

CSD 3.3 Report

Grey seal diet composition and prey consumption

Executive summary

Since the last comprehensive assessment of grey seal diet around Britain in 2002, grey seal numbers have continued to rise in the North Sea while harbour seal numbers have declined in Shetland, Orkney and southeast Scotland. Stocks of gadid fish have also declined. In this report on task CSD3.3 of the MMSS/001/11 programme, grey seal diet is reassessed in 2010/11 and compared to previous assessments in 1985 and 2002, and estimates of prey consumed by grey seals are compared with fish stock sizes to estimate percent predation mortality.

Grey seal scats were collected seasonally throughout Scotland and along the east coast of England over a 12 month period in 2010/11. Methods used to estimate diet followed those used in previous years. Hard remains of prey (fish otoliths and cephalopod beaks) were recovered, identified and measured, and corrections made to account for partial and complete digestion. Diet composition was estimated as the percentage, by weight, of each species in the diet for each region and season. Prey consumption was estimated assuming that grey seal populations met their annual energy requirements. Sampling variability was estimated using non-parametric and parametric bootstrap resampling methods.

A total of 2,205 grey seal scats containing hard prey remains were processed, yielding 68,465 otoliths and beaks. In the Western Isles, estimated diet was dominated by sandeel and gadid prey, particularly cod and ling. In the Northern Isles, the diet was also dominated by sandeel and gadid prey, particularly saithe and cod. Sandeel made up around a quarter of the diet in Shetland and around half of the diet in Orkney. In the central North Sea, diet was heavily dominated by sandeel but was more varied in the southern North Sea.

Overall, grey seals were estimated to have consumed 129,200 t (95% conf. interval: 114,800-149,400 t) of prey in the North Sea (ICES Subarea IV) and 70,300 t (95% conf. interval: 60,000-84,000 t) of prey west of Scotland (ICES Division VIa) in the 12 months from April 2010 to March 2011; a grand total of 199,500 t (95% conf. interval: 181,200-225,500 t).

Diet composition appears to have changed little in the Western Isles from 1985 to 2002 to 2010/11. In the Northern Isles, changes in diet composition were characterised by a marked decline in the contribution of sandeel in Shetland and a more gradual decline in Orkney, and an increase in the contribution of gadids. In the central North Sea, however, the change in the contribution of sandeel and gadids was the reverse of that seen in the Northern Isles. Gadids declined markedly but sandeel increased steadily between 1985 and 2010/11.

In the North Sea (ICES Subarea IV), consumption by seals as a percentage of estimated stock size is estimated to be small; the highest figure is for cod (5% in 2010). West of Scotland (ICES Division VIa), however, estimated consumption by seals as a percentage of estimated stock size is larger for whiting (10% in 2010) and very large for cod (> 100% in 2010). These figures increase to ~50% and > 200%, respectively, if harbour seal consumption is also included. The partial coverage of west coast cod by the stock assessment and the lack of overlap between the area of the fishery and the area where seals forage provide an explanation for how the estimated consumption by seals can be so large relative to the size of the assessed stock.