

White Shark Attacks on Inanimate Objects along the Pacific Coast of North America

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Introduction

Along the Pacific coast of North America, attacks by the white shark *Carcharodon carcharias* on boats have been described by Gilbert (1963b). Unfortunately, the list provided did not include information other than date, location, and, occasionally, the boat owner's name. Subsequently, Follett (1974) described details of the attack on Henry Tervo's boat, September 10–12, 1959. Otherwise, white shark attacks (strikes) on other inanimate objects have gone unreported.

In various reports, the identification of the attacking shark has often been inaccurate, as demonstrated by the conclusion that a killer whale *Orcinus orca* attacked and sunk a skiff near Bodega Bay, California, in 1952 (Caras, 1964). Some years later, Miller and Collier (1981) examined photographs of the skiff's hull and determined the attacker to be a white shark. Conversely, white shark attacks on humans, even from the same locations, have been well documented (Bolin, 1954; Fast, 1955; Gilbert, 1963b; Collier, 1964, 1992, 1993; Follett, 1974; Baldrige, 1974a; Miller and Collier, 1981; Lea and Miller, 1985; Ellis and McCosker, 1991; Tricas and McCosker, 1984).

In this chapter, we discuss white shark strikes on a number of inanimate objects of varying shapes, sizes,

and colors. These events are presented chronologically.

Methods

We review here the available literature and summarize accounts from primary sources (see Acknowledgments). The geographic distribution of events extends from Isla de Guadalupe, Baja California, Mexico (29°07' N, 118°21' W), to Esperanza Inlet, Queen Charlotte Islands, British Columbia, Canada (49°48' N, 127°07' W) (Fig. 1).

Results

Boats

1. 1955–1957; Guadalupe Island, Mexico (29°7' N, 118°21' W). Dr. Carl Hubbs, his wife Laura, and Al Stover were conducting pinniped counts aboard a 4.9-m blue fiberglass boat 50–100 m from shore at West Elephant Seal Beach. They observed a 3- to 4-m white shark motionless at the surface 30–40 m from their location. The shark, without provocation, turned and

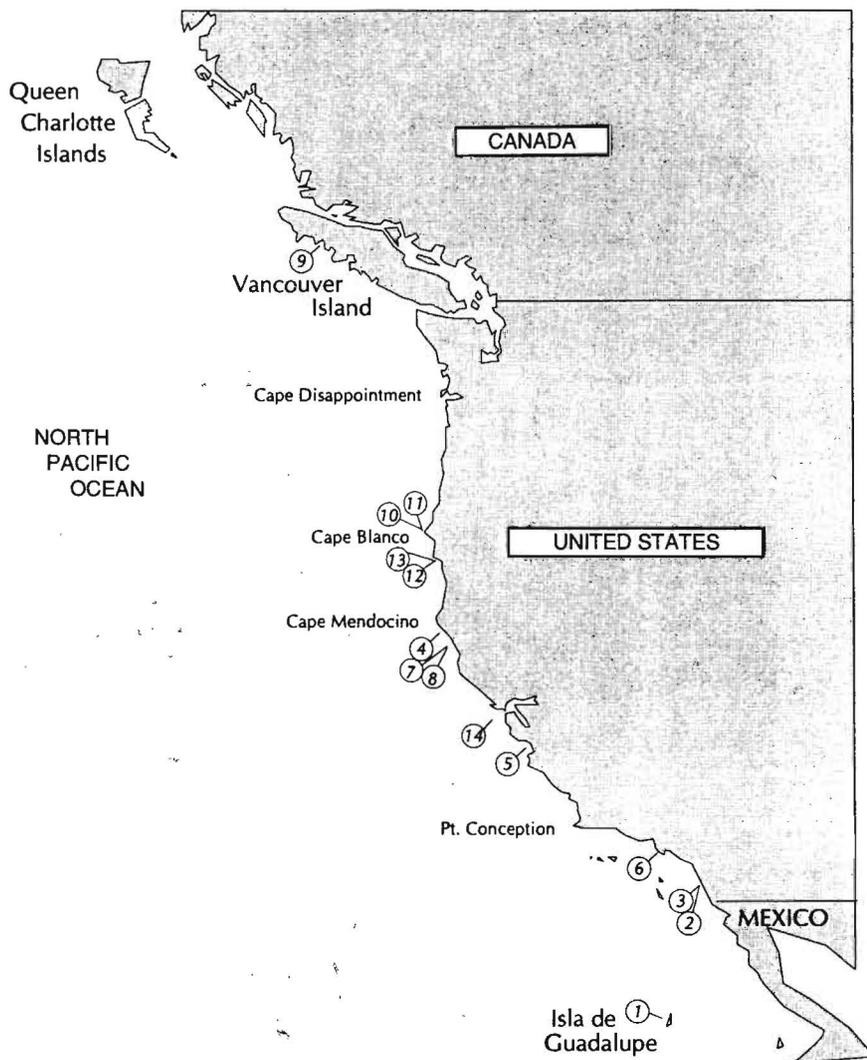


FIGURE 1 Locations of white shark attacks on boats and other inanimate objects in chronological order.

charged at a very high rate of speed, ramming the boat so violently that it nearly threw the Hubbses into the water (A. Stover, personal communication).

2. November 5, 1958; Pacific Beach, California (32°45' N, 117°11' W). Bob Shay's 4.3-m skiff was struck twice by a "heavy bodied shark with a head like a mackerel shark *Lamna ditropis*." The shark slashed the skiff's motor, apparently while trying to capture an injured fish tied to the stern. A white shark was presumed to be the attacker (C. Limbaugh, personal communication).

3. July 30, 1959; La Jolla, California (32°50' N, 117°16' W). James Randle's 4.3-m skiff was violently struck by a white shark 3–4 m in length. A cloth sack

containing several fish was removed by the shark, which returned 10 minutes later. At that time, several .38-caliber bullets were fired into the shark, which then disappeared in "a small cloud of blood."

4. July 21, 1985; Shelter Cove, California (40°01' N, 124°01' W). Jack Siverling was bottom fishing for lingcod *Ophiodon elongatus* about 1.5 km east-southeast of the whistle buoy at Shelter Cove. He hooked a fish, which suddenly took off at a sharp angle to the boat before his 100-lb test line parted. Seconds later, the entire stern of his 4.9-m fiberglass boat, with two outboard motors, was lifted out of the water to such a height that Siverling was nearly thrown into the water. A large swirl was observed astern, followed mo-

mentarily by a 5- to 6-m white shark that swam by 1 m below the boat (J. Siverling, personal communication).

5. April 9, 1989; Monterey Bay, California (36°37' N, 121°56' W). At 1035 hours, Jon Capella and friends were aboard the *Xeno*, a 10.7-m boat with a white and blue hull, about 1.5 km south of the whistle buoy at Point Pinos. The depth was 10 fm. They observed a 5- to 7-m white shark (Fig. 2D) feeding on a harbor seal *Phoca vitulina*. After 10 minutes, the shark began to circle the boat, finally ramming the bow with its head. The shark struck four times over a 15- to 20-minute period. Just prior to its departure, while astern of the boat, the shark rolled to one side and began slapping the swimstep and propeller with its tail. The boat had drifted some 20–30 m from the seal at this time, whereupon the shark returned to the seal for several additional bites before it departed (J. Capella, personal communication).

6. September 1989; Palos Verdes, California (33°46' N, 118°20' W). Tony DiCristo and Dan Fink were aboard the *Velmar*, a 11.6-m fiberglass boat, about 10 km off Palos Verdes, filming a 3- to 4-m white shark feeding on a dead whale. The shark left the carcass, swam over, and bit the swimstep several times, causing only minimal damage. Later, the shark rammed the boat several times, pushing it through the water. These events took place over a 4- to 5-hour period. When the boat drifted too close (4–6 m) to the whale, the shark would leave the carcass, focusing its attention on the boat (T. DiCristo and D. Fink, personal communication).

Crab Trap and Crab Trap Buoys

7. January 1983; Low Gap (Usal), California (40°06' N, 124°01' W), and Jackass Creek, California (39°53' N, 123°56' W). The January 1983 marine resources monthly report of the California Department of Fish and Game stated that "two crab fishers brought in three crab trap buoys that were hit by white sharks [Fig. 2C]. One buoy was off Low Gap, about 3 km south of Usal, and two were from Jackass Creek: all in about 9 fathoms of water. Two teeth removed from one buoy measured 42.0 mm and 42.2 mm in height. The other buoys showed serrated tooth patterns. All buoys were x-rayed, but no additional teeth or fragments were found."

8. April 1984; Usal, California (40°06' N, 124°01' W). The April 1984 marine resources monthly report of the California Department of Fish and Game described an incident reported by crab fisher Chuck Chernoff. While in the Usal area and retrieving his crab gear in about 20 fm, Chernoff reported that a

crab trap was almost halfway to the surface in calm water when something hit it so hard that the trap jerked past the stern of the boat, snapping the buoy line off the block. He retrieved the trap and brought it to a California Fish and Game office. Whatever hit the pot was large and powerful. Three of the welded 0.75-in. bars on the pot were bent, welds were broken, and the woven stainless steel wire was crushed all the way into the bait jar. Several large white sharks (4.3–5.5 m) had been reported in the area. Additionally, this is the area where lacerated crab trap buoys, having embedded white shark teeth, were found in 1983 (see case 7).

Otter Board and Float Bags

9. August 17, 1961; Esperanza Inlet, British Columbia, Canada (49°48' N, 127°07' W). While fishing for salmon *Oncorhynchus* spp. in the Vancouver Island area, Greg Trenholme observed a 4- to 6-m white shark surface astern of his boat, whereupon it charged and seized one of his canvas float bags. After several seconds, the shark released the bag and swam off, descending from sight. Upon examination, a single tooth and several fragments were removed from the damaged bag, identifying the attacker as a white shark (K. Ketchen, personal communication).

10. October 18, 1987; Elk River, Oregon (42°48' N, 124°32' W). In waters 3–5 fm deep near Cape Blanco, Nelson Miles of the *Elaine M*, a 9.5-m commercial salmon troller, witnessed a 3- to 4-m white shark charge and repeatedly strike his gray and white float bag. After the shark departed, six tooth punctures were found in the float bag (N. Miles, personal communication).

11. November 27, 1988; Elk River, Oregon (42°48' N, 124°32' W). The *Showdown*, a 12-m commercial salmon troller piloted by Dave Tilly, was fishing in calm waters 6–10 fm deep, near the mouth of the Elk River. At 1100 hours, he saw a white shark, 6–7 m in length, surface astern, then charge and strike a single blow to one of the float bags. It then submerged and was not seen again. The ring of tooth scars on the float bag measured 550 mm in diameter (D. Tilly, personal communication).

12. August 28, 1989; Port Orford, Oregon (42°44' N, 124°30' W). At 1430 hours, Gerald Moser was trolling for salmon in 10 fm of water, near the Port Orford whistle buoy. The *Tequila*, a 7-m fishing boat, was approached from the stern by a 3- to 4-m white shark. The shark struck the troller's fishing gear, which was partially submerged, biting a white inflatable float bag in half, then seizing and biting one of two wooden otter boards several times (Fig. 2A). The shark

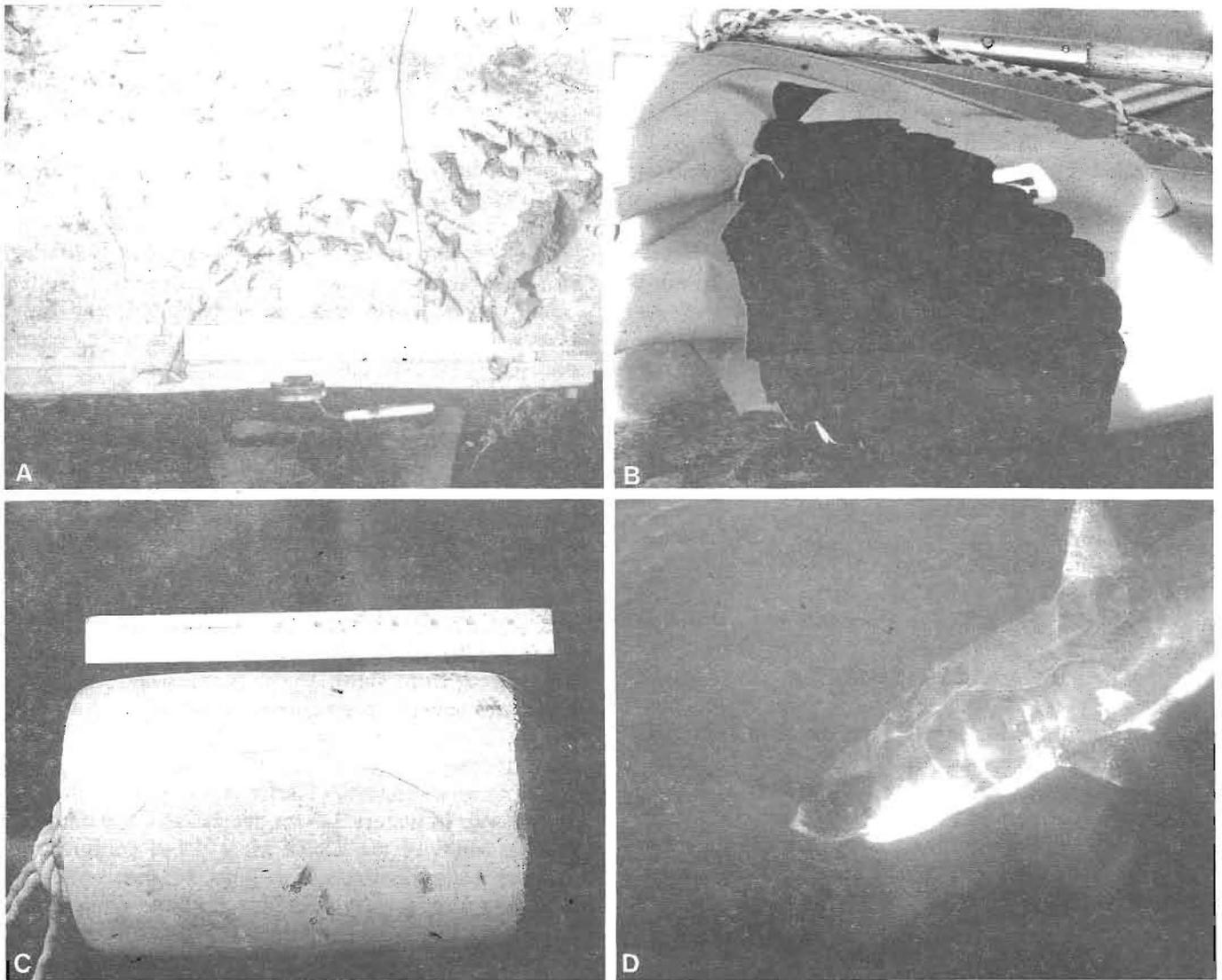


FIGURE 2 (A) The trawler board from Port Orford, Oregon (case 12). (Courtesy of G. Moser.) (B) The inflatable boat from the Farallon Islands, California (case 14). (Courtesy of A. P. Klimley.) (C) The crab pot buoy from Jackass Creek, California (case 7). (Courtesy of K. Collier.) (D) The white shark that rammed the *Xeno* in Monterey Bay, California (case 5). (Courtesy of J. Capella.)

departed after mouthing this equipment for several minutes.

13. October 1990; Port Orford, Oregon (42°45' N, 124°30' W). A white shark struck a float bag trolled behind an unidentified fishing vessel near Cape Blanco. The shark severed the float bag from its line and towed the bag into a kelp patch, where it was released. Upon retrieval, many individual tooth punctures were noted in the float bag. This incident was reported to local fisher J. Hassett, who also observed the damaged float bag (J. Hassett, personal communication).

Inflatable Boat

14. November 5, 1985; Farallon Islands, California (42°00' N, 123°00' W). Peter Klimley and Jim Wetzel were conducting field studies throughout the day from a 6.7-m boat. Klimley wrote in his field notes, "the inflatable was being used to ferry ourselves back and forth to a research skiff which was kept on a buoy at Fisherman's Bay. The shark attacked the inflatable while it was tied to the buoy with no persons aboard [Fig. 2B]. There was a large swell that day and the skiff was being jerked rhythmically in the water like a

large fishing jig" (A. P. Klimley, personal communication).

Discussion

Available for comparison with the observations reported here is a wealth of published information on attacks by white sharks on humans at nearby sites. This affords us the opportunity to discuss the popular hypothesis that white shark attacks on humans may be the result of mistaken identity.

Following exhaustive analysis of over 1700 cases of shark attacks against humans worldwide, Baldrige and Williams (1968; Baldrige, 1974a) concluded that "50–75% of all reported attacks upon man [worldwide] were motivated by a drive or drives other than feeding." Miller and Collier (1981) reported 47 cases of unprovoked shark attack along the California and Oregon coasts and reached the general conclusion that "most of the attacks resembled the feeding behavior of an isolated, large shark that appears to be investigating an object." In their description of the postulated "bite and spit" attack behavior adaptation, Tricas and McCosker (1984) believed that diver and surfer silhouettes, when viewed from below, resembled those of pinnipeds, a natural prey species of the white shark. In this case, attack was likely more than mere investigation.

The events described here do not support the "mistaken identity" hypothesis, because white sharks

attacked inanimate objects of a variety of shapes, colors, and sizes, none resembling the shape, size, or color of a marine mammal (Table I). The shapes of inanimate objects included the conical boats (cases 1–6), the circular crab trap buoys (case 7), the rectangular float bags (cases 9–13), and the complex shape of the inflatable boat (case 14). Object colors varied as well: crab trap buoys—blue and yellow; boats—blue and white; float bags—white and gray; otter boards—white and gray; and the inflatable—gray. The sizes of the objects ranged from the small crab trap buoys (35 cm in length) to the large boats (11.6 m in length). The movement of the object did not appear to be a significant contributor to the white sharks' attacking the object. Further, we believe that the object color(s) probably was not important, as any object viewed from below and back-lighted by a bright sun or light sky would appear as only a dark, colorless silhouette (see Chapter 21, by Strong). There appeared to be no correlation between an object's size, color, or shape and a "preferred silhouette" (i.e., a pinniped) for determining the probability of a white shark encounter, whether an inanimate object or a human.

On the basis of the events presented, we suggest that white sharks often strike unfamiliar objects to determine potential food value (see Chapter 20, by Anderson *et al.*, and Chapter 21, by Strong). Some evidence suggests that white sharks decide a prey's palatability while it is lodged in the shark's mouth, whether the shark is moving or stationary. Klimley

TABLE I Characteristics of Inanimate Objects Attacked by White Sharks

Object	No.	Location	Shape	Color	Size (m)	Movement
Crab buoy	1	Low Gap, California	Cylindrical	Yellow and blue	0.35	Minimal
	2	Jackass Creek, California	Cylindrical	Yellow and blue	0.35	Minimal
Boat	1	Pacific Beach, California	Conical		4.30	Minimal
	1	Monterey, California	Conical	White and blue	10.70	Minimal
	1	Palos Verdes, California	Conical	White	11.60	Minimal
	1	Shelter Cove, California	Conical		4.90	Minimal
	1	Guadalupe Island, Mexico	Conical	Light blue	4.90	Minimal
	1	La Jolla, California	Conical		4.30	Minimal
Inflatable	1	Farallon Islands, California		Gray	3.10	Erratic
Float bag	1	Esperanza, British Columbia, Canada	Rectangular		0.60	Constant
	1	Port Orford, Oregon	Circular	White	0.60	Constant
	1	Elk River, Oregon	Rectangular	White and gray	0.60	Constant
	1	Elk River, Oregon	Rectangular	White and gray	0.75	Constant
	1	Port Orford, Oregon	Rectangular	White and gray	0.60	Constant
Otter trawl board	1	Port Orford, Oregon	Rectangular	White and gray	0.75	Constant

(1994) argues that white sharks reject low-fat content (i.e., energy-poor) items, such as birds, sea otters, and humans, to feed on high-fat content pinnipeds and whales. Further, there are several cases of white shark attacks on humans from this same area that support this "high-energy content" hypothesis (Collier, 1993, unpublished data). It appears that white sharks are somewhat indiscriminate in their strikes on surface objects, regardless of whether or not the object resembles a prey species. It would seem that grasping an unfamiliar object would be the only reliable method of determining palatability.

Alternatively, in some instances, the shark could be eliciting a territorial behavior (i.e., butting a boat in the vicinity of food), or the behavior could be a form of displacement behavior (see Chapter 21, by Strong). Further, cases 2 and 3 could have been the result of the white sharks' attempting to eat the fish that had been tied to the boat. We do not believe the remaining cases (1 and 4-14) are the result of attracting or baiting the shark directly to the object struck. The presence of marine mammals (pinnipeds or whales) was reported in cases 1, 5, 6, and 14. The white shark which so violently struck the boat in case 1 was not feeding prior to its attack. Proximity to pinnipeds might have contributed to this incident. The crab trap (case 8) and buoys (cases 7 and 8) had a small amount, usually <1370 g, of bait present. The buoys were on the surface, 8-10 fm from the bottom (the location of the bait). This distance would reduce the likelihood that the bait was a significant contributor to the strike on the buoy.

Although bait was present in case 3, the shark struck the trap only after it began moving toward the

surface. Cases 9-13 demonstrate a white shark's ability to "run down" and effectively attack a moving object, in these cases float bags and an otter board. All of these objects were being towed at a constant speed with no baiting. The inflatable (case 14) was being erratically "jerked" near a pinniped haulout site, without any baiting.

It was not possible to determine whether the white shark uses a search image when hunting. The sizes, colors, and shapes of the objects discussed here indicate that the white shark investigates many foreign objects, in addition to its hunting strategies. We believe that these objects represent only a small proportion of things that white sharks investigate (see Chapter 20, by Anderson *et al.*, and Chapter 21, by Strong).

Summary

White shark strikes on a variety of inanimate objects have been described. Results indicate that the white shark approaches and seizes surface objects, without regard to shape, size, or color. We suggest that the shark is determining suitability as food in most cases.

Acknowledgments

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