

## Short Note

# Biggs Killer Whale (*Orcinus orca*) Predation on Subadult Humpback Whales (*Megaptera novaeangliae*) in Lower Cook Inlet and Kodiak, Alaska

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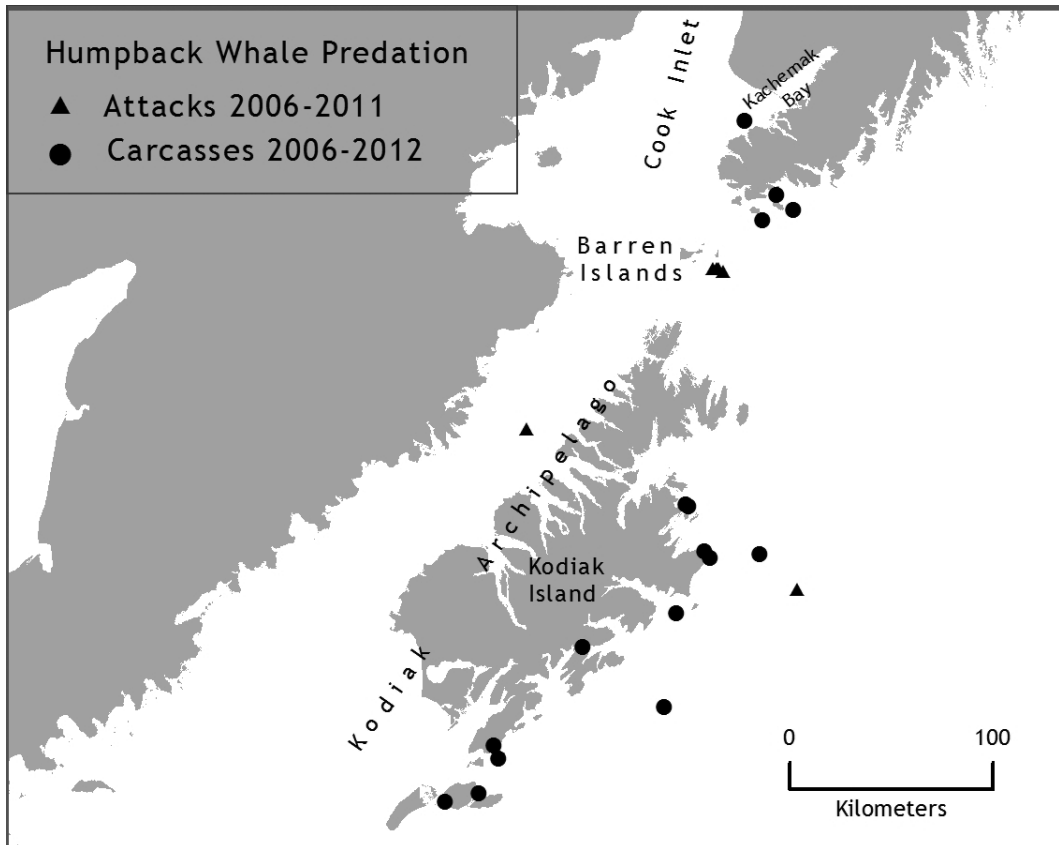
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Three genetically and acoustically distinct, non-associating ecotypes of killer whale (*Orcinus orca*) occur between southeastern Alaska and the Bering Sea: (1) residents (fish-eaters), (2) Bigg's (formerly transient; mammal-eaters), and (3) off-shores (shark-eaters) (Matkin et al., 1999; Ford et al., 2011). Bigg's killer whales across this range have been genetically separated into four putative populations: (1) West Coast transients, (2) AT1 (or Chugach) transients, (3) Gulf of Alaska transients, and (4) Eastern Aleutian transients (Barrett-Lennard, 2000; Parsons et al., 2013). Dietary differences between these populations have been described (Ford et al., 1998; Saulitis et al., 2000; Matkin et al., 2007, 2012; Barrett-Lennard et al., 2011). Gulf of Alaska transients are known to feed upon Steller sea lions (*Eumetopias jubatus*), Dall's porpoises (*Phocoenoides dalli*), and harbor seals (*Phoca vitulina*) (Heise et al., 2003), while AT1 transients feed primarily on harbor seals and Dall's porpoises but not sea lions (Saulitis et al., 2000). Around Unimak Island, Eastern Aleutian transients feed seasonally on migrating gray whale (*Eschrichtius robustus*) calves and subadults (Barrett-Lennard et al., 2011).

Eyewitness accounts of killer whale predation on humpback whales (*Megaptera novaeangliae*) in the North Pacific are rare (Jefferson et al., 1991; Matkin & Saulitis, 1994; Mizroch & Rice, 2006; Reeves et al., 2006; Ford & Reeves, 2008). In a review of the literature, Ford & Reeves (2008) summarized only 15 reliably documented accounts of predatory interactions between the two species. Recently, in western Australia, Pitman et al. (2014) observed 14 kills during 22 separate attacks of killer whales on neonate humpback whales on their calving grounds; however, there were no attacks on older calves or juveniles.

During killer whale surveys in Lower Cook Inlet, Alaska (Figure 1), we observed Bigg's killer whales attacking humpback whale subadults and cow/calf pairs and examined carcasses of subadult humpback whales that exhibited evidence of killer whale predation and consumption. Herein, we report on four humpback whale attacks in Lower Cook Inlet and one off Kodiak Island, and we describe 17 partially consumed humpback whale carcasses also found in the region between 2006 and 2012.

The first killer whale attack was observed during an aerial survey off Kodiak Island in 2006, although individual identifications of killer whales could not be made. The other four attacks were observed on 8 July 2008 near the Barren Islands (Figure 1; Table 1), and we were able to obtain identification photos of the killer whales. Observations were made from the research vessel *Natoa*, a 10.5-m-long vessel powered by a 280 HP single-screw diesel engine and equipped with a flying bridge allowing for increased visibility. The attacks were made by a group of 11 Bigg's killer whales, identified by dorsal fin and saddle patch shape (Ford & Ellis, 1999) and by previous genetic analysis from a biopsied tissue sample from one individual (WT174). The group was composed of one adult male, two calves/juveniles, and eight females/subadults. The attacks involved two cow/calf pairs and two lone subadult humpbacks. Each attack lasted 5 to 13 min. No kills were made, and the killer whales quickly moved from one attack to another. Digital photographs were obtained of all 11 killer whales involved in the attacks. Three individuals matched previously photo-identified individuals in the National Marine Mammal Laboratory (NMML) and North Gulf Oceanic Society (NGOS) (2009) photographic catalog



**Figure 1.** The study area, encompassing Lower Cook Inlet and the adjacent Kodiak Archipelago, with the locations of humpback whale attacks and humpback whale carcasses as listed in the text

of western transients. Three individuals, WT174 (CI1), WT253 (CI10), and WT362 (CI9), had been previously photographed together and in other groupings around the Kodiak Archipelago. The other eight whales had not been previously photographed but were catalogued as CI1 through CI8. Eight of the 11 whales identified in the Cook Inlet attacks and two juveniles not positively identified but likely CI6 and CI11 were later photographed off Kodiak Island on 9 September 2011 attacking two humpback whales of uncertain sex and age with blood seen in the water (M. E. Dahlheim, pers. comm., 11 December 2014).

In addition to observations of actual attacks, we recorded 17 dead stranded or floating humpback whales: 13 in the Kodiak Island area and four in Cook Inlet. All those observed in Cook Inlet were found in 2008, the same year as the attacks observed in that region (Table 2).

Although humpback carcasses have been recorded off Kodiak Island since 2006, the observation of several humpback whale predation events that occurred in Cook Inlet in 2008 was

unprecedented. There are several possible reasons. The waters of Lower Cook Inlet are difficult to work in from small boats, and reports of killer whales have been sporadic. These observations were made during our first dedicated survey of the area. Nevertheless, a small whale-watching and a large charter-fishing fleet have operated out of the nearby port of Homer for decades. Although there had been a few poorly documented reports over previous decades of killer whales harassing or attacking humpback whales, the multiple reports and detailed descriptions and photographs received in 2008 remain unique as of 2014.

It is likely that the transients we observed in Lower Cook Inlet are large-cetacean specialists (that include at least 11 individuals) from the Gulf of Alaska transient population that center their range near Kodiak Island or further west and focus on subadult and calf humpback whales when preying on that species. Unusually large numbers of humpback whales were observed in 2008 in the Lower Inlet by both charter boats and during our surveys, and this may have attracted

**Table 1.** Humpback whale (*Megaptera novaeangliae*) attacks by killer whales (*Orcinus orca*) observed in Lower Cook Inlet and Kodiak Island waters

Date	Location		Humpback age	# killer whales	Duration (min)	Method
	Lat.	Long.				
13 June 2006	58.17	153.66	Calf (w/cow)	10-12	--	--
8 July 2008	58.86	152.01	Calf (w/cow)	11	19	Attempted drowning
8 July 2008	58.85	151.97	Non-calf	11	12	Attempted drowning
8 July 2008	58.86	152.03	Calf (w/cow)	11	6	Attempted drowning
8 July 2008	58.86	152.06	Non-calf	11	6	Harassment
9 Sept. 2011 <sup>1</sup>	57.44	151.44	Non-calf	10	--	--

<sup>1</sup>M. E. Dahlheim, pers. comm., 11 December 2014

**Table 2.** Humpback whale carcasses observed in Lower Cook Inlet and Kodiak Island waters from 2006-2012

Date	Location		Sex	Age/length (m)	Description
	Lat.	Long.			
16 May 2006	56.53	154.33	M	Calf/7.5-8.5	Throat, tongue gone
17 July 2008	59.18	151.49	--	Subadult	Floating, feeding KWs
20 July 2008	59.11	151.35	M	Subadult/11.6	Throat, tongue gone
20 July 2008	59.07	151.62	M	Subadult/11.9	Throat, tongue gone, flesh removed
20 July 2008	59.51	151.74	M	Subadult/11.3	Throat, tongue gone
15 Aug. 2008	57.83	152.34	F	Subadult/9.3	Throat tongue gone, skin peeled
17 Aug. 2008	56.57	154.06	F	Subadult/9.8	Throat, tongue gone, skin peeled
17 Aug. 2008	56.72	153.90	--	--	Throat, tongue gone, skin peeled
1 June 2010	56.94	152.56	M	Subadult/9.3	Throat, tongue gone, skin peeled
20 July 2010	57.78	152.29	M	Subadult/11.3	Kill observed, floater
23 June 2011	57.60	151.74	--	--	Floater, throat, tongue gone
13 Aug. 2011	56.78	153.94	F	Subadult	Throat, tongue gone
1 May 2012	57.21	153.21	F	Calf/7.2-7.7	Throat, tongue gone
10 May 2012	57.35	152.44	F	Subadult/11.3	Floater, throat, tongue gone
12 July 2012	57.82	152.32	M	Adult/13-14.5	Throat, tongue gone
26 Aug. 2012	57.59	152.15	F	Subadult/9-11	Floater, throat, tongue gone
26 Sept. 2012	57.62	152.20	M	Subadult/12.2	Throat, tongue gone

these killer whales. Prey specialization, at least seasonally, appears to occur within Bigg's killer whale subpopulations (Maniscalco et al., 2007; Barrett-Lennard et al., 2011).

Our observations demonstrate that some predation on calf and subadult humpback whales does occur in summer on their northern feeding grounds, in addition to the predation on new calves occurring during migration as indicated by Mehta et al. (2007). Whether this predation has increased in recent years with increasing numbers of humpback whales is unclear as are the impacts of this predation on the humpback whale population.

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