

## INSIDE JEB

## Versatile sei whales both lunge and skim to feed



A sei whale (*Balaenoptera borealis*) lunge feeding in Berkeley Sound, the Falkland Islands. Photo credit: Paolo Segre.

Third in size only to their blue and fin whale cousins, sleek sei whales appear well built for a life of lunge feeding, engulfing colossal mouthfuls of water containing fish and krill that they filter out. Yet, a closer look at the brush-like baleen in their mouths reveals that it has more in common with the longer filaments of right and bow whales, which swim slowly through patches of prey, continuously filtering plankton. ‘Sei whales likely represent a functional and ecological intermediate in the transition between intermittent filter feeding and continuous filter feeding’, says Paolo Segre from Stanford University, USA, explaining that sei whales also cruise slowly to continually filter plankton at the surface. The question that intrigued Jeremy Goldbogen (Stanford University, USA) and Ari Friedlander (University of California, Santa Cruz, USA) was whether the whales’ sedate progress through clouds of plankton bears any resemblance to their lunges and whether their more leisurely dining strategy has impaired their ability to lunge feed.

‘Sei whales are fast, elusive and difficult to study’, says Segre, explaining that the

whales prefer the open ocean, where they are hard to find. Fortunately, the animals also visit the shallower waters of Berkeley Sound in the Falkland Islands, so Segre teamed up with Caroline Weir and Andrew Stanworth from Falklands Conservation and Steve Cartwright from the Shallow Marine Surveys Group to tag two of the whales. ‘The weather was terrible and the sei whales were by far the most difficult species I’ve tagged; they’re very fast and skittish’, Segre recalls. Having successfully attached the data collecting tags, equipped to capture the whales’ location, manoeuvres, speed and depth, and to film the view from their backs, the team also deployed a drone to film the whales from above.

Tracking the animals over 11–12 h, the team saw them alternate between lunging and skimming as they fed on amphipods near the surface. Analysing the ~6 s long surface lunges, the team observed the whales tip over on their right side, opening their mouths wide as they engulfed a large volume of water. However, instead of ceasing swimming and using their momentum to carry them forward, like blue whales, the sei whales continued swimming as they rolled on

their side during a lunge. In addition, the sei whales only reached a top speed of  $2.1 \text{ m s}^{-1}$ , compared with fast paced blue whales that lunge at  $3.9 \text{ m s}^{-1}$ . However, when the team analysed the sei whales’ lunges at depth, they were more reminiscent of blue whale lunges, reaching higher speeds ( $2.9 \text{ m s}^{-1}$ ) and accelerating before decelerating as their mouths filled with water.

In contrast, when the sei whales swept through the water, continuously filtering plankton, they tipped their rostrums upward, so they protruded from the water, while proceeding at a sedate  $1.4 \text{ m s}^{-1}$ . And when the team compared the sei whales’ manoeuvres with those of another continuous skim-feeding specialist, the bowhead whale, they found the continuous filter-feeding sessions of the sei whales were much shorter (3–49 s) than those of the bowhead whales (2.4 min).

Sei whales’ slow surface hunting strategies owe more to the manoeuvres of gentle skim feeders than to the explosive lunges of blue whales that catch prey unawares. ‘Knowing they have the muscle power to go much faster makes their slow feeding behaviours even more interesting’, says Segre. Yet, at depth, sei whales resume the fast-paced momentum-driven thrusts that other lunge feeders perform. The team suspects that sei whales may have adopted their surface-feeding style in response to the increased competition when large lunge-feeding creatures, including blue whales, began efficiently plundering the depths 3 million years ago, opening a range of dining opportunities that were previously unavailable to the versatile cetaceans.

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