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Short Communication

Silver gull harassment of humpback whales in Exmouth Gulf, Western Australia

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Abstract. We share observations of silver gulls (*Chroicocephalus novaehollandiae*) harassing humpback whales (*Megaptera novaeangliae*) in Exmouth Gulf, Western Australia, between August and October in 2018 and 2019. Sixteen events were recorded of gulls pecking at the skin of 16 mothers and 2 calves resting on the surface. Data were collected opportunistically from a research vessel covering 5474.2 km (565 h). Events were documented through photographs and unmanned aerial vehicle video recordings and persisted for an average minimum time of 20.73 min (range 2.50–46.85 min). At least one event of a gull consistently gouging in a pre-existing lesion was recorded on a mother. Changes in behavioural activity from the whales, which varied from slipping under the surface to travelling and performing instantaneous behavioural events, were observed in 94% (15/16) of events. These are the first known records of birds attacking humpback whales. The results are comparable to early events of kelp gull (*Larus dominicanus*) harassment of southern right whales (*Eubalaena australis*) off Península Valdés, Argentina, where events have escalated over the past 50 years to consistent attacks on the whales' skin and blubber. Future research is required to monitor the trajectory of these interactions to inform management.

Keywords: behaviour, bird attack, bird–whale interactions, disturbance, seabird–cetacean interactions, unmanned aerial vehicle.

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Introduction

Cetacean and seabird interactions are common, whereby seabirds may actively follow cetaceans and feed on their leftover 'prey fragments' (Sakamoto *et al.* 2009; Jourdain and Vongraven 2017) or on invertebrates in whale slicks that are congregated on the water surface (Grebmeier and Harrison 1992). However, reports of bird harassments or attacks on cetaceans are limited. The first observations of bird harassment on whales were recorded in 1971, of brown-hooded gulls (*Chroicocephalus maculipennis*) and kelp gulls (*Larus dominicanus*) landing on, and occasionally pecking at, southern right whales (*Eubalaena australis*) off Península Valdés, Argentina (Cummings *et al.* 1972). After 1972, records show only kelp gull harassment on southern right whales in this location that has continued for almost 50 years (Thomas 1988; Rowntree *et al.* 1998; Marón *et al.* 2015). Furthermore, gull harassment has also been documented in two isolated events on southern right whales off southern Brazil (Groch 2001), as well as from giant petrels *Macronectes* spp. preying on sperm whales (*Physeter microcephalus*) around the sub-Antarctic islands since *c.* 1997 (Towers and Gasco 2020).

Off Península Valdés, kelp gulls were initially seen occasionally pecking sloughed skin off the backs of adult southern right whales (Cummings *et al.* 1972). This harassment behaviour has developed more intensely over the years to gulls chasing the whales and waiting for them to take a breath to pursue their attack (Marón 2015). From the 1970s to the 2000s, the harassment behaviour progressed to gulls gouging into and feeding on both the skin and blubber, creating large lesions. These lesions could cause physiological effects, such as heat loss, increase in disease and dehydration (Thomas *et al.* 2013; McAloose *et al.* 2016). Mothers and calves are primarily targeted because of the high proportion of time spent resting on the water surface (Sironi *et al.* 2009). Whales off Península Valdés respond with a variety of active avoidance strategies, primarily increasing their swim speed. By the 1990s, a study reported that direct gull harassment decreased resting and slow travel time for mothers and calves by almost half and more than tripled their time in medium and fast swims (Rowntree *et al.* 1998). Some adult whales in the population have learnt to respond to these gull attacks by adopting the galleon position by submerging their backs (Thomas 1988; Fazio *et al.* 2015) or by using oblique breathing techniques, resting with only their head out of the water (Fazio *et al.* 2015); neither of these positions are observed in other populations where there are no gull attacks (e.g. South Australia; Nielsen *et al.* 2019). The calves may not be able to acquire some of these behavioural adaptations and

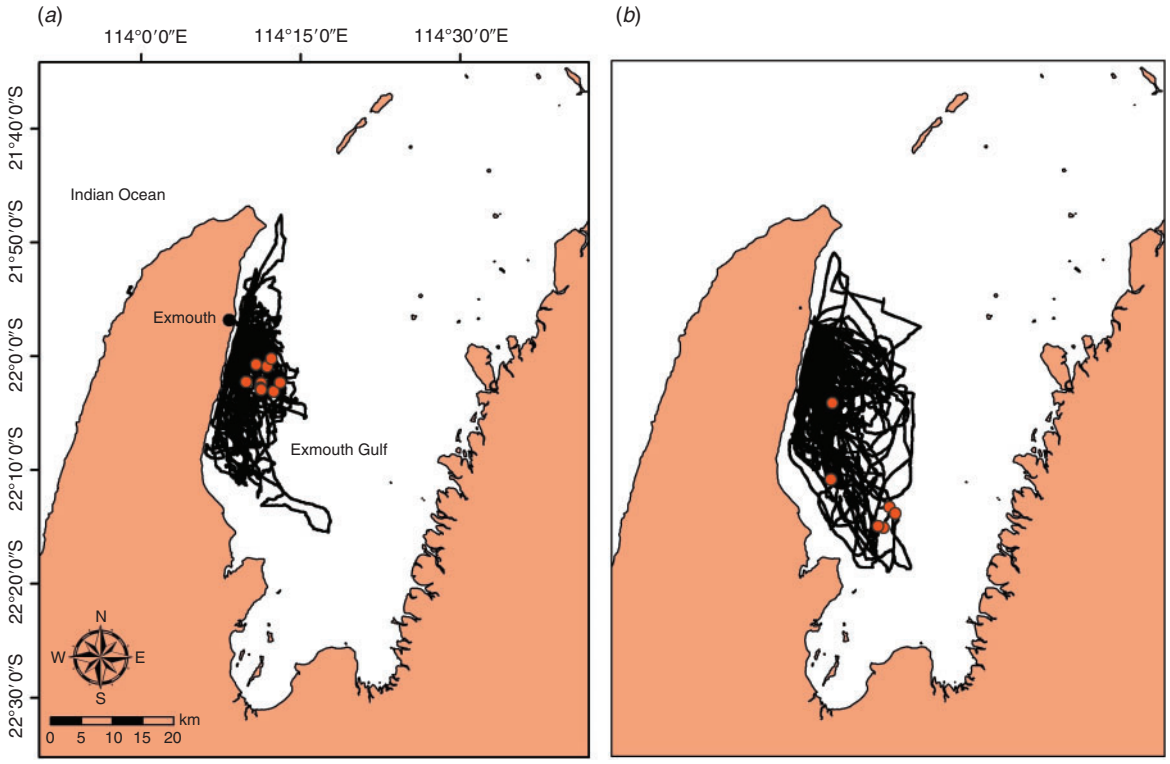

Fig. 1. Map of Exmouth Gulf, including the locations of gull harassment events (dots) and research effort track lines (black lines) covered between August and October in (*a*) 2018 and (*b*) 2019. Ten events were observed of silver gull harassments on humpback whales in October 2018 (*a*) and six events were observed in late September to mid-October 2019 (*b*).

so experience a higher volume of gull attacks (Sironi *et al.* 2014; Marón *et al.* 2015); this may have contributed to their extreme mortality rates in recent years, appearing as the most common factor among postmortem examinations conducted in the Península Valdés population (Fiorito *et al.* 2016; McAloose *et al.* 2016; Sironi *et al.* 2018). The gull behaviour has escalated exponentially over the decades, beginning with mother–calf pairs rarely being targeted in the 1970s with only 2% of the pairs observed exhibiting lesions, increasing to 36% in the 1980s and 84% in the 1990s, until the majority (99%) of the whale pairs observed in the 2000s exhibited lesions (Marón *et al.* 2015).

Silver gulls (*Chroicocephalus novaehollandiae*) have now been observed harassing humpback whales (*Megaptera novaeangliae*) in Exmouth Gulf, Western Australia (WA). This gull species shares many similar characteristics with kelp gulls, including diet and size (Birdlife Australia 2016). Silver gulls are found commonly in the Southern Hemisphere and around the coast of Australia (Johnstone 1982), with colonies along the WA coast (Nicholls 1974; Wooller and Dunlop 1979). Northwestern Australia is a breeding and calving area for humpback whales (Jenner *et al.* 2001). Within this region, Exmouth Gulf is used as a breeding ground and is an important resting ground for humpback whales on their southern migration. The WA humpback whale population is estimated at 20–30 000 animals, increasing 9–12.7% year^{-1} (Hedley *et al.* 2011; Salgado Kent *et al.* 2012; Jackson *et al.* 2015). After the population was almost decimated from whaling, it has made a substantial recovery and is now 'larger than 50%' of pre-whaling numbers (Bejder *et al.* 2016). Here we report on direct observations of silver gulls pecking at the skin and, in at least one event, gouging in a pre-existing lesion of humpback mothers and calves in 2018 and 2019 in Exmouth Gulf.

Materials and methods

This study was approved by the Murdoch University Animal Ethics Committee (R3048/18) and was licenced by the Western Australian Department of Biodiversity, Conservation and Attractions (08-002407-3, FO25000101). Unmanned aerial vehicle (UAV) operations were conducted under a UAV Operator's Certificate (CASA.ReOC.0075) and a remotely piloted aircraft system licence (Kate Sprogis) in accordance with regulations of the Australian Civil Aviation Safety Authority.

Study species and site

The WA humpback whale population (Breeding Stock D) feed in Antarctica (Area IV; Bestley *et al.* 2019) and calve in northwestern Australia (Jenner *et al.* 2001; Irvine *et al.* 2018). Whales enter Exmouth Gulf (22°S, 114°E; Fig. 1) between late August and early November, with a peak in late September (Irvine and Salgado Kent 2019). In 2018, 2772 whales, including 23 neonates, were observed in Exmouth Gulf between 8 August to 2 November during nine aerial surveys (Irvine and Salgado Kent 2019). Data on gull harassment events were collected in Exmouth Gulf between August and October in 2018 and 2019 from a research vessel (Quintrex; 6-m rigid hull, 4-stroke) while

Table 1. Gull harassment events recorded in 2018 and 2019

Silver gull *Chroicocephalus novaehollandiae* harassment events on humpback whales *Megaptera novaeangliae* recorded in field effort from August to October in 2018 and 2019, in Exmouth Gulf. CEE, controlled exposure experiments

Event	Date	Time (UTC+0800; hours)	Target individual(s)	Comments
2018				
1[A]	5 October	16:05	Mother	Arched and submerged; occurred in 'after' phase of CEE control noise
2	11 October	14:45	Mother	Dived and travelled (Case Study 1)
3	11 October	16:00	Mother	No behavioural response (Case Study 1)
4	15 October	14:47	Mother	Dived and started travelling as the gull flew away
5	16 October	13:24	Mother	Dived and breached; gull flew to another mother–calf pair
6[A]	16 October	11:16	Mother and calf	Dived and travelled; occurred in the 'before', 'during' and 'after' phases of low noise CEE (Case Study 2); possible small lesions on the mother
7	16 October	13:57	Mother	Dived in response to each gull contact; gull returned three times
8	16 October	13:43	Mother	Dived
9[A]	17 October	11:56	Mother	Dived and travelled; occurred in 'during' and 'after' phases of CEE control noise
10	20 October	15:09	Mother	Dived and travelled
2019				
11[A]	25 September	12:45	Mother	Arched, submerged and travelled; occurred 'before' and 'during' CEE low noise
12[A]	29 September	15:24	Mother	Dived and travelled; occurred in 'after' phase of CEE high noise
13	9 October	13:10	Mother	Dived and travelled
14	9 October	13:35	Mother	Dived
15	9 October	13:46	Mother	Dived; gull flew between whale groups
16	17 October	12:46	Mother and calf	Dived in response to each gull contact (Case Study 3); mother had a white lesion

[A]Five events occurred in 'during' or 'after' phases of CEE of Sprogis *et al.* (2020*b*).

investigating the effects of underwater vessel noise on mother and calf humpback whale behaviour (Sprogis *et al.* 2020*b*). Water depth in Exmouth Gulf ranges from <1 to 22 m (mean depth 9 m; Bejder *et al.* 2019).

Opportunistic data collection

During the study of Sprogis *et al.* (2020*b*), controlled exposure experiments were conducted to examine the effects of vessel noise levels on mother–calf humpback whales. Vessel approaches consisted of a slow approach (800 rpm, ~0.77 m s^{-1}), simulating a whale watch approach. The only variable that was changed during controlled exposure experiments was the vessel noise level, at control, low, medium or high noise (range 124–172 dB re 1 μPa root mean square (RMS) at 1 m). Controlled exposure experiments were conducted in daylight hours between 0720 and 1805 hours on resting mother–calf pairs logging on the surface with their backs exposed. 'Logging' was defined as a whale remaining on the surface of the water for more than 15 s with no other behavioural event visible (Sprogis *et al.* 2020*b*). When searching for whales or during a controlled exposure experiment, if a gull was observed to land on the focal whales or on nearby whales, data were collected opportunistically. Where possible, photographs were obtained from a digital SLR camera (Canon, Oita, Japan, 50D, 400-mm lens), as well as UAV video footage (altitude >25 m). The noise from UAVs at this altitude causes no apparent behavioural changes in baleen whales (Christiansen *et al.* 2016*b*, 2020*a*), therefore UAVs are a non-invasive tool in this case for behavioural studies. The time, date, latitude, longitude, water temperature and water depth were recorded for each gull event. The age class of the gull was examined *post hoc*. Adult silver gulls were identified by the colour of their bills and legs, both ranging from brick red to orange–yellow, compared to juveniles with grey to greyish–brown bills and legs (Johnstone 1982). Whales were identified using photographic identification of the dorsal fin (Hammond 1990) and patterns of the dorsal side from UAV aerial stills. The length of the whales was measured from still frames extracted from the UAV video when the mothers and calves had a straight body axis, lying flat at the surface with their body outline clearly visible, following the photogrammetry methods of Christiansen *et al.* (2016*a*). Responses by whales to gull attacks were classified by a change in behaviour, such as slipping under the water and diving.

Results

Research effort in 2018, from 20 August to 28 October, resulted in being on the water for 52 days (289.5 h), covering 2336.9 km on the western Gulf (Fig. 1). In 2019, from 22 August to 28 October, we were on the water for 48 days (275.5 h), covering a larger area of 3137.3 km in the western and southern Gulf (Fig. 1). The total effort across the 2 years was for 100 days (565 h), covering 5474.2 km. Sixteen gull harassment events were seen over a total of 170 focal whale groups observed. Of the 16 events, 11 occurred in 2018 (11 of 116 encounters; 9.5% of observations) and 5 occurred in 2019 (5 of 54 encounters; 9.3% of observations; Fig. 1; Table 1). The total number of whales encountered in 2019 was lower than that encountered in 2018, hence the larger distance travelled (Philippa Harkness and Kate Sprogis, pers. obs.). Events were observed at various times between 1155 and 1605 hours (Table 1). Both adult and juvenile

Fig. 2. A series of photographs showing a juvenile silver gull (*Chroicocephalus novaehollandiae*) pecking skin off the back of a mother humpback whale (*Megaptera novaeangliae*) (Event 3; Table 1; Case Study 1). The gull would walk up and down whale's back and peck at the skin. The gull's beak can be seen holding visible whale skin.

gulls were observed pecking persistently on mothers and calves. Events were observed in water temperatures ranging from 22.64 to 25.31°C (mean water temperature 23.71°C) and in water depths ranging from 10.9 to 20.1 m (mean depth 17.2 m) across the 2 years. The first recorded gull events in each year were on 5 October 2018 and 25 September 2019, consistent with the peak whale occurrence in Exmouth Gulf (late September).

Gull harassment events occurred on 18 individuals (16 mothers, 2 calves), all of which were resting on the surface. The minimum duration of the attacks ranged from 2.50 to 46.85 min (mean 20.73 min; $n = 11$), but the maximum duration of the attacks was unknown because it was not always possible to observe the event from the beginning or to the end of the interaction. Eleven events were recorded when the research vessel was >300 m from the whales with the engine in neutral (Table 1). The remaining five events were recorded during or after vessel approaches in controlled exposure experiments (Table 1). The mean (±s.d.) length of the targeted mothers was 13.2 ± 0.7 m ($n = 11$) and that of the calves was 5.9 ± 0.4 m ($n = 11$).

In 94% (15/16) of events, the whales exhibited a change in behaviour. The most common changes in behaviour were shifting from resting on the surface to arching their back, slipping under, diving or travelling. In Event 3 (Case Study 1), no obvious response was observed from the whale. A representative physical interaction would begin with a mother or a calf logging on the surface, after which the gull would land on the dorsum and immediately begin pecking at the whale's skin. Visible skin removal by the gull was observed (Fig. 2.). On one occasion, it appeared that the gull was pecking in a white lesion on the mother's back (Case Study 3; Fig. 3; see Video S1, available as Supplementary material to this paper). The gull would walk along the dorsal fin and back, but pecking was only observed on the back. In some events, as the whale dived the gull would attempt to land on the whale's fluke. A reaction from the whales would typically occur within minutes of the gull landing on the whale. Galleon positions and oblique breathing techniques, as adopted in Península Valdés, were not noticeably exhibited by any of the whales during the events observed in Exmouth (Fazio *et al.* 2015).

Behavioural tactics from the gulls varied throughout observations. After a whale would submerge, seemingly in response to a gull attack, some gulls would wait, either circling above or sitting on the water's surface, to repeatedly return to the same whale whenever it reappeared. In other observations, if the gull caused the whale to dive or swim away, making it no longer possible to land on the same whale, the gull would either land on the water, fly out of sight or fly between different nearby whale groups resting on the surface. On one occasion the gull did fly between and land on two groups of whales (Event 5; Table 1), but only one harassment event was recorded due to commitments to the primary research focus. The gulls also landed on calves in two observations (Events 6 and 16; Table 1), persistently returning to these calves after they resurfaced and pecking at them opportunistically. Each event included an individual gull.

Fig. 3. A series of still frames taken from unmanned aerial vehicle (UAV) video footage on 17 October 2019 (Event 16; Table 1; Case Study 3). The stills show an adult silver gull (*Chroicocephalus novaehollandiae*) pecking skin off a humpback whale (*Megaptera novaeangliae*) mother before the mother–calf pair dived and swam away. (*b*, *c*, *e*) The gull (circled) can be seen to be pecking and gouging in a lesion on the mothers back. (*a*, *d*) The white lesion is indicated by the square. (*d*) The inset shows a close-up of the lesion.

Case Study 1, 11 October 2018, target: lactating mothers

In the first event on 11 October 2018, the gull landed on the resting mother and pecked at her back for 7.88 min, causing the whale to dive and travel (Event 2; Table 1). After 2.50 min, the mother returned to resting by positioning herself vertically with her fluke out of the water. The gull attempted to land on the mother's fluke 39 s later but, as the water was covering the majority of the mother's fluke, the gull waited on the water close by. The calf then swam towards the gull causing it to fly away.

Later in the day we encountered the same mother–calf pair with a juvenile gull pecking at the mother's back. The gull then flew to a different mother, walking up and down her back pecking for at least 9.33 min (Event 3; Table 1). The gull then flew away with the whale seemingly unaffected. Fig. 2 illustrates the pecking behaviour of the silver gull and the skin it consumed in the process.

Case Study 2, 16 October 2018, target: mother–calf pair

During this event (Event 6; Table 1) the gull was already present when we began recording information, with the vessel >300 m away in neutral. The juvenile gull was observed to land on the mother and, after 5 s, she temporarily arched her back causing the gull to fly away; the mother–calf pair then slowly travelled away. Two minutes later, the mother and calf resumed resting on the surface. The gull landed on the calf 6.63 min later and pecked at the dorsum for 6.42 min before the calf dived slowly under the mother, seemingly in response to the gull. The gull sat on the water near the mother–calf pair and we started the 'during' and 'after' phases of a low noise controlled exposure experiment. In the 'during' and 'after' phase, the approach of the research vessel to a distance of 88 m may have altered the behavioural responses of the mother and calf. However, the vessel noise was close to the ambient noise in Exmouth Gulf, so the whales are likely to have heard the vessel but with a low perceived loudness. For this 'during' and 'after' vessel approach, the gull repeatedly revisited the mother and calf, and targeted three possible small white lesions on the mother's back. This gull harassment lasted for a total duration of 46.85 min.

Case Study 3, 17 October 2019, target: mother–calf pair

This event began with an adult gull pecking on the mother's back (Event 16; Table 1; Fig. 3; Video S1). The mother had a concave white lesion on her back that the gull would repeatedly return to and peck at (Fig. 3*a*). The mother stopped logging in response to the first observed attack, causing the gull to float on the water. Once the mother returned to logging, the gull flew to her and the mother slipped under the surface in response. The calf then surfaced and the gull immediately landed on its dorsum causing the calf to dive and the gull to wait on the water. The pair resurfaced 36 s later for breaths before diving again. The calf then resurfaced after 4.17 min and within 22 s the gull landed on the calf's back. After 15 s of the gull pecking, the calf slipped below the surface, pushing the gull off and then dived. The mother and calf both returned to logging on the surface

4.07 min later. Thirteen seconds into resting, the gull landed on the mother's back, exhibiting the typical behaviour observed of walking up and down her dorsum and pecking at her skin but, more specifically, consistently returning to her white lesion (Fig. 3*b*, *c*). The mother lowered her back 8 s later, momentarily pushing the gull off. After 27 s of continued pecking, the mother then sunk below the surface, leaving the gull on the water beside her. When the mother resurfaced 9 s later, the gull immediately landed on her back (Fig. 3*d*) and resumed pecking in her lesion (Fig. 3*e*). The mother and calf then both dived (Fig. 3*f*). The gull continued to wait on the surface close by. This event was observed for another 20 min before leaving the pair. Every time the gull would land on either the mother or calf, it would elicit a behavioural response in the mother or calf of moving below the surface, diving or, on one occasion, the calf fluke thrashing.

Aside from gull harassment on whales, we also observed gulls feeding on whale skin floating on the water's surface after breaching events. For example, on 22 October 2018, we observed a mother and calf breach and, after the fourth breach from the mother, 18–28 silver gulls and shearwaters flew to the scene and fed on the surface of the water in the whale slick. It appeared that the seabirds flew from a nearby fishing trawler. The whales travelled away while the birds remained in the whale slick.

Discussion

This study contributes to the limited information available on gull harassment behaviours directed at cetaceans and describes the way in which silver gulls were harassing 16 humpback whale mother–calf pairs off Exmouth Gulf. We most likely only observed attacks on mother–calf pairs because these were the focal individuals during the study of Sprogis *et al.* (2020*b*). However, mother–calf pairs are also the most likely individuals for gull attacks because they spend a greater amount of time resting on the surface, and calves come to the surface to breathe more often (Sironi *et al.* 2009; Sprogis *et al.* 2020*b*). There was only one observation (Case Study 1) where the mother appeared to be unaffected by the gull attack; however, due to the limited time we were able to spend with this mother–calf pair, we do not know whether any reactions were caused before or after we departed. In 94% of the gull harassment events, the whales stopped resting, travelled, submerged or performed instantaneous behavioural events seemingly in reaction to the gulls (Table 1). In five events, in addition to the reaction from the gulls, behavioural responses may have been altered by the gulls and the noise of our vessel in the 'during' and 'after' phases of the controlled exposure experiments (Sprogis *et al.* 2020*b*). It is possible that 2018 and 2019 were among the first-years where interactions between silver gulls and humpback whales have been persistent in Exmouth Gulf because such interactions were not reported on research trips conducted observing humpback whales from 2014 to 2017, however one event was recorded of a gull pecking in an open wound on a mother's dorsal fin in 2009 (Wayne and Pam Osbourne, pers. comm.).

In Exmouth Gulf, mothers rest, on average, for 35% of their time (Videsen *et al.* 2017; Bejder *et al.* 2019); thus, a decrease in resting time from gull attacks could have negative consequences for mothers because lactation is energetically costly and they do not feed until they return to their polar feeding grounds (Eisenmann *et al.* 2016; Bestley *et al.* 2019; Christiansen *et al.* 2020*b*). Because mothers rely on finite energy reserves during this period, they consequently lose ~25% of their body condition in the resting and breeding grounds (Christiansen *et al.* 2016*a*). While the mother rests, calves in Exmouth Gulf spend 20% of their time suckling on average (Videsen *et al.* 2017; Bejder *et al.* 2019), growing ~3 cm in length a day (Christiansen *et al.* 2016*a*). It is important for calves to rest and nurse to ensure they grow large and strong enough to make the long migration to polar waters (Cartwright and Sullivan 2009; Christiansen *et al.* 2016*a*) while avoiding predation from killer whales and sharks (Pitman *et al.* 2015). Thus, changes in the speed or distance of a swim due to gull attacks can affect both the sustenance of blubber stores and the growth rate for mothers and calves (Rowntree *et al.* 1998; Marón 2015). Therefore, prolonged or cumulative periods of disturbance to the resting behaviour of mothers and calves could lead to adverse effects through an increase in energy expenditure (Braithwaite *et al.* 2015).

The gull behaviour predominantly observed on mothers in Exmouth Gulf parallels early observations off Península Valdés when gull attacks, primarily occurring on mothers, were first recorded in the 1970s as an occasional behaviour (Cummings *et al.* 1972; Marón *et al.* 2015). In Exmouth, because the calves were relatively active on the surface compared with their resting mother (Ejrnæs 2020; Sprogis *et al.* 2020*b*), pecking appeared to occur less often on the calves due to reduced contact time available. In contrast, Thomas (1988) described the response of southern right whales to the kelp gull attacks in Península Valdés as 'immediate', illustrating a rapid response from the whales. This was not observed in the all silver gull harassment events in Exmouth Gulf. In the 15 events in which the whales exhibited behavioural responses, the reaction was delayed in comparison, which may be an interspecies difference. In addition, the silver gull harassment events in Exmouth were currently not as persistent as kelp gull attacks off Península Valdés, which can often last for over an hour (Rowntree *et al.* 1998).

In the 1970s off Península Valdés, lesions were found on mother–calf pairs in only 2% of observed attacks, but by the 2000s almost 99% of whales were found with lesions created through pecking (Marón 2015). During at least one event in Exmouth Gulf, a gull was gouging in a pre-existing lesion on a mother (Fig. 3; Case Study 3). This larger white lesion was consistent with wounds on some southern right whales off Península Valdés, described as 'round white lesions' and 'concave' (Rowntree *et al.* 1998). Repetitive pecking at whales in the same lesion causes physical damage on and under the skin (Fiorito *et al.* 2016). The pecking can leave epidermal erosion, ulceration and necrosis that can lead to systemic skin infections, as well as further trauma beneath the skin, and cause indirect physical and chemical stress (McAloose *et al.* 2016). These wounds may result in 'exhaustion, catabolism, dehydration and thermoregulatory stress' (Thomas *et al.* 2013). Off Península Valdés, from 1999 to 2001, 90.4% of attacks by kelp gulls were aimed at whales with existing wounds, potentially making them more targeted and at risk (Sironi *et al.* 2009). This behaviour of revisiting wounds implies that the gulls prefer tissue deeper within the dermis or hypodermal layers (Reeb *et al.* 2007; McAloose *et al.* 2016).

Silver gulls, the sole species observed attacking whales in Exmouth Gulf, are commonly found around the Australian

coastline (Johnstone 1982). Much like the kelp gull, they have a diverse diet of crustaceans, fish, land and marine insects, bird and turtle eggs, and they are known for exploiting easily accessible resources for survival, such as human food and scraps from waste disposal sites (Pringle 1987; Auman *et al.* 2008; Weiser and Powell 2011; Department of Biodiversity Conservation and Attractions 2017). Because of their opportunistic diets, increases in regional human populations and food refuse are correlated with increases in silver gull populations (Auman *et al.* 2008; Marinao *et al.* 2018; Smith and Carlile 1993). Gull populations, including silver gulls, have been increasing around Australia since the 1940s (Keast 1943; Gibson 1979; Surman and Nicholson 2009; Smith and Carlile 1993). The species has been discovered to have multiple clutches in a breeding season, suggesting a high reproduction rate (Nicholls 1974; Wooller and Dunlop 1979). The gull population size around Exmouth Gulf is unknown, but it appears that the number and behaviour of gulls may have changed around Exmouth and the North West Cape coastline, because observations and reports of gulls preying on turtle hatchlings have also become more common (Dani Rob, Marine Program Officer, Exmouth District, Department of Biodiversity, Conservation and Attractions, Western Australia, pers. comm.).

In addition to harassment from silver gulls, humpback whales face cumulative natural and anthropogenic stressors around Exmouth Gulf. These include predation from killer whales, interspecies interactions and anthropogenic disturbance, all of which contribute to a reduction in resting (Pitman *et al.* 2015; Bejder *et al.* 2019; Sprogis *et al.* 2020*b*). Anthropogenic disturbances range from underwater acoustic disruption, habitat modification and entanglement in fishing gear to disturbance from vessel strikes and the boat-based tourism industry (Bejder *et al.* 2016; Peel *et al.* 2018; Sprogis *et al.* 2020*a*). It appears that the newly recorded interactions between silver gulls and humpback whales is yet another factor that adds to the disturbance mothers and calves face in Exmouth Gulf. Future research to monitor the trajectory of the gull harassment events is needed and, if events continue, dedicated behavioural focal follows on the whales are required to examine changes in their behavioural state and energetics.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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