

## Marine Mammal Scientific Support Research Programme MMSS/001/1

### CSD3.1 Report

# Improved estimates of digestion correction factors and passage rates for harbour seal (*Phoca vitulina*) prey.

## Summary

Diet composition estimates for pinnipeds are widely conducted using prey hard remains recovered from faeces. To estimate the size and number of prey consumed accurately, digestion correction factors must be applied to measurements and counts of fish otoliths and cephalopod beaks. We conducted 101 whole prey feeding trials with six harbour seals (*Phoca vitulina*) and 18 prey species to derive estimates of digestion coefficients (DC; accounting for partial digestion using otolith width (OW) or length (OL)) and recovery rates (RR; accounting for complete digestion). Greater than 98% of otoliths were passed within 3 days of consumption. All otoliths passed were recovered by day 10 and all beaks by day 14. RRs were smallest for Atlantic salmon smolts (*Salmo salar*, RR=0.306; SE=0.031), progressively greater for sandeels, flatfish, squid (*Loligo forbesii*) and large gadoids, and greatest for *Trisopterus* spp (RR=1.017, SE=0.002). Species-specific DCs were greatest for greater sandeel (*Hyperoplus lanceolatus*, DC(OW)=1.75, SE=0.049), then progressively smaller for sandeel, flatfish, large gadoids and *Trisopterus* species (DC(OW)=1.14, SE=0.015). The amount of erosion of each otolith was graded using a scale of 1-4. The majority of otoliths recovered (65.9%) were severely eroded (grade 4). Grade specific DCs were greatest for greater sandeel (DC=1.82, SE=0.047), then progressively smaller for large gadoids, flatfish and *Trisopterus* spp (DC=1.18, SE=0.016). Possible explanations for some results with RR>1 and DC<1 are discussed. In almost all cases the CV was smaller for DCs using OW than using OL. As such, OW DCs (gradespecific) will be used to estimate the diet of harbour seals, where possible. RRs were broadly similar to those for grey seals (*Halichoerus grypus*), but harbour seal species- and grade-specific DCs were generally smaller. Differences in partial and complete digestion rates among prey species and between harbour and grey seals highlight the importance of applying predator and prey-specific digestion correction factors when reconstructing diet.