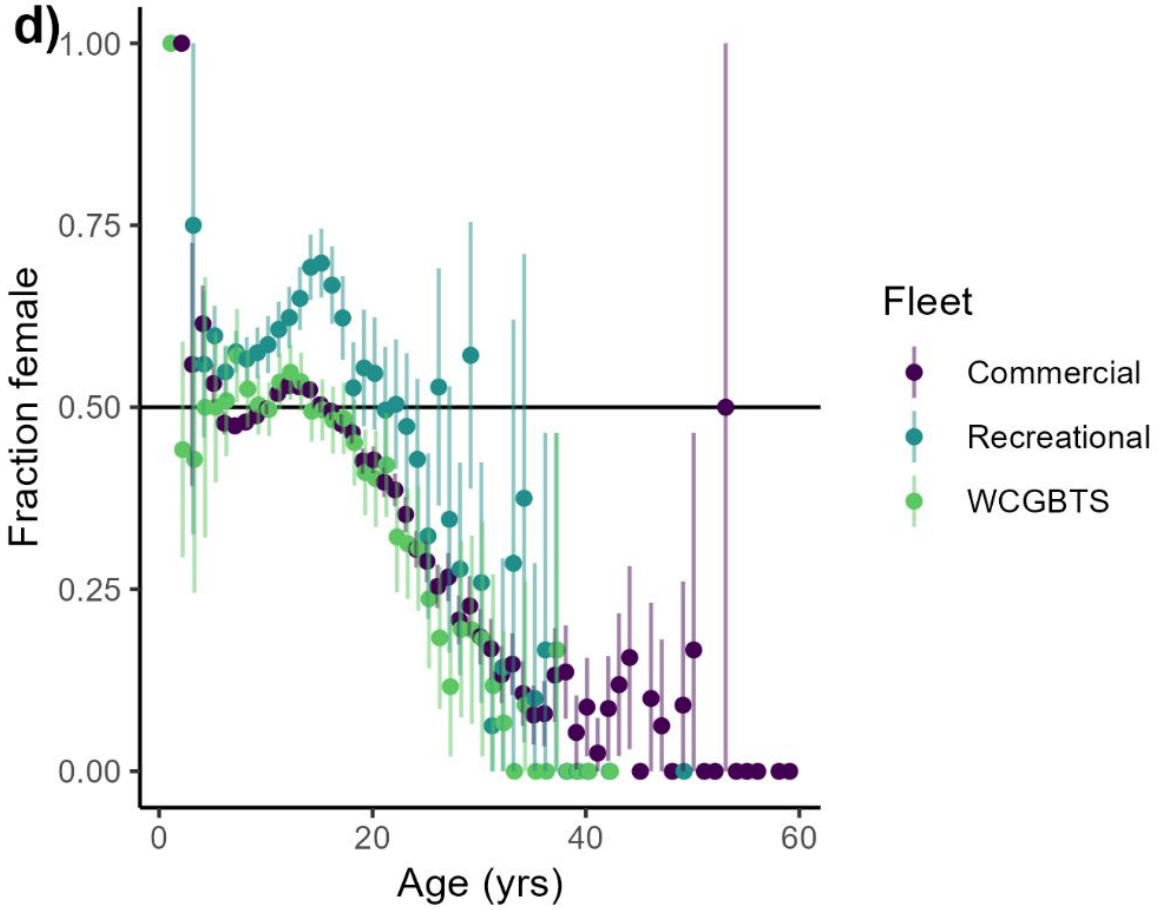
Male-skewed sex ratio for fish >20 years

Females more prevalent in recreational fleet (Untrawlable habitat?)



Appear to migrate north through ontogeny

YOY survey

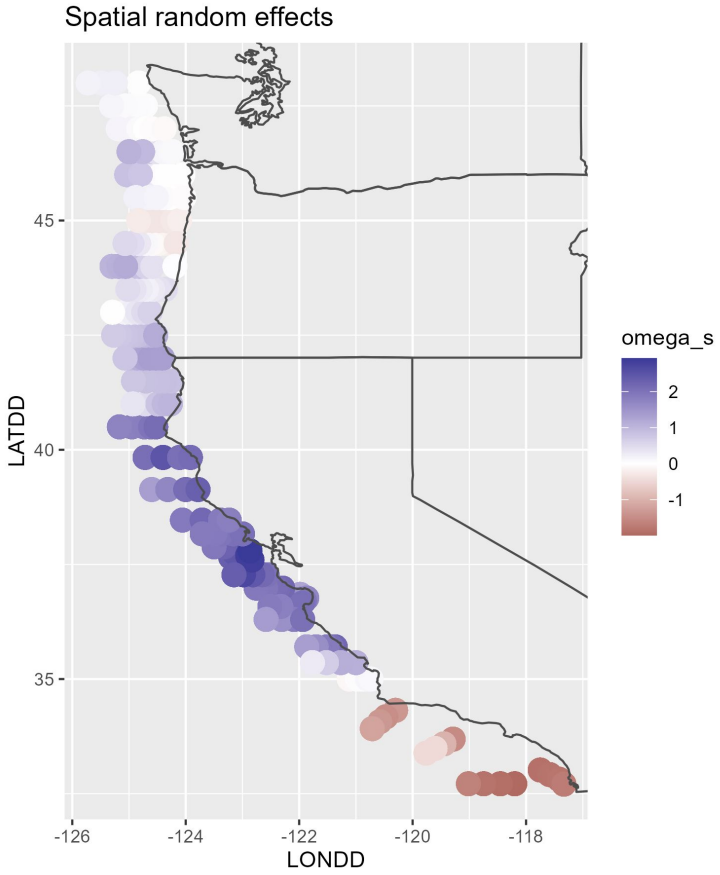
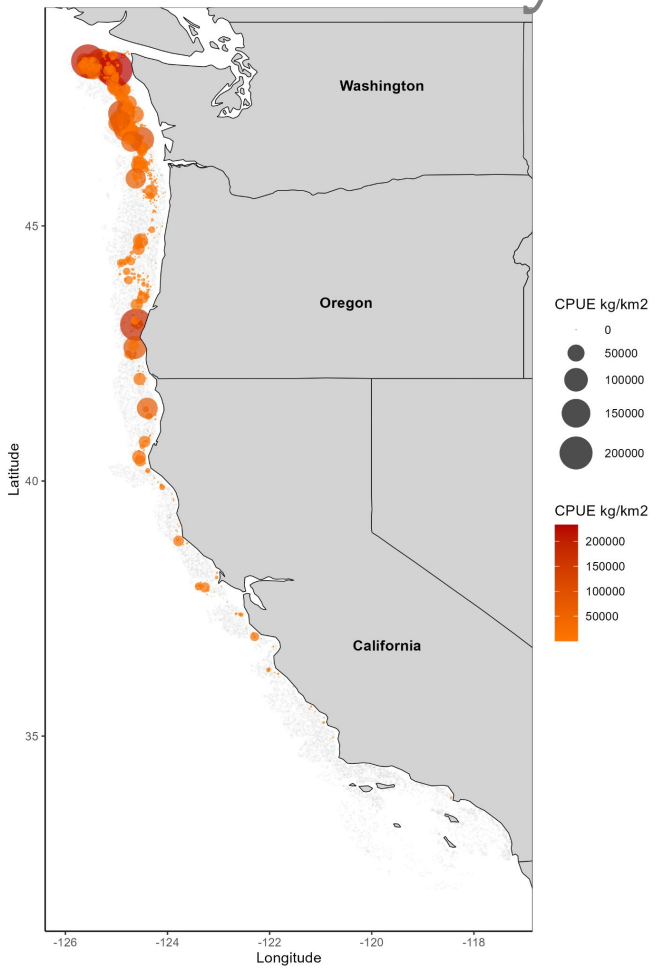


Figure courtesy of T. Rogers

Adult trawl survey



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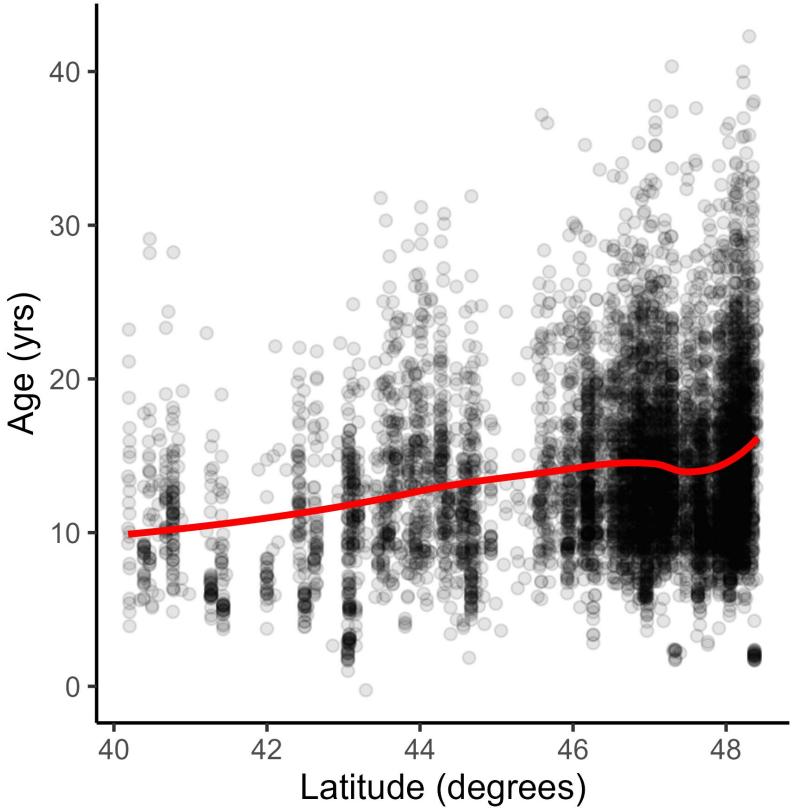
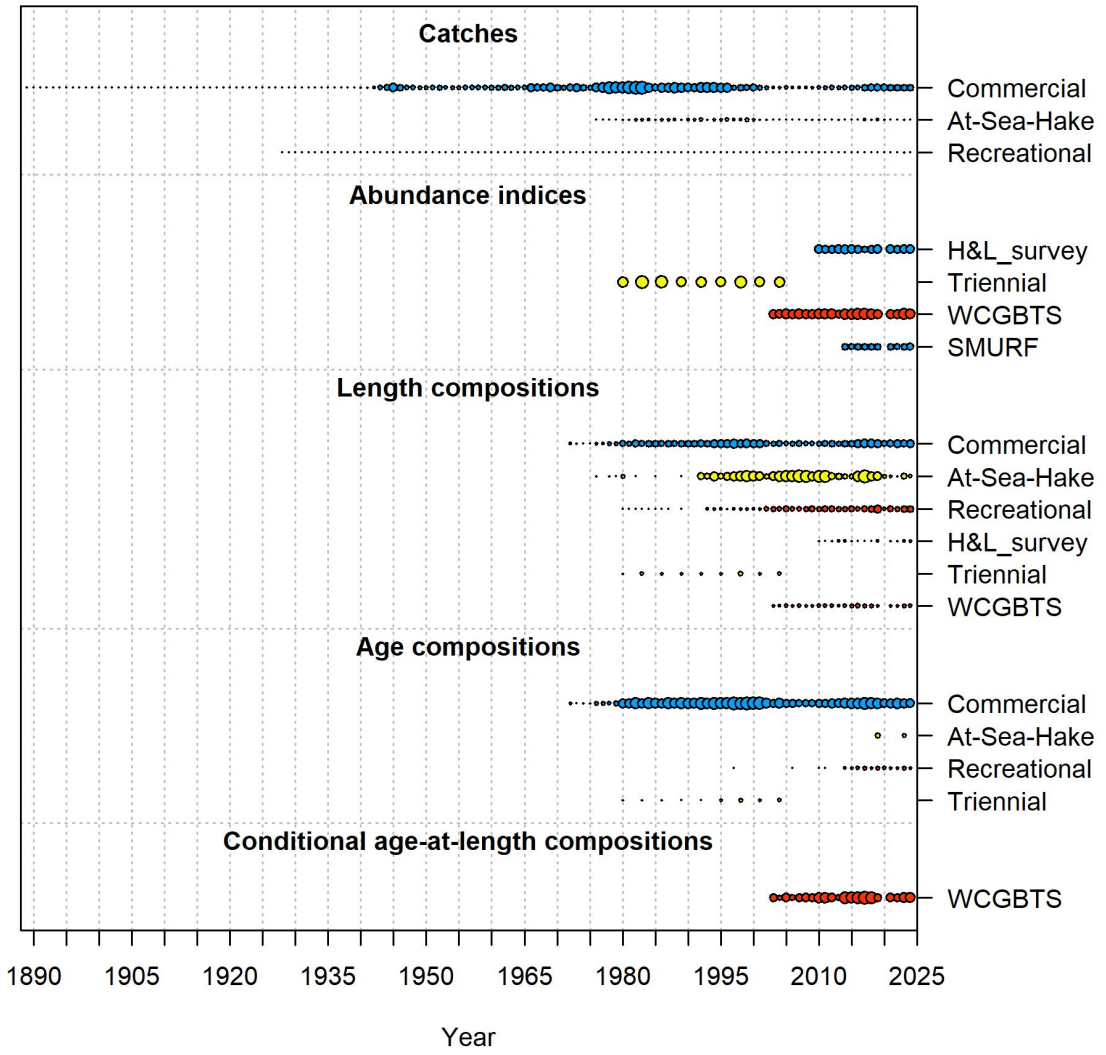


Fleet structure

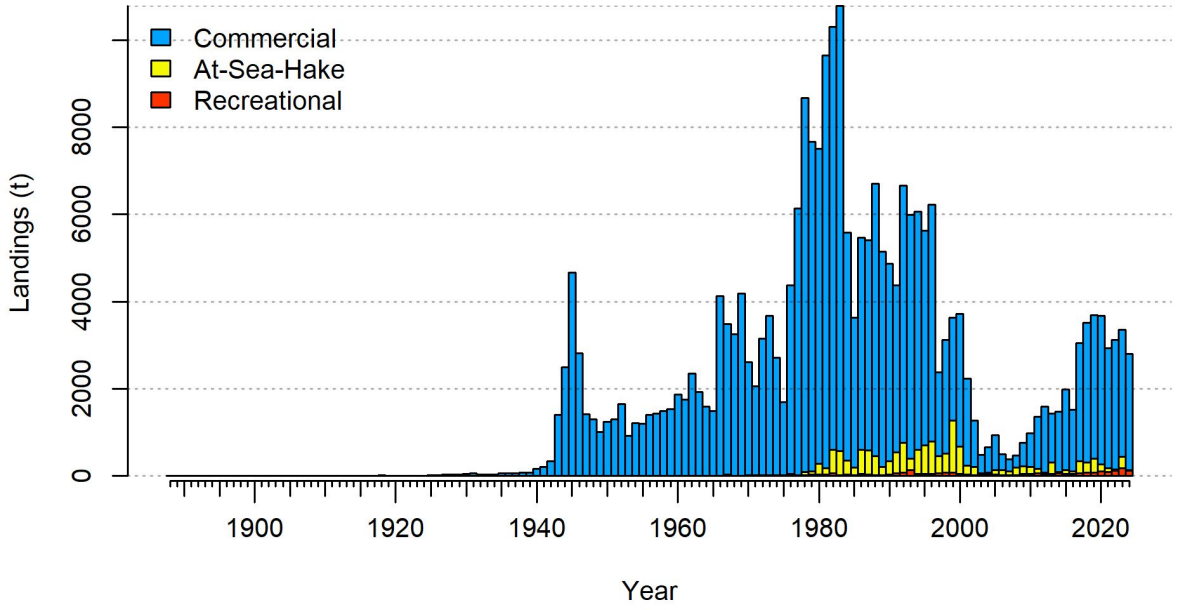
- Commercial shoreside
- At-sea hake
- Recreational

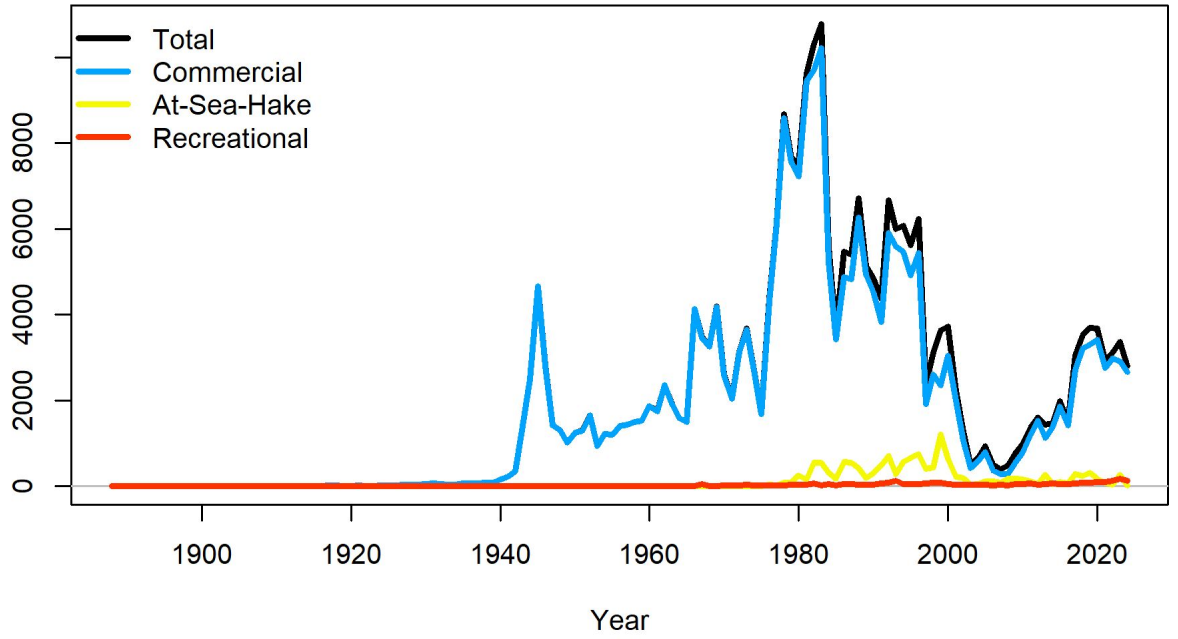
All fleets have catch, age, and length data



Catches dominated by commercial trawl fleet

Catches for each fleet include landings and discards

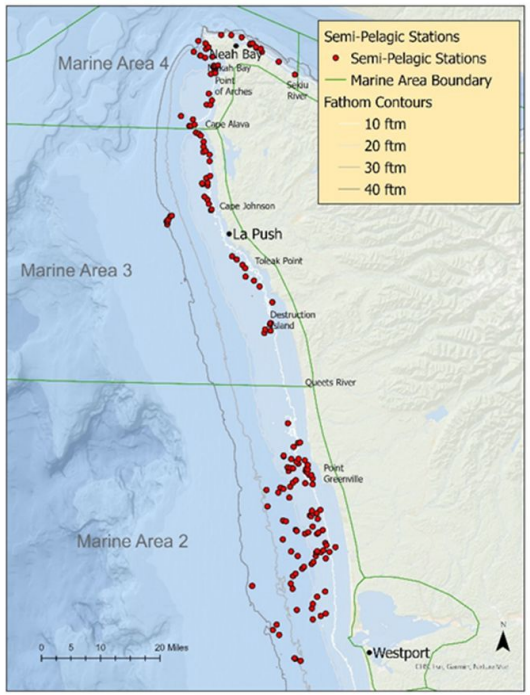




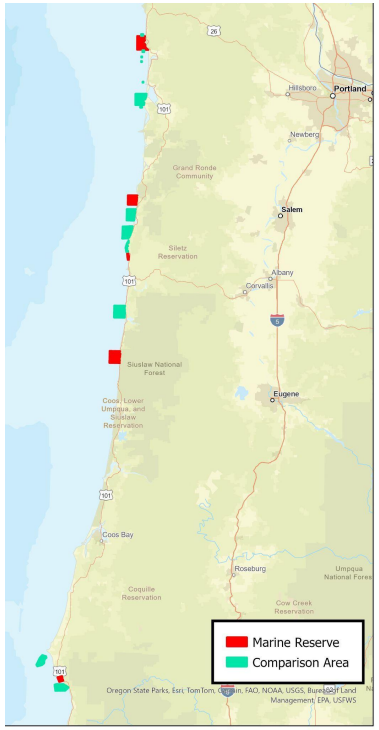
Fishery independent indices in model

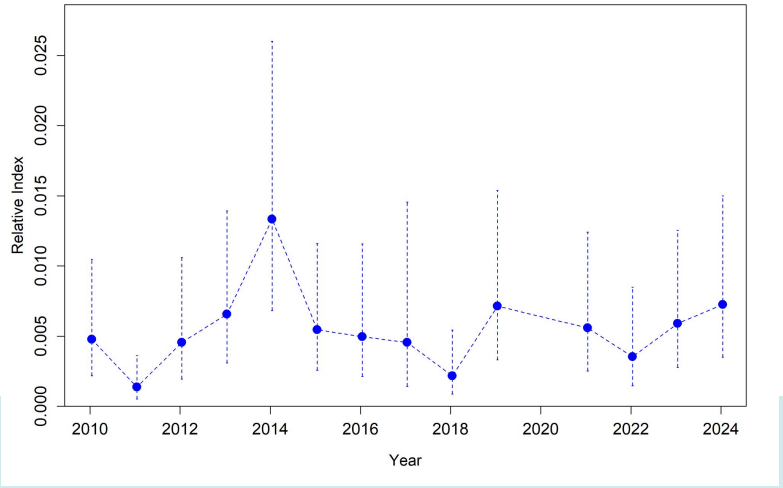
- NWFSC WCGBTS
  - 2003-2024 (no 2020)
  - 40°10’ N. - Canada
  - 55m - CUTOFF
  - Index, length, age-at-length
- Triennial
  - 1980-2004 (every 3rd year)
  - 40°10’ N. - Canada
  - DEPTH
  - Index, length, age
  - Single time series
- OR/WA Hook and Line
  - 2010-2024 (no 2020)
  - Combines similar surveys from ODFW, WDFW
  - Index, unsexed lengths
- SMURF
  - 2014-2024 (no 2020)
  - Oregon marine reserve sites
  - Samples YOY fish settling to the bottom, IDs to species level

OR/WA Combined Hook & Line Survey



Credit: Rob Davis, WDFW





- Combined WDFW rod and reel survey (2009 - 2024) with ODFW Marine Reserves hook and line survey (2013 - 2024)
- Filters - years with limited observations, spring surveys only (March - June)
  - Final dataset ~2k observations with overall 17.8% positive encounter rate
  - 2010 - 2024
- Model-based index in sdmTMB
  - A negative binomial model fit to catch in numbers with a log offset for angler hours
  - Final model covariates include: year, survey (ODFW/WDFW), drift depth (binned) and month
- Treatment (reserve vs non-reserve) not a significant factor
- Length compositions were also included

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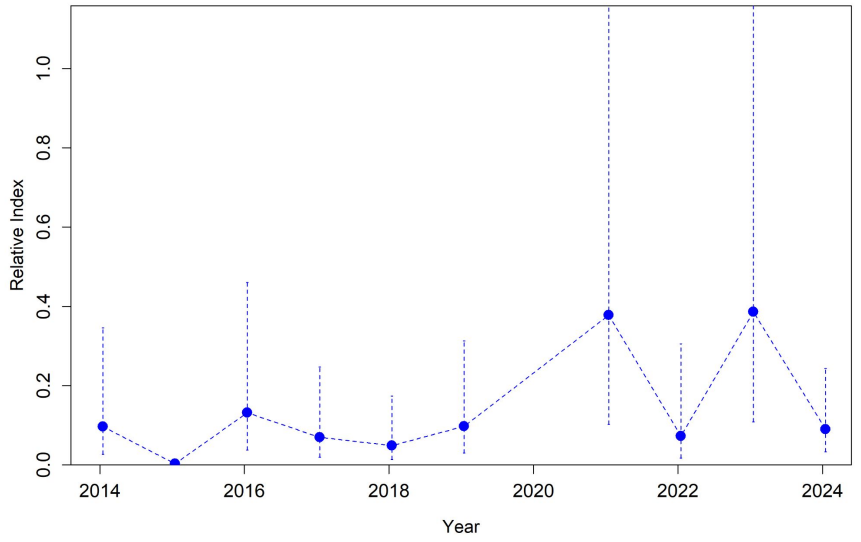
SMURF YOY Index

- Standard Monitoring Unit for the Recruitment of Fishes (SMURF)
  - Oregon State University/ODFW Marine Reserves
  - Otter Rock/Redfish Rocks
  - Monitored regularly throughout settlement season (April - Sept)
- Paired with ODFW oceanography data
  - Temp highly correlated across depth and between sites within region
  - 16 day rolling mean temp and 16 cumulative degree day (cdd)
  - (Mean SMURF deployment = 15.5 days)
- Filters - peak settlement for yellowtail (May - July), years with limited observations (2014 - 2024)
- Negative binomial model using sdmTMB
  - YOY fish/day ~ year + region + 16-day cdd



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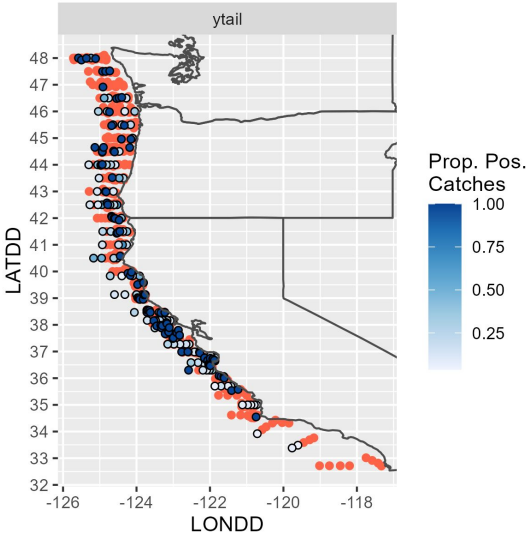
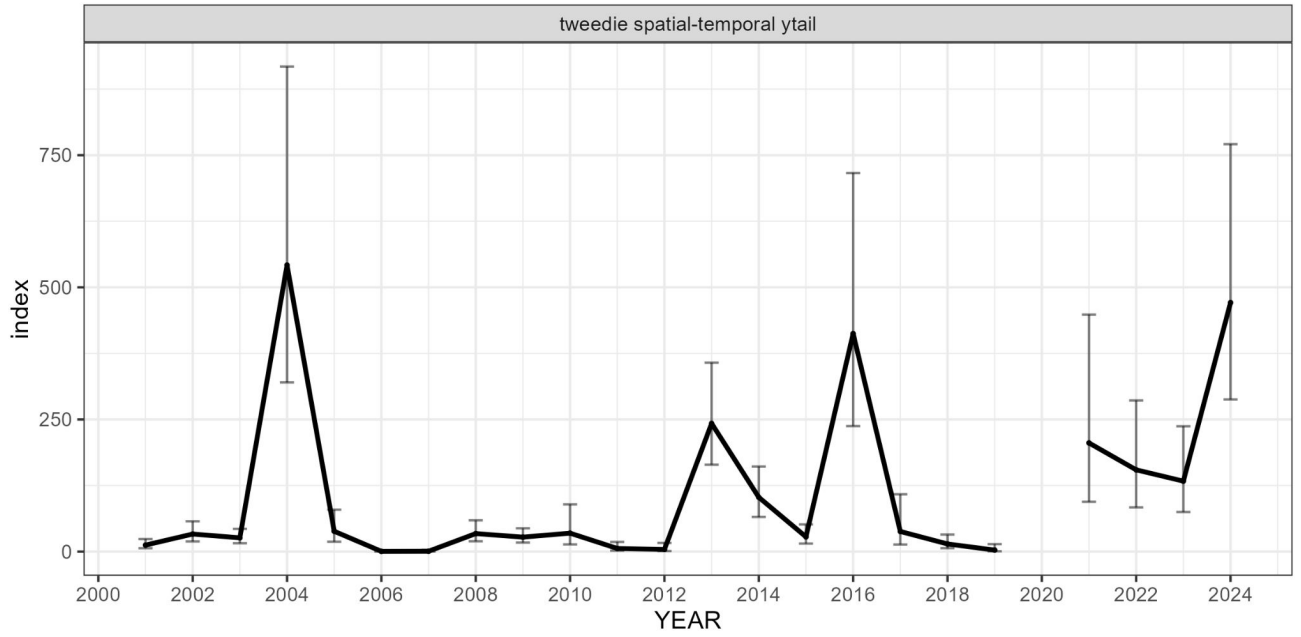
Rockfish Recruitment and Ecosystem Assessment Survey YOY Index

- Annual survey of pelagic juvenile rockfish (*Sebastes* spp.) May - June
  - Samples YOY ~100 days old
- US/Mexico border to Cape Mendocino
  - 2004 survey was expanded
- 2001 - 2009
  - Pacific Whiting Conservation Cooperative and NWFSC survey
- 2011 - present
  - NWFSC “Pre-recruit” survey
- Spatial GLM with sdmTMB
  - tweedie error structure (delta-lognormal, delta-gamma)
  - Catch per tow ~ year + s(Julian Day)

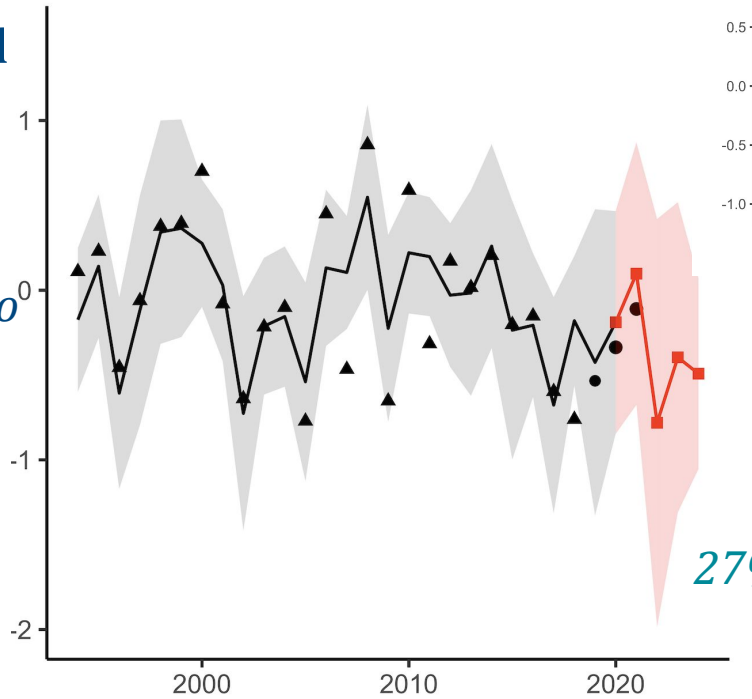


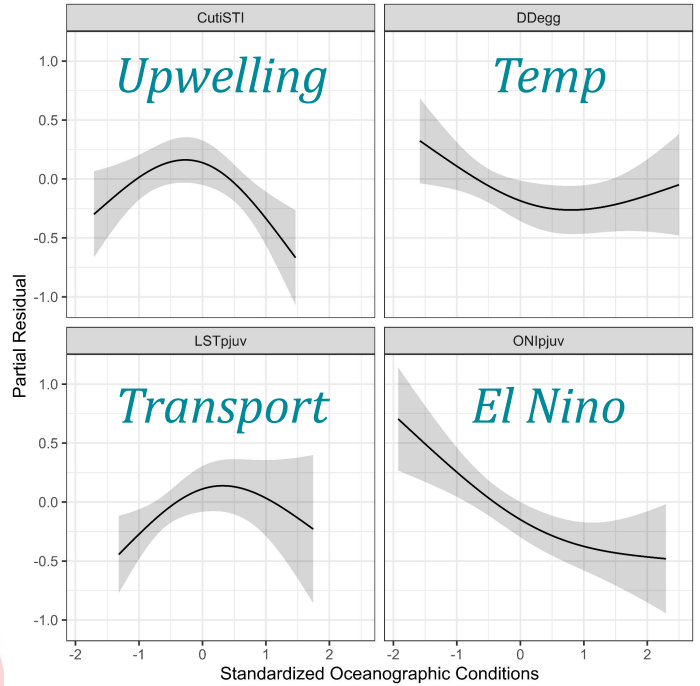


Oceanographic Index of Recruitment

- Oceanographic Index of Recruitment
  - Following methods developed for:
    - 2023 petrale sole; 2023 sablefish; and 2025 Pacific hake assessments
  - Developed models based on conceptual life history
    - Considers depth, location, and temporal domain of juvenile life stages
    - *Included flexible nonlinear relationships (GAMs)*
    - *Evaluated predictive capacity in addition to model fit*
    - *Used Copernicus Ocean Model Products (GLORYs)*
- Models were fit to 1993 - 2019

• RecDev ~s(DDegg)+s(CutiSTI)+s(ONIpjuv) +s(LSTpjuv)





- Late_RecrDev
- Main_RecrDev
- Predicted

65% Deviance Explained
27% improvement over null model
0.53 R-squared

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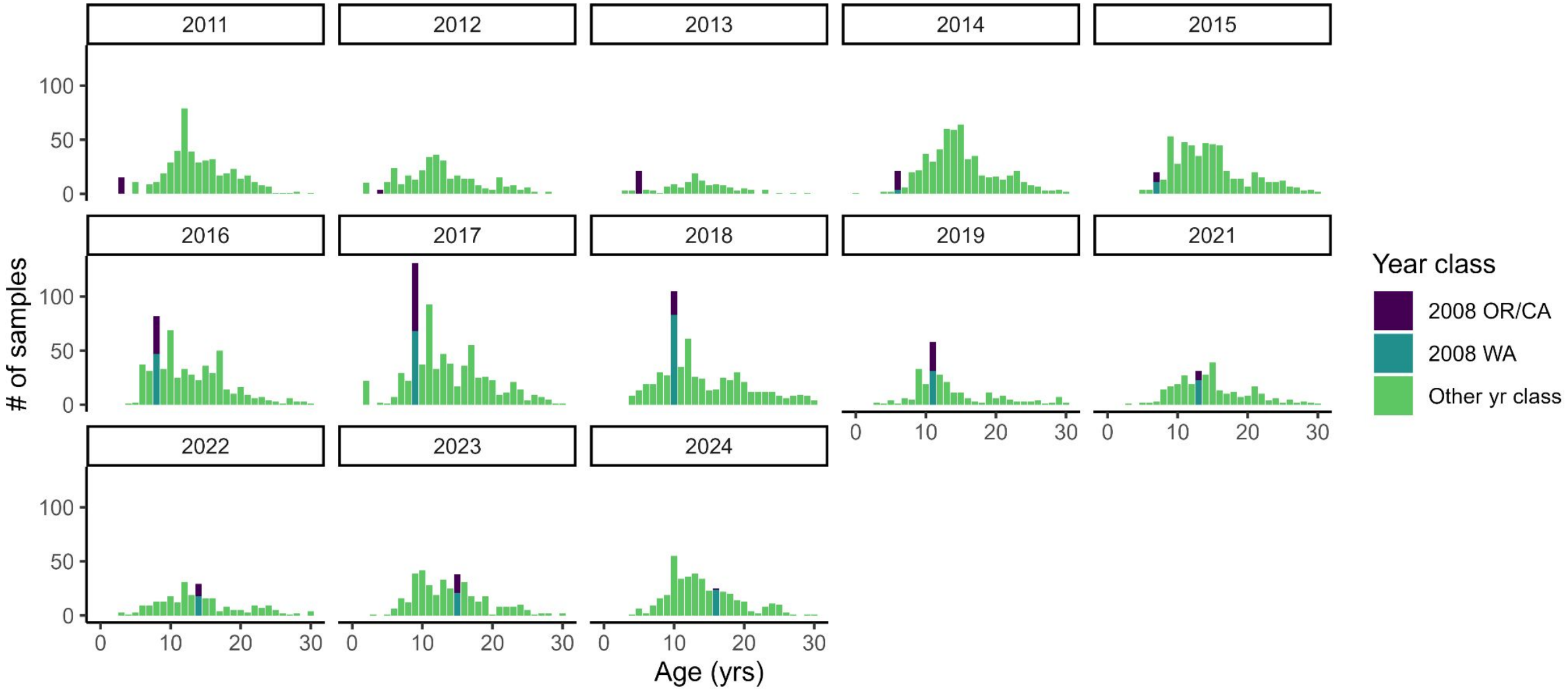
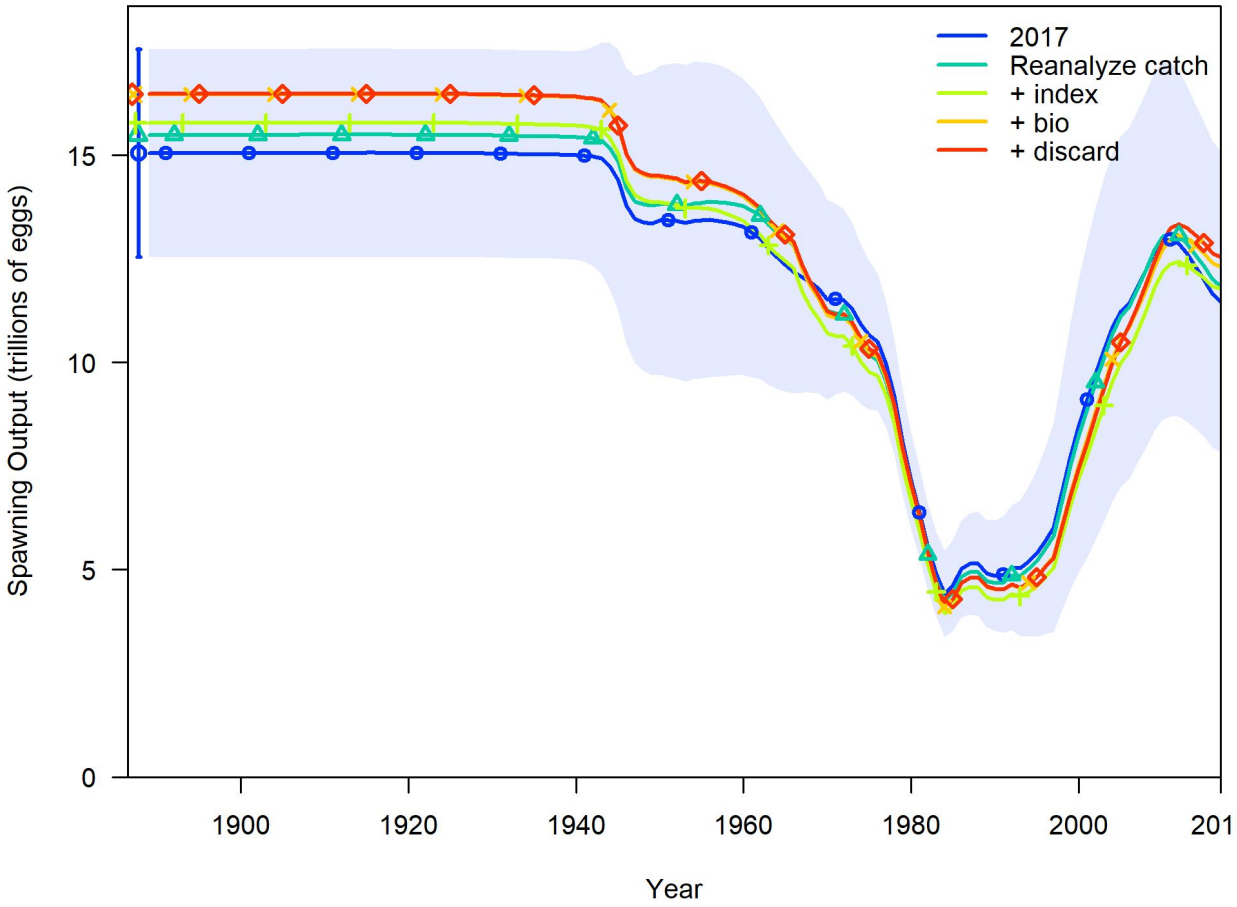
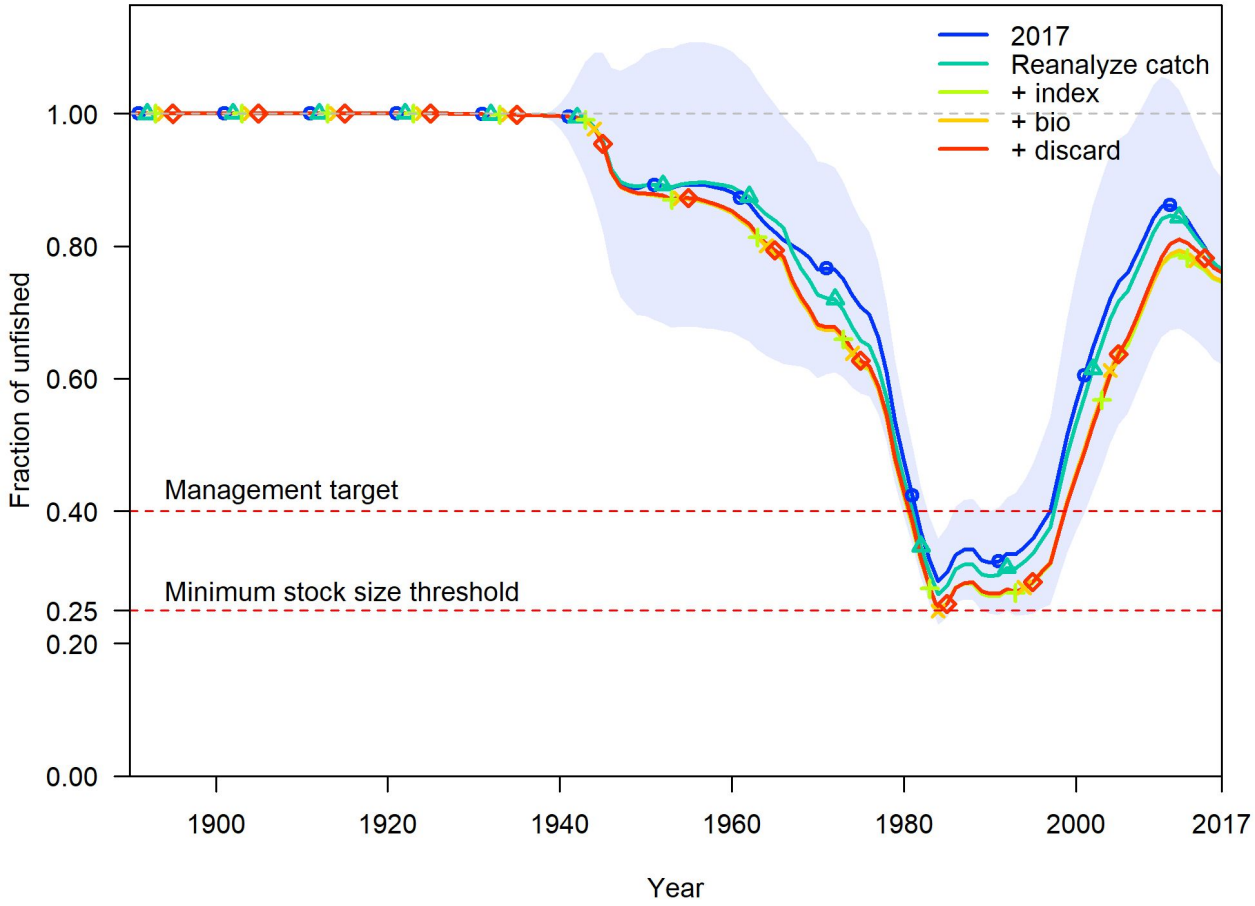
Strong evidence for large 2008 year class



Reanalyzing data bridging





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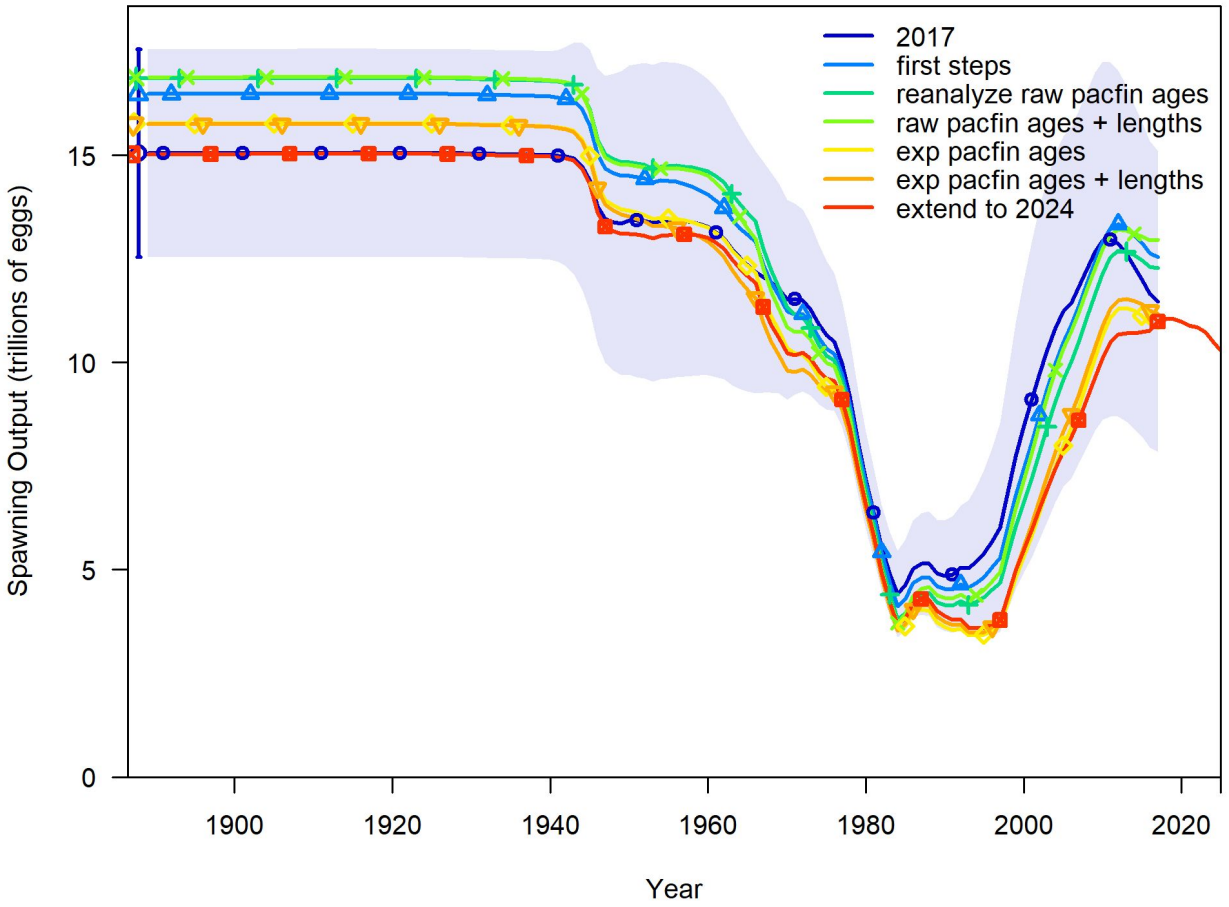

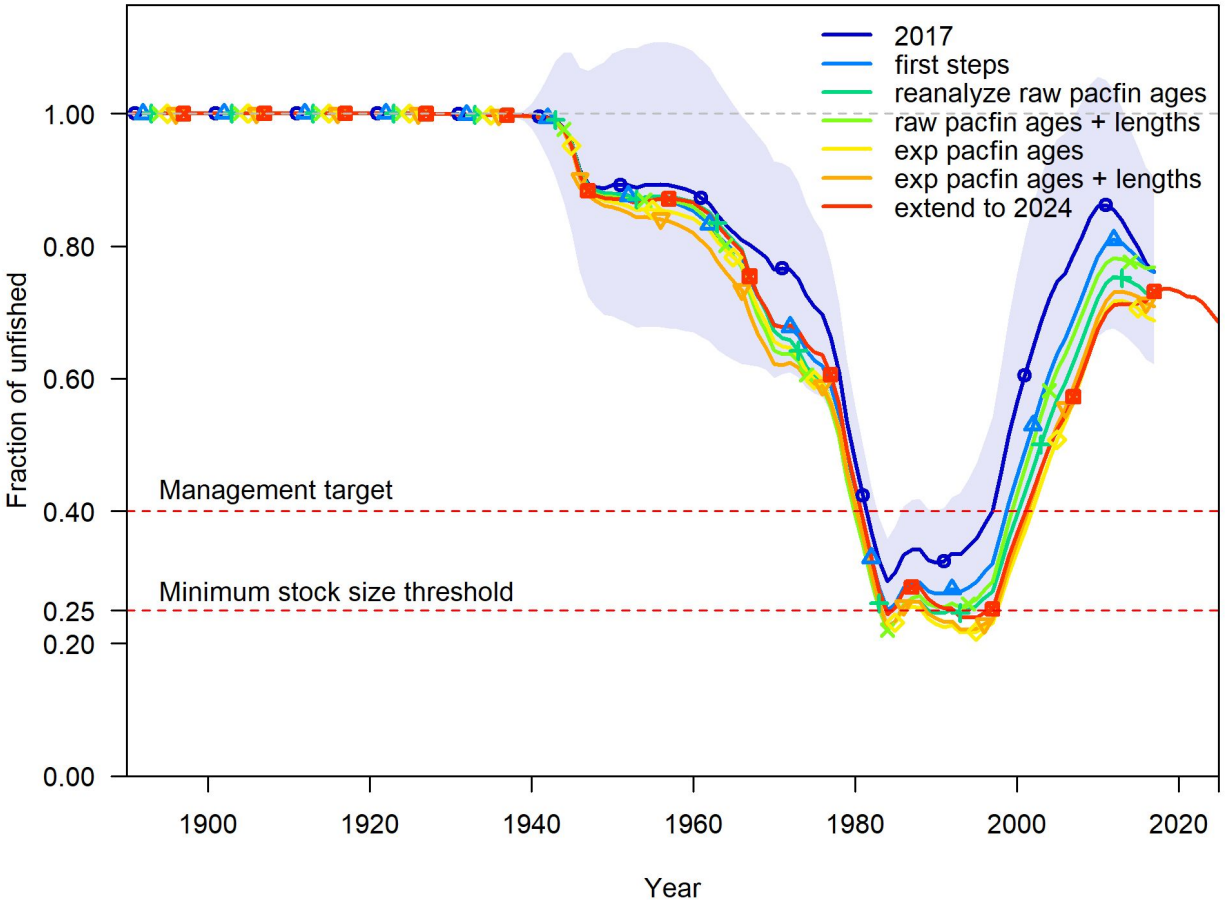

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