INSIDE JEB

Threatened whales and dolphins recognise predatory killer whales from their alarming calls

A Risso's dolphin, *Grampus griseus*. Photo credit: Ari Friedlaender.

Orca have a formidable reputation as one of the ocean's most ferocious predators. Hunting stealthily in packs, some populations pursue ocean-going mammals before overwhelming them in open waters, while others ambush seals on ice flows. However, other killer whales prefer to dine on a diet of fish alone, posing little or no threat to the mammals that share their waters. Knowing that some species, including birds and mammals, are capable of assessing the risk that they are under from predators in the vicinity, Matthew Bowers from Duke University, USA, and colleagues wondered whether aquatic mammals that are known to reside alongside killer whales and feature on their menu could distinguish the calls of the predatory killers from those of other marine mammals. With his PhD supervisors, Douglas Nowacek and Andrew Read from Duke University, USA, and Ari Friedlaender (University of California at Santa Cruz, USA), Vincent Janik (University of St Andrews, UK) and Brandon Southall (Southall Environmental Associates, USA), Bowers decided to investigate how pilot whales and Risso's dolphins react to the calls of killer whales.

Sailing 40 miles off the North Carolina coast to monitor pods of pilot whales and to Catalina Island off the coast of California to observe small groups of Risso's dolphins, Bowers and his colleagues prepared to play recordings of killer whales and social calls from pilot whales, Risso's dolphins and humpback whales to the animals while observing their reactions. 'Each playback experiment was an all-day endeavour', says Bowers, who describes tagging one member from each group with a data-logger that recorded the sounds heard by the animals, in addition to their depth and movements. Then, while the team played the whale, dolphin and killer whale recordings into the water from one boat, Danielle Waples from Duke University observed the animals' movements from a second inflatable.

Bowers recalls that the pilot whales and dolphins appeared to remain calm when most of the sounds – including many of the killer whale calls – were played into the water. However, he was astonished by the animal's reactions when he broadcast four specific killer whale calls. 'It was crazy to see a group of animals respond so strongly to something you're doing', says Bowers, describing the response of the Risso's dolphins as a stampede and adding, 'The strong and differential responses to this subset of killer whale calls was eye opening'.

Back in the lab, Bowers and Nicola Quick estimated how much energy the animals were using to build a sense of their urgency and reconstructed the dolphin and pilot whales' movements; they noticed that the two species' reactions were completely different. While the pilot whales assembled into a tight group that dived down toward the alarming sound, the Risso's dolphins clustered together and fled in the opposite direction at high speed for more than 10 km.

The team also correlated the animals' movements with the sounds that they had heard and found unique features in the distressing killer whale recordings that did not occur in calls by members of their own species, the humpback whale calls or the killer whale calls that had not provoked panic. The distressing calls had many sound structures that occur in mammalian distress cries, including human wails. 'The signal starts to jump around in an unpredictable fashion', says Bowers, explaining that the features are disturbing because our brains can't filter out the erratic sounds and ignore them. 'We suggest that these calls convey information about the predators' behaviour or intent', he says, and could warn potential victims of the killer in their midst.

10.1242/jeb.183038

Bowers, M. T., Friedlaender, A. S., Janik, V. M., Nowacek, D. P., Quick, N. J., Southall, B. L. and Read, A. J. (2018). Selective reactions to different killer whale call categories in two delphinid species. *J. Exp. Biol.* **221**, doi:10.1242/jeb.162479.

Kathryn Knight
kathryn.knight@biologists.com