

Munching on molids:

Predation on ocean sunfishes by orca (a review)

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Abstract

To better understand predation on ocean sunfishes (Family Molidae, genus *Mola* and *Masturus*) by orca (*Orcinus orca*) we searched for records in the literature and online. We found that predation has been documented at least since the 1960's, albeit in low numbers ($n=38$), with social media in recent decades clearly facilitating dissemination. In all events a single sunfish was involved ranging in size from ca. 0.3 – ca. 2 m total length (possibly larger). Overall, three species were confirmed (*Mola mola*, *Mola alexandrini* and *Masturus lanceolatus*). Sunfish responses to orca included what appeared to be deliberate avoidance behaviours to actively keep the clavus ("tail") towards the orca, the ventral area away, and discourage the orca from making physical contact. The behaviours were surprisingly rapid and agile, and included the sunfish turning up-side down, rolling backwards and rapidly spinning. Predation was reported for both mammal- and fish-eating orca ecotypes (at least $n=4$, and $n=1$, respectively). Most interactions involved one to four orca. Orca behaviour included apparent targeting of the sunfish fins (dorsal, anal and pectoral fins) and food sharing. Our findings suggest that sunfishes are potentially a localized food source for some orca, e.g., in Oceania and the eastern Pacific Ocean, where many of the records originated from. However, bias in human observation and reporting are integral in these kinds of studies. Further, our findings point to sunfish being a more agile taxa with a broader range of maneuvers than traditionally thought.

Results

- ✓ We collated a total of ($N=68$) interactions
- ✓ Molid predation occurred in all ocean basins (red in pie-graphs, **Fig. 1**)
- ✓ Molids conducted a range of 'evade' behaviours e.g., 'invert' (**Fig. 2**) and 'clavus-to-orca' (**Fig. 3**)
- ✓ Orca behaviour included Harass/Play (**Fig. 4**)
- ✓ Behavior for both taxa was diverse (**Fig. 5**)
- ✓ Both fish- & mammal-eating orca predate molids.

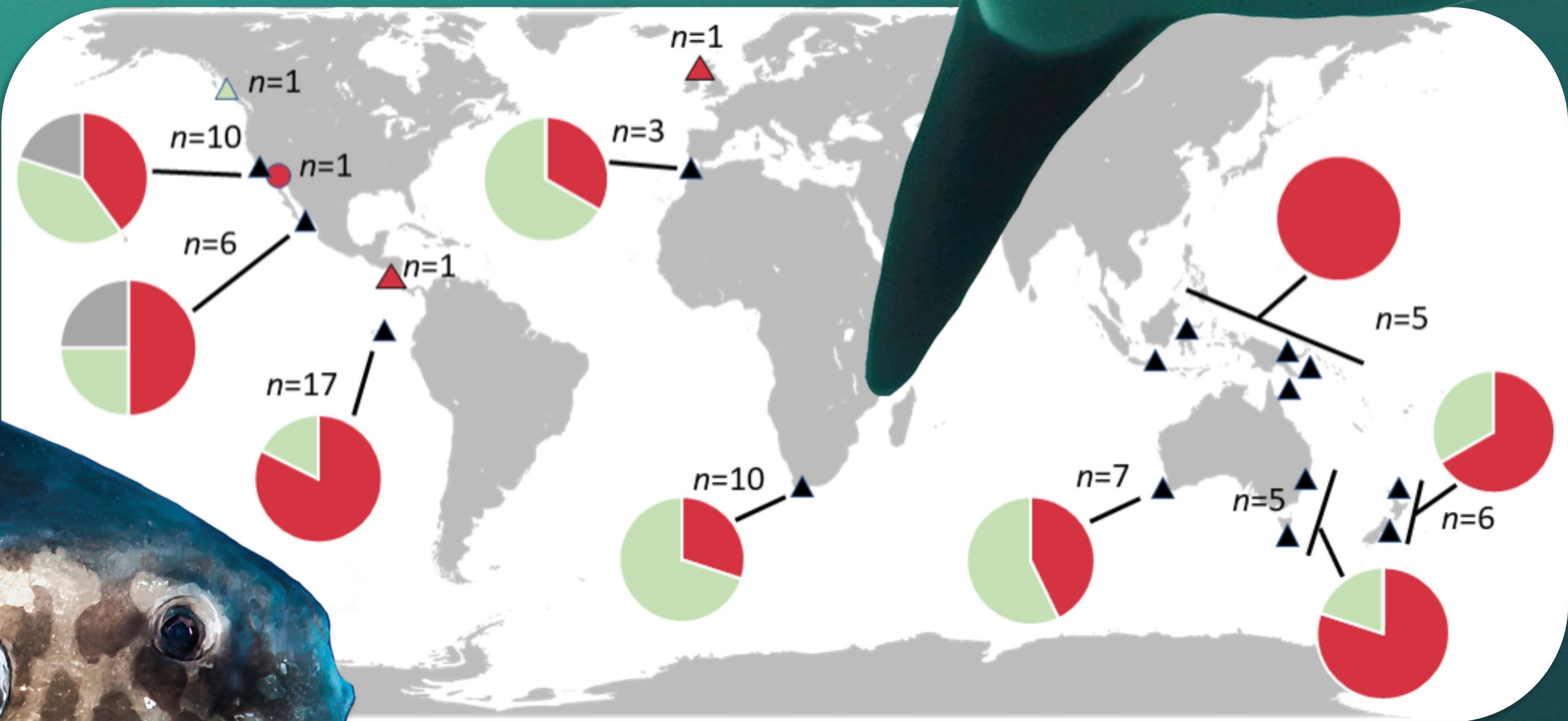


Fig 1. Distribution of molid-orca interactions, with predation (red) occurring in all locations. ($n=x$) = number of interactions at that location, Green = Non-predation, Grey = unclear.

Fig 4. During 'Harass/Play', an orca balances a young molid on its rostrum. Frame from video by Bill Bain, Australia

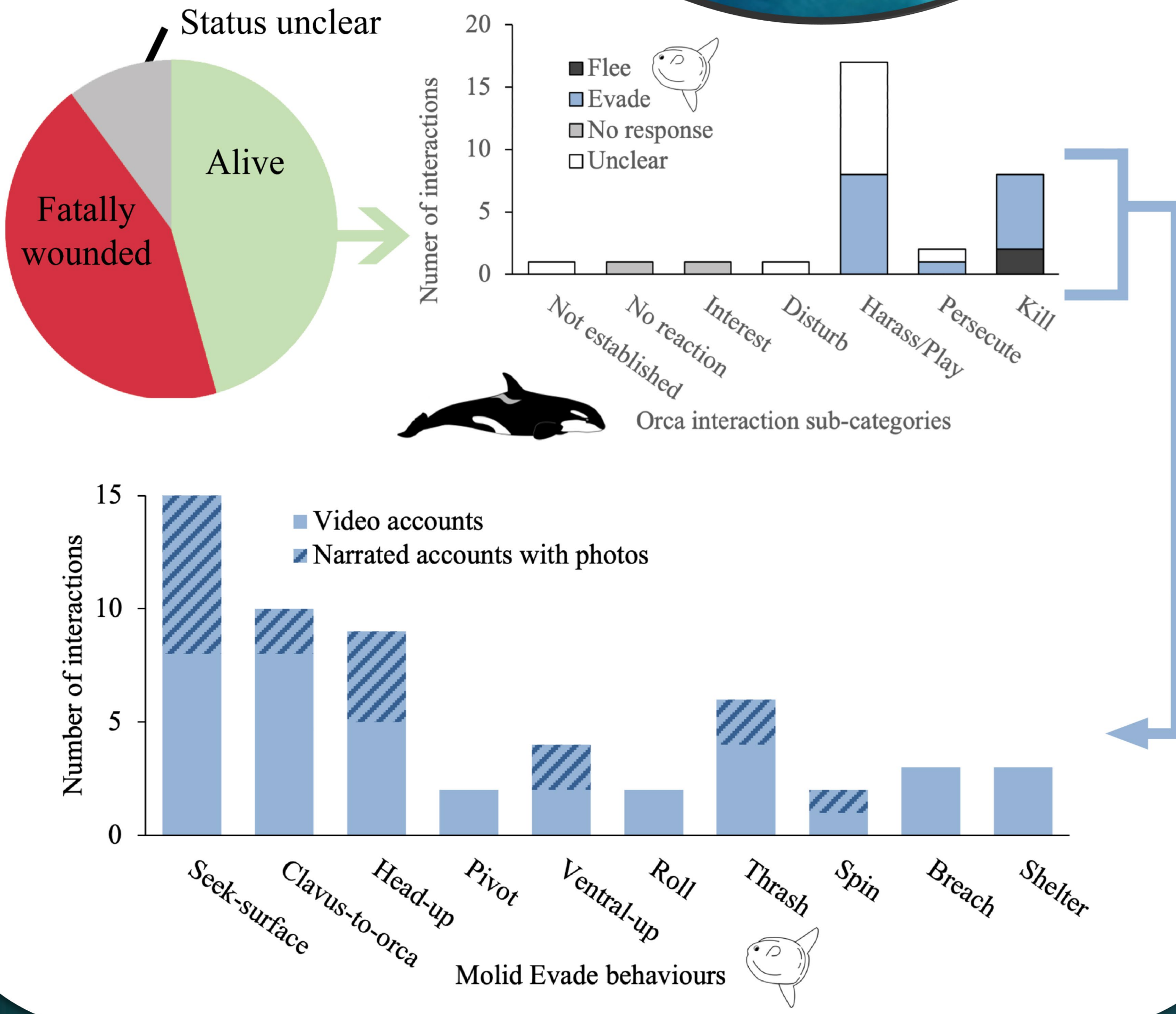


Fig 5. During 'Harass/Play', 'Persecute' and 'Kill' orca behaviours (top graph), molids conducted a wide range of 'evade' behaviours (bottom graph, and see **Figs. 2 & 3**).

Conclusions

- Molid behaviours were deliberate, surprisingly rapid and agile
- Interactions were not always fatal (evade behaviours by molids may contribute)
- Molids may be a localized food-source for some populations of orca (often referred to as 'ecotypes'), but predation occurs world-wide
- See Publications box for where to find further details.

How to Cite

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Nyegaard, M., Visser, I. N., and Fletcher, L. (submitted). Ocean sunfish (genus *Mola*, Family Molidae) exhibit surprising levels of agility during orca (*Orcinus orca*) interactions *Biodiversity Journal*.
Visser, I. N., Nyegaard, M., and Fletcher, L. (submitted). Orca (*Orcinus orca*) interactions with ocean sunfishes (Family Molidae, genus *Mola* and *Masturus*): A global review. *Biodiversity Journal*.
Visser, I. N., Nyegaard, M., and Fletcher, L. (submitted). Orca (*Orcinus orca*) interactions with ocean sunfishes (Family Molidae, genus *Mola* and *Masturus*): A global review *Biodiversity Journal*.