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**Seal-Cod Interactions on the Eastern Scotian Shelf: Decadal Scale Processes and ‘The Balance of Nature’**

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*with R. O’Boyle.*

For most fish stocks, a major reduction in fishing mortality has resulted in increases in abundance. The cod stock on the eastern Scotian Shelf is a notable exception. It collapsed in the early 1990s, and a moratorium on fishing has been in place since 1993. The stock has continued to decline, and has experienced high natural mortality. In parallel, the abundance of Grey seals foraging in the area has doubled about every seven years since the 1960s. The causes of the high cod natural mortality are not well understood, but seals are not considered to have played a significant role. This lecture takes a fresh look at the impact of seals on cod abundance. Abundance trends of the “Sable” and “Gulf” seal herds which forage on the Scotian Shelf are estimated to 2050. Total annual food consumption of the two herds is estimated, and the implications of changes in energy density of the diet evaluated. At present, in excess of 250,000 tons of fish are consumed annually by the ‘Sable’ herd, with the ‘Gulf’ herd consuming about 50,000 tons. The literature on Grey seal diets indicates that cod is a major item, even at low cod abundance. An exploratory approach is taken towards defining parameters of a Type 2 “functional response” of seal foraging on cod. A range of cod size/age selectivity options is considered, with best fit to the data being “flat top” partial recruitment. In a cohort analysis of 1970 – 2005 cod abundance, seals are treated as an additional fishing gear sector. Model results infer that seals account for most of the increases in natural mortality since the late 1980s. It is concluded that Grey seals are responsible for the lack of recovery of cod since 1993, and also have contributed to its collapse. Projections to 2050 predict a continuing decline, with cod becoming extirpated. However, recent increases in cod abundance are not predicted by the model. This case history on decadal fluctuations in seal and cod abundance is discussed in relation to concepts of “the balance of nature”.

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