Proposed adjustments to the Precautionary Upper Catch Limit (PUCL) for SA round herring

Small Pelagic Scientific Working Group
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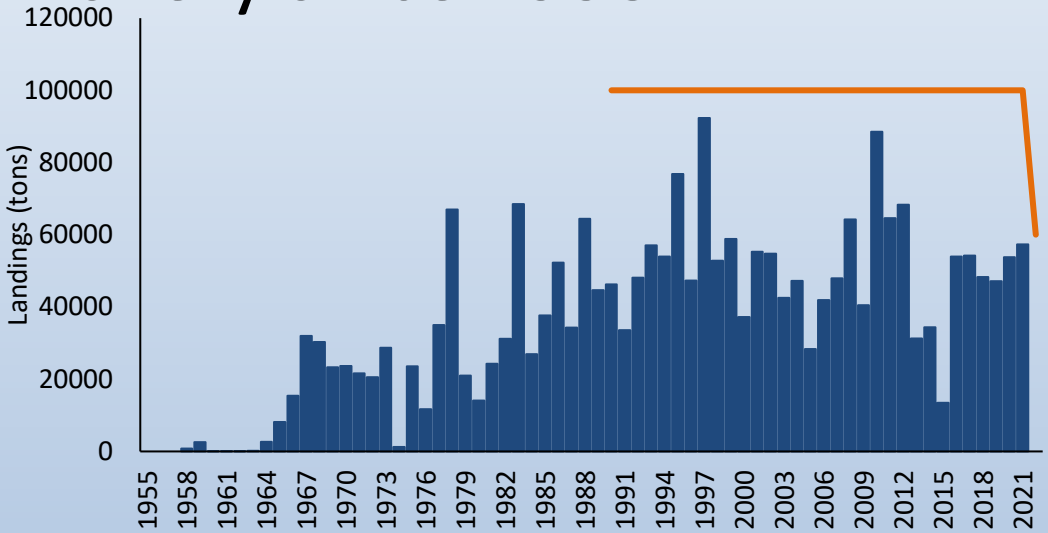
Carryn de Moor

Marine Resource Assessment and Management (MARAM) Group
University of Cape Town
South Africa

Historical RH catches and management

- Round herring landed by purse seine fishery since 1958
- Species with 3rd highest landed tonnage since mid-1970s



- Managed with a PUCL of 100 000t since 1989, with a commitment to decrease the PUCL if the survey biomass is <750 000t since 2012 (PUCL in 2022 was 60 000t, increased to 70 000t after recruit survey)

Historical RH catches and management

A commitment to ‘urgent action’, but no quantitative rule is currently in place (less than straight-forward process in 2022)

Implemented to encourage the industry to expand the fishery for RH, which was thought to be under-exploited following the first surveys in 1986/7

- Managed with a PUCL of 100 000t since 1989, with a commitment to decrease the PUCL if the survey biomass is <750 000t since 2012 (PUCL in 2022 was 60 000t, increased to 70 000t after recruit survey)

Updating the PUCL

- Two major developments since PUCL first implemented:

i) RH fishery has become well established as is no longer primarily opportunistic

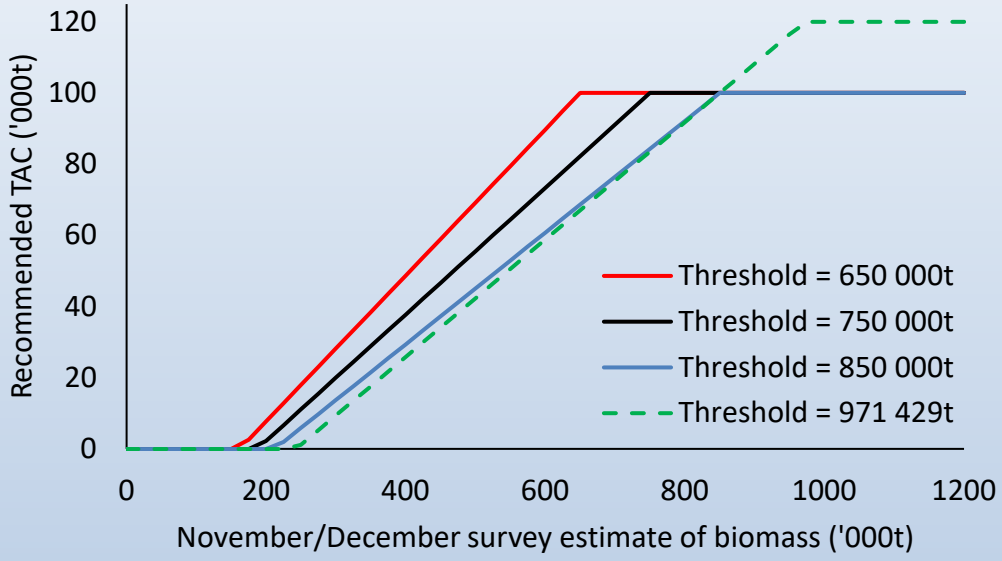
ii) A quantitative stock assessment is now available, informing relative and potentially absolute RH tonnage. Allows consideration of quantitative impact of catches on the resource

- The SWG-PEL can thus reconsider the PUCL

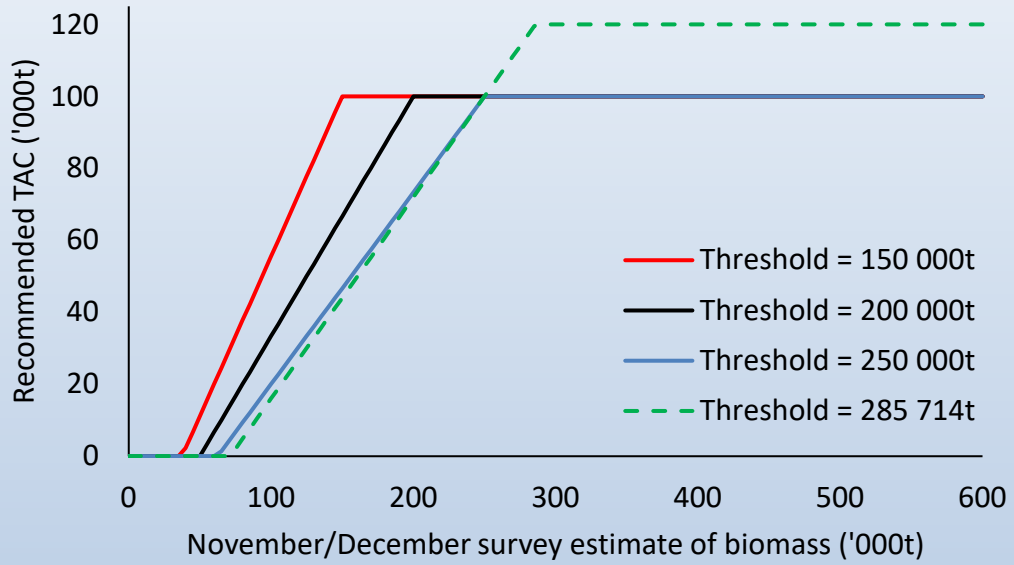
Updating the PUCL

- Ideally a new HCR (empirical MP) should be developed using MSE
- This is not immediately possible due to time constraints / sardine and anchovy MSE priority
- But a temporary quantitative HCR is still required
- Given progression in knowledge about the resource and fishery should this remain a PUCL or become a TAC?
- PUCL/TAC includes all landings (directed and bycatch)
- Alternative HCRs are considered ito impact on catches and future ERs compared to historical ERs and their possible relationship to biomass levels

Potential HCRs



Survey estimates west of Port Alfred



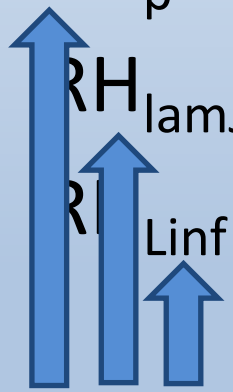
Survey estimates west of Cape Agulhas

- Historical landings have not reached 100 000t
- TAC/PUCL = 0 at ¼ of threshold (in line with sardine/anchovy)

Potential HCRs – Models used

- RH_0 – base case
- RH_k – k_{rec} = 0.591 and k_{ac} = 0.432
- RH_{west} – model of RH west of CA only
- RH_p – allow $p_3 = (1-p_2-p_1)$ to vary annually
- RH_{lamJ} – Estimate additional variance for recruit survey
- RH_{Linf} – L_∞=23.1 (west component sardine)

Extreme or crude test for spatial structure? Requiring any HCR to satisfy risk under RH_{west} will ensure any management advice remains precautionary until further research into stock structure, and an MSE, can be carried out

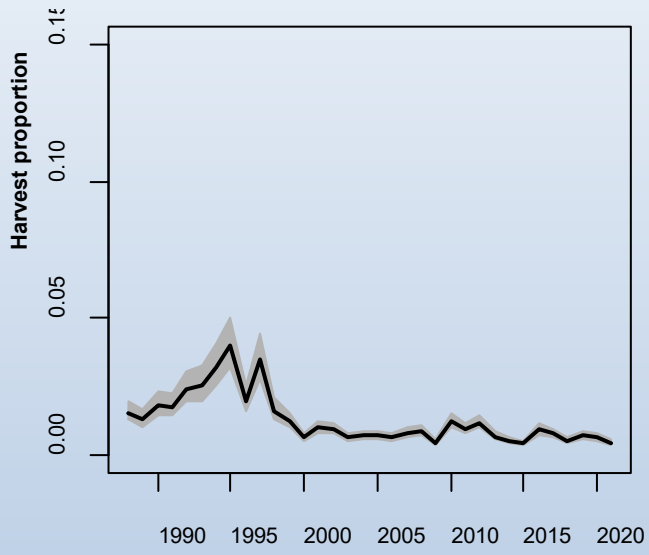


Improved fits to data compared to RH_0

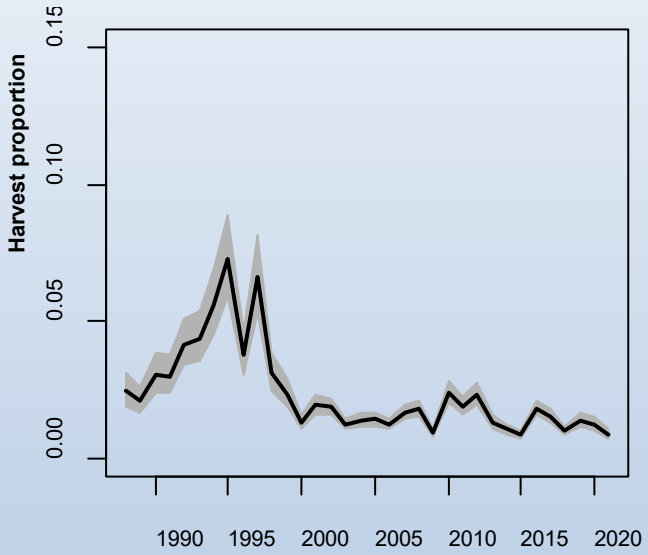
- Used historically estimated true biomass corresponding to survey estimates
- No projections, which would require assumptions about future recruitment
- Sufficiently wide range of historical observations to test alternative HCRs
  - below 650 000t, 750 000t, 850 000t in 12, 13, 15 historical years

Results – Historical Exploitation Rates

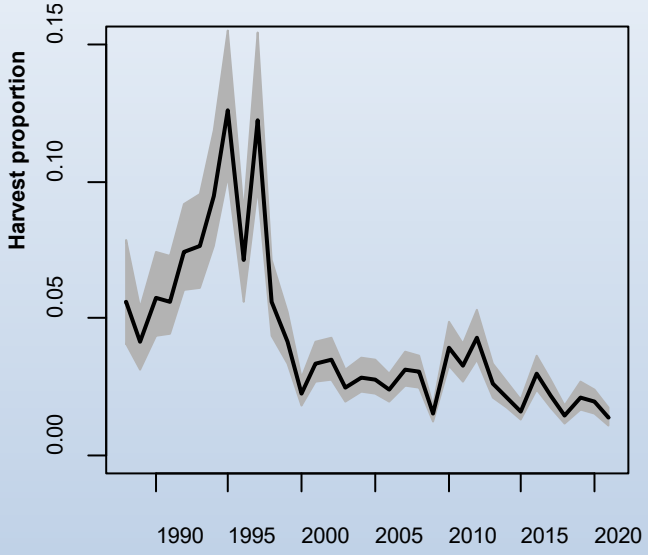
Median & 90%ile



RH_0

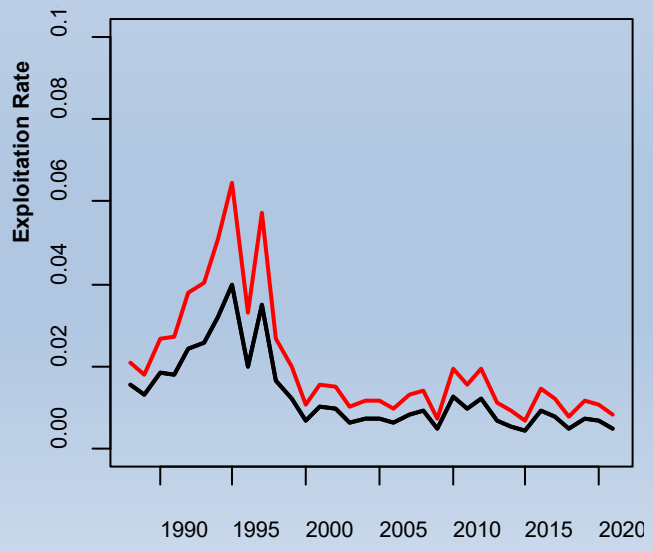


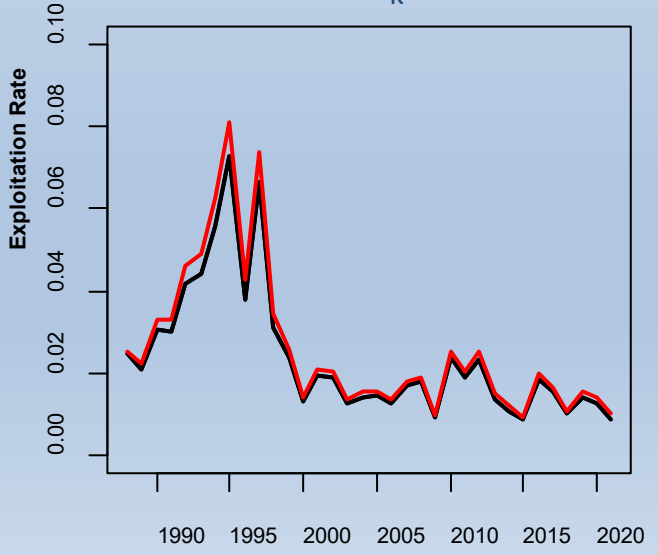
RH_k

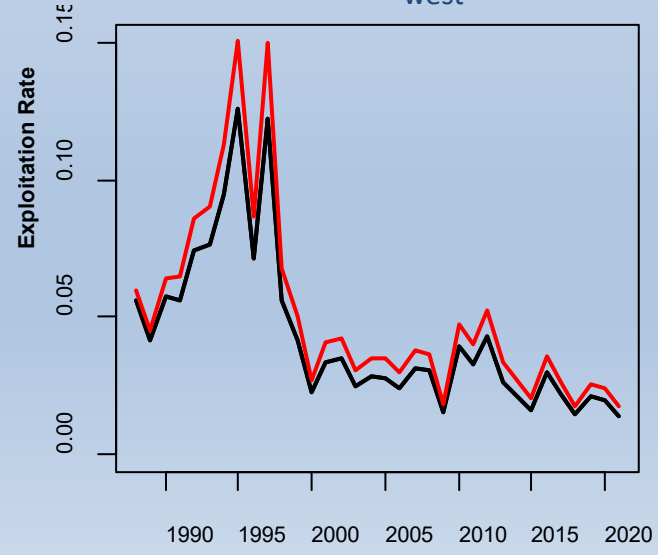


RH_{west}

Median (black) & JPM (red)

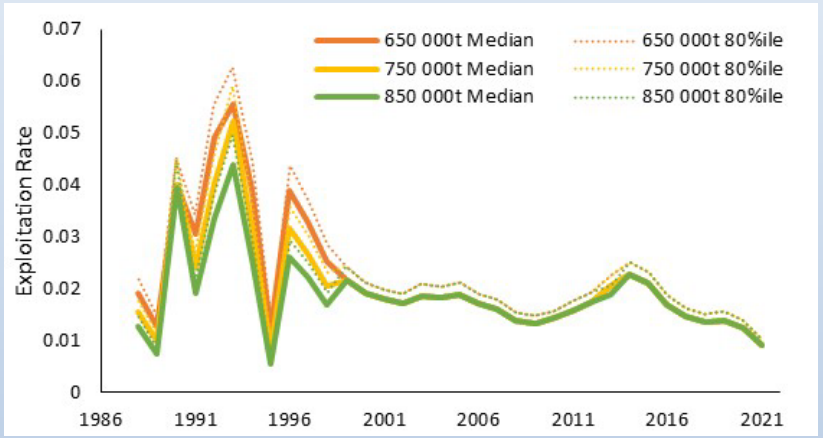




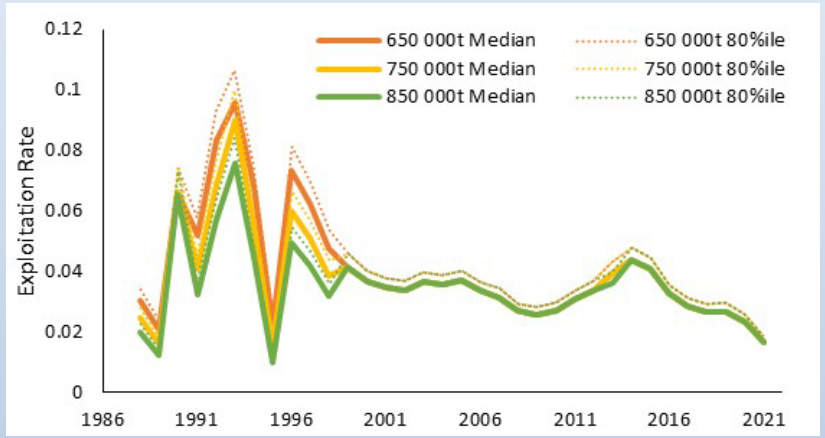


Results – HCR Exploitation Rates based on historical estimates

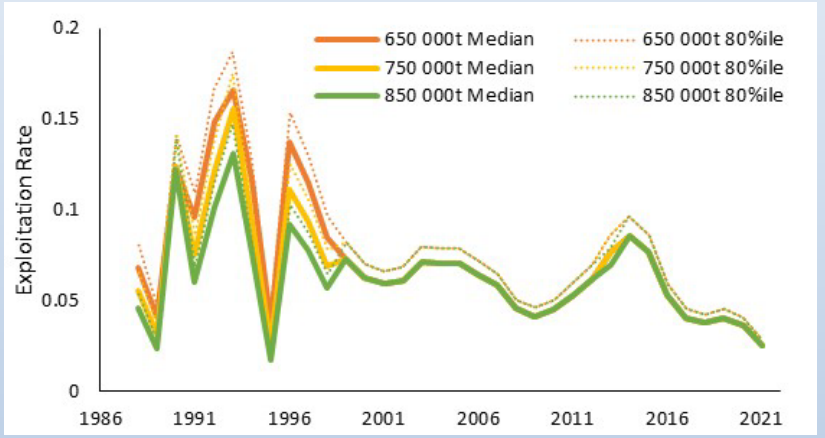
NB: Don't look at this as a 'time series'



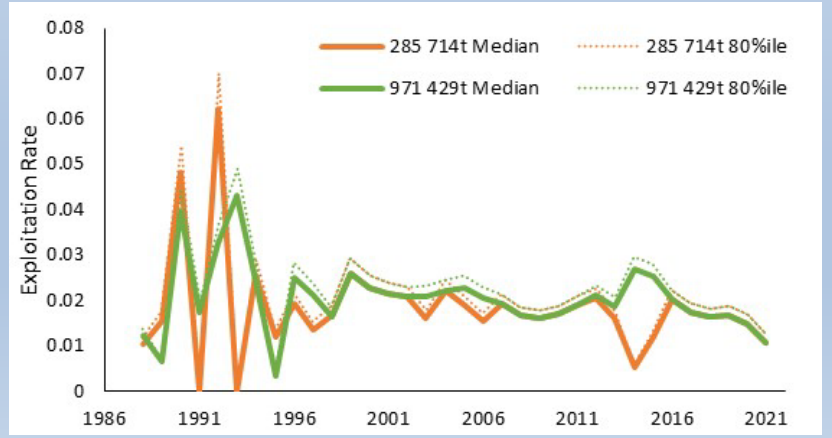
RH_0

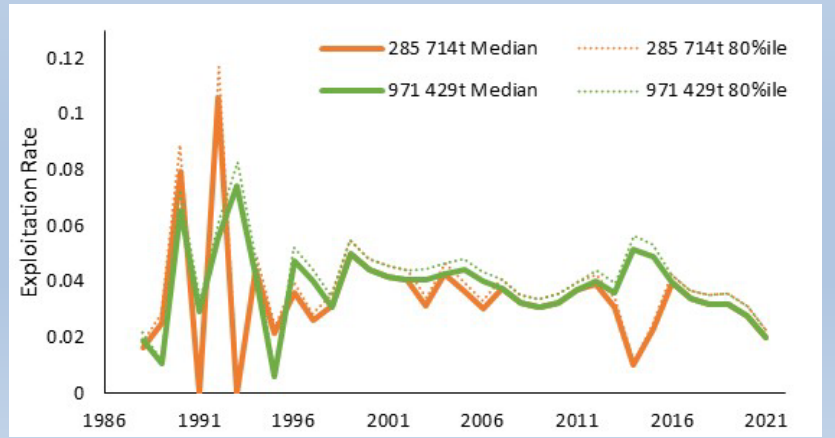


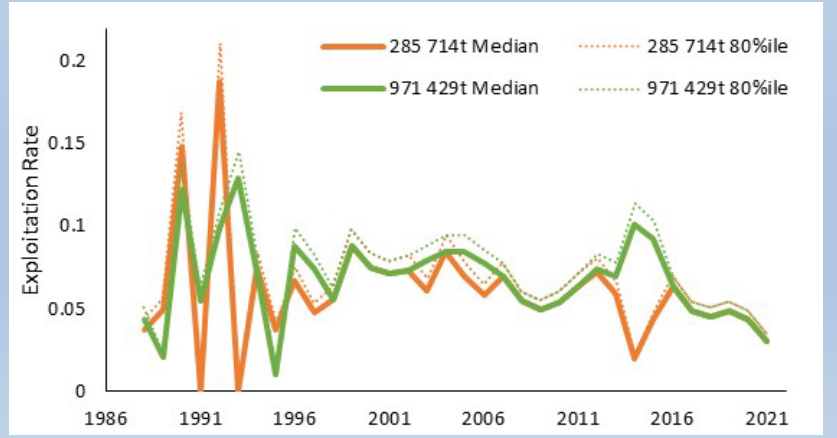
RH_k



RH_{west}

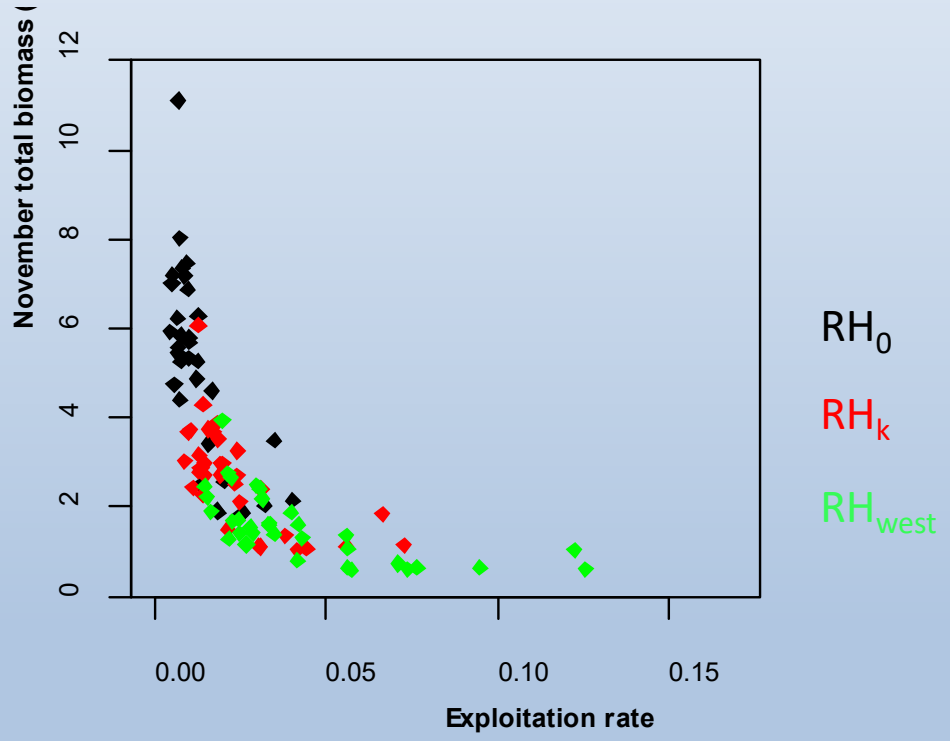






ERs that would have resulted in each historical year under different HCRs using survey estimates west of Port Alfred

Results – What Level of Exploitation Rate Is Acceptable?



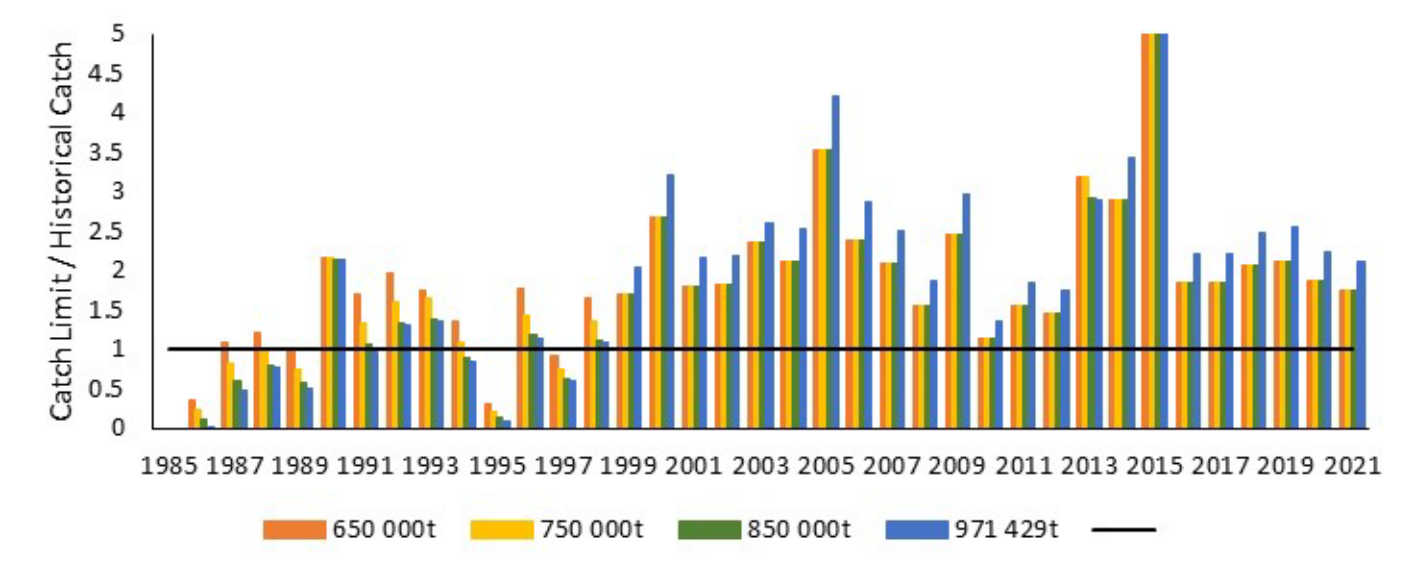
RH_0

RH_k

RH_{west}

Biomass at the END of the year, after catch.
ER uses previous year's biomass.

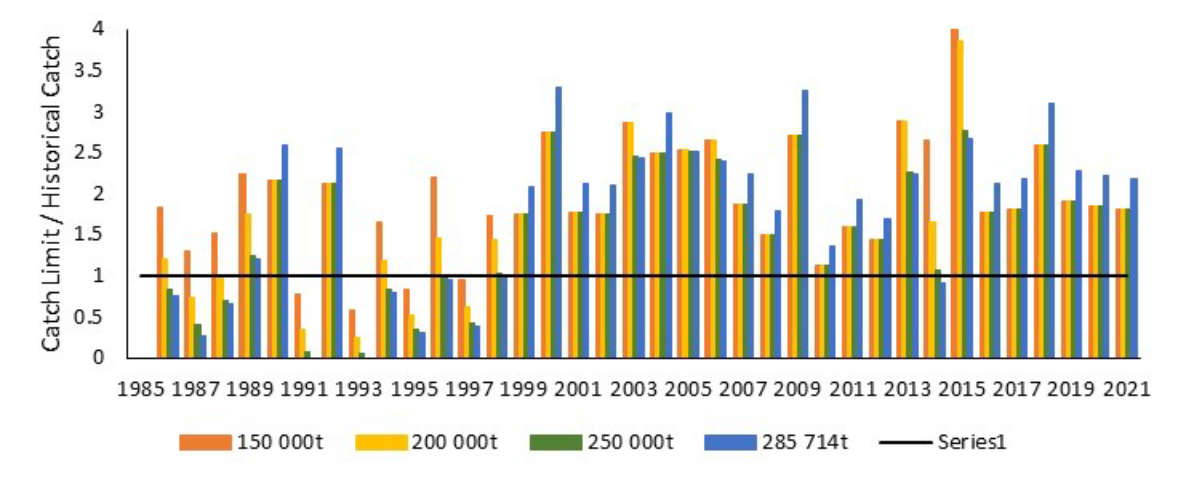
Catch Limits v Historical Catch



Survey estimates west of Port Alfred

- PUCL above catch since 1999
- Lower PUCL in years of low biomass (86, 87-89*, 95, 97*)

* Not for 650 000t



Survey estimates west of Cape Agulhas

HCRs for PUCL – Options

- No change (no rule below 750 000t)
- Delay decision for 2/3 weeks and first consider further results
- Threshold of 750 000t, max of 100 000t
- Threshold of 971 000t, max of 120 000t (only below 100 000t if biomass below 850 000t)
- Threshold of 550 000t, max of 100 000t