Outline thoughts on Horsemackerel management plan

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Starting points

- Knowledge base, what we know, or think we know of the stock and Fishery
- Some goals and objectives, biological, economic, etc..
- Strategy
- Trade offs
- Sensitivity/robustness
- Risk
- Technical issues

Knowledge base

- Precision of analytical assessment – low
- Availability of catch forecasts – low
- Availability/Precision of fishery independent information – triennial/low
- Reliability of relevant biological information – medium
- Availability of expertise to run strategies – high
- Ecosystem information – assumed not sensitive to absence of this
- Availability of fishery dependent data – high

What measures will be used to manage the stock

TAC & Quotas (mismatch between stock and management areas)
Vessel Licensing?
Effort regulation?
Technical measures Closed areas?
Minimum landing size?
Discard/bycatch regulations

Some goals and objectives

Goals: ensure long term sustainable use of the resource, maintain employment in coastal communities,
Objectives: **a)maintain SSB>SSB1982**, b)maximise long term yield, c)maximise economic return from the stock, d)achieve stable and predictable catches over time, **e)limit year to year TAC fluctuations by 15%,** f)Allow a 10% flexibility on annual TAC (how would this work with the previous objective?)
How are the objectives to be achieved? a) Set TAC consistent with low risk SSB< SSB1982 b) same c) trade off between a and harvesting recruits d) apply e e)incorporate in HCR and estimate trigger point consistent with a low risk f) what is low risk
Operational Performance indicators:
Verification of TAC overshoot assumptions (annual)
Recruitment estimates within expected bounds (retrospective annual)
Fishery independent estimated SSB within expected bounds (triennial)

Fundamental issues

- How robust do you want the strategy to be to TAC overshoot?
- How can the TAC be implemented with the stock management area mismatch?
- How do you want to harvest exceptional year-classes?

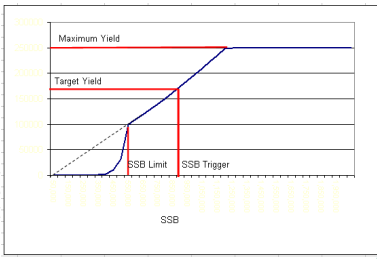
Science issues

- Stock Identity (measured, now assumed)
- Productivity (recruitment) (Measured indirectly historically)
- Growth (measured)
- Maturity (measured)
- Natural mortality (longevity, assumed)
- Stock distribution/movement/availability to the fisheries (ignored non spatially explicit model)

Simple HCR simulation set up

- Simple population single area, 1 fleet
- 2 recruitment models, 2 scenarios with w/o pulse R
- Uncertainty only in pop nums, and on assessed SSB
- 20 year projection
- limit at SSB 1982
- Trigger at SSB1982 * 1.5
- TAC adjusted triennially
- Simple HCR proportional to target yield 15% interannual variation
- Option to apply/suspend 15% rule below limit
- Option to change HCR below limit
- Max TAC 250kt, range of target yields tested
- Risk to any fall below limit, or average annual fall below limit

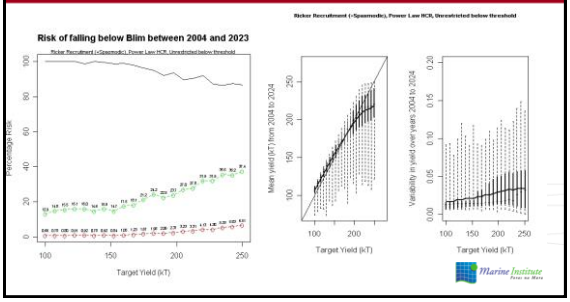
Visualisation of what happens in the rule



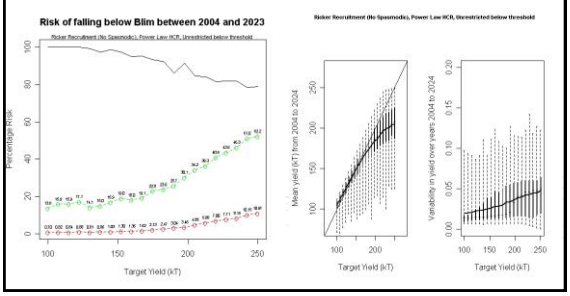
Max 15% change applied in all cases when SSB above limit

Rule applied only every 3 years, TAC fixed for the 3 years

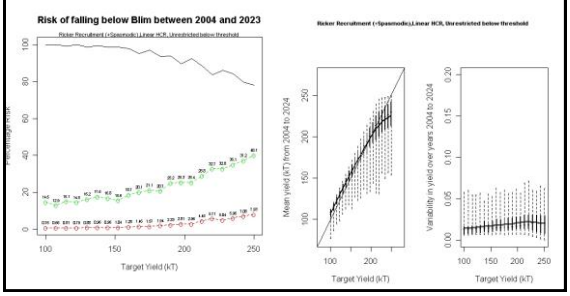
Strong action below limit, with spasmodic R



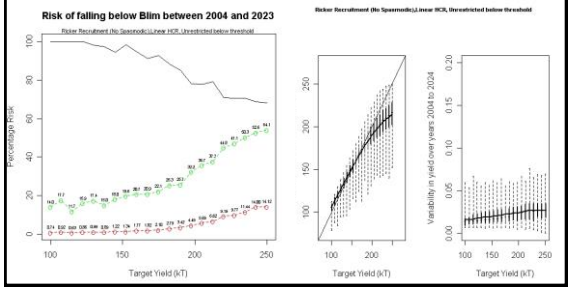
Strong action below limit, without spasmodic R



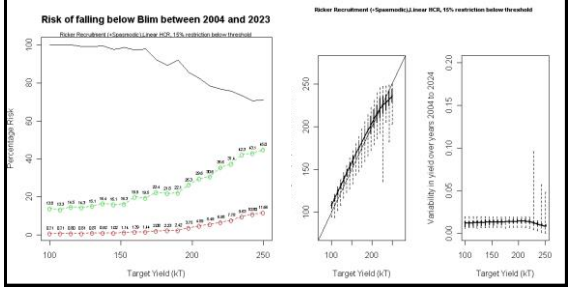
weak reaction below limit with spasmodic R



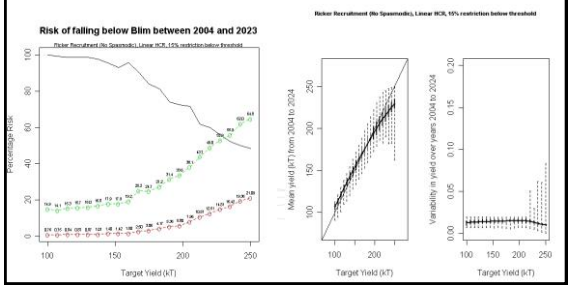
weak reaction below limit without spasmodic R



weak reaction below limit AND 15% change limit with spasmodic R



weak reaction below limit AND 15% change limit without spasmodic R



Trade offs emerging from HCR simulations

- The more punitive the HCR the higher target yield you can have for the same risk, but the more variable your Yield becomes (as the HCR has to kick in more often).
- Assuming pulse recruitment with a probability of 1/20 halves the risk associated with any strategy, or conversely assuming no pulse recruitment doubles the risk.
- When you apply a 15% limitation rule below Blim, you have to lower the target yield to offset the increased risk to the stock collapse
- The risk profile (in general) changes above 150kt