



WHEN SHARK MEETS MAN

How safe are Hawaii's waters? A report on where sharks attack, and why, plus a list of all shark attacks here since 1886

The blue shark, fairly common in offshore Hawaiian waters, is a relatively unaggressive species.

Timothy C. Tricas

By Victor Lipman

THE SMALL BOAT WAS about half-a-mile offshore, near Barbers Point. Melvin Toma of Aiea and two friends were "scouting" for new fishing grounds. They were preparing to net-fish, to work a purse net underwater by hand. But on this particular morning, they weren't actually fishing yet; Toma, wearing a mask, snorkel, shorts and fins, had just jumped off the boat and was swimming on top of the water, looking below to see if fish were in the area.

The date was Dec. 13, 1981; it was a warm sunny day, around 11 o'clock; the water was shallow, about 30 feet. The sea was unusually calm; the surface was smooth as glass, and clear.

Toma had taken about six strokes from the boat when he saw a shadow moving toward him, a dark shadow near the bottom, coming from the direction of shore. He could tell it was something big. An experienced diver and fisherman, Toma got a look at the shadow as it passed under

him, still a good distance below. Oh no, he thought to himself, a tiger...

Quickly Toma turned and called for the boat. But as he did, the shark, which was now about 25 feet away, turned too and began to swim back. Suddenly the fish came straight up from the bottom, and the next thing Toma knew, his left leg was in the shark's mouth.

From the boat, one of Toma's friends saw him hit, and saw a powerful tail flashing out of the water. But the shark didn't close its jaws; and with his arms, Toma was able to push the fish away. Then the boat was there and Toma pulled himself onto it.

The entire incident—from the moment Toma had jumped out of the boat until the time he was back aboard it—had happened extremely fast. Toma knew he'd been bitten, of course, but the pain wasn't too bad. His leg, however, was wide open, cut from below the knee to high on the thigh. Toma's friends made a tourni-

quet of a diver's belt and started for shore as fast as possible. The shark was long gone. The boat was a mess; blood was spurting all over it, like water "from a sprinkler."

They made it in about 10 minutes to Nimitz Beach near Barbers Point, where a group of medical people (or at least people familiar with emergency medicine) attending some sort of beach party went to work on Toma's leg, locating pressure points and applying direct pressure to the wound. Though he had lost a lot of blood, Toma was still conscious. His friends swore at him as they held him down, since he kept struggling to sit up and look at his leg. They were afraid if he saw it, he'd go into shock.

Finally the bleeding was stopped, and later at Queen's hospital the wound was closed with about 200 stitches. Toma was out of work for

two-and-one-half months. (His full-time job is at the post office; fishing is more of a hobby, though he does sell some of his catch.) A short time later he tried swimming in the ocean again; it was hard at first, he says, "kind of a mind trip," but once he got back in the water he was all right.

He had never worried much about sharks before, and tries not to now,

"... Toma had taken about six strokes from the boat when he saw a shadow moving toward him..."

since he figures his attack was a "one-in-a-million thing." His leg is occasionally stiff, not quite as strong as it used to be, and marked with a scar roughly the shape of a shark's open jaws, but the healing has gone well. So in some ways Melvin Toma is

lucky—that is, if you can call any 36-year-old who has been attacked by a 12-foot tiger shark "lucky." He received fast and competent medical care and today leads a normal life, diving and fishing once again.

Melvin Toma, according to a list compiled by University of Hawaii marine biologist George Balazs and biological technician Alan Kam (see page 62), was the 59th person attacked by a shark in Hawaiian waters since 1886. In the last 25 years there have been 30 recorded attacks, an average of slightly more than one per year.

How safe are Hawaii's waters? Ultimately, this is an unanswerable question; it depends on one's definition of "safe." On the average, there are about 30 shark attacks each year, worldwide. Compared to some areas, such as the waters off South Africa, Australia or even California, Hawaii has had relatively few fatal attacks. And when one considers the thousands and thousands of people who use Hawaii's beaches each year, the chance of any individual being attacked is extremely small.

Still, there is no doubt plenty of sharks *are* around. Talk to most longtime fishermen, surfers or scuba divers, and they will tell you of shark encounters they've had. According to Leighton Taylor, director of Waikiki Aquarium, there are at least 17 species of shark in Hawaiian waters, including the tiger shark, gray reef shark, black-tipped reef shark, sandbar shark and mako, all of which are potentially dangerous to man. Fortunately, the great white shark, undoubtedly the most feared and dangerous species, is only an occasional visitor to Hawaii. Whether this is because great whites prefer colder waters has not been conclusively established, but it is known they like to feed on seals and sea lions, neither of which are abundant around Hawaii's populous islands.

So where in Hawaii are most of the sharks? According to the list compiled by Balazs and Kam, there have been 28 shark attacks off Oahu, 13 off the Big Island, nine off Maui, four off Kauai, four off Molokai, two off Midway and one off Kaula. Of course the number of shark attacks does not necessarily reflect shark populations, since this statistic is also



The contents of this tiger shark's stomach revealed a 40-pound green sea turtle, swallowed whole.

"...Taylor: 'It's thought by a lot of people now that shark attacks might be an aggressive or territorial message, like a dog biting a postman'..."



Timothy C. Tricas/Ocean Films Ltd



George Beards

Top: A great white shark rises to take bait offered by researchers off Dangerous Reef, South Australia. By far the most bold and aggressive shark species, great whites are only occasional visitors to Hawaiian waters.

Above: A school of gray reef sharks just off French Frigate Shoals in the Leeward Hawaiian Islands.

influenced by the number of humans in the waters. Oahu, for example, would be expected to have a high number of attacks, since so many people live here and use the ocean; by comparison, the Northwestern Hawaiian Islands have been the scene of only two attacks—despite the fact they are generally considered to have a high shark population.

"The mouths of the harbors," says Leighton Taylor, "like Honolulu Harbor and Pearl Harbor, are the places where, if you ask a guy to catch you a tiger shark, he'll go fish. And the Hawaiian record for a great white was taken at the mouth of Honolulu Harbor. With sharks, the large species, like tigers or great whites, tend as individuals to be fairly wide-ranging, even over a 24-hour period. On the other hand, with the smaller species, the dangerous ones—like gray reef sharks—tend to stay more in one area."

In short, it is not really possible to pinpoint one specific spot in Hawaii

and say, "This is where most of the sharks are." The most publicized shark-related death here (in which 15-year-old Billy Weaver was victim) occurred in 1958 off Lanikai. Fishermen who hook ahi only to find them half-eaten by the time they reach the boat will tell you there are sharks off the Kona Coast. The open-water fishing buoys set up by the state are also places sharks can be found. In 1969 a privately funded shark control program was instituted—understandably, with no publicity whatsoever—"in shore waters near the Mauna Kea Beach Hotel." Interestingly (and fortunately for Hawaii's tourist industry), there has never been a shark fatality in the crowded waters off Waikiki, and not even an attack of any sort since the 1950s. In the last 11 years, a relatively high number of attacks—six—have occurred off Maui. And ask Melvin Toma and he will tell you sharks can be found off Barbers Point.

When a shark meets a man in the ocean, numerous things can happen. A shark may approach, investigate, circle, harass, attack—or simply cruise by and ignore; it all depends on the situation, the type of shark, the activity the person is engaged in, and so on—many different variables. The fact is, the vast majority of shark-man encounters do *not* result in attacks on humans. An intriguing question, then, is what happens in the relatively small number of encounters where attacks do take place? In short, what is apt to trigger an attack?

This is a simple question without a simple answer. Much is unknown about sharks; scientists are still engaged mostly in finding out *how* sharks behave, not *why*. Still, speculative though they may be, there are several theories.

The simplest—but perhaps simplistic—explanation is that sharks attack humans because they are hungry. They want a meal and, being opportunistic predators, they take what they can get; and doubtless this is sometimes the case. Yet this explanation leaves unanswered questions. Why, in many attacks on humans, do sharks not devour, or even attempt to devour, their prey? Why do they take just one bite and swim away?

"Within the last 20 years or so," says Leighton Taylor, "the idea has developed that shark attacks are not due primarily to sharks eating people

A HISTORY OF SHARK ATTACKS IN HAWAII

This list, compiled by University of Hawaii marine biologist George Balazs and biological technician Alan Kam, first appeared in the April 1981 issue of *Elepaio*, the journal of the Hawaii Audubon Society. The original list contained 52 cases; for HONOLULU, Balazs and Kam updated the list, adding seven attacks that have occurred since April '81 and two earlier attacks that came to their attention after the first publication. Based on newspaper accounts, personal communications and existing literature, it is the first such comprehensive list ever compiled for Hawaii.

Case number	Date	Location	Victim	Circumstances
1*	June 2, 1886	Hamakua, Hawaii	two females	Washed into sea while fishing from shore; one woman found bitten (fatal), other woman disappeared.
2*	Aug. 8, 1902	Kalihi	young male	Pulled under while crabbing; both arms amputated.
3*	1904	Honolulu	male	Unprovoked attack, but unable to determine circumstances.
4*	1907	Pepeekeo, Honomu, Hawaii	male	Bitten while fishing.
5	Oct. 13, 1907	Kalepolepo, Kihei, Maui	male	Bitten while retrieving fish caught in net.
6*	Jan. 17, 1908	Mana, Kauai	male	Pulled under while gathering fish stunned by dynamite.
7	April 1910	Pearl Harbor	Martin Lund	Unprovoked attack, but unable to determine circumstances.
8*	1910	Hilo	male	Bitten while fishing.
9*	March 3, 1914	Honomu, Hawaii	Okomoto	Washed into sea while picking opihi; attacked by two large sharks.
10	Sept. 28, 1922	Kaawanui, Kamalo, Molokai	male	Bitten while inspecting wharf.
11	April 7, 1926	Hilo Bay	Mrs. Leonard Carlsmith	Bitten while swimming in turbid water near yacht club; severe lacerations on leg; 6-foot shark observed in area.
12*	May 18, 1926	Haleiwa	William J. Goins	Gave a sudden shriek, then disappeared while swimming at Haleiwa; remains of body found in 12-foot great white shark caught off Kahuku.
13*	Sept. 2, 1931	Kahala	George Gaspar	Swept out to sea by strong currents while fishing; remains of body found in 18-foot shark caught off Barbers Point.
14	Oct. 4, 1939	Kaneohe Bay	James Akina	Bitten on hand by 5-foot shark while spear-fishing in shallow water.
15	July 1, 1941	Nanakuli	Hisao Shimoto	Bitten on arm while removing 100-pound shark from fishing line.
16	1943	Midway	male	Unprovoked attack, but unable to determine circumstances.
17	1943	Midway	male	Unprovoked attack, but unable to determine circumstances.
18	June 27, 1947	Makaha	Valentine Limatoc	Bitten while spear-fishing with six other men.
19	Sept. 19, 1948	Makapuu	Noah Kalama	Bitten on leg while swimming.
20*	June 25, 1951	Kapehu Beach, Laupahoehoe, Hawaii	Alejandro Nodura	Swept out to sea while fishing from shore. Victim seen in shark's mouth.
21*	Aug. 3, 1952	Ala Moana	Shigeichi Kawamura	Missing while swimming; shark bite found on right side of body.
22*	Dec. 3, 1952	Mali	Gerbacio Solano	Bitten on arm while swimming from fishing boat; shark reported to be in excess of 22 feet.
23	Feb. 18, 1953	Barbers Point	James S. Takeuchi	Bitten on hand while removing shark from net.
24	July 4, 1953	Kaula Rock	David Crick	Fell off boat while fishing; bitten on leg.
25*	April 15, 1953	Oahu	Leonard Gaut	Unprovoked attack, but unable to determine circumstances.
26*	July 26, 1953	Mali	Harold Souza	Bitten on thigh while spear-fishing close to shore; 10-foot shark observed.
27	Sept. 2, 1953	Waiau, Pearl Harbor	Daniel Gonsalves	Bitten on leg and foot by 5-foot hammerhead shark while crabbing.
28*	April 8, 1954	Waipae, Oahu	Gordon S. Chun	Missing while fishing from shore; body recovered in mutilated condition.
29	1954	Molokai	Severino	Unprovoked attack, but unable to determine circumstances.
30	April 1955	Hilo	Kanematsu Oshiro	Bitten on hand while fishing from boat.
31	Sept. 20, 1955	East Molokai	Phillip C. Diez	Bitten on arm while swimming.
32*	Dec. 13, 1958	Lanikai	William S. Weaver	Leg amputated while surfing on air mattress near Twin Islands; 15- to 25-foot shark (believed to be tiger) observed near body.

*Indicates fatal

33	1950s	Waikiki	David Lloyd	Provoked attack, but unable to determine circumstances.
34	Feb. 27, 1960	Makena, Maui	John Benjamin	Severe lacerations obtained while spear-fishing.
35*	Dec. 27, 1960	Mali Point	Harold Riley	Swept out to sea while net-fishing; 20-foot shark observed attacking victim; body recovered off Nanakuli.
36	Aug. 2, 1961	Pearl Harbor	Kazuhiko Kato	Bitten on hand by 8-foot shark while net-fishing.
37*	April 8, 1963	Hapuna Beach, Hawaii	Roy C. Kametani	Washed into sea while picking opihī; parts of body recovered.
38	April 12, 1963	Awili, South Kona, Hawaii	Aiona Aka	Bitten on leg and foot while surfing; 12- to 15-foot shark observed.
39*	Sept. 20, 1967	Kailua Bay	male	Victim lost at sea when boat capsized between Oahu and Molokai; remains of body found in 11-foot tiger shark.
40	March 9, 1969	Makaha	Licius Lee	Bitten on leg while surfing; shark identified as great white; dead whale recently removed from area.
41	Nov. 11, 1969	Barbers Point	D.R. McGinnis	Bitten on tank while scuba diving; abrasions on arms and legs resulting from contact with shark.
42*	1960s(?)	Lahaina, Maui	Danson Nakaima	Passed out while scuba diving for black coral at 180 feet. About 30 large sharks seen near remains of body.
43*	March 31, 1970	Waimca Bay	Ernie Reathafor	Swept out to sea while bodysurfing; 15- to 18-foot shark observed.
44*	Oct. 24, 1970	Brennecke Beach, Kauai	James C. Mattan	Bitten on shoulder and arm while bodysurfing.
45	March 16, 1972	Waihee, Wailuku, Maui	Adam Gomes Jr.	Bitten on leg while spear-fishing.
46	Aug. 17, 1972	Waimanu, Honokaa, Hawaii	Eric Fotherby	Bitten on arm by 8-foot shark while spear-fishing.
47	Jan. 9, 1973	Hookipa Beach, Paia, Maui	Robert Sterling	Bitten on leg while surfing close to shore; 4- to 6-foot shark observed in area.
48	Dec. 18, 1973	Kalama Beach, Kihei, Maui	Gary W. Floyd	Bitten on leg while swimming close to shore.
49	June 10, 1976	Kamaole Beach Park #1, Kihei, Maui	Donald Gard	Bitten on foot and leg by 3- to 5-foot shark while swimming.
50*	July 20, 1976	Mahaulepu, Koloa, Kauai	Stephen C. Powell	Missing while scuba diving; lower remains of body recovered.
51	April 21, 1976	Kaanapali, Maui	Ruskin Vest	Bitten on arm by 4-foot shark while swimming close to shore.
52	Nov. 27, 1978	Ewa	Wendell Cabunoc	Bitten on arm while surfing; 8-foot shark observed.
53*	1979(?)	South Kohala, Hawaii	elderly male	Disappeared while fishing from shore; fire department divers found only a hand and flashlight.
54	Aug. 6, 1980	Puamana, Lahaina, Maui	Mark Skidgel	Bitten on left side of body while surfing close to shore; shark identified as 14-foot tiger.
55*	May 24, 1981	Haena Beach Park, Kauai	Roger B. Garletts	Missing while scuba diving at 60 to 80 feet; only diving equipment recovered, including shredded wet suit bearing numerous teeth marks. Victim reportedly spear-fishing in murky, choppy water.
56*	June 12, 1981	Honolii Pali, Hilo Bay	Preston D. Soley	Retrieval of floating body hindered by 4-foot shark. Autopsy showed death was probably from drowning; one-third of body missing due to bites by at least four sharks.
57*	Aug. 24, 1981	Keaukaha, Hilo	Ernest Watson	Disappeared while fishing from shore; leg found seven days later wedged in rocks 150 yards offshore.
58	Nov. 9, 1981	Laau Point, Molokai	Leo A. Ohai	Bitten on hand while untangling crab-trap line from propeller; 7-foot shark had followed the boat for three days and reportedly was very unusual-looking with a "flat head."
59	Dec. 13, 1981	Barbers Point	Melvin T. Toma	Severely bitten on leg by 12-foot tiger shark while swimming at surface shortly after entering water; site located approximately half-mile offshore at depth of around 30 feet. Looking for fish, but none had been taken when attack occurred.
60	Feb. 14, 1982	White Plains Beach, Barbers Point	Lisa Miller	Bitten on left leg while wading in 3 to 4 feet of water; 17 stitches required.
61	Feb. 14, 1982	White Plains Beach, Barbers Point	female	Bitten on right foot while swimming in shallow water.

*Indicates fatal

or seeking food, but rather that there is some other behavioral reason for them. It's thought by a lot of people now that shark attacks might be an aggressive or territorial message, like a dog biting a postman. The dog is not trying to eat the postman, but is telling him to get out of the area."

It is by no means certain, though, that this "one-bite phenomenon" is always a territorial message. John McCosker, director of Steinhart Aquarium at California Academy of Science in San Francisco, has suggested another possibility. "It was a dilemma to people who had observed shark behavior," says McCosker, one of

the few people in the world who have free-swum with a great white shark, "how great whites apparently spit out their prey after a first encounter. If these are the great eating machines that have evolved, as people say, why don't they just finish

it off?" The answer, McCosker suggests, may be that sharks are shrewder predators than commonly believed. "Say a shark takes a bite out of an elephant seal or a Hawaiian monk seal. The last thing that animal wants to do is give up without a fight. It turns around with great flipper-nails and teeth, biting, snapping, trying to save its own life"—desperate behavior that could harm an incautious shark,

"...To consider sharks mean or evil is to ascribe to them essentially human characteristics..."

perhaps even damage its eyes. So what happens? Instead of moving in for the kill, says McCosker, "the shark takes a bite out of an animal, then wisely backs off and swims these Grade-B movie circles around its prey, waiting for it to bleed to

death—and then consumes it."

"And incidentally," adds Richard Ellis, New York-based author and illustrator of the *Book of Sharks*, "what that does is put the lie to the often-repeated story of sharks immediately being driven into a feeding frenzy by blood. Under these circumstances, exactly the opposite would be true." An unintended consequence of this behavior is that it would also

allow time for humans, who are usually in the water with companions, to be pulled ashore, or onto a boat, to safety.

People who are used to seeing sharks underwater can often detect,

from subtle behavioral signs, whether or not a shark is apt to attack.* In this regard, Timothy C. Tricas, a graduate student in zoology at the University of Hawaii, describes the unique behavior of one species, the gray reef shark. Though not a large species (around 5 or 6 feet), the gray reef shark, occurring in moderate numbers in Hawaiian waters, is well-known for its bold nature. "If it's threatened," says Tricas, "or backed up against the reef, or you seem to go into its territory—and I'm hesitant to say it's territorial; nobody has established that—it may begin to exhibit what is called an agonistic display. In a nutshell, the shark starts swimming in an exaggerated, very unusual posture; it lowers its pectoral fins and hunches its back and swims in a rolling, highly exaggerated motion. This type of behavior is interpreted by shark experts as being a possible attempt by the shark to communicate, 'Look out, I'm a little nervous here; press on me any more and I may well attack you.' It's well documented—a number of divers have been attacked after seeing this agonistic display. In some cases they didn't realize what the shark was doing; they thought it was injured or something."

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*Melvin Toma, for instance, had seen tiger sharks in deeper water on a couple of previous occasions, but because of the way they were moving ("just cruising") had felt no danger. He and his friends—and they are probably typical of many local fishermen—see smaller sharks fairly often, but normally, unless a shark starts acting unusually excited, these encounters are routine. "The regular sharks," says one fisherman with a shrug, "might come around and take a fish off the net or grab your bag or something. But you wouldn't get the feeling they would bite you."

WHEN MAN EATS SHARK

Although sharks have long been considered a good food fish in some parts of the world, such as Australia and Japan, they have never been eaten much in Hawaii. This is not because sharks are bad-tasting or inedible, as is often believed, but mainly because people here have never gotten used to the idea of eating them.

One person who has tried marketing shark in Hawaii is Mark Reed, owner of Garden Island Seafoods in Kailua. "We're presently producing a product we call 'Shark Bites,'" he says. "It's a tempura item, small pupus almost like the nuggets of chicken they sell, about a mouthful per piece." Reed has experimented with selling the product through both restaurants and supermarket chains. "Right now it's not catching on real fast," he says. "The problem is that there's a lot of good fish available here—and it's difficult to market something that's been so long ignored." Reed feels the product's greatest potential may be as a novelty item for the Mainland—"Hawaiian Shark Bites."

On the Big Island, Bob Dvorak of Hawaii Shark Processors in Kawaihae exports fins to Hong Kong and Chinatowns across the U.S. to be used in shark fin soup. "The market is

strictly Chinese," says Dvorak, "it's a Chinese product." And how is business? "It's going well," he says. "It's growing. We're aware that it's going to take time."

One problem with eating shark is that the meat must be handled properly when caught, or a strong ammonia smell and bad taste may result. New techniques of bleeding the fish while still alive are helping to eliminate this difficulty.

A final story on the tastiness of sharks comes from University of Hawaii zoology graduate student Timothy C. Tricas. Research fishing off Catalina Island in California one day, he caught a mako shark and a thresher shark. Later, when other fishing boats came in, he swapped some shark meat for some swordfish. That evening they had a 40-person picnic and prepared all three fish the same way: marinated in shoyu and lemon juice, and then barbecued. "We told everyone there were two sharks and one swordfish," Tricas says, "but we didn't tell them which was which—they just tasted it. And it was almost unanimous—thresher shark was best, mako shark second, and swordfish, which was selling for \$5.50 a pound, was last on the list." —V.J.

Sharks

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The gray reef shark's threat-posturing—somewhat akin to a dog's baring its teeth or raising its back—is thought to be behavior that falls somewhere on a continuum “between fight and flight.” In short, the animal is agitated; at any moment it could attack or flee, depending on how the encounter evolves. “The main thing you want to do [in this situation],” says Tricas, “is *don't press the shark*. For example, if a dog is growling at you, you don't go in to the dog. You don't want to trigger whatever stimulus is necessary to cause an attack. The best thing for a diver to do would be to slowly back away. Try not to threaten the shark any more.

“It's a serious moment,” says Tricas, who has had gray reef sharks nose right up to him to force him out of an area. “It's very unnerving, a critical moment.”

Another possible explanation for the “one-bite phenomenon” involves a case of mistaken identity. Humans are not one of sharks' primary food items; it's possible, though, that they are sometimes mistaken for other animals that are. A person lying stomach-down on a boogie board, for example, dangling and kicking flippers over the sides, may, from a shark's-eye view in murky water, look rather like a sea turtle. In recent years a number of incidents have been reported from California in which sharks have taken bites out of surfboards. Researchers have found it intriguing that the boards bitten were usually the newer, shorter, split-fin variety; it's possible that this type of surfboard, complete with feet trailing over the back of it, produced a seallike effect in the water that the bigger, boatlike boards don't. After Melvin Toma was attacked, he talked with Leighton Taylor, who was curious to know if many turtles were in the area. It's possible—though of course unprovable—that the tiger shark, catching a glimpse of something splashing above him with fins, mistook Toma for a turtle, but lost interest in the meal when he mouthed a human leg.

“Everyone calls sharks very stupid eating machines,” says John McCosker, “stupid fish. But on the other hand they've been doing so very well for so very long, feeding and responding to stimuli that were unmis-

takable throughout history. If you were a tiger shark and you saw what looked like a monk seal in the water, you'd say, ‘monk seal,’ and that was all it could be. But in the last 100, maybe 200 years—which is a flyspeck in evolutionary time—we've put funny things in the water: surfboards, boats with motors, all sorts of things. Sharks, like a lot of primitive organisms, take a while to differentiate—or even learn that they should differentiate—one from the other. And we've done a pretty good job of imitating their normal food items.”

Perhaps the main misconception people have about sharks is that they are somehow “mean” or “evil,” and have a vendetta against humans. “The basic fallacy with *Jaws*,” says Richard Ellis, “is that there was a single shark that liked to eat people, and was cruising around the beaches of a mythical town looking for people to eat.* Whether or not sharks bite people, or attack people inadvertently or even advertently, is still very different from thinking of a shark cruising around offshore waiting for some swimmer, skin-diver, boogie boarder or whatever, so the shark can eat that person.”

To consider sharks mean or evil is to ascribe to them essentially human characteristics; what a shark is, is a large and unpredictable predatory animal. Most shark experts agree that of the normal range of human water-related activities—swimming, surfing, boogie boarding, snorkeling, scuba diving, spear-fishing, etc.—spear-fishing is the most likely to invite a shark attack. This is not because sharks somehow dislike spear-fishermen; it is because 1) spear-fishing takes place over a wider range of the shark's domain than do swimming, surfing, boogie boarding or snorkeling (which are done only on or near the water's surface); 2) spear-fishing takes place in an area where sharks would be looking for normal food items (fish); and 3) spear-fishing introduces to the encounter an element—blood from a wounded fish—that is absent in the other activities.

*An interesting aside here is that Ellis, a personal friend of *Jaws* author Peter Benchley, has nothing but praise for *Jaws* as a work of fiction. “For what Benchley set out to do, he did a terrific job,” says Ellis. “Fiction by definition does not have to be the truth. He does not have to say: *This actually happened*. If it actually happened, it would be written up in some scientific journal.”

“If you know that a large predatory animal keys on certain factors,” says Ellis, “and you can produce all those factors, you can make the animal attack... The presence of blood doesn't necessarily excite a shark to attack, but it does trigger a certain stimulus which is the same: an injured animal. Something is the matter; and it's easier for a predatory animal to take a weak or injured animal than it is to take a healthy one who's going to fight back.”

From time to time, the state of Hawaii has responded to shark attacks with fishing programs designed to destroy as many sharks as possible, presumably making the ocean safer for humans. The last such program took place in early 1982 shortly after two women were bitten near Barbers Point. Interestingly, even officials involved in these headline-making “shark abatement” programs are uncertain of their usefulness. In addition to its being costly and possibly upsetting to the marine ecosystem, it is hard to tell if the programs do any good. “It takes a lot of time, and you catch a few sharks,” says one state official. Indeed, he admits the program's main benefit is probably “psychological—setting the minds of the people to rest.”

In this regard, a line from the classic *Sharks and Survival*, edited by Perry W. Gilbert, is appropriate. “Although it is probable that most people would regard a statement on the rarity of attacks in the statistical sense as correct and reasonable, it appears that people in general are less willing to accept a risk involving sharks than greater risks of almost any other kind.”

In ancient Hawaii, sharks were considered *aumakua*, personal gods, and worshiped. The current attitude toward sharks amounts almost to a form of mass paranoia—a fear far out of proportion to actual danger. Magnificent, superbly adapted and at times fearsome animals, sharks have been around for some 400 million years and will doubtless be around for quite a time to come. “As long as anybody gets into the water,” says Timothy Tricas, “people are going to be getting bit, just because of the fact that sharks are there, and you're going to have encounters, and certain things will develop. But more often than not, they'll wind up with only an encounter—with both parties going safely on their own way.”