

Limit Reference Points: lessons learned from 2J3KL capelin

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Outline

- Background for Limit Reference Points (LRP)
- LRP considerations
- 2J3KL capelin: a case study
- Selecting an LRP
- Lessons learned

Background

Revisions to the Fisheries Act (2019) LRP National Advisory Process (2022)

SCIENCE ADVICE ON GUIDANCE FOR LIMIT REFERENCE POINTS UNDER THE FISH STOCKS PROVISIONS



Operationalizing Thresholds to Serious Harm: Existing Guidance and Contemporary Canadian Practices

Julie R. Marentette¹, Tim Barrett², Karen M. Cogliati¹, Danny Ings¹,
Jason Ladell¹, Mary E. Thiess¹

Technical Considerations for Stock Status and Limit Reference Points under the Fish Stock Provisions

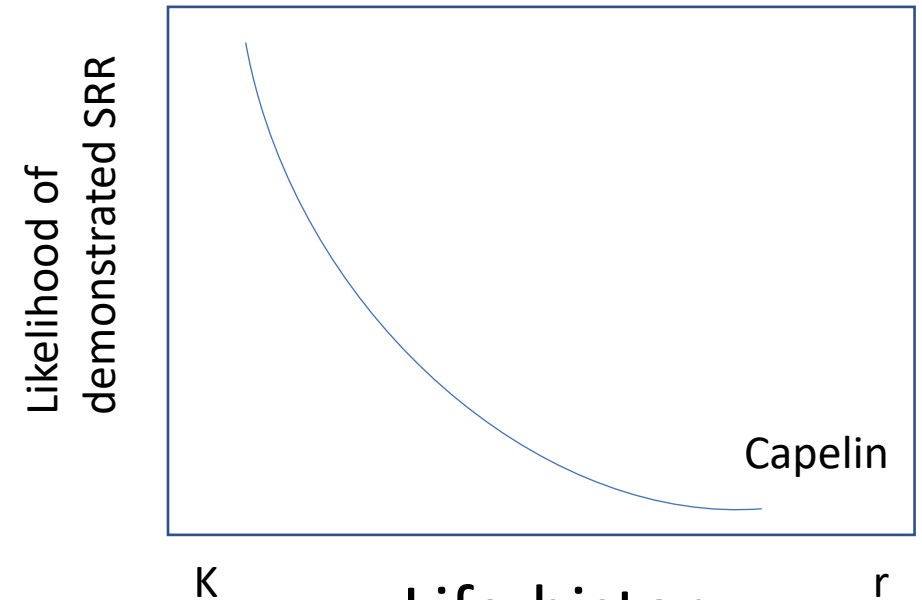
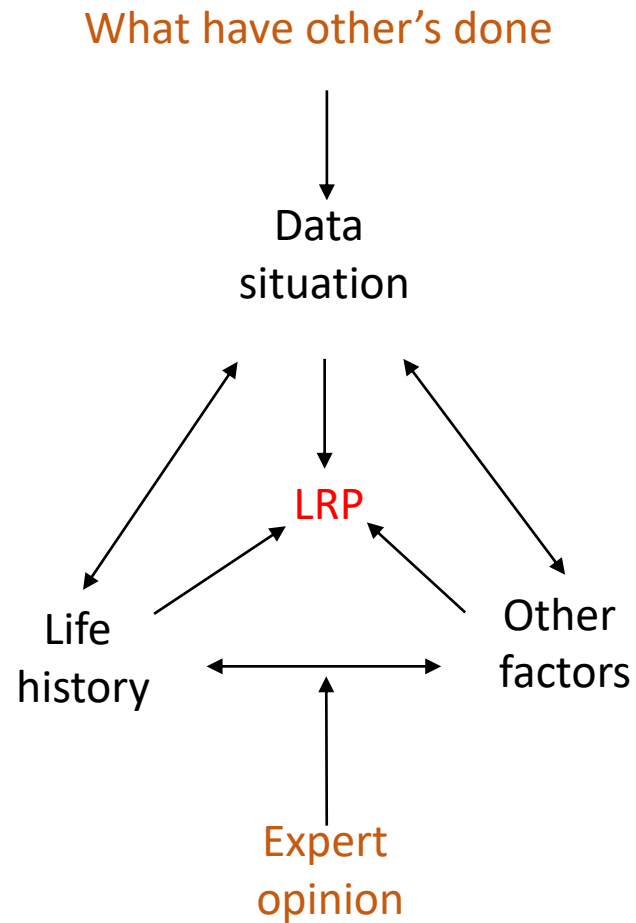
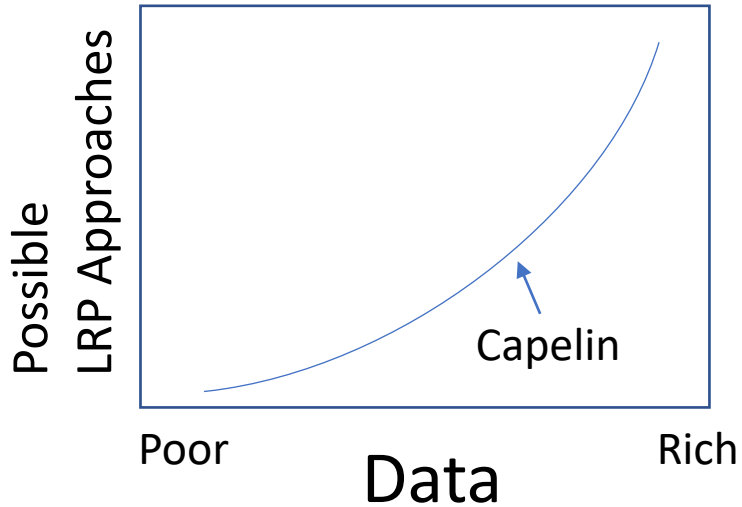
Tim J. Barrett¹, Julie R. Marentette², Robyn E. Forrest³, Sean C. Anderson³, Carrie A. Holt³,
Danny Ings⁴, Mary E. Thiess¹

Considerations for Stock Structure and Management Scale under the Fish Stock Provisions

Danny W. Ings, Julie R. Marentette, Mary Thiess, Tim Barrett

Lesson: read SAR and Marentette et al. (Julie's NAP Res Doc)

LRP considerations



Without an SRR, little justification for MSY type approaches

For data poor stocks, see Boudreau and Duplisea 2022

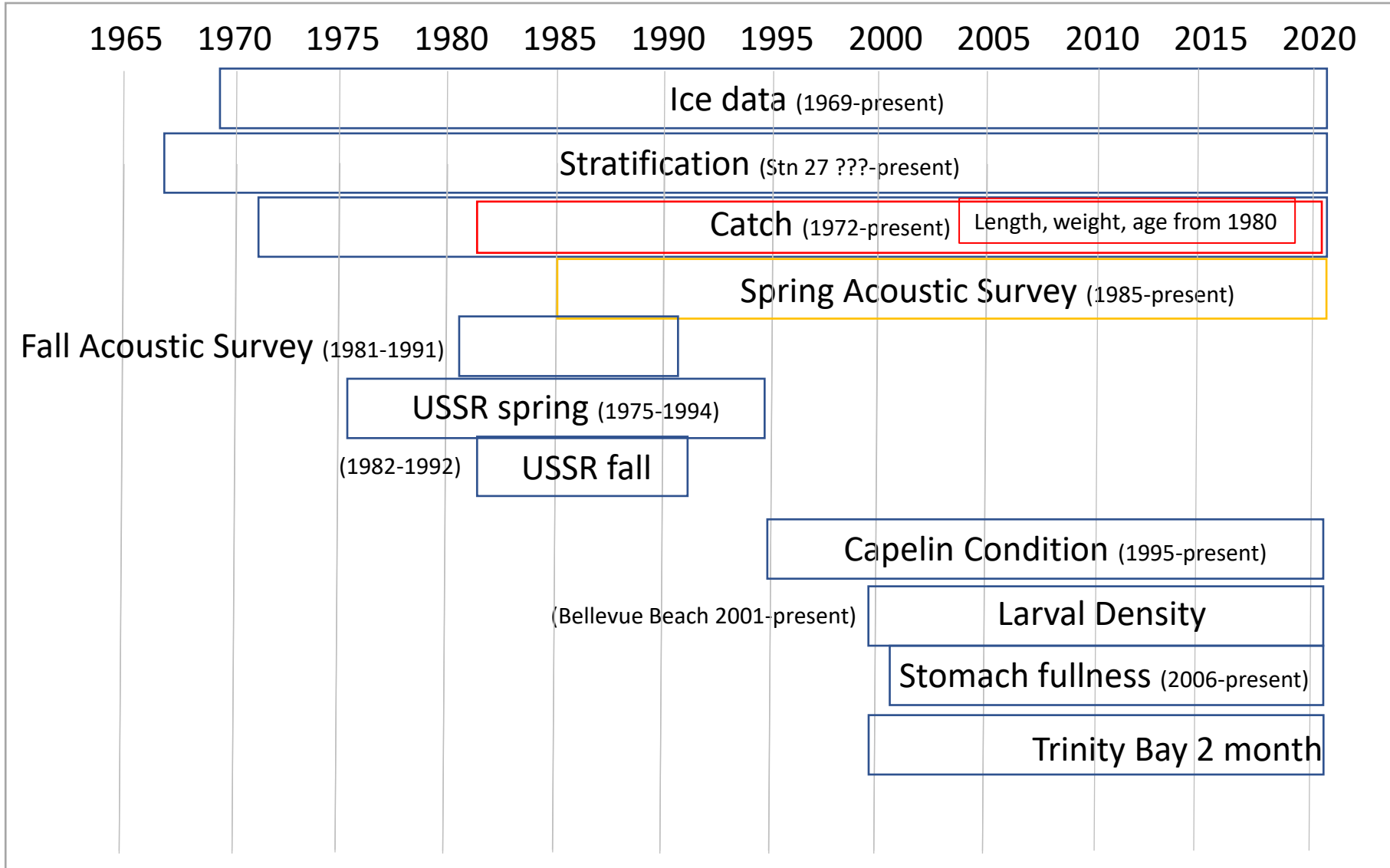
Lesson: read Barrett et al. (Tim's NAP Res Doc); Consult widely



2J3KL capelin: a case study

Assess literature and talk to experts but does this really work for your species

The data situation: time series



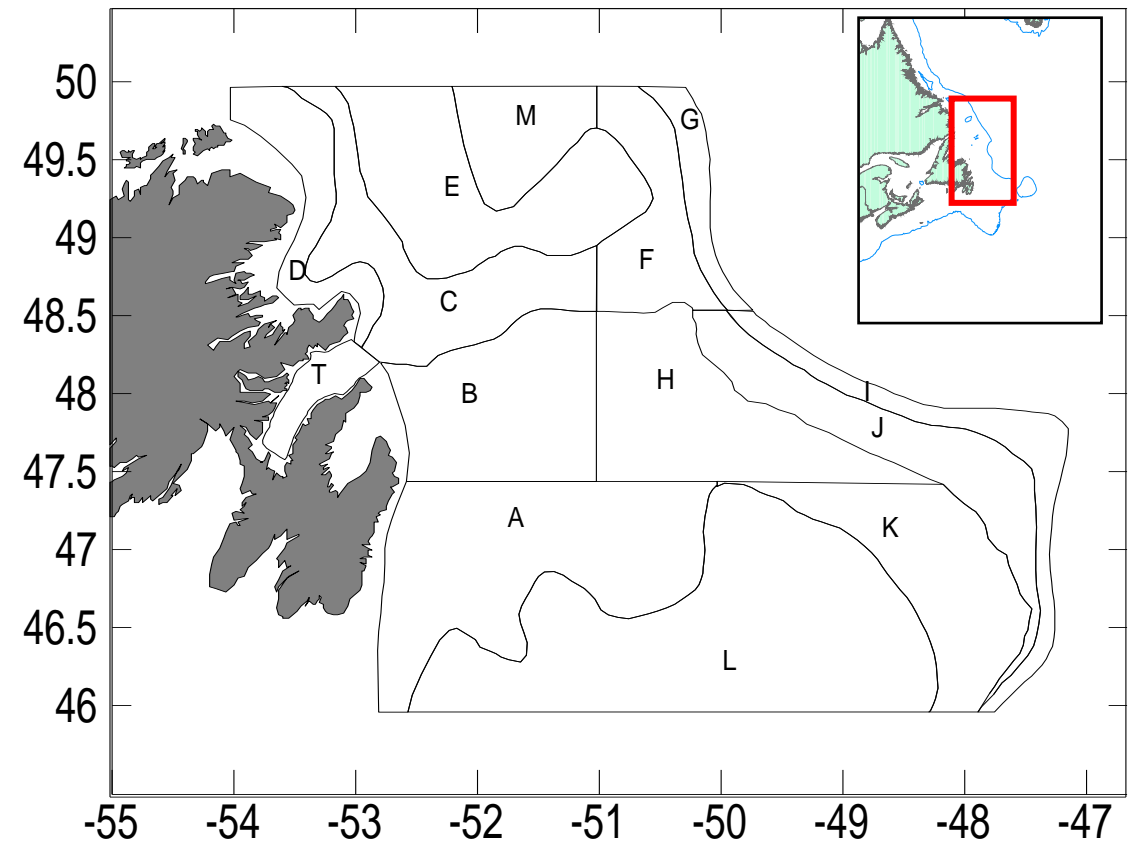
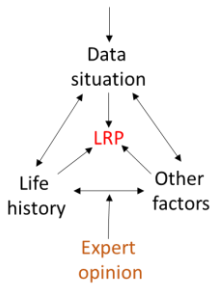
2J3KL capelin: a case study

The data situation

- An index, not total biomass and not what comes to spawn
- One sampling site for larval capelin

Lots of data but caveats to how it can be used

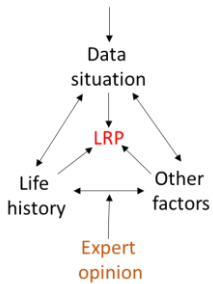
What have other's done



2J3KL capelin: a case study

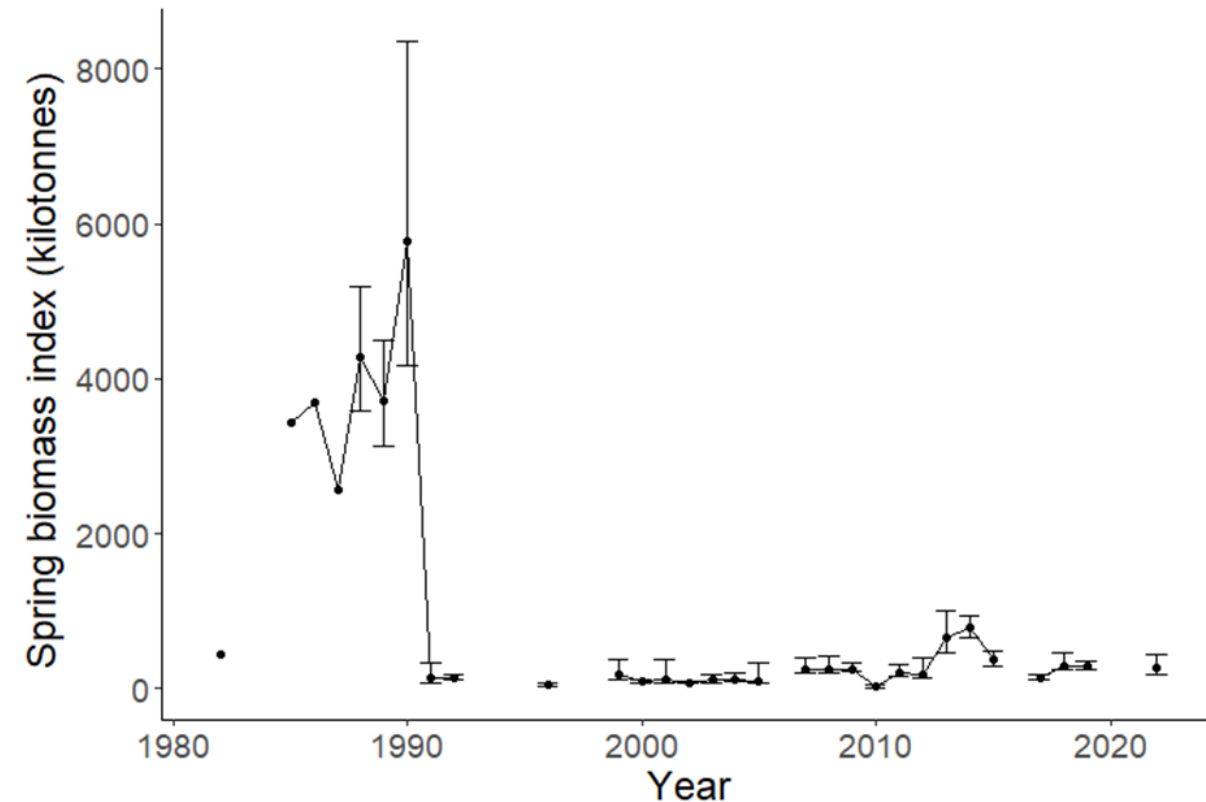
Other factors: ecosystem role and population status

What have other's done



Bottom-Up Regulation of Capelin, a Keystone Forage Species

Alejandro D. Buren^{1,2*}, Mariano Koen-Alonso², Pierre Pepin², Fran Mowbray², Brian Nakashima², Garry Stenson², Neil Ollerhead², William A. Montevecchi¹



Lesson learned: consult and achieve consensus prior to RAP; use as many lines of evidence as possible

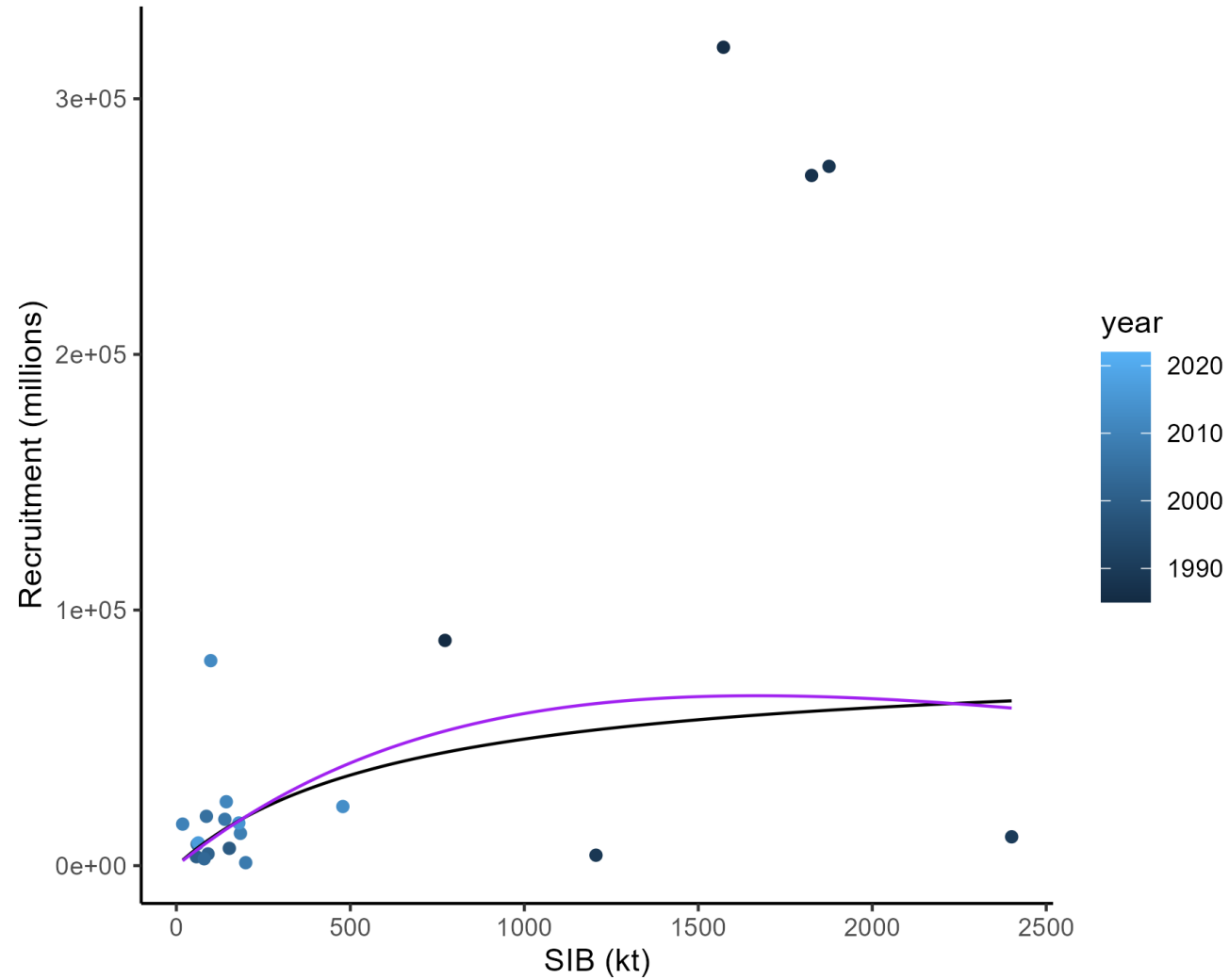
Selecting a capelin LRP

Approach and criteria

- NAP (June 2022) provided advice on best practices: criteria
 - Feasible – can an LRP be developed with a given approach?
 - Reliable – given uncertainties in the data, parameters, or models, should an approach be used to develop an LRP?

Selecting a capelin LRP

Feasible but not reliable



Selecting a capelin LRP

Approach and criteria

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 - Feasible – can an LRP be developed with a given approach?
 - Reliable – given uncertainties in the data, parameters, or models, should an approach be used to develop an LRP?
 - Plausible – is the LRP consistent with the understanding of the state of the stock?

Selecting a capelin LRP

LRP approaches and criteria (DFO 2023) - A sample table

| LRP approach | Estimation/Method | Feasible | Reliable | Plausible | LRP (kt) |
|--------------|-------------------|----------|----------|-----------|----------------|
| Approach 1 | ... | Yes | No | NA | |
| Approach 2 | ... | Yes | Yes | No | |
| . | | | | | |
| . | | | | | |
| . | | | | | |
| Approach N | ... | Yes | Yes | Yes | X ¹ |

¹Valid – the approach is feasible, reliable, and plausible;
term not in SAR

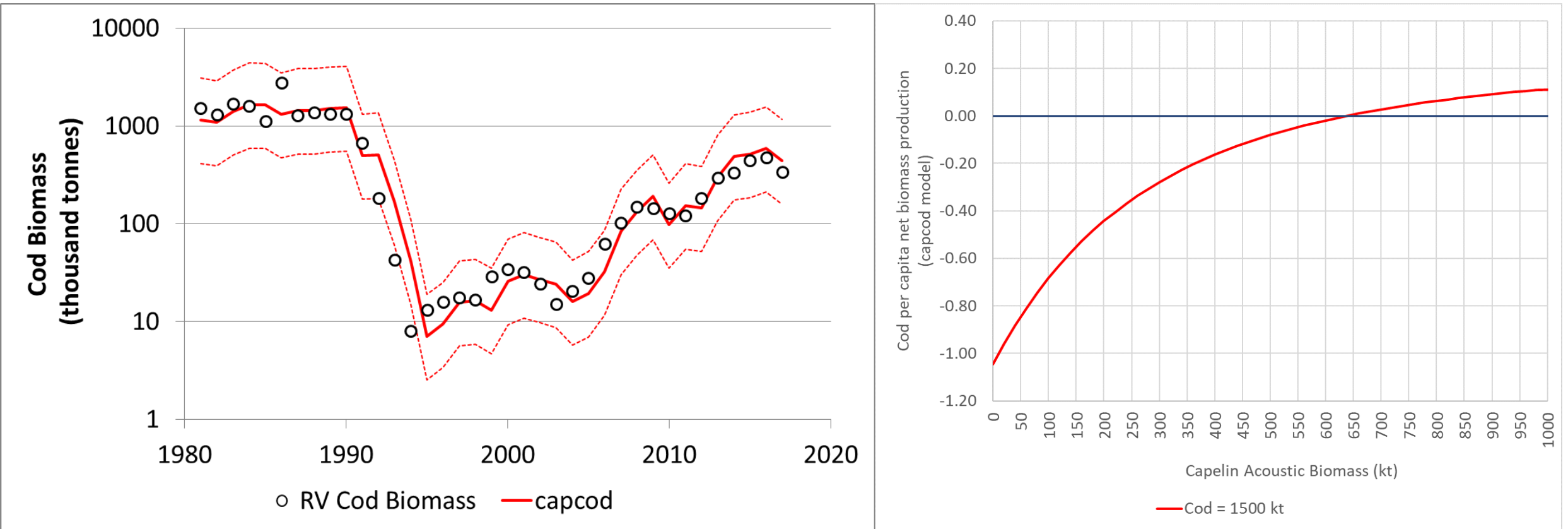
Selecting a capelin LRP

LRP approaches and criteria (DFO 2023)

| LRP approach | Estimation | Method (e.g.) | Feasible | Reliable | Plausible | Uncertainties (parameters, structure) ¹ | LRP (kt) |
|---------------------------------------|-------------------------------------------------|---------------------------------------------|--------------------|----------|-----------|--------------------------------------------------------------------------------------------------------|----------|
| Proportion B_{msy}/B_0 | Age- or size-structured, DD | IPM | Yes but incomplete | NA | NA | NA | |
| | SPM | JABBA | Yes | No | NA | Params - Value of the r prior affects model (see Appendix 2) Str - process error explains variation | |
| | Catch only CLS | CMSY | Yes | No | NA | See SPM | |
| Bmsy-proxy – $F_{X\%SPR}$ | Estimate F and SPR | Calculate | No | NA | NA | NA | |
| $X\% R_{max}$ | SRR | Beverton-holt, Ricker, segmented regression | Yes | No | NA | Params – NA Str – large differences between SR curves; segmented regression inappropriate | |
| Historical - Time series ² | B_{loss} | Lowest value | Yes | Yes | No | NA | |
| | $B_{recover}$ | Expert judgement | Yes | Yes | Yes | Data – concerns over 1982 value Params & Str – NA | 446 |
| | B_{min} | Percentiles | Yes | No | NA | LRP values varies widely based on percentiles values | |
| B_{msy}/B_0 – historical proxies | Estimate of high or pre-exploitation stock size | mean or median multiplied by a fraction | Yes | Yes | Yes | Params - Uncertainty in years used for when indicator is high Str - NA | 741 |
| | | | | | | | |
| Ecosystem Approach | Bioenergetic-allometric | Capcod | Yes | Yes | Yes | Params - acceptable Str - acceptable | 640 |

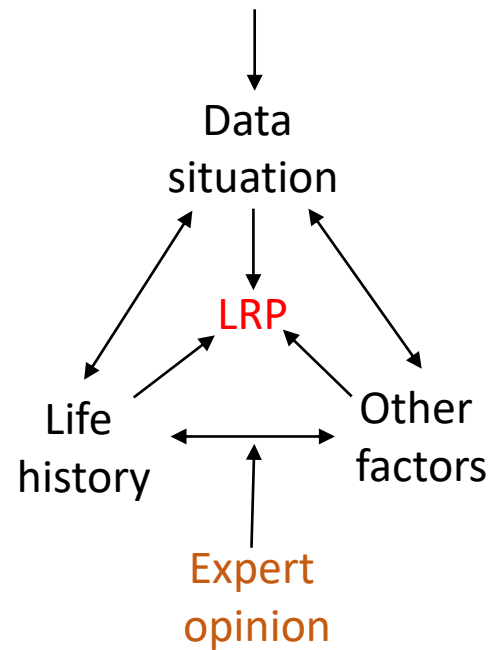
Selecting a capelin LRP

An ecosystem approach using 'capcod'



Lessons learned

What have other's done



Create a suite of LRP approaches (road map)

Work towards internal consensus (pre-meeting)

Determine valid LRPs using criteria

Select most robust approach

Acknowledgements

- Fran Mowbray, Hannah Murphy, Aaron Adamack, Christina Bourne + Pelagics section (present and past)
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- Mariano Koen-Alonso (MER)
- Paul Regular (GF)
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Thanks for coming