

## Comment

### Comment on “Towards a precautionary approach to managing Canada’s commercial harp seal hunt” by Leaper *et al.*

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The Objective-Based Fisheries Management used by Canada to manage the Northwest Atlantic seal hunt conforms to United Nations and Canadian Government precautionary approach frameworks in its structure and industry involvement. Managers and industry use clearly identified thresholds and harvest control rules to adjust quotas to respect the management framework. Although simulation testing is needed to evaluate management model performance under additional sources of uncertainty, this approach has successfully maintained the harp seal population at or near the highest level ever seen, during a period of intensive hunting.

**Keywords:** harp seal, harvesting, management, precautionary approach.

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Leaper *et al.* (2010) compare Canada’s Objective-Based Management Framework (OBFM) with the Revised Management Plan (RMP) of the International Whaling Commission, and the Potential Biological Removal (PBR). They conclude that OBFM is not a precautionary approach (PA) because it has not been evaluated by simulation and does not specify a catch-limit algorithm (CLA) to identify acceptable catch levels. They propose that catches be limited within the PBR until the OBFM can be tested.

The PA is a complex framework that involves all parties in the process of identifying appropriate biological thresholds to ensure conservation and that specific actions follow if thresholds are exceeded. As such, the goals of a PA can be achieved using a variety of approaches. We feel that the OBFM meets these criteria, but rather than setting a specific CLA, it does so by providing thresholds that identify the general health of a population and the control rules that give direction to managers and industry to choose the specific quota. Annual quotas are allowed to vary while ensuring that the population reaches or is maintained at a healthy state.

To date, most PA initiatives have focused on fish population dynamics using an approach similar to that of the OBFM. Canada ratified the United Nations Fish Stock Agreement (UNFA) in 1999, and the harp seal (*Pagophilus groenlandicus*) hunt was the first management plan it implemented that conformed to a PA framework (Rivard, 2005). OBFM is consistent with UNFA and recently developed Canadian departmental

requirements in its structure (<http://www.dfo-mpo.gc.ca>) and its industry involvement. In contrast, setting  $B_{lim}$  at 0.54  $K$  in the RMP appears to be overly conservative (Butterworth and Best, 1994), and the RMP was not industry-inclusive (as per Hilborn *et al.*, 2001).

Potential Biological Removal, which is a clearly specified CLA, was not developed with the intent of setting directed harvests and does not use all the information available for a well-studied species. Applying PBR would reduce the potential quota significantly (compared with OBFM) and, like the RMP, may never be accepted by managers and industry because “it is so conservative that it will waste much of a potential harvest” (Butterworth, 1995). Moreover, the application of this CLA without consideration of other information may have unintended consequences. PBR-derived catches could result in declines in White Sea harp seals, whereas quotas from population models are more conservative (ICES, 2009).

The suggestion to use observational data (i.e. pup production) directly, rather than model estimates, has been considered, but changes in pup-production estimates are difficult to interpret as harvest and environmental impacts will not be observable for 5–7 years. However, by monitoring annual reproductive rates (Sjare and Stenson, 2010) and catches, changes in the resource can be identified by modelling total population size, and the problems described for Scottish grey seals avoided.

Although we disagree with Leaper *et al.* (2010) that OBFM does not meet the criteria for the PA, we do agree that simulation testing

of OBFM is needed (Hammill and Stenson, 2007) and appreciate some of their suggestions. Limited testing to date shows that the basic OBFM framework performs well (e.g. Leaper and Mathews, 2008, cited in Leaper *et al.*, 2010), with few trials (<5%) falling below the limit reference point (Hammill and Stenson, 2009). The possibility of stock structure is worthy of further investigation, although earlier studies have argued for a single stock (Perry *et al.*, 2000), and we believe that industry, rather than scientists, should decide on economic value. We also agree with the suggestions to examine the impact of assuming errors in input data and plausible changes in mortality and fecundity, although some aspects of these have been incorporated into the assessment since 2003.

In closing, OBFM was established in 2003 because the replacement-yield approach was considered to be a high risk (McLaren *et al.*, 2001), and to date, it has worked well. The reference by Leaper *et al.* (2010) to a powerpoint presentation that the TAC should be set at 270 000 animals or lower does not reflect the full set of runs that showed that the 280 000 seal TAC was consistent with OBFM (DFO, 2009). Although no person can predict the future, since being implemented OBFM has successfully maintained the Northwest Atlantic harp seal population at or near the highest level ever seen, coincident with a period of intensive hunting.

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## References

- Butterworth, D. S. 1995. Additional essays on whales and man, High North Alliance, 1995. An essay first presented at the Symposium on Scientific Management of Fisheries and Marine Mammals, Washington, DC, April 1994, organized by the Science and Environment Policy Project.
- Butterworth, D. S., and Best, P. B. 1994. The origins of the choice of 54% of carrying capacity as the protection level for baleen whale stocks and the implications thereof for management procedures. Report of the International Whaling Commission, 44: 491–497.
- DFO. 2009. A review of the harp seal total allowable catch (TAC) for 2009. DFO Canada Science Advisory Secretariat Science Response, 2009/006.
- Hammill, M. O., and Stenson, G. B. 2007. Application of the precautionary approach and conservation reference points to the management of Atlantic seals. ICES Journal of Marine Science, 64: 702–706.
- Hammill, M. O., and Stenson, G. B. 2009. A preliminary evaluation of the performance of the Canadian management approach for harp seals using simulation studies. Canadian Stock Assessment Secretariat Research Document, 2009/093.
- Hilborn, R., Maguire, J.-J., Parma, A. M., and Rosenberg, A. A. 2001. The precautionary approach and risk management: can they increase the probability of success in fishery management. Canadian Journal of Fisheries and Aquatic Sciences, 58: 99–107.
- ICES. 2009. Report of the Joint ICES/NAFO Working Group on Harp and Hooded Seals (WGHARP). ICES Document CM 2009/ACOM: 17.
- Leaper, R., Lavigne, D. M., Corkeron, P., and Johnston, D. W. 2010. Towards a precautionary approach to managing Canada's commercial seal hunt. ICES Journal of Marine Science, 67: 316–320.
- Leaper, R., and Matthews, J. 2008. Implications of uncertainty for Canada's commercial hunt of harp seals (*Pagophilus groenlandicus*). Nature Proceedings, <http://hdl.handle.net/10101/npre.2008.1798.1>.
- McLaren, I. A., Brault, S., Harwood, J., and Vardy, D. 2001. Report of the eminent panel on seal management. 146 pp. <http://www.dfo-mpo.gc.ca/seal-phoque>.
- Perry, E. A., Stenson, G. B., Bartlett, S. E., Davidson, W. S., and Carr, S. M. 2000. DNA sequence analysis identifies genetically distinguishable populations of harp seals (*Pagophilus groenlandicus*) in the Northwest and Northeast Atlantic. Marine Biology, 137: 53–58.
- Rivard, D. 2005. Proceedings of the Meeting of the Science Working Group on the Precautionary Approach, Ottawa, Ontario, 20–21 October 2005. Canadian Science Advisory Secretariat Proceedings Series, 2005/027.
- Sjare, B., and Stenson, G. B. 2010. Changes in the reproductive parameters of female harp seals (*Pagophilus groenlandicus*) in the northwest Atlantic. ICES Journal of Marine Science, 67: 304–315.

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