



Killer whales devastate a pod of sperm whales in the Pacific off the coast of California.

Terror in Black and White

By Robert L. Pitman and Susan J. Chivers

We sit silently in the galley waiting for the sun to rise on another day at sea. Vibrations from the ship's engines cause concentric circles to jiggle in our coffee cups, and we stare at them, mesmerized. Attention is easily corralled at five in the morning.

Our meditations are interrupted by a phone call from the wheelhouse, with a report that killer whales are attacking sperm whales in front of the ship. We hesitate. The crew is sometimes merciless with its practical jokes, and the scientists on board are easy prey. We are here to study the diving habits of sperm whales, but we have spent a luckless two weeks off the coast of central California on the *David Starr Jordan*, a research vessel of the National Oceanographic and Atmospheric Administration (NOAA). Late yesterday, about seventy miles off the coast, we finally sighted a group of whales; and we are, as the crew knows, eager to relocate them. So it is not without skepticism that we gather our coffee cups and make our way up to the flying bridge. Moments later, we are focusing our binoculars on a group of sperm whales rafting close together at the surface. They are surrounded by a large slick, the kind that forms when oil from exposed blubber seeps to the surface. Even in the dim light, we can see a large and widening circle of blood.

As our eyes adjust to the light, we witness a sight that few who study whales have ever seen. Nine sperm whales have gathered to form a "rosette," their heads

pointing to the center, their bodies radiating out like the spokes of a wheel. Sperm whales, like musk oxen, are known to "circle the wagons" in the face of imminent danger, but whereas musk oxen always face outward with their horns toward their attackers, sperm whales form a ring with their tails out—the tail of a large whale being a formidable weapon. The reason for the defensive formation quickly becomes apparent: three or four adult killer whales are rapidly circling just outside the rosette.

From their relatively small, backward-curving dorsal fins, we can see that the killer whales are females (the dorsal fins of adult males are giant and triangular). At least two of the females are accompanied by young calves, which leap alongside their mothers like frisky pups.

A killer whale in attack mode is a



Right: A killer whale spins violently as it tries to wrest a chunk of flesh from a sperm whale. Above: A raft of injured sperm whales. Top: Researchers aboard the David Starr Jordan scan the horizon for whales.

strangely contradictory sight; the consensus among us is that with its striking black-and-white pattern and aggressive demeanor, it looks like a shark in a clown costume. But this group of killer whales is here on business. One of the adults charges into the rosette, arches, and broadsides a sperm whale, hitting it hard below the waterline. The wound she inflicts must be serious, because fresh blood wells up to the surface of the water.

Next, for no apparent reason, the killer whales abruptly dive and leave the scene. The sperm whales, however, continue to hold their formation. Soon, four female killer whales come charging in, this time from about a quarter mile out. At one



hundred yards, they lunge high out of the water, shoulder to shoulder, in the synchrony of practiced pack hunters. Circling rapidly around the rosette, they stay just beyond the reach of those dangerous tails. One cuts in and locks her jaws onto the side of a sperm whale. We can see flashes of white below the surface as she spins around, tail pumping, trying to wrest a mouthful of flesh. As fresh blood again colors the surface, two more killer whales join the attack. After a brief flurry, the attackers again retreat and the sperm whales shore up their formation. From our vantage point, the sperm whales appear to be holding their own. But the air is filled with the smell of flesh and oil, and they huddle in a gathering cloud of their own blood, which hints at the unseen damage below.

Curiously, although killer whales are believed to prey regularly upon larger whales, only a handful of recorded observations exist. And these eyewitness accounts are lacking in detail—probably because most of the action takes place

underwater. Consequently, almost nothing is known about how these attacks are orchestrated, what the responses of the prey are, or even how prevalent such encounters really are.

Although we are scheduled to move out of the area, this rare opportunity cannot be ignored. We watch for three hours as the female killer whales and their excited young return again and again to press their attack. The rest of the herd, including two or three adult males, are scattered up to a mile or so away. The strategy of the attackers seems to be to wear down their much larger prey—to wound them, withdraw and let them bleed for a while, and then charge again. Whenever the killer whales withdraw for a little longer than usual, individual sperm whales briefly pull away from the rosette, roll on their sides, or hang head-up or tail-up in the water, perhaps looking for signs of the predators' return.

The sperm whales we are observing this morning are probably adult females, judging by their size. Smaller than males, they

are still considerably larger than their aggressors (about thirty-three feet versus twenty-one feet) and much heavier (approximately thirteen tons versus four tons). They can, with a flick of that giant tail, inflict a fatal blow. Even a broken jaw can cut short the roughly sixty-year life span of a killer whale.

After witnessing some two dozen attacks, we begin to wonder aloud why the sperm whales don't defend themselves. Old whaling accounts are filled with graphic descriptions of sperm whales lashing out at whalers who attacked them, at times destroying longboats with their flailing tails or snapping jaws, or even ramming whaling vessels with their blunt heads. Sperm whales can also dive for over an hour, much longer and much deeper than killer whales can. And nothing in our years at sea working with whales has prepared us for such apparent helplessness.

We also have another question: why aren't the adult male killer whales participating? Only the adult females and their

The four female killer whales come charging in from about a quarter mile away. At a hundred yards, they begin to lunge high out of the water, in the synchrony of practiced pack hunters.

young have so far been involved in the raids. Adult males are substantially larger, outweighing females by as much as a ton and a half. But the only ones we have seen in the area have stayed out of the action. What are they waiting for?

Killer whales hunt in packs like wolves, and this group may have spent decades together honing the cooperative skills necessary to bring down large prey. This morning they seem intent on breaking up the rosette and isolating individuals. During one of their sorties, a sperm whale is pulled away from the rosette and immedi-



ately set upon by four or five attackers. We can see several black-and-white shapes beneath the water; the group is charging at the sperm whale from both sides. Twisting their bodies and violently shaking their heads like huge hungry sharks, the killer whales try to wrench off mouthfuls of what must be very tough flesh. The tempo of the attack picks up, as though the killer whales sense they are gaining the advantage. The sperm whale cannot survive this punishment for long.

Then, to our astonishment, two sperm whales leave the rosette formation and approach their isolated companion. One on each side, the two begin to herd the severely injured whale back to the rosette. For a time, the killer whales redirect their attack to the escorts, then retreat once again. We see this same heroic scenario several times: one or two members of the rosette invite attack on themselves in an effort to bring one of their own back into the formation. All who watch are shaken by these acts of apparent altruism.

Eventually the sperm whales become disoriented. They try, but fail to hold the rosette formation. All appear to be wounded, several severely. The number of killer whales in the area is building—we now estimate there are forty to fifty—and the raiding parties are getting larger. Perhaps emboldened by their success, they attack with increasing intensity. Earlier, during the actual attacks, the killer whale calves were left swimming outside the rosette, but now they tug on whale flesh alongside their mothers. Could this be a training exercise? Or could the area now be safer because the sperm whales are weaker? The mothers are solicitous of their young calves, a behavior that starkly contrasts with the carnage of the hunt, and we are aware of our own tangled emotions as we watch in horror and fascination.

The battle has reached its peak. Several sperm whales have been dragged away from the rosette and are being savagely attacked. One of the largest rolls slowly over on its side like a sinking ship and appears to be very near death. Then, as if on cue, a bull killer whale rushes in. He broadsides

the isolated sperm whale, pushing it sideways through the water. Like an angry dog, he seizes it by the flanks and shakes it violently from side to side, then swings it around in an arc, throwing up huge sprays of water. As he jerks his head to tear off chunks of flesh, his turgid dorsal fin quivers with intensity. The actions of the female killers have been demure compared with the power exhibited by this animal.

Just as abruptly as it began, this final assault ends, and a calm sea covers up the evidence. The bull slips away, dragging the dead sperm whale with him. Our vessel moves slowly through the area of the kill; we pick up a forty-pound chunk of floating blubber from the slain whale. Back at the lab, using molecular genetic techniques, we will confirm that the victim was a female. Sperm whales are thought to have a matriarchal social system; this individual may have been mother, daughter, or sister to the others in her group.

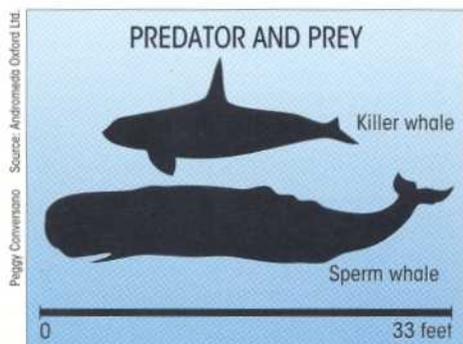
After the coup de grâce and exit of the bull, the females and their young leave the

member of the herd has been injured, and all may die from wounds received this morning. One has been disemboweled, its intestines draped over its back and floating alongside. Another rolls over close to our ship; hanging from its side is a huge, yawning slab of blubber, perhaps eight inches thick and as big as a queen-size mattress. The attackers had been skinning this whale alive. The killer whales killed more this morning than they could possibly eat: hundreds of tons of flesh are left behind. We are struck by the tremendous waste. Leaving the remaining sperm whales, we silently watch them still trying, with little apparent success, to form a rosette as they disappear in our wake.

A mile or so from the kill site, we rejoin the killer whales and photograph them for an hour as they dive, presumably feeding on a carcass well below the surface.

What we have seen is probably the most dramatic killer whale attack on a large whale species ever witnessed by scientists. Although it has provided new insights into

We witness a heroic scenario: one or two members of the sperm whale pod under attack leave their defensive formation and try to escort an isolated, injured companion to safety.



area. We see the dead sperm whale one last time when a group of four or five killer whales bring it briefly to the surface. Towing it backward through the water, they quickly distance themselves from the remaining sperm whales. A giant tail, once lifted out of the water in majestic arcs at the start of hour-long dives, now dangles awkwardly over the heads of the victors.

A pod of whales that may have spent decades traveling the North Pacific together has been devastated. Instead of targeting a specific individual during the attacks, the killer whales appear to have attacked at random. As a result, every

the dynamics of killer whale predation, it has also left many unanswered questions. For example, how important has killer whale predation been in shaping the life-history characteristics of large whales? Before witnessing this encounter, we—like others in the field—believed that sperm whales, because of their size, cooperative herd behavior, and deep-diving proclivities, were largely exempt from the pressures of predation by killer whales. Also, why were these sperm whales so passive in the face of attack, and why did they stay together and, in some cases, risk their lives to come to the aid of others in their

group? Many individuals might have escaped harm by diving and leaving their wounded companions behind.

Just as many questions remain about killer whales. What is the role of the adult male in their hunting strategy? Does he wait, like the male lion, until the females have performed the risky business of killing larger prey, then step in and use his large size to claim the spoils? Or does he represent the power hitter who steps up to bat when the bases are loaded?

Interestingly, scientists currently recognize two distinct types of killer whale: A rather docile type, typically found near shore, preys mainly on fish and tends to be relatively easy to follow and study. Another, wilder type is usually found farther offshore, and relatively little is known about it, except that it preys primarily on marine mammals. The forces of political correctness and media marketing seem bent on projecting an image of a more benign form (the *Free Willy* or Shamu model), and some people urge exclusive use of the name "orca" for the species, instead of what is perceived as the more sinister label of "killer whale." But consider, for example, that by current estimate more than 80,000 killer whales live in the waters off Antarctica during the summer. There they are well known for their habit of eating just the fleshy lips and tongues of minke whales, then leaving their victims to die. The image of the gentle giant may be ingrained in many people's minds, but the name "killer whale" is an appropriate reminder that this species consumes huge numbers of marine mammals annually and that its predatory habits are a significant force in shaping marine communities.

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