1990s-2000s SHARK FILE

OF GEORGE H. BALAZS

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NATION

WARREN BOLSTER / For The Times

Rocking the Boat

An increasing number of surfers in Hawaii claim the government is downplaying a serious shark problem to preserve its vital tourist industry. State and federal officials say the surfers are overreacting, **Column One** reports. Above, **an 11½-foot tiger shark rocks the boat off the island of Oahu** as it is reeled in. **A1**

COLUMN ONE

Hawaii in the Jaws of a Dilemma

■ Surfers say deadly sharks lurk beneath the waves, but state says it's just a wave of hysteria. Some want sharks left alone, but no one wants tourists to go away.

By PETE THOMAS
TIMES STAFF WRITER

HONOLULU—Not far off the coast of Waikiki, where thousands would splash in the surf the next day, a series of meat hooks baited with freshly killed tuna dangled beneath the night sea.

Hawaii had reluctantly embarked on another shark hunt, hoping to catch *nothing* and put an end to persistent claims—mostly from surfers—that tiger sharks had become a menace off the heavily populated south shore of Oahu.

The state had conducted similar hunts after attacks on surfers last winter and earlier this summer off the sparsely populated north and west shores. In each of those, a specially commissioned task force had caught the sharks it considered responsible for the attacks.

This time officials, prompted by what they said was an unusual number of reported sightings on the south shore, had hoped to prove the safety of the water off Waikiki, an area with no history of problems but one visited by 4 million tourists each year.

The overnight hunt in late June turned up only a small sandbar shark, a species not considered particularly dangerous. Relieved officials declared the situation resolved.

But the controversy lingers. An increasing number of surfers claim the government is downplaying a serious problem to preserve its vital tourist industry. State and federal officials say the surfers are overreacting. Other residents—including some surfers—say surfers have always faced the risk of attack, and sharks should be left alone because the ocean is their domain, not man's.

The tiger shark, meanwhile, has become the target of vigilantes who have taken it upon themselves to remove as many as they can. The state's policy is

Please see SHARKS, A16

WARREN BOLSTER / For The Times

Man guts a captured shark.

Sea Grant Investigates...

Following the tiger shark's trail

by Sandi Magaoay

Preliminary results from a shark tracking project based at the Hawaii Institute of Marine Biology have shown unexpected swimming behavior that could affect future shark control decisions.

Many scientists believe that tiger sharks are coastal and stay at or near the ocean's surface. But the preliminary results of Dr. Kim Holland's Sea Grant-funded project have already shed new light on these perceptions. Researchers in his lab have found that tiger sharks travel far and fast.

"We're finding that tiger sharks do go to deep, or 'blue,' water," Holland said. "Three sharks have been tracked so far, and over the period of the tracks, none of them show an attachment to coastlines."

The first tagged shark, an immature male, traveled a little over 62 miles (100 kilometers) in about 30 hours. The second shark, a mature female, traveled 35 miles (56 kilometers) in a day. The sharks also took 600- and 1,000- foot dives. Both of these sharks were tagged off of Oahu's south shore and swam to Penguin Bank, a shoal off Molokai. The third shark also swam offshore but, unfortunately, the battery in the transmitter died after only a few hours.

Holland's project gets to the heart of the controversy regarding the effectiveness of shark control programs: Does a shark stay in one area or does it swim aimlessly from one area to another?

Although research in this area is sketchy, one popular conception emerging among scientists is that sharks have a "home range." This would mean they stay predominantly in one area. (An animal with a home range is different than a territorial animal. A territorial animal defends its area.)

"Whether or not sharks have a home range makes a big difference in the feasibility of shark control programs," Holland said. "If they stay in one place, such as Waikiki, then you can control the area by fishing the sharks in the area. You can know how far to fish if you can determine their home range. If sharks do not have a home range, but wander all around, then it makes no sense to fish for them. We hope the results from this study will help us know when to fish, how often, what time of year — or if fishing makes any sense at all."

The effectiveness of shark control programs is a crucial question, especially for Hawaii. Although some states have shark fisheries, shark hunting in Hawaii is a controversial issue. In addition to raising environmental questions, shark hunting has religious implications. In the Hawaiian culture, a shark may be regarded as an *'aumakua*, a deified ancestor. This makes shark killings *kapu* to many native Hawaiians. However, tourism's dependence on ocean recreation makes having a safe — or shark-free — ocean desirable.

"The recent shark attacks and perceived increase in shark sightings have heightened the shark hunting debate," Holland said. "But we can't make any decisions because scientifically, we know very little about their movements or what they do and when they do it."

Until Holland's project, comprehensive studies on the swimming behavior of sharks in popular recreational areas had not been conducted. His project is also the first in the world to extensively track tiger sharks. The tiger shark, a carnivorous species that can grow to over 15 feet, has been implicated in Hawaii's shark attacks more than any other species.

Holland's study is especially important to future shark control decisions in Hawaii because the sharks are caught and tagged off the islands' coastlines. In the past, researchers have studied sharks in waters surrounding remote atolls. Holland's results will be more accurate in portraying the behavioral patterns of sharks that live around our main islands.

In a high-island setting, such as in Hawaii, a shark can get to deep water more quickly because the cliffs beneath the surface of the ocean are steeper than around continental coastlines. This means a shark living in waters surrounding the main Hawaiian Islands would probably behave differently from a shark living around a low, atoll-type island or continent.

In addition to important local applications, this project also has national and international value, because tiger sharks are found throughout the world. Appropriate shark management programs are necessary because sharks are vulnerable to overfishing; the entire ecosystem would be affected by their depletion, Holland said.

"Tiger sharks are the ocean's top predators," he said. "They keep smaller sharks in check. Those smaller sharks feed on game fish. If you take out the top predator then it's possible that there will be more small and medium sharks. Consequently, less game fish will be available for food. If you lose a fish at the top of the chain, you also lose at the bottom."

In the future, Holland plans to expand the project and use transmitters that can track the sharks for several weeks, rather than only a few days. Hopefully, Holland will be able to answer another question that is vital to shark control programs in Hawaii: Do sharks avoid areas of high human activity?

The project is also supported by the National Marine Fisheries Service and the State of Hawaii Department of Land and Natural Resources, Division of Aquatic Resources.

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Mimicking Mother Nature

Labs improve chances for dwindling fish population

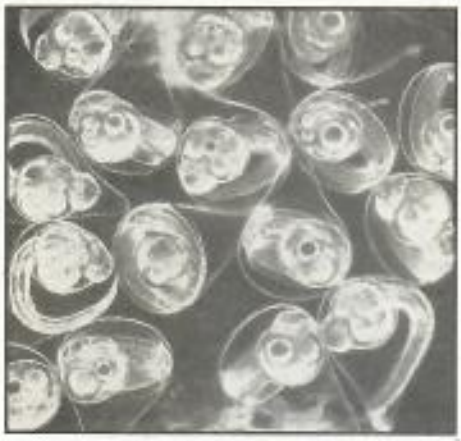
by Sandi Magaoay

Methods to raise larvae are being used in a research project that could ensure the survival of an endangered species candidate that is endemic to Hawaii.

The *Lentipes concolor*, known in Hawaii as the *'o'opu hi'ukole* (red tail) or *'o'opu alamo'o* (looks like a lizard), is listed as a Category 2 species, which means it has the potential to be listed as an endangered species. The *'o'opu* is also commonly known as the goby. Dr. Christopher Brown is studying the early life history and reproductive behavior of the *'o'opu* at the Hawaii Institute of Marine Biology, with funding support from the state Department of Land and Natural Resources, Division of Aquatic Resources. Brown hopes his research will eventually lead to the development of *'o'opu* culturing techniques.

In a separate project, which is partially funded by Sea Grant, Brown is trying to determine the optimal fish-rearing conditions for native Hawaiian ornamental and edible fish. Brown discovered that larvae treated with thyroid hormones developed vital organs sooner than untreated larvae, and therefore, have better survival rates. The project is significant to Hawaii's aquaculture industry because it tackles one of the most expensive and labor-intensive aspects of fish-rearing — producing healthy larvae.

Brown has used those same hormones and technology in his *'o'opu* culturing project. The results have been promising. *'O'opu* larvae treated with thyroid hormones lived a few days longer than the control group.



'O'opu eggs, 60 hours after spawning.

"This is an important project because it could be used to re-stock streams," said Daniel P. Lindstrom, a doctoral candidate in zoology who is working with Brown. "'*O'opu* are top predators, so their presence affects the entire ecosystem."

Brown added that *'o'opu* are not a popular species to culture among scientists because it produces tiny eggs, making their larvae fragile and difficult to rear.

"Plus, they go through salinity changes, and that's difficult to understand and mimic properly in a lab," he said.

'O'opu spawn in mountain streams and their larvae are washed into the sea, where they spend the early part of their juvenile phase. The fish then return to the mountain streams where they grow into adulthood and spawn. *'O'opu* live the rest of their lives in the freshwater streams.

After three years of research, Brown's research team has successfully replicated environmental conditions for the larvae to live until the age of three weeks old. Researchers are already preparing for the next phase in their life-cycle by developing feed for juvenile *'o'opu*.

Although *L. concolor* is the only one of the five *'o'opu* species that has Category 2 status, researchers are experimenting with all of them.

"If we can learn to rear one, then we can apply those techniques to all the others," Lindstrom said.

Brown's labs, located on Coconut Island, are an interesting blend of nature and high-tech science. At the spawning lab, dozens of aquariums house pairs of fish — a male and a female. The water in the tanks is filtered until it reaches a level that is equivalent to the soft water found in mountain streams. But unlike a natural stream, the water is pollution-free and treated with medicine to keep the eggs and larvae disease-free. The temperature in the spawning lab is about 20° Celsius (68° Fahrenheit), similar to a larva's first habitat in the cool mountains.

After four days, the eggs hatch and the larvae are "washed into the ocean." Well, not really. Lindstrom carries them into another lab, where they are placed into tanks that are filled with sterilized and filtered seawater from Kaneohe Bay. The tanks are specially designed to eliminate stress on the larvae. The larvae actually

(Continued on page 2)

In This Issue...

Labs improve chances

(Continued from page 1)

live in a bowl-like enclosure within the tank. Water pours into the tank, then gently overflows into the bowl, eliminating any harsh currents or back-breaking water flows on the tiny larvae. The temperature in this lab is similar to ocean conditions — about 25° C.

Lindstrom calls their larvae experiments a "numbers game."

"'*O'opu* are high-fecundity animals. This means a lot of energy is put into producing thousands of eggs, but very little energy is put into parental care," Lindstrom explained. "Nature just hopes that out of the thousands of larvae produced, at least two will make it to adulthood and reproduce, ensuring the species' survival.

"We're playing a numbers game. We're trying to improve our odds. The more larvae that survive, the better the chances of a fish reaching adulthood."

Brown's project has aquaculture, conservation, and scientific applications. The project will establish a genetic basis for identifying the larvae, develop rearing protocols and stock enhancement programs, develop the information necessary for species survival management decisions, and provide a basis for comparison with similar fish that live in both freshwater streams and the ocean.

What is a goby?

by Sandi Magaoay

The goby, called *'o'opu* in Hawaii, is the only fish in the world that makes its way upstream by swimming and climbing. A suction disc on its chest, which is actually two pelvic fins that have fused together, enables the goby to hold onto the surface of rocks while its back fins propel it upward. Some gobies have been found in pools above the 425-foot-high Alakai Falls on the Big Island.

Five species of goby are found in Hawaii's freshwater streams; all of them are endemic to the islands, meaning they are found nowhere else in the world. In ancient Hawaii, the *'o'opu* was used for food and ceremonial purposes. Today, gobies are a delicacy in Hawaii's ethnic communities, but they may only be caught with a hook and line.

Gobies are one of the few freshwater fish that spend part of their lives in the ocean. Gobies spawn in the mountain streams and live mainly on the windward side of the Hawaiian Islands. The female lays about 10,000 eggs on the surface of a rock. After the eggs hatch, the larvae are washed down to the ocean, where they spend their juvenile stage in the ocean. After about nine months, depending on the species, gobies begin their arduous journey back to the mountain streams to spawn and spend their adult lives.

Since 1989, the *Lentipes concolor* has been an endangered species candidate. Although baseline population figures and research on the goby is limited, officials from the Sierra Club and many of Hawaii's old-timers say the number of gobies has declined. The reasons for their decline are not clear, but experts say agricultural water diversions, sewer discharges, and introduced species, such as pigs, cattle, game fish, and released aquarium fish are obvious culprits.

Gobies are the only native fish that live in Hawaii's streams, therefore, the loss of one would dramatically reduce biological diversity in Hawaii's freshwater environments. The *L. concolor* lives the farthest away from the coastline than the other gobies and is often the only fish present in streams located well inland.

"The *'o'opu* are important to the Hawaiian culture and to native ecosystems," said Marjorie Ziegler, a resource analyst for the Sierra Club Legal Defense Fund's Mid-Pacific office. "We aren't exactly sure how these animals are connected to other plants and animals, nor do we fully understand what role they play in the aquatic environment. Consequently, we should keep the entire ecosystems intact by protecting these species and by preserving high-quality streams, riparian zones, estuaries, and nearshore waters."

The *'o'opu*, along with the hihiwai (a mollusk) and 'opai (a shrimp), are good indicator species of stream health because they migrate between stream and ocean to complete their life cycles, Ziegler added.

One interesting aspect of *L. concolor* is its courtship behavior. The male exhibits a striking and rapid color change when a female approaches. He changes from brown-green colors, similar to a female, to jet black and bright orange. The male and female then display a series of darting, swimming, and creeping movements until spawning takes place. The male, who is relatively territorial, protects the eggs. However, once the eggs hatch, the offspring fend for themselves.

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SANTIAGO, Chile (AP) -- A giant shark attacked a group of American scientists swimming near Easter Island in the south Pacific and severed the left leg of a 19-year-old woman.

Heather Boswell, whose leg was not recovered, was flown to Panama for treatment, said Easter Island naval Capt. Ricardo Menzel.

He said another unidentified American scientist was also hurt in the attack Wednesday afternoon.

The scientists were members of the crew of Discoverer, a research ship that has been conducting a series of experiments around Easter Island in the Pacific Ocean, 2,800 miles off the coast of Chile.

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YELLOW PAPER

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1999. Summary of events surrounding shark attack on Jesse Spencer at Old Kona Airport MLCD, Friday, October 1, 1999, based on interviews with Spencer (age 16) and Bala Clark (age 14), Tuesday, October 19, 1999. Unpublished correspondence for Mike Fujimoto, Acting Administrator, DLNR Division of Aquatic Resources, Honolulu, Hawaii.

Newspaper Web Sites

West Hawaii Today

http://westhawaii.com

Maui News

http://Mauinews.com

The Garden Island

http://www.planet-hawaii.com/gardenisland

Shark

CONTINUED FROM A1

shore, police said.

"He was bitten front to back in his shoulder area," Tom said

Police said he was also injured in the face.

Authorities said the man, whose name wasn't immediately released, was met at the shore by firefighters and medics. He was flown by helicopter to Maui Memorial Hospital, and was listed in critical condition.

He told authorities he had been attacked by a "big shark," police said.

There have been two serious shark attacks in Hawai'i waters during the past year:

• On April 7, surfer Willis McInnis, 57, was killed by a shark in murky water off Kahana, Maui.

• Bethany Hamilton, then 13, lost her left arm in a shark attack Oct. 31, 2003, in clear water off Hā'ena, Kaua'i.

HOW TO HELP PREVENT SHARK ATTACKS

The Shark Task Force has issued these 10 tips to reduce the risk of shark attack.

1. Swim, surf or dive with other people, and don't move too far away from assistance.
2. Stay out of the water at dawn, dusk and night, when some species of sharks may move in-shore to feed.
3. Do not enter the water if you have open wounds or are bleeding in any way. Sharks can detect blood and body fluids in extremely small concentrations.
4. Avoid murky waters, harbor entrances, and areas near stream mouths (especially after heavy rain), channels, or steep dropoffs. Sharks frequent these types of water.
5. Do not wear high-contrast clothing or shiny jewelry. Sharks see contrast very well.
6. Refrain from excessive splashing; keep pets, which swim erratically, out of the water. Sharks are attracted to such activity.
7. Do not enter the water if sharks are known to be present, and leave the water quickly and calmly if one is sighted. Do not provoke or harass a shark, even a small one.
8. If fish or turtles start to behave erratically, leave the water. Watch for dolphins, as they are prey for some large sharks.
9. Remove speared fish from the water or tow them a safe distance behind you. Do not swim near people fishing or spearfishing. Stay away from dead animals in the water.
10. Swim or surf at beaches patrolled by lifeguards, and follow their advice.

SUNDAY

Shark attacks diver off Moloka'i

10-10-04 OK AV

Advertiser staff and news services

A 34-year-old O'ahu man was bitten by what was described as a large shark yesterday off Moloka'i's southeast shore, according to the Maui County police and fire departments.

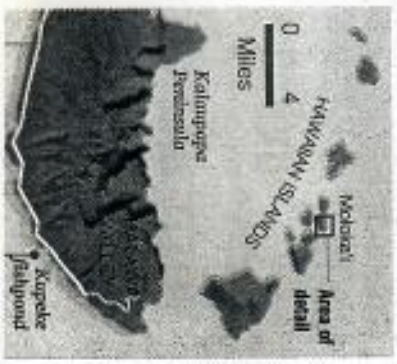
Police said the victim was diving with a friend in waters outside the Kupeke fish pond. The friend had come into shore when the attack occurred, police said.

A fire official said he was attacked around 12:40 p.m. near a wall about 200 yards from the beach access.

"He was diving alone and he had got bitten by a shark," Maui County Assistant Fire Chief Frank Tam said. "He was screaming. Some residents and bystanders came to his aid, saw that he had an injury and called 911.

A kayaker helped bring him to

SEE SHARK, A2



Honolulu Advertiser

HAWAI'I'S NEWSPAPER

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[HONOLULUADVERTISER.COM]

Moloka'i shark victim saw shoulder 'gone'

Pearl Harbor worker will be moved to O'ahu hospital today

BY PETER BOYLAN
Advertiser Staff Writer

Davy Sanada was done diving for the day off east Moloka'i and was swimming to shore when he suddenly saw a large shark dead ahead in the murky water bearing straight for him.

"I only saw it when it had me," Sanada, 34, of Kāne'ohe, told The Advertiser last night in a phone interview from his hospital bed at Maui Memorial Medical Center. He was being treated for severe wounds to his left shoulder from the attack in shallow waters outside Kupeke Fishpond.

Sanada, a pipefitter at Pearl Harbor Naval Shipyard, said he was done fishing at about 12:30 p.m. Saturday and was heading for shore, his bag of speared fish trailing about 30 feet behind him, when the shark, estimated by officials at 12 feet long, attacked.

"I remember this big force hitting me and this big shadow wrapping me up and I remember just being shaken," he said. "It shocked me. I started panicking. Something had me, then I started flailing away at it."

As quickly as it attacked, the shark let go, Sanada said.

Sanada stood up quickly — the water was only four feet deep — and looked down to see his blood spreading in the water around him.

Then he saw the shark coming back.

"I just started hitting it with my spear (gun). It was not cocked. I had taken the rubber band off already, so I was just poking it," said Sanada.

"Finally it turned and swam off."

Sanada said he could see his friends on the beach about 200 yards away and tried yelling to them, but the distance prevented them from hearing him.

"I looked at my (left) shoulder and it was just gone," he said. "I flipped my wetsuit over it to try

SEE SHARK, A6

Shark

CONTINUED FROM A1

and stop some of the bleeding and started walking in. I was yelling for help."

Sanada said he was in shock and a lot of pain.

"I was pretty much ready to pass out a few times," he said. "I thought I was a goner."

Sanada said a woman who heard his cries paddled out to him in her kayak but was unable to steady her boat in the strong current. He said he got off the kayak, walked to the rock wall of the fishpond, climbed onto it and waited for help.

"He was waving for help," said Carol Beadle, who said she and other bystanders assisted Sanada. "I could tell his face was ripped and his shoulder was dislocated."

Sanada said a friend of his, a former firefighter, came to the wall and helped him until paramedics and firefighters arrived. They applied pressure to control Sanada's bleeding until a helicopter airlifted him out, authorities said.

Sanada said he has been diving since high school and never thought something like this could happen to him. He said he has a lot of gratitude and much aloha for those who came to his aid.

Sanada is in stable condition and scheduled to be transferred to The Queen's Medical Center on O'ahu today. Sanada said he can't move around much and is connected to a morphine drip. He said doctors have told him he will need several surgeries, including possibly a complete shoulder reconstruction.

"It's going to be a long battle from here," he said. "It's one of those freak things. You have to respect the ocean and the predators in it and just be smart."

Sanada said he wasn't sure if he will go diving again.

The Associated Press contributed to this report. Reach Peter Boylan at pboylan @honoluluadvertiser.com or 535-8110.

Shark bite survivor recounts his ordeal

HSB 10/11/04
Monday A1

A Kaneohe man says he used his spear gun to drive the fish away

By Mary Vorsino
mvorsino@starbulletin.com

After a large shark tore into Davy Sanada's shoulder off Molokai Saturday afternoon, leaving him severely injured, it came back for more, the Kaneohe man said yesterday from his Maui hospital room.

"I stood up in the water," said Sanada, 34, who was in stable condition at Maui Memorial Medical Center yesterday afternoon, "and I could see him coming back after me."

Sanada said he used his spear gun to scare the shark away once it returned after already biting Sanada on the shoulder and face in shallow waters more than 200 yards from shore. The shark, which rescuers estimated to be at least 12 feet long, then went for the spearfisherman's catches, which were on a float more than 30 feet behind him.

"I think he must have been interested in my fish," Sanada said, adding that he's fairly sure the animal was a tiger shark.

Sanada, a Pearl Harbor pipefitter, had been free diving alone in waters outside Kupeke Fishpond on Molokai when the attack happened just after noon Saturday.

He said yesterday that he was heading into shore when he was bitten by the shark.

"I was swimming in," Sanada said, "and he came out of nowhere. He hit me from the front. ... I didn't see him coming."

After the attack, Sanada said he pulled his wet suit over his shoulder injury to stem the bleeding. He then started working his way into shore as he yelled for help and waved his good arm in the air to try to get the attention of those on the beach.

"I must have been 200 yards offshore," he said. "I had lost a lot of blood. I was getting dizzy. It was an ordeal, but I was yelling for help, and nobody was responding."

Please see **Shark, A5**

Shark: Victim says it is unclear if he will regain full use of his arm

Continued From **A1**

Finally, resident Carol Beadle heard the man and called 911. Then, she alerted others and got into a kayak to paddle out to Sanada.

"I just kept trying to make my way toward the beach," Sanada said. "I waved my arms, and I noticed them getting their kayak ready. That kind of gave me my second wind. ... I just had it in my mind to make it to shore."

When Beadle got to Sanada, he was able to slump over her kayak and she took him about 30 yards to the wall of Kupeke Fishpond. The seas were too rough to get him to the beach, she told the Star-Bulletin Saturday, so she left him on the wall and went back to shore to get help.

Rescuers were able to stabilize Sanada at the site, and he was airlifted about 1 p.m. to Maui Memorial Medical Center. Sanada said he's set to be transferred to the Queen's Medical Center in Honolulu today, where he'll undergo surgery to repair and clean his shoulder wound.

"I'm missing a small chunk of my shoulder," Sanada said, adding that it's unclear whether he'll regain full use of his arm. "That's something that the doctors and I have to talk about."

Sanada, who was vacationing on Molokai, said he's been spearfishing in the area where the attack occurred several times before and never saw a shark. But he said he's seen sharks while free diving elsewhere, and they have never approached him.

"If I see a shark, I give them all the room in the world," he said. "We respect each other. You've got to realize that's their domain and give them all the respect."

The attack is the first off Molokai since 1992, when a man was attacked while fishing 50 yards offshore of Honomuni. He suffered an abrasion and bruise to his right leg.

State Shark Task Force member John Naughton said the group is still getting information on Saturday's attack, and will likely be interviewing Sanada this week.

He said it's unusual for a shark to attack a swimmer midday in shallow waters, but added the fish Sanada had caught probably attracted the shark.

Residents said no warning signs were posted in the area where the attack occurred yesterday, probably because it is difficult to get to and not well-frequented. A state Department of Land and Natural Resources official could not be reached yesterday to confirm the information.

A6

[NEWSWATCH]

Shark attack victim still in fair condition

A Kaneohe man who was bitten by a shark on Saturday remains in fair condition as he recuperates, Queen's Medical Center officials say.

Davy Sanada was free diving in waters off east Molokai when he was attacked by the shark, sustaining deep wounds to his shoulder and face.

Fire officials said the shark attack occurred in shallow water about 600 yards offshore outside Kupeke Fishpond.

Sanada was initially taken to the Maui Memorial Medical Center in serious condition. He was later transferred to Oahu. Queen's officials said yesterday that his primary wounds are on the anterior shoulder muscles.

Congress approves brown tree snake bill

Congress has passed legislation to eradicate the brown tree snake in Guam and prevent its spread to other Pacific islands.

The Brown Tree Snake Bill (H.R. 3479) calls for $15.5 million a year on anti-brown tree snake measures in the fiscal years 2006-2010, including control, research, prevention and eradication on Guam and other Pacific islands.

Since becoming established on Guam in the 1950s, the non-native snake has killed most of Guam's native birds, damaged the island's ecosystem, and caused economic hardship by causing electrical power outages. Hawaii doesn't have brown tree snakes, and officials want to keep them out.

State and federal wildlife and political officials in Hawaii helped lobby for passage of the bill, according to a release from Madeleine Bordallo, Guam's delegate to Congress.

The Brown Tree Snake Bill passed the House on Sept. 28 and passed the Senate this week and will go to the White House for action by President Bush in coming weeks, Bordallo's release said.

Gov OKs land transfer for Big Isle fire station

HILO >> Gov. Linda Lingle has signed an executive order transferring 19.4 acres of state land to county use for the creation of a new fire station at Pahoa, south of Hilo.

The action follows approval by the state Board of Land and Natural Resources in June of a request for the land by Mayor Harry Kim. The site is on the main Keaau-Pahoa Highway at the entrance to the town.

The transfer means the state will retain ownership of the land while the county uses it, said the governor's spokesman, Russell Pang.

The county has $150,000 in federal community development money to design and plan the new fire station, said Fire Chief Darryl Oliveira. No construction money is available for the $1.7 million project.

The county also intends to put a new police substation and recreation facilities at the site, possibly including a gymnasium, the governor said.

Star-Bulletin staff

Doctor, victim: Attack was definitely by shark

Federal biologist repudiates rumor about hand injury

By HARRY EAGAR
Staff Writer

KIHEI – San Diego Internet marketing executive Jonathan Genant knows he was attacked by a shark off Maui on Dec. 21.

So does the surgeon who helped to repair the damage to Genant's left hand, which had the pinkie and part of the ring finger sheared off in the incident of Keawakapu Beach.

Which is why Genant is more than annoyed that some people on Maui are intent on spreading a rumor that he was the victim of a turtle, suggesting that he had been harassing the animal.

It was a shark.

"Absolutely, 100 percent, beyond the shadow of a doubt," said Dr. Peter Galpin, a physician with as much experience treating shark bites as anybody in Hawaii.

"I have no idea how things like this get started. But I'd like to be part of a process that puts a stop to it," said marine biologist George Balazs, who actually has been bitten by green sea turtles more than once.

Balazs is leader of the Marine Turtle Research Program at the National Marine Fisheries Service in Honolulu.

He is also the man who compiled the first thorough listing of shark attacks in Hawaii, and he is the reporter for new attacks to the International Shark Attack Registry in Florida.

So when the rumor reached him several weeks ago, he was concerned on several levels.

> *'They may take some flesh but far more often they bruise or pinch or make cuts/abrasions. They crush.'*
>
> – George Balazs, marine biologist

Scientifically, because he had already reported the shark attack to the registry, and if that was incorrect he wanted to correct it.

Second, because it impugned the character of Genant, 29, a co-founder of Better Deals LLC, an Internet marketing business in San Diego.

Third, because it was bad publicity for turtles.

Genant himself was amazed to hear the story and upset by it.

"I'm taking it a little personally, questioning, was there something about my story or something I had said (to reporters/interviewers) that didn't sound believable, therefore causing local community to discredit my account and not accept it altogether?" he wrote Balazs.

On the other hand, Genant said he doesn't need any more publicity, and he is getting along fine despite the wound.

He is following the shark bite news from Maui carefully, and there's been plenty since that day in December.

Since the Dec. 22 attack, there have been at least four reports of individuals encountering sharks in waters off South Maui, with the most recent being a Kihei girl standing in shallow water at Oneloa Beach at Makena suffering a bite on her calf.

"I cannot believe there aren't more fatalities," said Genant, now that he knows what it's like to be bitten.

Balazs said a Hawaii green turtle or hawksbill could bite a human or "anything else that molested it." However, "they do not go out seeking people or other things to bite, unless the 'other things' are their natural food sources – mainly seaweed for greens and sponges for hawksbills."

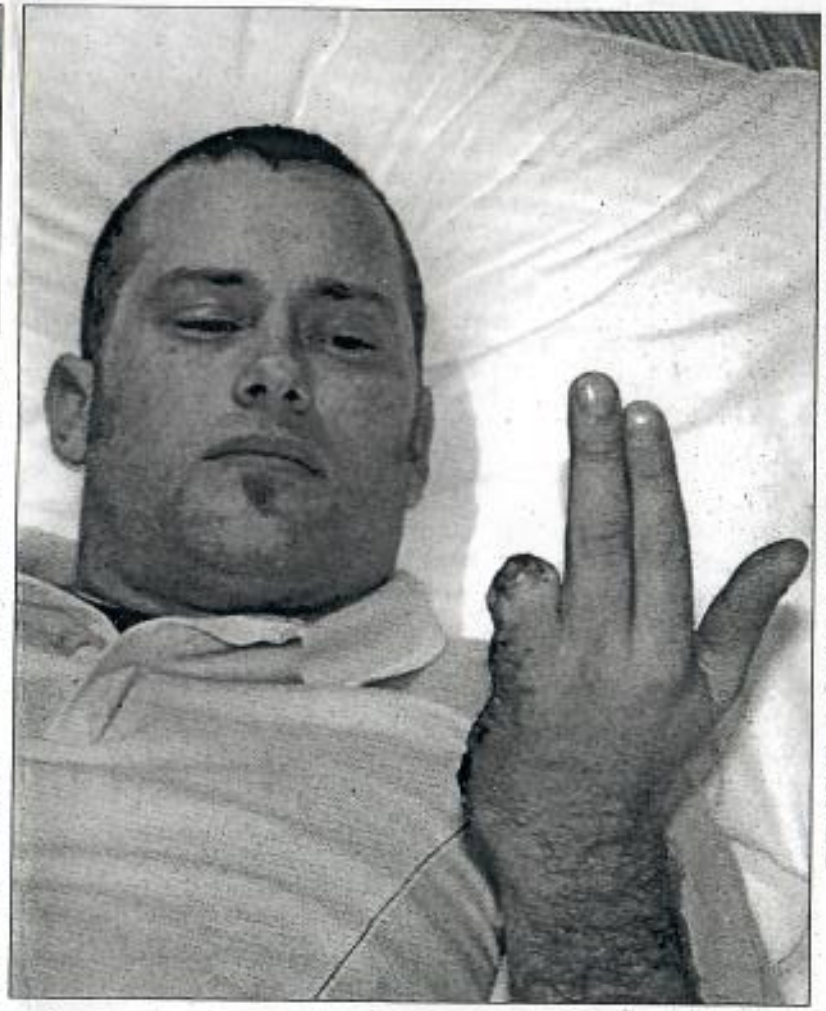
If bothered, turtles either swim away or hide under a rock ledge.

If restrained, they can bite.

"But the bites do not shear through bone," said Balazs. "They may take some flesh but far more often they bruise or pinch or make cuts/abrasions. They crush."

Photographs taken of Genant's injury before his hand was cleaned up and stitched up at Maui Memorial Medical Center clearly show that five to six inches along the side of the palm and the top half of the ring finger were sheared off. The cut along the side of the hand is not straight across, but serrated – as might be expected of a bite by a shark.

Both Galpin and Balazs say it is inconceivable that the injuries were the result of a turtle.



San Diego Internet executive Jonathan Genant is a distance swimmer who was working out in the ocean off Keawakapu on Dec. 22 when he was attacked by a shark that bit through the left side of his hand, taking the pinkie and most of the ring finger. Search crews subsequently reported seeing what appeared to be a 12-foot tiger shark in the area while the shoreline was closed from Wailea to the Kamaole Beach parks.

Genant said last week that he knows he cannot do anything about people spreading rumors, but he wants it on record that it was a shark.

"If the shark had taken anything other than part of my hand, I probably wouldn't have been able to cut off the blood flow – as I did, using the other hand – and kick back to shore. I feel quite fortunate that it wasn't any worse than it was and very grateful – to the shark and to fate – to still be here."

■ *Harry Eagar can be reached at heagar@mauinews.com.*

10/20/04 Honolulu Star-Bulletin A3

CRAIG T. KOJIMA / CKOJIMA@STARBULLETIN.COM

Davy Sanada spoke at the Queen's Medical Center yesterday. He thanked the many people who helped save him. Later, Dr. Morris Mitsunaga gave more information on the attack and treatment of Sanada.

A FIGHT FOR SURVIVAL

A Kaneohe man was like a rag doll in the mouth of a shark

By Leila Fujimori
lfujimori@starbulletin.com

Davy Sanada may have saved his life by pulling his wet suit over a bleeding shoulder like a tourniquet after an 8-foot tiger shark tore a third to a half of his left shoulder muscle Oct. 9 off Molokai, an orthopedic surgeon said yesterday.

Dr. Morris Mitsunaga said the 34-year-old Kaneohe man realized how serious it was when he could see down to the bone.

"He's a brave young man," Mitsunaga said. His actions helped to stop the bleeding, and others packed his wound.

Sanada was free diving about 600 yards offshore outside Kupeke Fishpond just after noon when he was attacked in murky, waist-deep water.

The shark had clamped its bottom teeth over Sanada's chest and its top teeth on his back, then shook him for five seconds like a rag doll, creating a sawing action, Mitsunaga said.

The shark took some of the muscles in his back, he said.

"If it had him a little bit longer, it would probably would have gotten his whole arm," he said.

Sanada received lacerations to his face, which required stitches.

After the initial attack, Sanada was near shore in shallow water when the shark came back and tried to attack him again, but he fended him off with his spear, Mitsunaga said.

Sanada declined comment on the attack before his discharge from the Queen's Medical Center yesterday.

He did, however, thank doctors and medical staff in Honolulu and Maui, fire rescue crews in Molokai, family and friends.

Sanada received a large extensive wound from his chest to his shoulder and down to his back, Mitsunaga said.

Plastic surgeon Vincent Nip removed the dead skin and replaced it with grafted skin from his leg.

His wounds have been closed up and he will undergo extensive rehabilitation.

Doctors will then need to assess what further surgeries he may need to transfer muscles from other areas so he can regain muscle function.

Doctors don't know whether Sanada, a pipe fitter at Pearl Harbor Naval Shipyard, will be able to return to his work, which requires crawling and holding things overhead.

Sanada is also athletic and plays softball and dives, both of which require the use of his shoulder and arm, Mitsunaga said.

Mitsunaga said Sanada's deltoids, which help bring the arm up, and the infraspinatus, which bring the arm out, received extensive damage.

"All the muscles in the back were completely gone," he said.

However, the right-hander retains use of both hands, although his left arm remains in a sling.

"All the muscles in the back were completely gone."

Dr. Morris Mitsunaga

On patient and shark bite victim Davy Sanada

SHARK FILE

PAM KELLERMAN
627 Ambrose Creek Rd.
Stevensville, Mont 59870

MAY 00

Hi George.

It was a nice surprize hearing from you.

Thank you for sending me the information on the kind of research you do.

Ya know, I knew that you were a Marine Biologist, but I have to admit, I had no idea just how much time & dedication you put into your work until now.

You know George, your pretty remarkable!

I know I'm no one big nor important, But I have to tell you, after reading the paper work you sent me, I was totally impressed. (More so, Then what I already was with you.)

I learned more from your paper work, then I ever learned in school - Thank you! :)

It mentions in one part, that a lady named Anne Killere was helping you, But now she's gone. Have you found anyone else to help you? It sounds like it would be a great job to have.

Anyway, things have been going good around here.

Phil has been working out of town for the Past 2 month. He's building a resort Cabin for his Boss. But come next month, he's going to be building a new school 3 miles from here.

The girls are doing good, Briel

turned 13 today. Wow- thats hard to believe.

Were taking the girls Camping this weekend with my brother & his family. The girls love to fish and so does my brother, so I figured even tho Phil & I don't care for it (fishing that is) will all have a good time. Good way to start the summer.

Weve had some pretty nice wether lately, infact its be in the high Seventies - low Eighties, which is pretty warm for this time of year. Normally its in the mid sixties

I heard that the officials around here, are a little concerned ABOUT our snow melt off.

We really didn't get that much snow fall this year. And the snow on the mountains are already pretty much melted. We use the melt off to water our feilds and other things

So I guess will see come July & Aug, which is our hotest months.

Well my friend, I best close for now.

Again, Thankyou for taking the time to send me your research. It was great hearing from ya.

May be one of these days, will be able to meet face to face. (Wouldn't that be neat!)

With Love Always
Pam

THA

AROUND THE ISLANDS

NORTH SHORE

Shark bites board at Rocky Point

A surfer on the North Shore reported he was knocked off his board at Rocky Point yesterday by what appeared to be an 8-foot tiger shark.

The shark left teeth marks in the board, but the surfer was unharmed.

Lifeguards warned beachgoers from Pipeline to Sunset yesterday that a potentially aggressive shark had been spotted.

Randy Honebrink, state Shark Task Force member, last night said tiger sharks bite people two to three times each year in the Islands. Most often the shark bites either the surfer or the board once, then goes away.

"It's the way they find out if something is edible," Honebrink said.

A spearfisherman was cut in the face and shoulder in October by an 8-foot tiger shark in murky water off Moloka'i.

On April 7, 2004, surfer Willis McInnis, 57, was killed by a shark in murky water off Kahana, Maui.

Safety tips to reduce the chance of shark injury include avoiding murky water; swimming, surfing and diving with others; and staying out of the water when bleeding. More information is available at www.hawaiisharks.com.

Honolulu Star-Bulletin
HAWAII
THURSDAY, FEBRUARY 17, 2005 >> PAGE A3

Shark bumps surfer

An estimated 8-foot tiger shark surprises the professional surfer off Rocky Point

By Leila Fujimori
lfujimori@starbulletin.com

Greg Long has surfed the world over but yesterday had his first close encounter with what he estimates was an 8-foot tiger shark.

Long, of San Clemente, Calif., was on Oahu's North Shore surfing with friends when was bumped from below by a shark off Rocky Point, he said last night.

"Out of nowhere it just came up beneath me," said Long, who has been competing in the Monster Energy Pipeline Pro.

Long said he had been lying on his board 30 minutes during a lull between sets when the shark came straight up beneath him and grazed his left foot. The shark bit his surf board.

"Had I been sitting and had my legs dangling, it would have gotten at least one of them," he said. "I'm lucky.

"I knew that it didn't have me," he said, adding that he experienced the "initial shock of the board hitting me in the chest and knocking the wind out of me."

The shark was just out of his reach, and Long said he tried to swim away with his right leg and arm, while trying to shove and kick at the shark with his

INSIDE

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on North Shore

left leg and arm.

"I would have made an attempt at fighting it off," said Long, who started surfing at age 10 and said he knows that the best thing is to fight back if attacked. Instead, Long hopped on his board and paddled back to the beach, escaping without a scratch.

He and another surfer 30 feet away, who witnessed the event, waved to everyone else to get out of the water.

Long, who is in his early 20s, has surfed in Europe, Africa, Australia and the islands of the Pacific and the Atlantic, and he has been fishing and diving most his life. "This is by far the closest encounter I've had with a shark," he said.

Long guesses the shark was a tiger, based on its color — grayish brown with stripes — but didn't get a look at the shape of the body, saying it all happened so quickly.

The report prompted lifeguards to post signs warning of a shark sighting along North Shore beaches from Pipeline to Sunset. The signs were still up at 9 a.m. today. Beaches were never closed, according to the Ocean Safety Division.

The surfer's board was bitten, but the surfer got away unharmed, a state Department of Land and Natural Resources spokeswoman confirmed. A member of the state's shark task force was investigating.

The Associated Press contributed to this report.

1/20/05

COURTESY MAUI POLICE DEPARTMENT

Maui Police Chief Thomas Phillips congratulated Molokai's Carol Beadle yesterday for receiving the Civilian Medal of Valor. Beadle helped to save the life of a shark attack victim last year.

Rescuer honored in diver's shark attack

A Molokai woman gets the highest police medal for civilians

By Gary Kubota
gkubota@starbulletin.com

WAILUKU >> Molokai resident Carol Beadle has been awarded the Maui Police Department's Civilian Medal of Valor for rescuing a diver who was attacked by a shark.

Beadle, 62, a retired Haleakala National Park ranger, received a certificate and the medal yesterday during ceremonies before the Maui County Police Commission.

Beadle, who lives near Kupeke Fishpond in East Molokai, noticed a diver in distress on the afternoon of Oct. 9, then got into her kayak to rescue the man.

The shark had bitten Oahu resident Davy Sanada in the left shoulder and cheek and returned to attack again, forcing him to use his spear to fend the animal off.

Police said Beadle saw Sanada waving one arm in waist-deep water about 500 to 600 feet from shore. She paddled a borrowed kayak to help him, with an extra paddle on board in case she needed to fight off the shark.

Sanada, then 34, slumped over the kayak as Beadle paddled him to a wall of the fishpond. She then went to a neighbor's house to get help.

Police Chief Thomas Phillips said Beadle paddled out to help Sanada despite the rough water and threat to her own safety.

"This is one brave lady," Phillips said. "We believe she saved his life. That's why we wanted to honor her."

He said the medal is the highest award given by the department to a civilian, and no one else has received one in the seven years that he has been the police chief.

Beadle said yesterday that she wanted to get out to the man because she suspected he had been attacked by a shark and might be attacked again. She was afraid he might not make it out of the water.

"I just wanted to get out there. ... He probably would have bled to death," she said.

"This is one brave lady. We believe she saved his life. That's why we wanted to honor her."

Thomas Phillips
Maui police chief

[POLICE / FIRE]

Honolulu Star-Bulletin 2/10/05 A4

Surf photographer dies of sea injuries

A 34-year-old surf photographer died yesterday of head injuries sustained in waters off Ehukai Beach Park, fire and emergency medical service officials said.

Friends identified the victim as Jon Mozo.

Fire officials responded to the park, a main entrance to the popular Pipeline surf break, about 2:05 p.m. Mozo was taken in extremely critical condition to Kahuku Hospital, where he later died.

Mozo, who is well known for his surf photography, had a gallery in Hauula.

He had also photographed CD covers for more than 20 Hawaii musicians and shot advertising photos for a number of local companies, including Ala Moana Center and Bank of Hawaii.

In 1993, Mozo survived a shark attack while surfing near Goat Island. Friends said he was bitten on his legs and confined to a wheelchair for months.

According to his Web site (www.jonmozo.com), Mozo had a wife and four children.

HONOLULU

Police arrest juvenile riding locked mo-ped

Police arrested a juvenile male yesterday after he was seen attempting to ride a mo-ped with its steering locked.

Police said the incident happened at 1010 Pensacola St. about 8:40 a.m.

The suspect, whose age was not disclosed, was released pending an investigation.

Noise-weary neighbor allegedly stabs wall

Police arrested a 33-year-old man after he allegedly threatened his neighbor for making too much noise just after midnight Tuesday.

Both the victim and suspect live in a North King Street apartment building, police said. Police said that about 12:20 a.m. the victim, a 22-year-old woman, was standing at her doorway talking to friends when the suspect punched the wall across from her apartment, then stabbed the wall with a knife.

The victim called police, and the suspect was arrested for investigation of first-degree terroristic threatening.

NEIGHBOR ISLANDS

Mo-ped driver injured in crash with pickup

Maui police said a 17-year-old mo-ped driver ran a red light at Leialii Parkway intersection Tuesday and rammed into a Ford F-150 pickup truck.

The mo-ped's driver, who police identified as Christopher Boskoff, was taken to Maui Memorial Medical Center in critical condition.

The driver of the pickup truck, a 48-year-old man, and his two passengers were uninjured.

Police said the accident happened about 6:08 p.m. when the pickup truck was making a left turn into Wahikuli State Wayside Park on a green arrow.

The mo-ped driver was traveling southbound on Honoapiilani Highway when he ran the red light.

Star-Bulletin staff

WARREN BOLSTER / For The Times

Randy Honebrink, center, of the state task force supervises the measurement of a tiger shark believed responsible for a June 10 attack

SHARKS: Fears Spark Safety Debate

Continued from A1

to hunt sharks only after attacks.

"Quite frankly, I think it is hysteria," says Stanley Hong, 55, president of the Hawaii Visitors Bureau. "Even though there have been some sharks, small ones, sighted close in to Waikiki. . . . Essentially, people sometimes forget that the ocean happens to be a habitat of things that swim."

Marine biologists say there is no way to determine the number of sharks in Hawaiian waters but say there are probably more than before the state's last shark control program in 1976.

Among the region's 40 or so species, eight live near shore and among those only the tiger shark—which can grow to 20 feet or more—is considered extremely dangerous.

The state has removed fewer than 20 large tiger sharks since the first attack of 1992. Free-lance hunters are believed to have taken at least another 30.

"You have more and more people in the water and a huge shark population growing at geometric proportions," said James Jones, 40, a Honolulu resident who became well-known in the early 1970s for his big-wave riding. "We know there are more sharks, more people and more attacks—the facts are indisputable. As far as I'm concerned, to hell with the visitor industry. I don't think that all the sharks in the ocean are worth one human life."

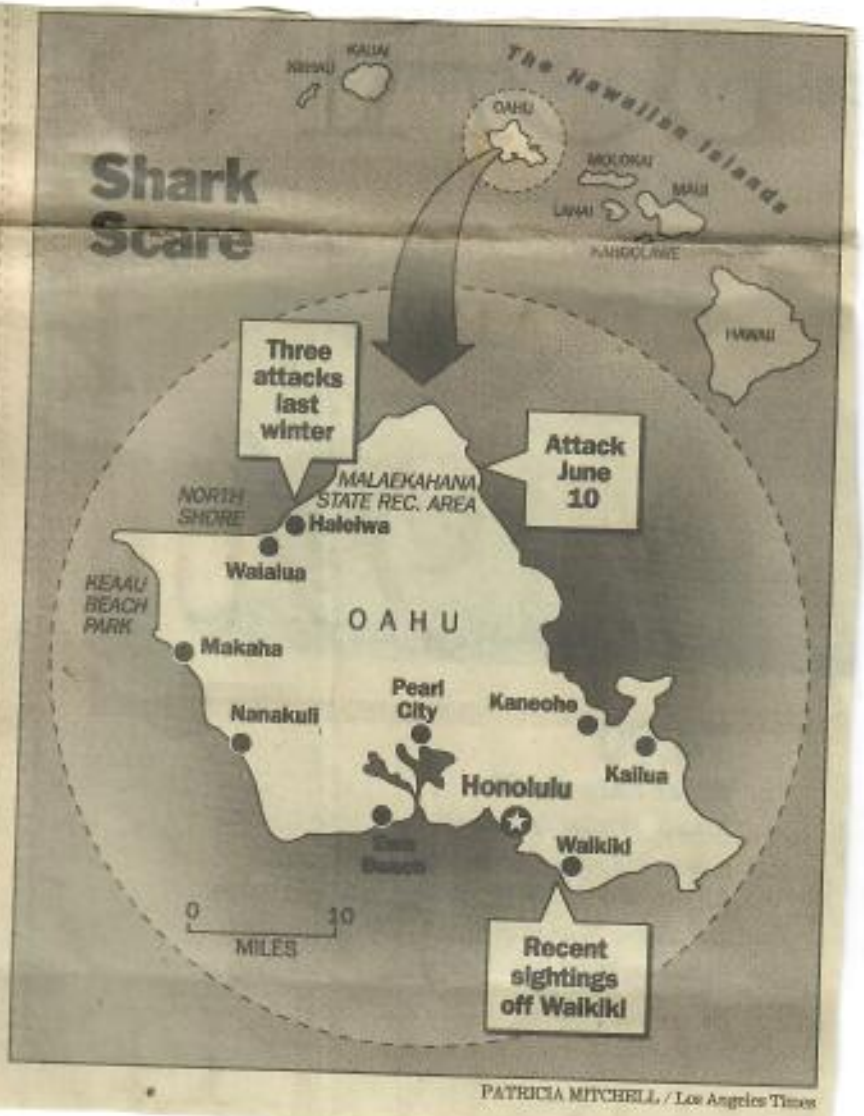
Since the first documented attack in Hawaii in 1779, there have been an average of two or three a year, according to the National Marine Fisheries Service. Most have occurred off Oahu and involve surfers and bodyboarders, who often paddle out hundreds of yards.

Surfers are quick to note that last year there were four conned swells that reached the south shore in early June, another season began. And it didn't take long for the shark issue to surface, more volatile than ever.

On June 10, Jon Mozo, 22, of Laie was surfing off the northeast shore. A tiger shark grabbed him by both feet as he was lying on his board.

"I didn't even have a clue there was even a shark in the water," Mozo said. He was able to pull his feet from the mouth of the shark before it got a grip, but he suffered deep cuts and was briefly hospitalized.

"He shut [his mouth] right after that, and he was just shaking back and forth, and I saw him open his mouth again," Mozo said. "I don't know what happened next because



PATRICIA MITCHELL / Los Angeles Times

firmed attacks—one of them fatal—and a probable attack on a bodyboarder who disappeared and was presumed dead.

In the first attack, Bryan Adona, 29, of Ewa disappeared in February, 1992, while bodyboarding near Waimea Bay on the north shore of Oahu. His board washed ashore the next morning with teeth marks made by what was believed to be a large tiger shark.

A month later, a surfer on the neighboring island of Kauai suffered a small foot wound when a shark bit her surfboard.

These incidents passed without much commotion. But when north swells started breaking over the outer reefs last autumn, marking the beginning of another surfing season on Oahu's north shore, a series of attacks brought tiger sharks back into the spotlight.

In the worst case, Aaron Romento, 18, of Pearl City was bodyboarding off the west side of Oahu on Nov. 5 when he was severely bitten on the right leg by a tiger shark only 30 yards from shore. He died a short time later of loss of blood.

Two other cases, both on the north shore, involved surfers who had crescent-shaped chunks bitten from their boards while they were lying on them. Both suffered only scrapes.

The attacks put Hawaii under pressure from both surfers who wanted hunts and residents who didn't. But the state got a reprieve as winter turned to spring with no further incidents.

However, when winter storms in the Southern Hemisphere generat-

I turned around and I freaked out and paddled away as fast as I could. I never looked back."

Others began to freak out as well. It was summer vacation, and tourism in Waikiki was reaching its peak. Even though there had never been an attack on a tourist, some vacationers were getting edgy. The Honolulu Advertiser carried a story about the attack on Mozo and later there were front-page pictures of a 13-foot tiger shark caught along with a 10-footer by the task force. The 13-footer was believed responsible for the attack. There was almost daily news coverage of dead sharks and of the exploits of vigilantes.

"I've been reading about [the sharks] a little too much to feel comfortable," said Pam Stills, 42, visiting from Arizona with her husband and two children, on the day of the Waikiki hunt. Assured by lifeguards that the water was safe, she reluctantly let her children go in but kept a close watch.

To make matters worse, this was the time of year when scalloped hammerhead sharks—smaller and less dangerous than great hammerheads, and much less dangerous than tiger sharks—filter through the deeper channels between the reefs to spawn, before moving back to deeper water.

Dark shadows moving through a turquoise sea were the last thing swimmers and surfers wanted to see.

"These sharks are minding their own business and not posing a threat to anybody," said Randy Honebrink, a spokesman for the state task force.

Hong of the Visitors Bureau agreed: "The media generally likes to pick these things up and say, 'Shark-infested Waikiki waters,' and it isn't true."

To prove its case, on the night of June 21, the task force dropped 12 hooks on a line secured by anchors that stretched from Kewalo Basin to Ala Wai Harbor near Ala Moana. It was the state's first attempt to catch sharks off Waikiki since December, after the north shore attacks.

When the lone taker was a 5½-foot sandbar shark, officials breathed a huge sigh of relief.

John Naughton, a biologist for the National Marine Fisheries Service and a member of the task force, called the uneventful catch "eventful for us because there was no big tiger shark on the line; that's the last thing we wanted to catch."

Naughton told Honolulu newspapers that "this supports our contention that there are no shark problems in the Waikiki area."

Tourists were also relieved. But many in the surfing community were not. They blasted the state for dismissing after one overnight hunt the possibility of a shark problem that they claimed would warrant periodic hunts to control future threats.

Arthur Kamisugi, 44, is a Honolulu orthodontist and longtime surfer who worked with the task force during a hunt on the north shore last winter. He claimed to have caught seven- and eight-foot tiger sharks off Waikiki in the days leading up to the state hunt.

On the night the task force was setting its hooks off Waikiki, Scott Moncrief, 25, a commercial fisherman who dives along the southeast shore, went hunting off Kailua, about 25 miles away.

The next morning, Moncrief and two companions had their hands full with an 11½-foot tiger shark. The shark came to life when Moncrief grabbed the line, which was shaking with such force that it nearly pulled the bow of Moncrief's 18-foot Boston Whaler under.

Moncrief eventually subdued the shark and towed it back to the beach to prepare it for market.

Moncrief later told Naughton that in two weeks he caught 11 sharks, five of them tigers, two of them 14-footers.

He told a reporter that a 20-foot tiger shark attacked one of the hooked 14-footers while he watched from above.

"Its mouth was as big as the beam of this boat," Moncrief said, holding his arms outstretched at the bow of the Boston Whaler. "He just took one huge bite and ripped the shark's side off. All we got were the fins. We dumped the rest because, basically, there was nothing left."

Fishing for sharks is not illegal, but evidence of such vigilantism suggests a growing discontent with the state and how it is handling the situation.

"What are they waiting for, some politician or some important person to get eaten?" asked Barry Kanaiaupuni, 47, a well-known big-wave rider from the '70s who lives in the hills above Waimea.

That happened in 1958, when 15-year-old Billy Weaver, son of a wealthy businessman, was on an air mattress off Lanikai, Oahu, when a shark bit off his leg in front of a horrified crowd. When his body was recovered two hours later, a tiger shark estimated at 15 to 20 feet was seen nearby.

Jones recalled that Weaver's father offered a bounty of $100 for every tiger shark 10 feet or larger.

"His father owned a big restaurant chain," Jones said. "He had pull, got it done. Every gas station on the island had sharks hanging from the rafters, and then the state took on the program and they fished on a regular basis."

The state effort was responsible for the killing of 697 sharks, only 87 of which were tigers. Since then, there have been smaller

shark control programs, in 1967 and 1968, 1972 and 1976.

"Since 1976, they haven't done any controlled or systematic fishing [for sharks], so you could say that the tiger shark population has rebounded back to almost normal," said Richard Grigg, a big-wave rider in the 1950s and a professor of oceanography at the University of Hawaii. "And you can correlate that with the increase in attacks. It's not just more people in the water; it's definitely more sharks."

Tiger sharks have a life span of about 25 years. They reach reproductive maturity at about 10 years and can produce between 40 and 80 pups. They generally remain in deep water during the day and swim into the shallows at dusk to [during past shark hunts], but we don't know how these sharks emigrate to fill in," Holland said. "With the hunts, you give people a false sense of security because you've got no guarantee that by taking the animals out that you've reduced significantly the risk of shark attack."

The issue had been simmering again until recently when a freelance hunter hauled up a 16-foot tiger shark on the east side of the island. That made the front pages of local newspapers and seemed indicative of a pattern that has no end.

Herb Kane, 65, who lives on the nearby island of Hawaii, has argued against shark hunts on behalf of native Hawaiians, some of

WARREN BOLSTER / For The Times

Commercial fisherman Scott Moncrief, second from left, and his companions bring in an 11½-foot tiger shark caught off Kailua on Oahu.

feed on reef fish, crustaceans and smaller sharks before moving back to deep water before daybreak.

A recent state-sponsored study concluded that reef fish, particularly around Oahu, have declined by about 80% over the years. The lobster fishery has suffered a similar decline.

"It just stands to reason that they're really having a hard time getting enough to eat," Grigg said of the sharks. "So they probably stay around longer in the morning because they haven't got enough to eat during the night, so instead of going back out to deep water, which is their normal behavior, they hang around in shallow water for a longer period of time, and that brings them into direct contact with the dawn patrol."

The dawn patrol is the early-morning surfers. Most attacks on surfers and swimmers have occurred in early morning or late afternoon.

But is hunting sharks the answer?

Dr. Kim Holland, associate researcher at Hawaii's Marine Institute of Oceanography and a consultant for the task force, said too little is known about tiger sharks to suggest that random hunts will decrease the possibility of attacks.

"There were quite a lot taken whom believe that certain sharks have deified ties to their ancestral past. He said it is the surfers, not the sharks, who are becoming too bold, paddling out in areas where sharks are known to feed.

"The answer is simply not to go in those waters," said Kane. "When I was a kid, they drummed in our heads the dos and don'ts regarding sharks: Do not go in the water at dark or very early in the morning because that's when the big guys come up to the shallow water to feed. Do not go into murky water at the mouth of a stream because that's also dark water. There were a number of admonitions that kids today are not getting."

Task force spokesman Honebrink, from his Honolulu branch office of the Department of Land and Natural Resources, said that this being an island-state, there are no real answers. Hawaii can only hope the issue will fade on its own.

He added, however, that it would be naive to believe there won't be more attacks.

"There will be another attack, there's no question about it. I would say there's going to be two more this year, because we're up to an average of about four a year now. It's not a question of if, it's a question of when."

Ginsburg All but Certain to Be Confirmed to High Court Today

WASHINGTON—Senators praised Supreme Court nominee Ruth Bader Ginsburg on Monday as a cautious judge who is unlikely to push an ideological agenda on the high court.

"Judge Ginsburg's judicial record and style mark her as a true consensus candidate" who also understands "what liberty and equality mean," Judiciary Committee Chairman Joseph R. Biden Jr. (D-Del.) told colleagues.

Ginsburg appeared all but certain to win confirmation in the Senate vote scheduled for today. The 60-year-old federal appellate judge and former women's rights advocate is the first high court nominee by a Democratic President in more than a quarter-century. She would replace retired Justice Byron R. White.

—Associated Press

JAN. 28, 1995 HONOLULU STAR-

Shark hunt after attack

BY BRUCE DUNFORD
Associated Press

Large-scale shark-fishing programs to reduce shark attacks don't appear to work, and selective fishing in the area right after an attack may be futile, a University of Hawaii research team says.

In a report to the state Legislature, the Shark Research Committee said that before determining the best method to reduce shark attacks, much more information about shark movements, habits and biology is needed.

It said, however, the concentration should be on tiger sharks, which are believed responsible for several shark attacks in the past few years.

Large local shark species such as the Galapagos and gray reef shark pose less of a threat to humans than the tiger shark because they are infrequently encountered, the researchers said.

The committee recommended the state provide $318,000 for a four-year research program on tiger sharks to learn their movements in Hawaii waters, their reproduction rate and genetic identification to determine migration patterns.

The state spent $300,000 on shark control programs between 1959 and 1976, resulting in the taking of 4,668 sharks at an average cost of $182 per shark, the report said

"A stable tiger shark population over 20 to 30 years illustrates the problem of trying to control a shark population whose biology is not understood," it said.

Attaching acoustic transmitters to tiger sharks to determine patterns in their movements into shallow waters could be used to determine how to reduce con-

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futile, report says

frontations with humans, according to the committee.

The researchers said a current-tracking program found some sharks traveled up to 30 miles in 24 hours after being tagged, suggesting that selective fishing after an attack may be of little use.

Information from limited tagging in shark-control programs in Hawaii have been cited as evidence that tiger sharks are territorial and do not move between the islands, the committee said.

Worldwide studies show, however, tiger sharks make extensive movements of nearly 2,000 miles and tagging studies at several islands would reveal whether they make long-range movements in the Hawaiian chain, it said.

Obtaining genetic samples of tiger sharks in a tag-and-release program could determine if the tiger sharks population around the main Hawaiian islands is separate or continuous with the northwestern end of the chain, it added.

Making up the research team are Kim Holland, Jerry Crow, Brad Wetherbee and Chris Lowe.

To determine the rate at which a tiger shark population could replenish itself following a fishing program, research is needed to determine the size at which a tiger shark reaches maturity, time of mating and pupping, frequency of reproduction and number of offspring, the committee said.

Tiger sharks are top-level predators which keep other animal populations in balance and ecological ramifications of large-scale shark removal are extremely difficult to quantify, the report said.

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Aquatic expert gives shark warning

■ He urges an end to the feeding of fish at the artificial reefs

BY MELISSA VICKERS
Star-Bulletin

Henry Sakuda, former state Aquatics Division director, says feeding fish at an artificial reef off Waikiki could attract sharks.

But legislators and scientists still aren't sure whether it brings sharks too close for comfort.

The House Committee on Ocean Recreation and Marine Resources yesterday considered Sakuda's recommendations to halt all artificial reef placement and fish feeding until more is known.

"It's true, we cannot say that sharks are a threat, but the feeding does bring some in — Atlantis Submarines and our own divers saw that," Sakuda said.

Some people who swim off Waikiki near the wreck making up an artificial reef a mile offshore, said they fear the feeding and reef put them in danger.

Sam Gruber, a professor of marine and atmospheric sciences at Miami University and director of the Bimini Shark Lab, said swimmers and snorkelers should not fear artificial reefs or feeding.

"The types of sharks attracted by feeding activity bringing in schools of reef fish are usually small, like the white-tip or black-tip reef sharks," he said. "They are real pussycats, you'd pretty much have to stick your arm in their mouth to get bit."

Atlantis stopped feeding fish in 1992, except during the state study last year, after a fatal attack on the Leeward side prompted shark hunts and other efforts.

"The legislators need to look at what the fish do when they're being fed, because that's what bothers me," Sakuda said. If you allow more people, and many want permission, to create reefs off Waikiki and feed fish, you will attract a population of fish that cannot be supported in that small of an area."

Chris Lowe, a graduate student studying shark biology at the University of Hawaii, said he agrees with the conclusions of the state study suggesting artificial reefs and fish feeding be banned until more studies are done. "There should be a study of what effect the artificial reef that's already there will have on the area, and that could take years," Lowe said.

Honolulu Star Bulletin

> *"It's true, we cannot say that sharks are a threat, but the feeding does bring some in — Atlantis Submarines and our own divers saw that."*
>
> **Henry Sakuda**
> Former director, state Aquatics Division

Shark control isn't working, says UH panel; study urged

By Bruce Dunford
Associated Press

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In a report to the Legislature, the Shark Research Committee said that before determining the best method to reduce shark attacks much more information about shark movements, habits and biology is needed.

It said, however, the concentration should be on tiger sharks, which are believed responsible for several widely-publicized shark attacks in the past few years.

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"A stable tiger shark population over 20 to 30 years illustrates the problem of trying to control a shark population whose biology is not understood," it said.

Attaching acoustic transmitters to tiger sharks to determine patterns in their movements into shallow waters could be used to determine how to reduce confrontations with humans, according to the committee.

The researchers said a current tracking program found some sharks traveled up to 30 miles in 24 hours after being tagged, suggesting that selective fishing after an attack may be of little use.

Information from limited tagging in shark-control programs in Hawaii has been cited as evidence that tiger sharks are territorial and do not move between the Islands, the committee said.

However, worldwide studies show tiger sharks make extensive movements of nearly 2,000 miles and tagging studies at several islands would reveal whether they make long-range movements in the Hawaiian chain, it said.

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Warnings up at beach with sharks

BY GARY T. KUBOTA
Maui correspondent

KIHEI — Federal officials today were warning swimmers away from shark-infested waters off a mile-long stretch of shoreline in Kihei where a 45-foot humpback whale was killed by tiger sharks yesterday. They urged people to stay out of the water for the next 24 hours.

"We've had some very serious attacks on humans associated with whale carcasses," said John Naughton, National Marine Fisheries Service biologist. "The juices coming out of this animal are enough to attract sharks from a considerable distance."

At least eight large tiger sharks were seen last night at sunset feeding on the carcass in about 50 feet of water off Halama Street. Several were also seen this morning.

Officials say the whale, an endangered species, got entangled in lines of some kind. They today were trying to determine if they were anchor lines or fishing gear.

The whale freed itself with help from Coast Guard divers, who cut the ropes. But it was too weak to fight off the sharks.

"It really didn't look healthy," said Allen Tom, program specialist for the federal humpback whale sanctuary in Hawaii. "You could see cord and a kind of netting wrapped around the fluke."

It was the second time in two weeks that an endangered humpback whale had run into trouble in Maui waters.

Federal officials are investigating a collision last week between the Americas II sailboat and a humpback whale.

Yesterday, Tom said he saw four to five tiger sharks feeding on the whale about 50 feet offshore near Halama Street in Kihei at about 3 p.m. He said residents were horrified as they watched the whale being eaten alive.

The whale was still entangled in a cable and thick netting, he said.

"Maybe this will galvanize support for people to do something about marine debris," Tom said.

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"This is one of the reasons why we need a humpback whale sanctuary."

Hannah Bernard
Ocean Mammal Institute, a research and educational group on Maui

BY GARY KUBOTA, Star-Bulletin

Federal and state officials inspect a humpback whale killed by tiger sharks in waters off Kihei, Maui yesterday. A tug boat later towed the whale's carcass to a channel between Maui and Lanai.

Humans had role in death of whale off Maui beach

■ The humpback was tangled in ropes before tiger sharks attacked it

BY GARY T. KUBOTA
Maui correspondent

KIHEI, Maui — When Coast Guard Petty Officers Elvin Kamoku and John Kidwell dived into Maui waters to rescue a humpback whale, they found it tangled in a mass of ropes.

"That's how the whale got stuck under there," Kamoku said. "There were too many lines."

Kidwell and Kamoku cut the lines attached to a boat off Sugar Beach at about 11:24 a.m. Wednesday. The whale swam south for several miles before being attacked and killed by tiger sharks.

Yesterday a tug pulled the huge carcass off a south Maui beach and released it in a channel between Maui and Lanai.

The dead whale, about 36 feet long, may have been about two years old, said Eugene Nitta, an official with the National Marine Fisheries Service.

"This is one of the reasons why we need a humpback whale sanctuary," said Hannah Bernard, an official with the Ocean Mammal Institute, a research and educational group on Maui.

Environmentalists say they hope the death will lead to better rules to protect the endangered species.

But they aren't optimistic, noting the trend in Congress away from government regulation of private activities.

The divers found yellow plastic rope and another unidentified type of rope wrapped around the whale. It wasn't known where the ropes came from or what they were used for.

Nitta said one of the ropes appeared to have been on the whale for a while.

Meanwhile, marine enforcement officials are receiving increasing numbers of complaints of whale harassment.

Many of the alleged perpetrators are kayakers and wind surfers, said Scott Yamashita, a federal enforcement supervisor.

More than 35 complaints have been registered in the first two months of this year, about halfway through the winter whale season.

A total of 47 were received by the federal agency last season.

Greg Kaufman, president of the Pacific Whale Foundation, said speed limits should be set in waters frequented by the visiting whales during whale season, from December through May.

While thrill crafts are banned from these areas during the season, boats and wind surfers are still allowed to race across the water.

Under federal law, vessels are supposed to stay at least 100 yards away from a humpback, but speeding makes stopping difficult when a whale suddenly appears, Kaufman said.

Some researchers believe humpback whales have made a slight recovery in the last 15 years, increasing from 2,000 to 3,000 in the northern Pacific.

But they point out the estimates remain unconfirmed and are still considerably below the 15,000 that once roamed the region.

Environmentalists have criticized the state for supporting boating activity rather than preserving a habitat for the humpback whales, especially in Maalaea Bay.

The state has backed a plan to expand Maalaea Harbor and allowed moorings to be unregulated at nearby Sugar Beach.

Federal officials have no plans to change any ocean rules in Hawaii, if they establish the Hawaiian Islands Humpback Whale National Marine Sanctuary.

Allen Tom, the sanctuary's program specialist, said all existing rules and laws will be allowed to continue.

"Our focus is on educating the public," he said.

Reprinted from "H30 Hawaiian Surfing Magazine" March 1993.

Sharks and Turtles

by
George H. Balazs
Deputy Chairman
Marine Turtle Specialist Group
International Union for the Conservation of Nature

My compliments to your environmental writer, Mindy Foster, for reporting factual instead of fantasy information regarding sea turtles and tiger sharks ("The Shark Factor" 2/93). Few people in the news media seem to be doing so these days. Mindy rightfully pointed out that "There is no hard evidence that the increased turtle population is the cause of increased (shark) sightings and attacks". I agree. There is no evidence whatsoever, beyond idle speculation. And, strangely enough, in some cases the speculators are persons interested in "solving" the shark problem by hunting and killing sea turtles.

In the first place, while more turtles are indeed being seen now, compared to say 15 years ago, the increase is not anywhere near as great as some would like us to believe. In addition, such sightings need to be viewed in their proper perspective. That is, turtles are highly visible creatures that must come to the surface every so often to breathe. Once there, they are easy to spot, even when you're not looking for them. A dozen turtles in an area, breathing once every 5 to 15 minutes, can give the deceptive impression of abundance well beyond the numbers actually present. In contrast, a dozen fish, crabs, or octopus spread out over the same area won't even be noticed unless you're intentionally searching underwater for them. You don't have to search hard to spot a sea turtle, even if there are only a few in the area where you're surfing.

Some people have also gotten the flawed impression that turtles are the overwhelming, if not exclusive, food item in the tiger shark's diet. But that's simply not the case. It is a biological fact that tiger sharks eat a wide variety of prey, more so than any other species of shark. For example, in a 2-year study conducted by the University of Hawaii, tiger sharks in Hawaiian waters were found to prey upon the following items (in descending order of percent sharks containing these items): fish; crabs and lobsters; garbage (often floating garbage); birds; sharks and rays; squid and octopus; turtles; porpoise and whales; and humans.

Even though the tiger shark preys on numerous items, turtles are nevertheless frequently overestimated in their diet by people (even some scientists) cutting them open to see what they eat. This happens because the tiger shark's digestive tract functions in such a way that only mushy material-- that is, the broken-down

remains of prey items subjected to strong stomach acid-- can pass out of the stomach into the intestines. Objects of any size that can't be decomposed in the stomach are retained there for an unknown but likely long period of time before being regurgitated. The outer surfaces of a sea turtle, especially the plates of the shell, are made of a tough keratin-like substance that is totally resistant to decomposition in the stomach. Consequently these large and clearly recognizable items from a turtle are held in the stomach, while the rest of the animal including meat, bones and all else is digested. The protective plates and scales covering the turtle also lengthen the total amount of time needed to digest the rest of the body, since turtles up to 50 lbs can be swallowed whole. In sharp contrast, soft bodied prey items, with far fewer and smaller indigestible parts, digest faster and can be easily overlooked and underestimated in stomach contents. These factor working together give an erroneous and biased picture of the dietary makeup of the tiger shark when viewed by persons who are unaware of the biological facts I have just described. Yes, of course, turtles are a part of the tiger shark's diet. But a very complex situation exists whereby many sorts of things are eaten under varying feeding rates, and then digested over different periods of time. No one really knows how often tiger shark's feed, how long it takes to digest each of their prey items, and how often they regurgitate items like turtle parts that can't be digested.

Some people have also speculated that attacks on surfers by tiger sharks are the result of "mistaken identity" for sea turtles. Again, there is no credible information to support such an idea. The theory by some scientists that great white sharks mistake surfers for seals off California simply can't be logically transposed to tiger sharks and turtles in Hawaii. In California a surfer is suppose to look like a seal floating at the surface. Copying that same theme, in Hawaii a surfer is purported by the news media to look like a turtle floating at the surface. Obviously both cases can't be correct, since a sea turtle bears no resemblance to a seal. Does a surfer on a 6-to-8 foot long narrow surfboard look like your average 2-foot oval sea turtle? Of course not. But maybe this is like looking at an inkblot. If you stare at it long enough you can start to see all sorts of things. And maybe that's what some people are doing when they make such faulty comparisons.

The fact is that tiger sharks don't have to "mistake" anything floating at the surface in order to strike, bite, or eat it. Taking things at the surface is a natural part of the tiger shark's known feeding strategy. Jean-Michel Cousteau summarized this situation correctly when interviewed a year ago, following the death of a swimmer attacked and devoured by a large shark off Olowalu on Maui. Cousteau said, "Tiger sharks are particularly dangerous to swimmers. Some sharks are more fussy than others about what they eat. Tiger sharks are known to eat almost anything and everything, and ..are more likely to attack anything

on the surface whether it's a piece of wood, a surfboard, a boat, or a bird".

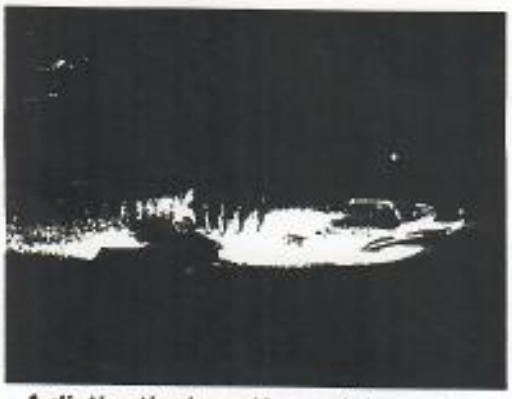
Recent attacks in Hawaii on surfers have taken place during daylight hours in reasonably clean, clear water. It's hard to imagine that the sharks involved mistook their victims for anything else than an object at the surface that was potentially edible. A few months ago there was even an eye-witness account (with photos) of a 2000 lb bull swimming in waters off Maui being attacked by tiger sharks (see Hawaii Fishing News, 12/92). Did the sharks "mistake" this bull for a sea turtle? Perhaps, but only if they had been staring at inkblots for too long!

Interestingly, the "mistaken identity" idea fits quite comfortably with those people who, due to their sincere convictions, for one reason or another are opposed to fishing for tiger sharks in Hawaiian waters. The logic would be as follows: If a shark really didn't mean to bite a human,-- that is, it was "just a big mistake", -- then the news media and public at large might be more inclined to have greater understanding and tolerance of attacks in Hawaii.

It is my responsibility, as a member of the IUCN Marine Turtle Specialist Group, to make sure that turtles don't get a bum rap as the result of groundless speculation, intentional bias, or flawed scientific reasoning. I've spent 20 years in the Hawaiian Islands dedicated to studying Hawaiian sea turtles. There's a lot known, but still much to be learned. Factual information, not emotions, must prevail. Some people are very emotional over the issue of fishing for sharks. Others may be overly concerned with the risk of shark attack in Hawaii. One thing for certain is that the current status of sharks here in Hawaii is very different from the east coast of the United States, where some populations are seriously depleted from commercial fishing.

Hawaii's sea turtles have long been considered the surfer's friend--rugged and skilled ocean animals that eat marine vegetation and pose no threat to humans. Tiger sharks, **not** turtles, have been attacking surfers. Recently an authority on Hawaiian sharks was quoted in Surfing Magazine saying, "In the sixties and seventies the state (of Hawaii) had a shark eradication program to control the population of potentially dangerous sharks. But there's been nothing done in the last twenty years, so the tiger population right now should really be at a peak". This statement certainly makes sense, considering that tiger sharks are apex predators that have no natural enemies of their own, except for other larger sharks. As a nearshore species roaming the reef edge in search of food, it would seem perfectly reasonable to expect a "peak" in the tiger shark population after 20 years of virtually no fishing. And that would even hold true for places where there are no turtles at all for tiger shark s to include in their diet.

Yes, sea turtles can still be considered the surfer's friend. Because if the turtles weren't out there now making themselves available as a food item, that "peak" population of sharks would simply turn to something else to eat. And that "something else" might be greater numbers of "someone else" out there surfing or swimming.



***A distinctively-patterned** tiger shark.*

THE CURIOUS EATING HABITS OF TIGER SHARKS

The tiger shark is one of three species most frequently named as being responsible for attacks on humans. Voracious eaters, they will swallow almost anything they encounter in the sea. At various times the stomachs of captured specimens have been found to contain an astonishing variety of objects including: a coil of copper wire, nuts, bolts, lumps of coal, boat cushions, clothing, a tom-tom, an unopened can of salmon, driftwood, birds, other sharks, seals and the head of a crocodile.

Sharks can regurgitate the contents of their stomachs at will, and some can apparently store food undigested. Sir Edward Hallstom, honorary director of Sydney's Taronga Park Zoo, once observed this phenomenon in a tiger shark that lived for a month at the zoo in 1950. On two occasions during its captivity the shark was fed on horse meat which it regurgitated. After it died the shark's stomach was cut open and was found to contain two undigested dolphins, eaten before its capture.

3:30 p.m.
Nov. 20th, 1993

Mr. Balazs,

My name is Kapono Kanoho, and I am a ninth grader currently at Aiea High School. I, along with the rest of my fellow Honors English + Social Studies classmates are currently working on a special Geography contest sponsored by American Express. We each have chosen a topic regarding three facets of Geography; The Enviroment, Travel and Trade, or Cultural Diversity. My chosen topic is 'Shark Attacks' (Recent attacks, their causes, and possible solutions.) I have made several trips to the library, and your name has come up, along with a couple of your books. I was hoping that you might have some information or tips regarding my subject. Also, I would appreciate an idea of how I might be able to focus on one certain aspect of Shark attacks in Hawaii, as we are required to turn in a First draft of our report on Dec. 17, 1993. If I were to tackle the whole topic of Shark attacks, my time would be shortlived. Any information or tips would be greatly appreciated.

Sincerely,
Kapono Kanoho

47-201B
Hui Akikiki Pl.
Kaneohe, HI
96744

#239-6411

Preliminary Analysis of Data from Australian Waters

In: SHARKS: BIOLOGY AND FISHERIES. 1992. Edited by J. Pepperell
CSIRO Australia

J.G. West

Taronga Zoo, P.O. Box 20, Mosman, 2088.

Abstract

This paper presents a preliminary analysis of selected data from the Australian Shark Attack File as of 14 February 1991. The Australian Shark Attack File is held at Taronga Zoo Aquarium. It is associated with the International Shark Attack File which is coordinated by the American Elasmobranch Society. The ASAF was initiated in 1985 and is supported by Taronga Zoo as part of Taronga's Marine Biology program. Criteria for inclusion into the file is any human/shark interaction where injury occurs to a human (alive), the equipment worn or held is damaged or where imminent contact is averted by diversionary action by the victim or others where no injury to the human occurred. Initial data has been compiled from a variety of sources including Coppleson, Whitley, the International Shark Attack File, Green and ASAF research. As of 14 February 1991 there have been 471 recorded cases from Australian waters of which 184 have been fatal.

Introduction

The Australian Shark Attack File (ASAF) is held at Taronga Zoo Aquarium. It is associated with the International Shark Attack File which is coordinated by the American Elasmobranch Society.

The ASAF was initiated as a research project in 1985 and is supported by Taronga Zoo as part of its Marine Biology program, and is aimed at understanding and documenting the biology and behaviours of aquatic animals in captivity and in the wild.

Initial data was compiled from a variety of sources including Coppleson (1958), Whitley (unpublished), Baldridge (1974), Gilbert (1973), Green (1976), the International Shark Attack File and ASAF research. The ASAF data is continually researched, cross-checked and updated. Figures stated for case numbers or fatalities will change as new attacks occur or come to light, or where information initially recorded is found to be incorrect or does not fit the stated Criteria for Inclusion.

It must be clearly stated that the goal of this paper is to supply data that answers the most commonly asked questions about Australian shark attacks. There are no interpretations offered as to shark behaviour in this paper. It does not constitute a full analysis of the data recorded, only a summary of selected available data.

At this stage of development of the ASAF, the majority of the 102 computer fields per case history are incomplete and require continued research and updating before meaningful analysis can reveal relationships between a host of factors and shark attacks on humans.

The information held is confidential and access by anyone other than the ASAF researchers is restricted. Applications to utilise the data for *bona fide* research projects will be given serious consideration.

Materials and Methods

The ASAF is held on a sponsored 286 (DOS) Computer. The program was designed around the DBXL (Dbase III clone) and written in 'Clipper' computer language.

There are 102 fields of information available on each record which include details of the victim's name, age and sex, date of attack, time of attack, time in water, awareness of shark, whether victim was fishing, skin colour, activities in water, diversionary action by victim, effects of diversionary action, provocative acts by human, attractants, injuries resulting from attack, type of wounds inflicted, recovery of victim, description of clothes, description of diving gear, protective devices used, effects of weapons.

Details on the shark include, number, size, species, common name, was shark in captivity, was shark captured, object of the attack, remains of humans in shark, teeth left in humans wounds, other animals present. Details on the shark's behaviour include behaviour prior to, initially, during and after the attack.

Details of the site of the attack include, site description, shallow water, location name, State, latitude and longitude, depth of attack, distance from shore, air and water temperatures, sea conditions, weather conditions, sunlight conditions, artificial light involved, tide, distance to kelp and the shore and total water depth.

Also included are details on activities of the witnesses and rescuers including fishing activities, people closer than 3m, 3-15m, more than 15m from attack, diversionary actions by others, effects of diversionary actions, fate of rescuers. Other details cover data source, location of files, preparation lag time, photographs, authenticity and all references to the case.

Data notification and retrieval methods for information on current reports of attacks include access to a national newsclipping service, radio, television and printed media reports, network of personal and professional contacts throughout Australia, public contact resulting from radio, television and newspaper interviews about the ASAF and literature searches of newspaper archives and libraries.

Data Assimilation Program

At the time of writing, (14 February 1991), during the period 1791 to 1991, there have been 471 cases of shark encounters reported from Australian waters, of which 184 were fatal. Because of the quality of information from earlier reports (1791 through to the 1950s) some questions at times had to be answered from available information.

Cases have been assigned codes which accurately reflect the data as it exists in the available records. For example, where a victim's sex was not noted in the information it

would be extrapolated from the first name, or references to 'he' or 'she' statements within the available information. Where extrapolation could not reveal information, an 'Unknown' code is assigned.

For all recorded cases the minimum initial data used to open a case record includes name, sex, location, State, recovery, contact information and references. Since 1985, on hearing of an incident, contact is usually made by phone with the victim, witnesses or hospital and an ASAF questionnaire is sent to the relevant persons. Records previous to 1985 were followed up via literature searches through libraries, museums, media archives, books, etc. Where contact is made with victims and witnesses of incidents, an ASAF questionnaire is sent to them. The case record is then completed or updated with the return of the questionnaire.

During the research there have been adjustments to the number of recorded cases and the resulting fatalities. These adjustments resulted from initial records from various sources having the same case recorded with different attack dates, names spelt differently, recorded as fatal when in fact they recovered, or did not fulfill the Criteria for Inclusion.

The Aims and Objectives of the Shark Attack File

1. To chronicle all known information on shark attacks from Australian waters past, present and future.
2. To provide source material for study to help identify the common factors relating to the causes of attacks on humans.
3. To provide information held on file for public education, awareness and for publication by the media.
4. To publish information resulting from analysis of the acquired data.

Criteria for Inclusion

Any human/shark interaction where injury occurs to a human, being alive at the time of the attack, the equipment worn or held is damaged (including surfboards and kayaks) or where imminent contact is averted by diversionary action by the victim or others (no injury to the human occurred).

Data on incidents that do not meet the stated criteria (e.g. reported attacks on boats, dead bodies, animals, etc) are not entered on the ASAF but are filed separately for future review.

Terminology

The term "ATTACK" refers to all encounters recorded on the ASAF whether contact is made, or not, with the human (as per Criteria for Inclusion). The term also includes provoked incidents (capturing, grabbing, spearing shark or other fish) and unprovoked encounters and encounters with sharks which are in captivity (bitten during feeding or capture, etc).

Results

The earliest recorded Australian shark attack was in 1791, the victim being a native female on the north coast of N.S.W. The attack was fatal.

As of 14 February 1991 there have been 471 recorded cases of shark attack (as per Criteria of Inclusion) from Australian waters of which 184 have been fatal.

Table 1. Sex of victims

Males	437 cases (92.8%)
Females	34 cases (7.2%)
Ratio M:F	13.8 : 1

Table 2. Attacks by State

State	Total attacks	Total fatal	Last fatal attack
NSW	185	76	1982 Byron Bay.
Qld	178	69	1990 Off Townsville.
Vic	19	7	1977 Mornington Penn.
SA	27	14	1989 Waitpinga Beach.
WA	36	7	1967 Jurien Bay.
NT	10	3	1938 Bathurst Island.
Tas	16	8	1982 South Cape Bay.
Total	471	184 (as of 14.2.1991.)	

Table 3. Attacks in NSW since 1937 by time period

Year	Cases recorded	Fatalities
1937-1946	25	9
1947-1956	20	8
1957-1966	29	3
1967-1976	16	0
1977-1986	7	1
>1987	6	0
Total	103	21

Table 4. Attacks in QLD since 1937 by time period

Year	Cases recorded	Fatalities
1937-1946	25	14
1947-1956	17	8
1957-1966	19	5
1967-1976	17	2
1977-1986	17	6
>1987	16	3
Total	111	38

Table 5. Fatalities by State, 1917 - 1991

Year	NSW	Qld	Vic	SA	WA	NT	Tas	Total
<1917	26	5	1	2	1	0	4	39
1917-36	29	26	3	2	3	2	1	66
1937-56	17	22	1	1	1	1	0	43
1957-76	3	7	1	6	2	0	2	21
>1977	1	9	1	3	0	0	1	15
Total	76	69	7	14	7	3	8	184

Table 6. Recorded activities of victims

Activity	Cases	Fatalities
Unknown	318	140
Scuba diving	9	3
Spearfishing	30	3
Snorkelling/Skindiving/ Pearl diving	13	5
Swimming	42	2
Surf board riding/Surf ski/ Blow-up mattress	31	0
Fishing from beach/Boat/ Kayak/Prawning	13	0
Clinging to wreckage	6	5
Standing in shallow water	3	0
Rescuer	1	0
Feeding captive sharks	60	
Total	471	184

Table 7. Shark species positively identified

Species	Cases	Fatalities
Whalers (General)	23	8
Great White Shark	20	10
Tiger Shark	19	9
Wobbegong	13	0
Grey Nurse	4	0
Hammerhead	3	0
Unknown	389	157

Table 8. Time of day of attacks

Time	Recorded cases	Fatalities
1 - 2 am	0	0
2 - 3 am	0	0
3 - 4 am	0	0
4 - 5 am	1	1
5 - 6 am	0	0
6 - 7 am	3	1
7 - 8 am	5	0
8 - 9 am	2	1
9 - 10 am	2	0
10 - 11 am	1	0
11 - 12 am	5	2
12 - 1 pm	6	2
1 - 2 pm	6	3
2 - 3 pm	8	2
3 - 4 pm	8	5
4 - 5 pm	13	7
5 - 6 pm	5	2
6 - 7 pm	3	1
7 - 8 pm	2	1
8 - 9 pm	2	1
9 - 10 pm	1	0
10 - 11 pm	0	0
11 - 12 pm	0	0
Total	73	29

Shark Fatalities in Perspective

The following statistics illustrate the number of deaths associated with water related activities in general for New South Wales.

Table 9. Deaths associated with water-related activities, NSW. Data supplied by the Australian Bureau of Statistics.

Year	Accidental drowning & submersion: Total	Surfboard Riding	Rock Fishing	Skin Diving	Fell or wandered into water
1984	124 of which	2	4	2	17
1985	140 " "	5	4	4	30
1986	129 " "	1	6	3	6
Total	393	8	14	9	53

Eleven Australians were killed by lightning in the years 1983 to 1986. (Sedgwick 1990) while 4 deaths occurred in the same period due to shark attack Australia wide. On average, there are 2-3 deaths per year from bee stings in Australia (Dr van Nunen, Royal North Shore Hospital Allergy Unit. Manly Daily, Feb 3 1989). Diving related deaths in Australia, 1945-1987 = 292 (from Diving Accident Management in Australia 1988). On average, less than one person per year is killed by shark attack in Australia.

Discussion

Shark attacks will persist as humans continue to enter the habitat of the shark for recreational pursuits or economic necessity. While the motivation for unprovoked attacks by sharks on humans is not yet clear, there are indications that, in the majority of cases recorded, feeding behaviour is not considered to be applicable.

The statistics do indicate that even with the increasing population in Australia using the water, there has been a marked decline in recorded attacks and fatalities caused by sharks. This decrease is indicated even though there has been an increase in water related activities away from protected (meshed) areas around major city beaches (Sydney, Brisbane).

Since its inception, the ASAF has been widely utilised by the printed and electronic media and by Government Departments and agencies as a source of up-to-date, valid information on known instances of shark attacks on humans. It has helped to keep the issue of sharks and attacks in its proper perspective. The ASAF has led to changes in community attitudes and has the potential to assist in attack management strategies in the future.

Acknowledgements

I would like to thank the Zoological Parks Board of NSW for their support of the file, The Director and Chief Executive, Dr John Kelly for his encouragement, and Mr Mark Wilson, who worked long hours on a voluntary basis assisting me with research. Thanks also to the sponsors of the computer equipment 'Star Micronics' Pty Ltd and Mr Peter Rich of PR & MR Enterprises for writing the program, Dr David Baldridge Captain, United States Navy (Retired) for his permission to utilise the raw data from the Analytical Data on Shark Attacks (1988) and The Australian Museum for allowing access to unpublished data from the Gilbert Whitley archives held at the Museum.

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October 28, 1993

George Burgess
Florida Museum of Natural History
University of Florida
Gainesville, FL 32611

Dear George:

As we have discussed a number of times, I have re-appointed you Chairman of the 1993-94 Shark Attack File Committee, a standing committee of the AES appointed by the President. As the curator vested with custody of the International Shark Attack File (ISAF) files, you are automatically designated Chairman of this committee according to the AES By-Laws. This appointment extends from June 1993 to June 1994. Further appointments beyond next year's annual meeting will be the responsibility of President-Elect Don Nelson.

At the 1993 AES meeting, we agreed on the following membership for the 1993-94 Shark Attack File Committee: George Burgess, University of Florida (Chairman, curator of the ISAF files, and U.S. east coast representative); Bob Lea, California Fish and Game (west coast rep.); Ralph Collier, Van Nuys CA (west coast rep.); George Balazs, National Marine Fisheries Service/Honolulu (Hawaii rep.); John West, Taronga Zoo & Aquarium (Australia rep.); Geremy Cliff, Natal Sharks Board (South Africa rep.); Bernie Zahuranec, Office of Naval Research (at-large member); Victor Springer, Smithsonian Institution (at-large member); and Dave Baldridge, Sarasota FL (at-large member). These members are being reminded of their membership in this committee by way of copy of this letter.

As called for in the AES By-Laws, the Shark Attack File Committee's task is to manage the ISAF including, but not limited to, compilation and distribution of information contained within the ISAF, under the guidelines established by the AES Board of Directors. Until detailed, written guidelines are established by the Board, any actions of a significant or final nature should be reviewed first by the AES Executive Committee. Further review of such actions by the Board should be made through communication with the Executive Committee.

Thank you for your hard work over the years in chairing this important committee of the AES.

Cordially,

Robert E. Hueter, Ph.D.
President, American Elasmobranch Society
Director, MML Center for Shark Research

xc: D. Nelson
J. Carrier
B. Lea
R. Collier
G. Balazs
J. West
G. Cliff
B. Zahuranec
V. Springer
D. Baldridge

Metropolitan Digest

LOS ANGELES COUNTY NEWS IN BRIEF

The Great White Shark: Threatened Species?

Last week, Gov. Pete Wilson signed a bill by state Assemblyman Dan Hauser (D-Arcata) to prohibit the killing of great white sharks except under specific circumstances, such as for scientific or educational purposes. Exact statistics are unknown, but some experts believe that the population of great white sharks has been reduced significantly in recent years. Anecdotal reports, however, seem to indicate an increase in sightings of great whites—perhaps attributable to an increase in the populations of many marine mammals, a primary food source for sharks. Thirty-six shark species can be found off California, from the foot-long pygmy shark to the 50-foot whale shark, an infrequent visitor and the world's largest fish. Most attacks involve the great white. Here is a look at the species and some tips for avoiding contact:

Anatomy

- Huge optic nerves give it excellent vision.
- Water flowing through the nostrils allows detection of even very faint odors.
- A "sixth sense" provided by an elaborate system of sensory tubes inside the snout—known as the ampullae of Lorenzini—can detect electrical signals from objects in the water.
- Unlike other fish, it cannot pump water over its gills, relying instead on constant swimming to force water through the mouth and over the gills.
- Large jaws hold several rows of extremely sharp, triangular and slightly serrated teeth. When striking, the jaws extrude. The biting force is estimated to be several thousand pounds per square inch, enough to bite through a surfer and a surfboard. Open jaw size for an adult great white ranges from 2 ½ to 3 feet.
- Its torpedo-shaped body can grow to a length of more than 20 feet. Gray on top and white underneath, it is cartalaginous, having no bony skeletal structure.

Behavior

Shark Attacks

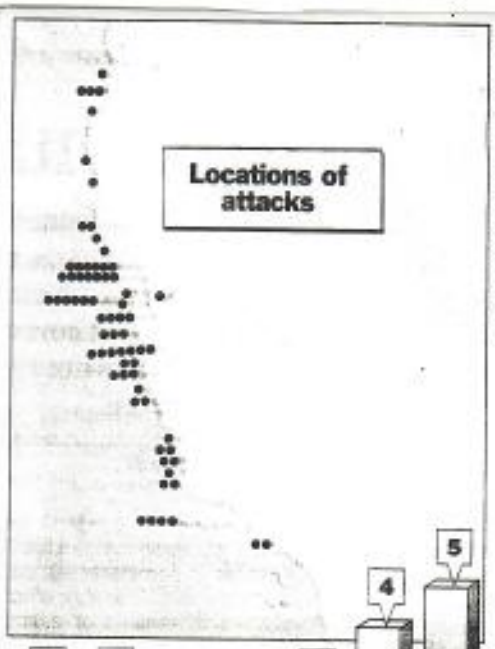
In August, a great white rammed a fishing boat off Santa Cruz Island, one of the Channel Islands. Sharks do bump or attack boats, but not in the manner portrayed in the movie "Jaws." The undersides of boats often have a small electrical field, which a shark may sense through the ampullae of Lorenzini and misread as a living organism. Sharks avoid strong electrical fields, a fact that researchers hope to use in helping people ward off attacks.

Food

Generally feeds on large prey, including fish, seals, sea lions, sometimes other sharks and other marine animals. Other things reportedly found in the stomachs of sharks: a man in a full suit of armor, license plates, and pieces of land animals ranging from horses to buffaloes to elephants.

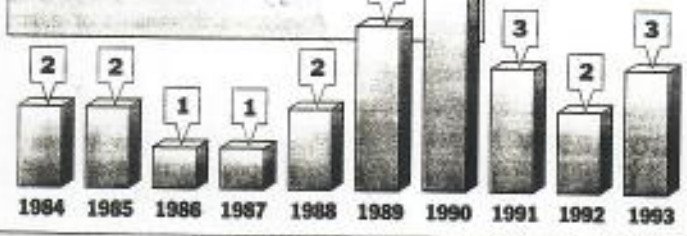
Steps Toward Protection

Sharks, which bear very few young in comparison to other fish, are extremely vulnerable to overfishing. Assembly Bill 522 would prohibit most commercial and recreational fishing of great white sharks. It would specifically ban severing the pelvic fin from a shark that is caught accidentally unless it is brought ashore—a provision aimed at halting the killing of sharks solely for souvenirs or shark-fin soup.



Since 1926, great white sharks are suspected in a total of 69 attacks on humans in California waters, including three non-fatal attacks in 1993, all in Northern California. Seven of the 69 attacks were fatal.

Recorded attacks by great white sharks in California



Safe Swimming Rules

1. Never swim, surf or dive alone.
2. Never swim with an open wound or near fishing areas. Blood may attract sharks.
3. Never swim at night or in murky water.
4. Leave the water immediately if a shark is sighted. Swim as smoothly as possible; thrashing movements may attract a shark.

5. Never grab or injure any shark, no matter how small.
6. Avoid places with a history of shark attacks.
7. Stay away from areas where marine mammals enter and leave the water. Sharks may be attracted to these areas.
8. If you do see animals rapidly leaving the water, this may be an indication that a shark is in the area.

Sources: John McCosker, California Academy of Sciences, Steinhart Aquarium, San Francisco; World Book Encyclopedia

Researched by NONA YATES

PATRICIA MITCHELL / Los Angeles Times

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Wednesday, November 10, 1993

George Balazs
N M F S Honolulu Lab
2570 Dole Street
Honolulu, HI 96822-2396

I just received six copies of the *Sharks* book. Here is a copy for you. I will send you more when the larger shipment arrives. Also, when you want to buy more, I can get you the author's 40% discount, but I bet you can make the same arrangement directly with UH Press because your name is on the title page.

I hope you are pleased with it. Someday, I hope to do a book where I have control over the design. Some of these colors are different than I would have chosen. All in all, I think the book turned out very well, in large part due to your excellent work. Thank you very much!

Sincerely,

Leighton Taylor

P.O. Box 1417 Sausalito, California 94966 415/331-3474 FAX 415/331-2239

HAWAII
Saturday, November 13, 1993 ■ Star-Bulletin •

■ Kailua mc
■ Hula fest
■ Board to

Kauai man survives attack by 12-foot shark

☐ The state hasn't decided whether to hunt for the shark

By Lester Chang
Kauai correspondent

WAILUA BAY, Kauai — As David Silva waited for a wave off Wailua Beach yesterday a 12-foot shark clamped its jaws around his surfboard and left leg.

The 31-year-old Kapaa resident was in fair condition today at Wilcox Hospital after surgery yesterday to repair cuts to his left leg and thigh.

Silva was surfing 75 yards from shore with 40 other people when the shark bit him.

Officials discovered 15-inch-wide bite marks on the bottom of his board after Silva came to shore. It was taken to the hospital for experts to study.

> *"The shark bit him to the bone. It was deep."*
>
> **Tom Vander Wende**
> Paramedic

Silva saved himself from more-serious injuries when he wheeled and punched the shark, causing it to let go, officials said.

"The shark bit him to the bone. It was deep," said Tom Vander Wende, a paramedic.

Another surfer brought Silva to shore after the 11:20 a.m. attack. Paramedics stopped extensive bleeding and transported him to Wilcox Hospital by ambulance.

Kauai County, meanwhile, posted warning signs and placed the ocean off limits along two miles of coast. Fire officials also told hotels and condominiums to warn guests to stay out of the water.

The state Department of Land and Natural Resources hasn't decided whether to hunt for the shark, said Randy Honebrink, an education coordinator for the department's Aquatic Resources Division.

"There won't be a hunt tonight," he said yesterday. "We need to talk with the local community . . . Hawaiian leaders, and evaluate the circumstances."

Honebrink, a member of the inactive Shark Task Force, said he will fly to Kauai today to review details of the attack.

A Real Big Catch

11/93 LA Times

LORI SHEPLER / Los Angeles Times

Biologists from the Los Angeles County Museum of Natural History examine a great white shark that was snared Monday in a net intended for swordfish. The 17-foot shark was caught off Santa Barbara Island and had an adult sea lion in its mouth, biologists said.

Honolulu Advertiser
Saturday, Nov. 13, 199

A1

Kauai surfer attacked by 12-foot tiger shark

Fish releases grip after punch to snout

By Jan TenBruggencate
Advertiser Kauai Bureau

LIHUE, Kauai — David Silva was paddling his surfboard when he felt something grab his leg.

He turned and looked a 12-foot tiger shark in the eye.

He punched it, and it let go.

Last night, after surgery to close two large wounds in his lower left leg, Silva said he won't surf again.

The attack occurred shortly after 11 a.m. yesterday off the north end of Wailua Beach. Kauai parks officials ordered swimmers out of the water from Nukolii to Waipouli following the incident.

Silva, 31, a groundskeeper from Kapaa, was in fair condition at Wilcox Hospital last night after a medical team repaired two open wounds 14 inches apart on his left lower leg. The two wounds were the result of a single bite.

Police reported the shark left a semi-circular imprint of its bite on the bottom of Silva's board that was 14½ inches wide at the board's edge.

Silva was part of a group of surfers at a break called Horners at the Kapaa end of Wailua Beach.

During a telephone interview from his hospital bed last night, he said he was paddling to shore when he felt something on the back of his board.

There was no pain at first. He twisted around, and saw what he described as a 12-foot tiger shark with his leg and the end of his yellow surfboard in its mouth.

The shark's eye was looking at him, Silva said.

"I punched him in the nose," and the shark let go, he said.

It did not strike again.

He said he paddled the 80 yards to shore on his own. Then others came and helped.

Silva said he has seen sharks in the water before, but had not seen the big tiger before it attacked.

The waters of Wailua have been dirty and debris-filled following heavy rains earlier in the week. There was muddy water yesterday at the south end of the bay near the mouth of Wailua River, but much of the bay appeared clear.

Silva said he did not see any sea turtles in the area, but police said they spotted turtles near the area of the attack during their investigation of the incident. Tiger sharks prey on sea turtles.

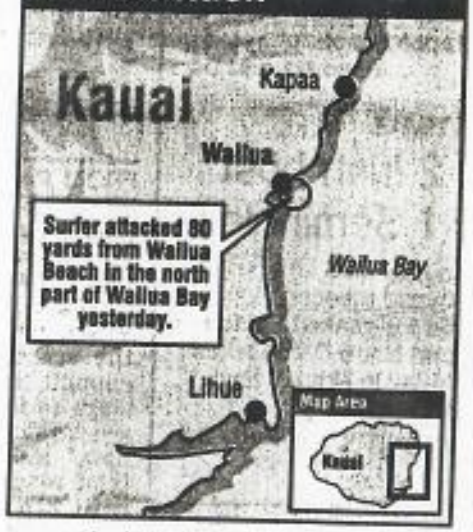
Asked if he would ever surf again, Silva said no. "Pau surf," he added.

The county Division of Parks and Recreation posted "no swimming" signs at beaches from the Coconut Plantation area south to Nukolii.

Wailua Bay and the east side of Kauai have no extensive history of shark attacks.

In 1989 a man was washed out to sea from Wailua Beach in strong currents, and parts of his body were found six days later showing evidence of shark feeding. In the same year, a surfer was bitten on the ankle off Anahola, about 10 miles north of Wailua.

Shark attack



Shark attacks

Recent shark attacks in Hawaii include:

Nov. 26, 1991—Martha Morrell, 34, of Olowalu, Maui, is fatally attacked while swimming near her home.

Feb. 19, 1992—Bryan Adona, 29, of Ewa, disappears while bodyboarding at "Leftovers" on Oahu's North Shore. His board is found with what appears to be a shark bite.

Oct. 23, 1992—Rick Gruzinsky, 26, of Hawaii Kai, escapes injury when a shark bites his surfboard at Laniakea on Oahu's North Shore.

Nov. 5, 1992—Aaron Romento, 18, of Pearl City, is fatally attacked while bodyboarding at Keaau on Oahu's Leeward Coast.

Dec. 23, 1992—Gary M. Chun, 30, of Kaneohe, suffers minor cuts when a shark bites his surfboard at Chun's Reef on Oahu's North Shore.

March 14, 1993—Roddy Lewis, 35, of Kuau, Maui, is bitten on the legs while surfing near Keanae.

June 10, 1993—Jonathan Mozo, 22, of Laie is bitten on the feet while surfing near Malaekahana Park.

Hunt back on for 1962 Alcatraz escapees

The Honolulu Star-Bulletin 11-11-93 A16

SAN FRANCISCO (L.A. Times) – Spurred by new information from a former inmate, the U.S. Marshal's Service has revived its hunt for three bank robbers who escaped from the notorious Alcatraz Island penitentiary in 1962 and were presumed drowned or eaten by sharks.

Former convict Thomas Kent, interviewed for an episode of "America's Most Wanted" airing later this month, provides "significant new leads" in the remarkable escape made popular by a Clint Eastwood movie, a marshals' spokesman said yesterday.

The new information may offer the first clear explanation of how Frank Lee Morris and brothers Clarence and John Anglin broke out of their cells and fashioned a raft they presumably used to cross the chilly, treacherous waters of San Francisco Bay.

Originally the FBI concluded the trio used spoons to dig out of their cells. But Kent, who reportedly helped plan the jailbreak, said the inmates stole a vacuum cleaner motor and fashioned it into a drill they used to widen a ventilation duct. To conceal the noise of the drilling, he said, the men worked during the prison's evening music hour.

After crawling through the duct to reach the roof, the convicts slid down a pipe to the ground and climbed a barbed wire fence to reach the island's foggy shore. There, Kent said, the escapees boarded a makeshift raft they created by smuggling raincoats into the prison sewing shop and transforming them into rubber pontoons.

"Although we never found bodies, we presumed they had drowned because a makeshift oar and a life vest turned up on (nearby) Angel Island," said Dave Branham, a marshal's service spokesman in Washington. But now that the escapees' ingenuity has been disclosed, "we think there is a possibility they are alive."

If the fugitives did pull off the 1962 breakout featured in the film "Escape from Alcatraz," they would be in their early 60s today. Kent, who was paroled in 1965, said he would have joined the escape had he known how to swim.

FORM CD-14
(2-76)
Prescr. by
DAO 214-2

U.S. DEPT. OF COMM.

TRANSMITTAL SLIP

DATE: Nov 17, 1993

TO: George Barbes

REF. NO. OR ROOM, BLDG.

FROM: John Naughton

REF. NO. OR ROOM, BLDG.

ACTION

- [ ] NOTE AND FILE
- [ ] NOTE AND RETURN TO ME
- [ ] RETURN WITH MORE DETAILS
- [ ] NOTE AND SEE ME ABOUT THIS
- [ ] PLEASE ANSWER
- [ ] PREPARE REPLY FOR MY SIGNATURE
- [ ] TAKE APPROPRIATE ACTION
- [x] PER OUR CONVERSATION
- [ ] PER YOUR REQUEST
- [ ] FOR YOUR APPROVAL
- [x] FOR YOUR INFORMATION
- [ ] FOR YOUR COMMENTS
- [ ] SIGNATURE
- [ ] INVESTIGATE AND REPORT

COMMENTS:

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2

To John Naughton	From B Wetherbee
Co. NMFS	Co. HIMB
Dept.	Phone # 236-7430
Fax # 949-7400	Fax # 236-7443

University of Hawai'i at Mānoa

Hawai'i Institute of Marine Biology
P.O. Box 1346 • Coconut Island • Kāne'ohe, Hawai'i 96744-1346
Telephone: (808) 236-7401 • Facsimile: (808) 236-7443

John Naughton
National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822

November 16, 1993

Dear John,

Just a short note to remind you that there is mounting scientific evidence that tiger sharks do not "hang around feeding in a specific area" as per your quote in the newspaper this morning. In our limited dealings with the media we've seen how journalists take liberties with what one tells them. Based on our two tiger shark tracks, the chance of catching the shark responsible for an attack would be very slim if the type of movements our two tracked sharks have exhibited are typical for tiger sharks. This "preliminary information" is probably a lot better than anecdotal stories of resident sharks for judging where a tiger shark is (or isn't) even a few hours after an attack at a particular site.

As we track more sharks we will be able to get a better idea of typical tiger shark behavior, but up to this point everything we have learned from the tracks (the two sharks we tracked travelled over 20 miles in 24 hours) indicates that fishing at the site of an attack would prove very ineffective in catching the shark actually responsible. Since you are a primary spokesman for the scientific community we hope that you will consider our results in future statements made to the press about tiger shark behavior. Thank you for considering our input.

Brad Wetherbee

Brad Wetherbee

Chris Lowe

Chris Lowe

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Area Office - Southwest Region
2570 Dole St. Honolulu, HI 96822-2396
PH: (808)955-8831 FAX: (808)949-7400

November 16, 1993 F/SW023:JJN

Mr. Brad Wetherbee
Mr. Chris Lowe
Hawaii Institute of Marine Biology
P.O. Box 1346
Coconut Island
Kaneohe, Hawaii 96744-1346

Dear Brad and Chris:

In response to your note of today, I in fact did mention the results of HIMB's efforts to date to the Honolulu Advertiser reporter. However, as you know not everything we tell the media is included in the resulting story.

I'm basing my statements on several pieces of information, some anecdotal and some based on scientific studies. They include the following tiger shark information from Hawaii:

a) Tag returns from Tester's and other studies include five returns from captured tiger sharks (of which I am aware). All have occurred from the same island where they were tagged, four from within a few miles of the tagging site. Time at liberty ranged from approximately 5 months to 2.5 years.

b) Information from fishermen, of which I continue to receive updates on a fairly regular basis. They claim they see the same sharks, including tiger sharks, in the same areas while hauling traps or bottomfishing. They recognize the animals via scarring and/or their vessels bottom paint on the animal's dorsal surface.

c) The reduction in catch-per-unit effort of sharks in areas fished, such as by independent fishermen around Oahu recently. The reduction in sightings of tiger sharks, as well as incidents and attacks, around Oahu since at least 54 tiger sharks have been caught over the past two years.

Granted, these are certainly not the best data. However I feel they are sufficient to justify a selective, site specific control program after an attack or confirmed sightings of a large shark in a specific area over time. Also I feel it's a prudent

method to reduce the public's demand for a large scale control program, which we all agree is the last thing we want to see occur. In addition, we will be able to obtain much needed data from the few sharks killed. (All other species and tiger sharks under 8-feet in length should be tagged and released, as we have done for the most part around Oahu).

I feel the work you guys are beginning at HIMB is the most pertinent and exciting shark research ongoing in Hawaii. However, with the two tracks to date being conducted on highly stressed animals, I wonder if they are exhibiting normal behavior once released, especially short term behavior. Obviously if hooked sharks are to be tagged, released, and tracked, you will need to stay on the animals for a much longer period so we can be certain they have returned to "normal" activities and movements.

I appreciate your comments and good luck with your research. We certainly need the results to improve management decisions.

Sincerely,

John J. Naughton
Pacific Islands
Environmental Coordinator

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October 28, 1993

George Burgess
Florida Museum of Natural History
University of Florida
Gainesville, FL 32611

Dear George:

As we have discussed a number of times, I have re-appointed you Chairman of the 1993-94 Shark Attack File Committee, a standing committee of the AES appointed by the President. As the curator vested with custody of the International Shark Attack File (ISAF) files, you are automatically designated Chairman of this committee according to the AES By-Laws. This appointment extends from June 1993 to June 1994. Further appointments beyond next year's annual meeting will be the responsibility of President-Elect Don Nelson.

At the 1993 AES meeting, we agreed on the following membership for the 1993-94 Shark Attack File Committee: George Burgess, University of Florida (Chairman, curator of the ISAF files, and U.S. east coast representative); Bob Lea, California Fish and Game (west coast rep.); Ralph Collier, Van Nuys CA (west coast rep.); George Balazs, National Marine Fisheries Service/Honolulu (Hawaii rep.); John West, Taronga Zoo & Aquarium (Australia rep.); Geremy Cliff, Natal Sharks Board (South Africa rep.); Bernie Zahuranec, Office of Naval Research (at-large member); Victor Springer, Smithsonian Institution (at-large member); and Dave Baldridge, Sarasota FL (at-large member). These members are being reminded of their membership in this committee by way of copy of this letter.

As called for in the AES By-Laws, the Shark Attack File Committee's task is to manage the ISAF including, but not limited to, compilation and distribution of information contained within the ISAF, under the guidelines established by the AES Board of Directors. Until detailed, written guidelines are established by the Board, any actions of a significant or final nature should be reviewed first by the AES Executive Committee. Further review of such actions by the Board should be made through communication with the Executive Committee.

Thank you for your hard work over the years in chairing this important committee of the AES.

Cordially,

Robert E. Hueter, Ph.D.
President, American Elasmobranch Society
Director, MML Center for Shark Research

xc: D. Nelson
J. Carrier
B. Lea
R. Collier
G. Balazs
J. West
G. Cliff
B. Zahuranec
V. Springer
D. Baldridge

U.S. DEPARTMENT OF COMMERCE
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11/16/93

Dear George -

I was pleased to receive the recent letter appointing me to your ISAF steering committee. I pledge to do the best possible in whatever manner called upon. Attached are more recent articles on the Kauai shark attack. I'm fearful that the state will be seen as sweeping this one "under-the-rug" in the name of tourism. As you know, Kauai is already in ruins with regard to tourist industry.

I've received an advance copy of Leighton Taylor's book "Sharks in Hawaii: Their Biology and Conservation". All pages of my list are in pink or red. I had no idea that would happen. Given the choice, I would have voted against that.

(over)

I would like you to consider this suggestion as a manner to combat abuse, misuse, and sloppy reporting by the news media. The confusion (if we can call it that) by news media stems from the word "attack." Perhaps the formal official name of I.S.A.F. should be changed to I.S. INCIDENT FILE, or I.S. INTERACTION FILE, or even I.S. ACCIDENT FILE. Certainly I would follow suit, if such a change happened. And other similar lists elsewhere.

I think something along these lines is the longterm solution. If you anticipate any sort of meeting by the steering committee over the coming year, I recommend we take up the subject at that time.

Best regards,

Sye

NOTE - I'll send you a copy of Taylor's book just as soon as I receive my dozen free copies.

the tour?

Nothing is more exciting than when the world tour comes to Hawaii each winter. But this year, things are different. For the first time since 1985, the world pro championship title may be totally unaffected by contest results in Hawaii. As of the end of August, the Pipeline Masters, which was abandoned by its faithful Maui sponsor, and the World Cup at Sunset Beach had yet to be picked up by major sponsors. "Negotiations are continuing," said Randy Rarick, the event director for the Hawaiian Triple Crown. Rarick, Triple Crown partner Fred Williamson and the ASP board stepped in to guarantee the Pipe's status as a world title event, but whether the women will be included still remains open to question. At least the dates are known: The Pipe contest will be held Dec 7-17, and the World Cup at Sunset Beach, will be held Nov 26-Dec 6. With the exception of those changes, few events have been affected this year. The Wyland Galleries Hawaiian Pro, a highly rated WQS event, will be held once again at Haleiwa from Nov 16-24. And the tenth annual Xcel Pro will be held from Oct 30-Nov 13 at Sunset Beach. The Xcel Pro is a WQS ASP-rated event put on in conjunction with the HPAC tour. Also, the Quiksilver Eddie Aikau at Waimea Bay, a specialty event, will happen between December 1993 and February 1994 (if the Bay delivers).

Also, the Oxbow World Longboard Championships will be held at Haleiwa, with the Wyland Galleries Hawaiian Pro Several top pros have entered.

Rarick organizing

tough call

Nature does. How nuts will these guys go this year?

The root of the Hawaiian winter is not just the surf itself, it's the people. It revolves around the shapers, the locals and the visiting pros. The shapers have been working on new things or traveling since the North Shore calmed down at the end of last winter, and they are very excited about the changes and refinements in the boards that will be put to the test this winter. The pros have been traveling around the world since they last visited the North Shore and they are totally amped about the tour's visit there. And since there's a good chance that the world title may be decided at the Pipe Masters, the anticipation of their arrival has probably doubled.

But, as far as the WCT goes in Hawaii this year, there are many uncertainties. The locals. They have been busy surfing town all summer or spent some time in California surfing a few of the WQS contests trying to get the points they need to qualify for next years world tour.

Some locals could care less about points and ratings, but are just as stoked about the Hawaiian winter as anybody else that has seen it and experienced it.

So, who will shine? Who will pay their dues? What could possibly happen? Nobody can truly predict what this winter holds in store for the people involved, and maybe some people don't want to know. Sure, it's important to know who wins the Triple Crown and the world title and all, (go to p 24)

Shane Dorian, one of the hottest of the new breed in big North Shore surf, scallops a smooth little Backdoor wall...could Shane do something really big this season?

the sharks?

On April Fools Day 1990, a shark attacked a surfer just west of Haleiwa, it was the first reported shark attack on the North Shore in over ten years. Since then, there have been three more attacks on surfers. Of those four attacks, one was fatal. All attacks have occurred west of Waimea. Is there really a problem with sharks on the North Shore? Maybe. While many would strongly suggest that there is a problem, the experts disagree. "There is no indication that there is more of a problem now with sharks than there has been in the past," said Dr. Kim Holland, a marine biologist at the University of Hawaii. "People are just more aware of their presence now. The whole idea sells a lot of newspapers and television time." Randy Honebrink, who works for the Hawaii State Shark Task Force, agrees that this whole issue is nothing new. "There has always been shark attacks in Hawaii and there will always be shark attacks in Hawaii, as far as water safety concerns go, it's the neck, spinal injuries and drownings that top the list." Honebrink added, "We don't have a shark problem. We really need to keep that point in perspective. Everytime a shark blinks, it's making the news."

who knows

Biting back

A3

• THURSDAY, Nov. 18, 1993
The Honolulu Advertiser

Some on Kauai urge state to take action and fish for shark

By Jan TenBruggencate
Advertiser Kauai Bureau

LIHUE, Kauai — David Silva said he's going fishing for the shark that bit him, but some Kauai residents think the state should have launched a hunt first.

"There has to be some response. If not, somebody is going to get killed," said County Councilman Jesse Fukushima, the only member of the Council from the area where Silva was attacked on Friday.

"If that shark just bit the surfboard, no, but if that shark bit a person, they should go out and catch it," said Kauai Fire Chief Alejandro Lomosad. "They should go after this one."

Other Kauai residents have differing views on the issue *(see story below)*, but the community is not uniformly opposed to shark fishing, as a state official assumed after a visit the day after the attack.

Randy Honebrink, education coordinator for the state Department of Land and Natural Resources Division of Aquatic Resources, came to determine whether a shark hunt was appropriate. He decided against it after talking to several people.

"Our position is that if there's local opposition we would not fish. I talked to lifeguards, law enforcement people and members of the public, and without exception, people said it was not going to do any good to fish because you're not sure you're going to get the right shark," Honebrink said.

Our Hawaii

But people familiar with Wailua Bay, where Silva was bitten, say the shark is very well known.

Fukushima said the large shark that cruises the bay, one of Kauai's premier tourist beaches, is well-known to veteran Kauai anglers.

"It's been there for years," he said. Now that it has been implicated in an attack on a human, the community must respond, he said.

Fisherman Richard Sloggett III said he's familiar with the shark, too.

"I have seen that shark, I don't know how many times, when we go oio (bonefish) fishing out there. He comes around when we palu (chum) in the bay.

"He's a tiger shark, maybe 12 feet long. That's a big bruiser," Sloggett said.

Sloggett is among those who do not feel the state should target the animal. "That's his territory," he said.

A large tiger shark attacked Silva just 70 or 80 feet from shore at Wailua Beach Friday. It ripped at his leg, catching it against his surfboard, then loosed its grip and took another bite, giving Silva two huge wounds in the calf of his left leg. Silva said the shark let go after he punched it twice in the gills.

Advertiser photo by Jan TenBruggencate

Though others debate the wisdom of shark hunts, surfer and shark attack victim David Silva has no doubts: "As soon as I'm better, I'm going after him."

Silva had been paddling to shore after surfing at a break on the north side of the bay. The water in the surfing area was clear, although there was muddy water at the mouth of Wailua River, a half-mile away, and reportedly some discolored water near shore.

A police officer said he saw a turtle in the area after the attack, but Silva said he saw no turtles in the water while surfing. Large sharks sometimes eat turtles, and some people assume the presence of turtles attracts sharks.

Kauai County Water Safety Director Orlando Anaya said he recommended to Honebrink that the state not hunt for the shark.

One of the considerations in his discussions with Honebrink, Anaya said, is that there's often more publicity surrounding a shark hunt than around the shark attack itself.

"We did look at the tourist impact and the press. We did talk about tourism," he said.

Silva, who was released from Wilcox Hospital late Tuesday, has no problems with shark hunts. The day after the attack, he told Honebrink that he didn't feel a fishing effort could ensure the right shark was caught. But he said that's not going to stop him from trying to get it.

"I've got some heavy fishing gear. As soon as I'm better, I'm going after him. And if I don't get that one, at least I'll pull a couple of 8-footers out of the water," Silva said.

Strong opinions on shark hunting

LIHUE, Kauai – Folks on Kauai have differing, but generally strong opinions on whether the state should hunt for the shark that attacked David Silva at Wailua Bay last Friday.

Cindy Desamparado, of Kapaa, thinks the state has a responsibility to remove the shark that attacked the surfer.

"That's my favorite beach. I swim and fish there. (The state needs) to make sure that it's not around there," Desamparado said.

Jovita Guerrero, of Hanamaulu, agrees. "It's dangerous for a lot of people. Closing the beach isn't enough. It would be safer, people would feel safer, if they got that shark," she said.

Gary Best, a second-time Kauai visitor from Santa Barbara, Calif., said some effort to catch the shark would be important, particularly to tourists.

Desamparado

Best

"I think it would look better, don't you? It would seem better if they at least said they were doing something," Best said.

Others, like Henry Kanoho of Anahola, feel a surfer should be alert to signals that sharks might be present, and should avoid risky situations.

"I think that's the first time a shark attack happened over there. If the surfers had seen turtles around, they shouldn't go," he said.

"He should have known better than to be in there," said Lihue resident Nancy Fujii.

Some residents believe it's wrong to target a specific shark, but OK to expand the catching of sharks as a fishery.

Ted Chihara, a Lihue surfer and lawyer, is in the last group.

"I'd be in favor of a regular commercial fishery, but not just killing them for revenge," he said. Chihara added, jokingly: "Besides, it adds a little thrill to surfing."

— Jan TenBruggencate

Asia and the Pacific

Tiger shark examined

PERTH, Australia (AP) – Forensic scientists today will check the identity of human remains found in the digestive system of a shark, police said.

The 8-foot tiger shark was one of 10 caught by hunters over the weekend not far from where a scuba diver disappeared.

Diver Richard Bisley, 28, vanished Nov. 21 while checking underwater oyster nets at an offshore pearl farm near Broome, 1,000 miles north of Perth.

Police said torn clothing was also found in the shark.

SCIENCE/ENVIRONMENT

JAN TENBRUGGENCATE
Advertiser Environment Writer

Shark expert says eradication programs may worsen problem

The right way to deal with Hawaii's shark attacks will ultimately come from more research, not more killing, according to one of the world's premier shark experts.

Samuel H. Gruber, in Hawaii recently en route to a meeting in Bangkok of the World Conservation Union's Shark Specialist Group, which he chairs, said most of the evidence worldwide suggests local fishing won't do much to reduce numbers of migratory sharks.

And he noted that most available research indicates that tiger sharks, implicated in most Hawaii shark attacks, are migratory.

That might not turn out to be true in Hawaii, but until researchers receive the funding to do solid tracking studies, we won't know, he said.

Some of the preliminary research in Hawaii suggests some sharks return to the same areas regularly, and some people say they recognize the same sharks in the same areas repeatedly.

However, a recent review of shark catches by longline fishing craft, by Jeffrey Polovina and Boulderson Lau of the National Marine Fisheries Service, showed tiger sharks are found far from shore, with one caught 365 miles offshore.

Gruber is a professor of marine biology and fisheries at the University of Miami. He does most of his shark research in a lagoon at Bimini, about 42 miles from Miami, specializing in lemon sharks, which are not found in Hawaii.

10-year shark hunt

He said the best evidence about the impact of wholesale shark hunts comes from the Indian Ocean coast of South Africa, where, after a series of attacks in the 1950s, a decade-long shark eradication program took place.

"After about 10 years they noticed a couple of things," he said. "Many species were being caught at the same rate — the migratory species like the great white, the tiger, silky sharks and dusky sharks. These sharks would maintain their numbers over the years.

"Other species numbers fell precipitously around the beaches and were disappearing. The ultimate result of about 10 years of this activity is that the shark diversity changed in a very bizarre way — the inshore sharks were represented only by one species and only for part of their life cycle — juveniles, and there were thousands of them. They proliferated."

Despite all the fishing, the catch of tiger sharks did not seem to change, indicating they did not have a strictly local range, Gruber said.

"I've tracked tiger sharks, I've tagged, oh, 100 to 120 of them in my career. It leads me to believe they are not localized animals. They move. They are migratory.

"These sharks are later caught in Cuba, in the Carolinas. I firmly believe that these things are highly migratory."

It is possible that in Hawaii they migrate and then return, that Hawaiian tigers treat the islands as their home base. But to find that out, studies are needed.

"You're going to have to go out there and make a concerted effort to tag sharks. You can put a transmitter on a shark that can be tracked by satellite, one that pops to the surface in 30 days, 60 or 90 days, so you know where that shark has gone. There is a dedicated satellite for animal research."

There is also the kind of tagging that involves placing a small radio transmitter on the shark and using a boat to follow the animal.

Tagging in Hawaii

The first serious Hawaii tracking research is now under way under the direction of researcher Kim Holland. In the first two cases, sharks tagged just off south Oahu immediately swam offshore, to the edge of the Penguin Banks, between Molokai and Oahu.

It's not yet clear what that means, some researchers say, since scientists can't discount the possibility that the sharks initially behaved oddly from the trauma of having been caught on a hook and tagged.

Gruber said tiger sharks are among the toughest of sharks, though.

On the other hand, just to discount the possibility of trauma, "whenever I do a long-term tracking, I don't count the first day's data."

One of the problems with fishing extensively for sharks without having learned more is that we don't know what will happen in the Hawaii marine environment if we remove the top predator, Gruber said.

"In all ecosystems where top predators have been known to be studied and their prey have been studied, it is known that the top predators are the prime movers in the biology of the prey."

It's possible, for instance, that removing tigers — if they are a localized species — would cause a dramatic increase in the population of one of its prey species, that the prey will then wipe out its own main food source, with similar ripples throughout the nearshore marine environment.

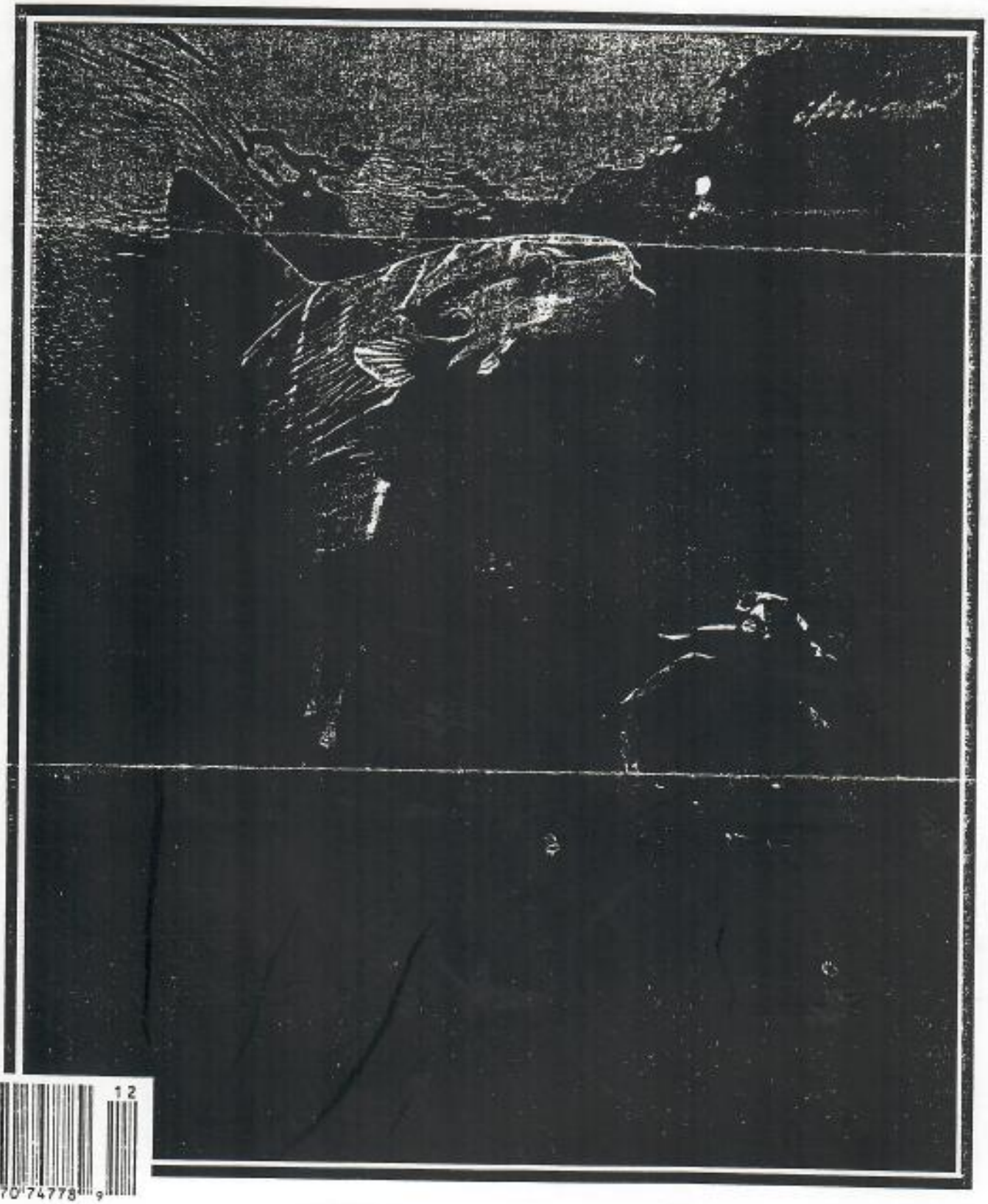
Gruber has a special appreciation of sharks, having spent his life studying them, but he also understands the special fears they create.

"There is something about sharks that affects the human psyche in a way that is beyond the bounds of understanding," he said.

NOVEMBER 1993

Ocean Realm

INTERNATIONAL MAGAZINE OF THE SEA



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Sharks and Albatross on Laysan Island

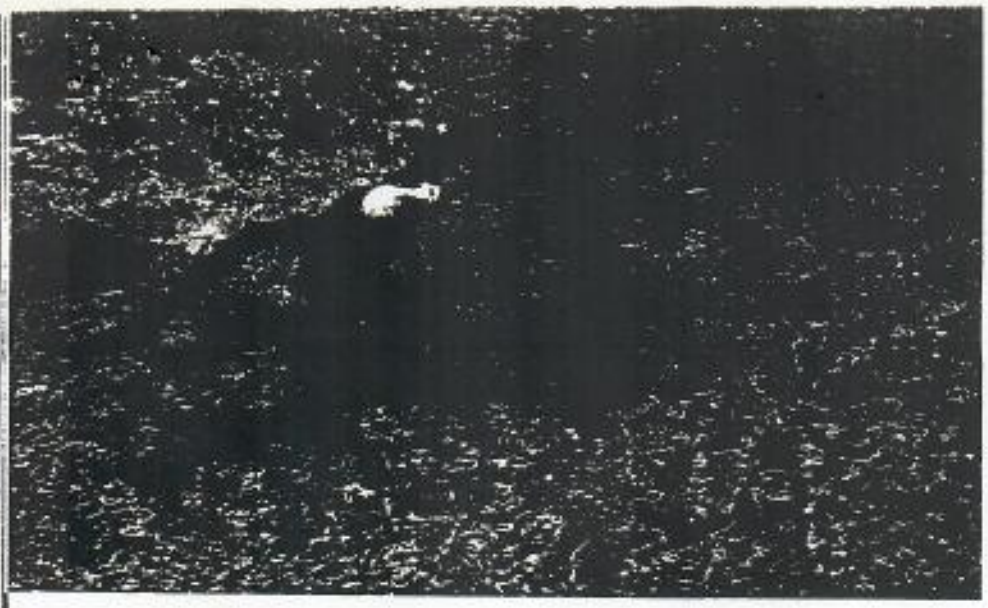
It is late June in the northwestern Hawaiian Islands. The sun beats down and heat waves dance off the blinding white sand. Scattered across Laysan Island are as many as one hundred thousand young albatross, both black-footed and Laysan albatross, ready to fly to sea. They have weathered late winter storms and summer heat waves during their first 150 days of life. Now, their greatest challenge is to become airborne and survive at sea.

The young birds look much like punk rockers with their various mohawks and side burns.

Albatross chicks have slowly grown in bulk and weight, fed on a diet of predigested flying-fish eggs, squid, and red stomach oils. But by mid-June, their parents feed them less and less frequently until they cease visiting the island entirely and depart for the North Pacific. As the summer solstice approaches, the young birds are adult-sized but exceed the adults' weight by almost a third. The soon-to-be fledglings wait in vain at their nest sites for their parents to return with a meal. As they wait, they slim down from overweight butterballs to svelte, if awkward, adolescents.

They spend the summer days panting in the heat and exercising in cool weather. Each gust of wind, especially when accompanied by rain, elicits the same response from thousands of albatross.

BY MARK J. RAUZON



The bird thrusts its wings out and runs again on the surface, but each time it tires sooner. As the exhausted bird drifts near the barrier reef, an underwater shadow slowly approaches.

When a squall sweeps across the island, the accompanying winds stimulate all the fledglings to open their seven-foot wings to the breeze and practice in unison. They all jump up and down, flapping their saber-like wings. Their flight feathers are stiff, and tufts of down are wiped off during exercise and carried away by the tradewinds. The chicks are well-feathered, but vestiges of down still cling to their heads and necks.

Many gain experience flying short distances and crash-landing in the island's interior. Over and over they practice until they develop enough coordination to control their wings in the tradewinds and escape the island altogether. Individuals who live closer to the beach congregate near the shore where they have a clear runway to practice on. Free from obstacles, they run along the beach and fly for the first time. But out here, unlike in the interior, it's usually a one-way trip. A Laysan albatross fledgling makes a running start from the sand and hits the water, flapping its wings while paddling on the surface with webbed feet. The youngster gets briefly airborne but quickly tires its new flight muscles. Wing tips drag through the water and wet the still downy plumage. Weighed down by water, the albatross pause to rest and perhaps consider this novel medium that offers them an escape at the exact same time as it confines them. As the bird sits on the surface, an offshore current pulls it further from the island.

Shark Bay at Laysan Island is one site where a breach in the reef allows large tiger sharks close access to the shore where birds enter the water. Usually, tigers reside in the deeper waters outside the barrier reefs of the northwestern Hawaiian Islands. They enter lagoon waters at night and usually leave by daylight. But during albatross fledgling time at specific sites off all of the islands in the northwestern archipelago, they appear reliably. Individual tiger sharks learn of the ephemeral bounty available to them, and they generally appear in the morning hours during a brief period in June to take their fill. Small sharks are scared away from the feeding grounds by the larger tigers, so only the biggest sharks are able to take advantage of the naive birds.

In June 1990, Shark Bay was patrolled by about five large sharks, each one working certain areas. One shark would venture near shore about every twenty minutes, looking for birds constrained by the reef and associated currents. A rising shark that missed its mark would motivate some birds to learn to fly in a hurry. Most, however, entered the ocean food chain. The bird's moment of death ended an eight-month period of labor by adult albatross — their annual output devoured in an instant. However, since albatross are long-lived birds — up to fifty years — they will have other chances to fledge a chick successfully. Next year, maybe their chick will survive.

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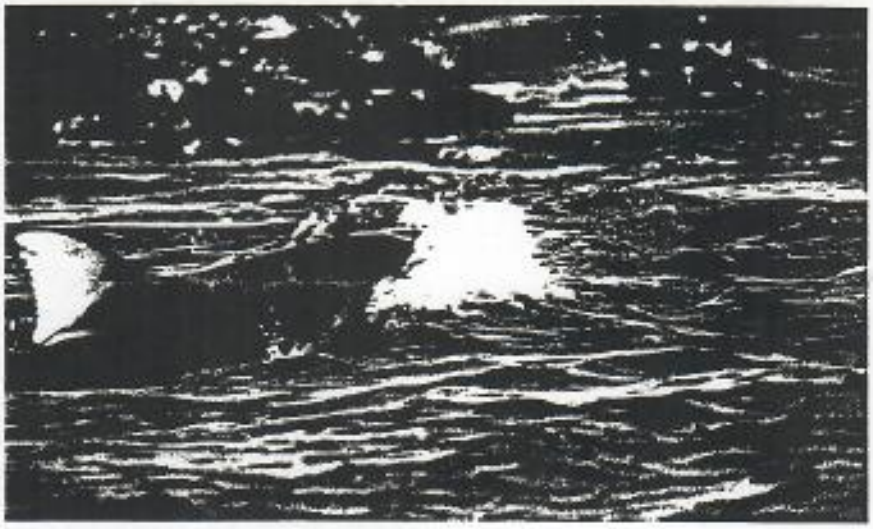
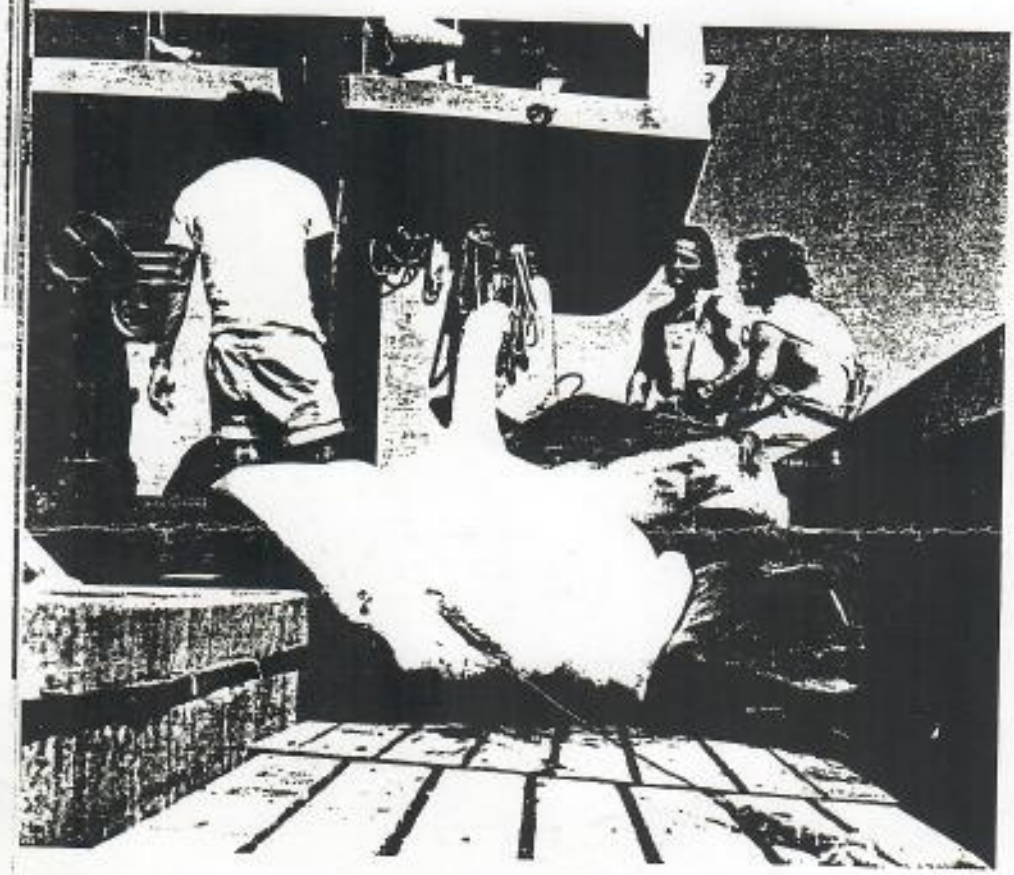
Suddenly a fourteen-foot tiger shark erupts from the aqua waters. Its snout reaches two feet in the air to the height of its prey. Closing the nictitating membranes of its eyes, the shark brushes against the unwary albatross. A head bump and backwash of the passing shark swamps the bird. The shark is now one of its mark: it instantly turns and with one mouthful, chops the bird into oblivion. In its wake, a "footprint" of albatross stomach oil calms the surface. It floats like a temporary grave marker, and the daily death toll can be counted on the water until finally the oil and blood disperse into the great ocean.





One of the lucky ones, this exhausted chick has survived its brush with death. But man is a more formidable predator than the shark, and for these tigers, luck has run out.

The catholic diet of tiger sharks in Hawaii was studied at French Frigate Shoals in 1977. Researchers from Waikiki Aquarium and the National Marine Fisheries Service fo nd fledgling seabirds, porpoise skulls, monk seal flippers, sea turtles, and other smaller sharks in the stomachs of giant tigers. Hawaiian monk seals and sea turtles with half-moon-shaped bite marks or missing appendages are a not uncommon sight on the beaches of the northwestern Hawaiian Islands.

Yet the sharks now face an unprecedented challenge. In order to prevent similar scarring patterns on tourists in the main Hawaiian Islands, the National Marine Fisheries Service has called for the eradication of big sharks from areas frequented by surfers, swimmers, and tourists where a few shark attacks on humans have already occurred. The greatest fear is that if a tourist were attacked, the visitor industry would suffer profound financial losses.

This line of reasoning has created a controversy concerning the role of sharks in the Hawaiian waters. Inquiries from scientists and lay persons alike have poured in. Internationally, there is a call for a moratorium on shark harvest, yet in Hawaii, the fervor to remove sharks originates from the agency concerned with managing and enhancing marine resources: the National Marine Fisheries Service. Surely, a more enlightened view that considers the benefits the sharks provide and the place of tourism in Hawaii is needed before any sharks are removed.

In Hawaiian lore, sharks are considered to be the spirits of the ancestors, and in an ecological perspective, they are the legitimate heirs to the top food-chain position. After all, if albatross and ancient Hawaiians evolved along with these predators and learned to survive, the modern humans can adapt and continue to thrive while allowing these magnificent predators their place in the ocean food chain. □

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Science Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396
(808)943-1221 • Fax: (808)943-1290

12/16/93

Randy -

We now had the opportunity to personally speak with David Silva on Kauai regarding his attack. Are you aware of all the discrepancies of the circumstances of this case, with regard to misinformation in the newspaper and TV? The public in Hawaii was left "believing" many things that simply weren't true. It would appear that one of us.., me as the regional compiler of shark attacks, .. or you as the state's aquatic information specialists.. has the responsibility/obligation to set the record straight. Who should it be? Let's seriously discuss after the Holidays.

Best regards,
Jeff

943-1240

Letters

Drugs, trees, tourism, sharks

More turtles mean more sharks

There is, in mathematics, a system of differential equations called the predator-prey equations. (See, for example, chapter 12 of "Differential Equations, Dynamical Systems, and Linear Algebra," by Morris Hirsch and Steven Smale.)

These equations determine a mathematical model for the variation in time of the population of a predator-prey pair (for example tiger sharks and sea turtles). The model predicts that the population of both predator and prey will vary periodically in time.

It is unclear how accurate the model is when applied to the populations of tiger sharks and sea turtles. There is little precise information available about the population of either species.

But windsurfers in Kailua believe that there has been a recent (over the past five or 10 years) increase in the sea turtle population and I have read in various places that the population of tiger sharks is increasing.

The frightening thing is that the model predicts that the tiger shark population will continue to increase until the sea turtle population stabilizes and even will continue to increase for a while as the sea turtle population decreases.

If the prey-predator model is applicable here we may be in for a further increase in the tiger shark population and a consequent increase in the frequency of shark attacks on surfers.

HUGH M. HILDEN
Professor
Mathematics Department
University of Hawaii

Volunteers Needed—Please Sign Up

by Lynne Matusow

A volunteer organization is only as good as the efforts put forth by its members. Without the assistance of members like you, the Hawaii Audubon Society will be hard pressed to continue and expand its services. At press time we were seeking to fill the following positions:

Laysan Albatross Breeding Colony Project. Located on Kaohikaipu Island (Black Rock) off the windward coast of O'ahu, near Makapu'u Point, this project is a cooperative effort of the Hawaii and National Audubon Societies, the U. S. Fish and Wildlife Service, U.S.D.A. Animal Damage Control, Dr. Causey Whittow of the University of Hawaii, the State Division of Forestry and Wildlife, and Sea Life Park. The project will use decoys and recordings to attract young albatross looking for a suitable nesting place.

As a cooperator Hawaii Audubon needs volunteers to help monitor the response by young albatross to the decoys and tape recordings. Monitoring will be the primary measure of success for the project. Now is your chance to get in on the ground floor of this important wildlife recovery effort. Call Steve Carter at Hawaii Audubon, 528-1432.

Recording Secretary. This Board of Directors position entails taking and transcribing minutes at the monthly Board meetings and sending them to Board members. Call Linda Paul, 262-6859 (H).

Phone Tree Callers. We are growing a phone tree—a chain of people who can make calls to decision-makers on environmental issues. This allows the environmental community to respond very quickly with public pressure on important issues. To join our phone tree, call David Hill at 988-7460 (H).

Testimony Presenters. Here we need self-starters who can tactfully and effectively present testimony at the legislature, county councils, and hearings of governmental boards and agencies, usually on weekdays during daytime hours. If you can't write the testimony, we will have someone else do it. A knowledge of Hawaii, including issues, politicians, and who the players are is a big plus. A minimum of four hours a month is required. To volunteer call David Hill, 988-7460 (H).

Office Staff. Among the duties are answering the telephone, distributing the mail, referring problems to the appropriate officer or committee chair, inputting questionaire data in the computer, filing, and responding to routine correspondence. To volunteer call Lynne Matusow, 531-4260 (H).

Field Trip Leaders. You have asked us to expand our field trip offerings. To do so we need leaders on all islands. If you can donate a Saturday or Sunday once every few months and can lead a reef walk or have expertise in bird and/or plant identification call Lance Tanino, 247-5965 (H), Monday and Wednesday nights.

Paradise Pursits Preliminaries. Enjoy a ring side seat at the Paradise Pursuits preliminaries by assisting with the competitions. Scorers and timers are needed for the following:

Hawai'i, 12 March, call Marie Morin, 329-9390 (H).

Kaua'i, 26 March, call Randy Yokoyama or Kali Lopez, 332-7324 (W).

Maui, 19 February, call Renata Gassmann-Duvall, 572-1584 (H).

O'ahu, 5 March (definite) and 2 April (tentative), call Emily Gardner, 734-3921 (H).

The above is only a partial list. If you have a particular skill or interest call Lynne Matusow, 531-4260 (H). Who knows, maybe we have the right opening but haven't publicized it yet. All of the above are volunteer positions. Hawaii Audubon does not have paid staff.

Volunteer News

The Hawaii Audubon Society welcomes several new volunteers and says thank you to ongoing volunteers who are staffing the office and assisting in a variety of projects.

George Campbell continues to staff the office Wednesday morning and early afternoon.

Steve Carter is our volunteer coordinator. He will be in the office on Monday mornings and is setting up volunteer programs where members will have hands on experience in the field. His top priority is the Laysan Albatross Breeding Colony project. Information on this is listed under the Volunteer Corner article on this page.

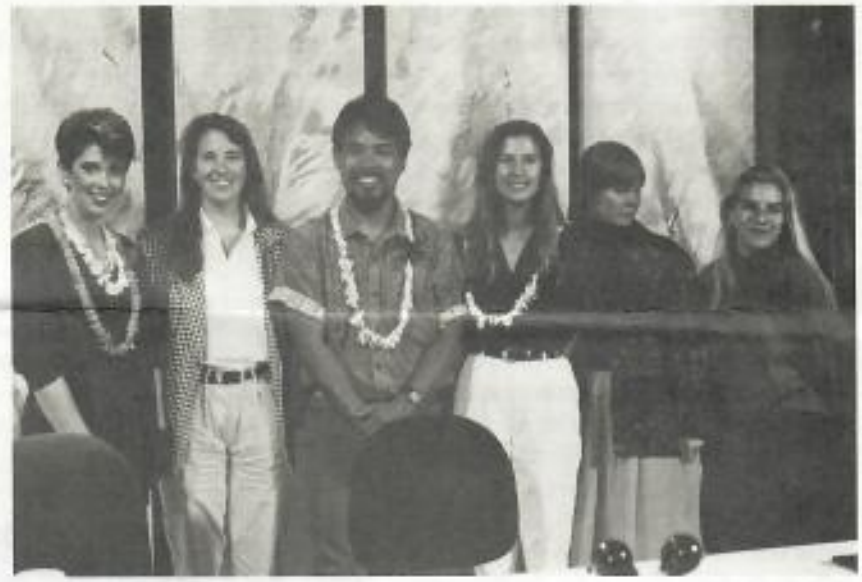
Andy Cowell plans to be in the office on Tuesday and Thursday afternoons, when he is not presenting HAS testimony at the State legislature or substitute teaching. He is also writing stories for the *'Elepaio* and working with the media.

Elly Roberts is our archivist and also works on special projects.

And a special Mahalo to the following volunteers who helped with the November ballot, dues renewal, and *'Elepaio* mailing: Kathleen Aki, George Campbell, Lynn Carey, Andy Cowell, Helen Marston, Lynne Matusow, Christi Moore, Lynn Moore, Bob Pyle, and Elly Roberts.

Albatross and young. Photo © by Dr. Causey Whittow.

Pursuing Paradise



Top left: Leslie Wilcox hosting the Paradise Pursuits finals on KHON-TV2 in January 1993 with the victorious team from Kamehameha Schools. Top right: Coach Lorene Suehiro watching Kalani High School team enjoying their prizes. Middle: left to right, Leslie Wilcox, volunteer Mary Joe Gellenbeck, judges Sam Gon and Emily Gardner, and volunteers Kersten Johnson and Candace Lutzow. Bottom left: Big Island preliminaries, left to right, Robert Mitsuyasu, Sean Wistrom, coach Keith Burchett, judge Marie Morin, and host Reginald E. David. Bottom right: Hana and Maui High School teams on a field trip led by Renata Gassmann-Duvall following the Maui competitions. Photos by Sheila A. Laffey.

The Honolulu Advertiser Sunday, December 26, 1993 A21

Study: animals just like humans

LOS ANGELES (AP) — Nearly half of Americans believe animals are a lot like humans when it comes to emotions and reasoning ability, according to a Los Angeles Times poll published yesterday.

Also, half said they object to the wearing of fur, while slightly more, 54 percent, said they oppose hunting for sport.

The nationwide survey of 1,612 adults was conducted Dec. 4-7. The sampling error was plus or minus 3 percentage points.

While 47 percent of those polled said animals "are just like humans in all important ways," 51 percent disagreed and 2 percent had no opinion.

Selected respondents indicated in interviews that they equated animals' and humans' emotions and reasoning ability. Some said animals are entitled to basic rights, just like people.

Some cited religious convictions for disagreeing, saying that people have God-granted control over animals for utilitarian reasons.

"I don't feel animals have a soul," said one respondent.

"They were put here for our use."

LIFESTYLE

The New View From On High

from Newsweek 1993

Trends: A wave of drugs floods the clubs

MOST AMERICANS REACTed to the death of River Phoenix in October with at least a sigh of sympathy. Among a certain set, though, it sparked a grim curiosity. Early press reports of the actor's death by overdose mentioned GHB, an obscure and dangerous steroid substitute occasionally gulped down by West Coast thrill seekers. Never mind that according to a Los Angeles coroner's report GHB was not found in the actor's body. And never mind, too, that it's scarcely available outside a few Los Angeles nightspots. The hunt was on. "I'd never heard of GHB before. No one in New York had," said a Manhattan drug user last week. "This month it's the only drug."

ALLAN TANNENBAUM—SYGMA

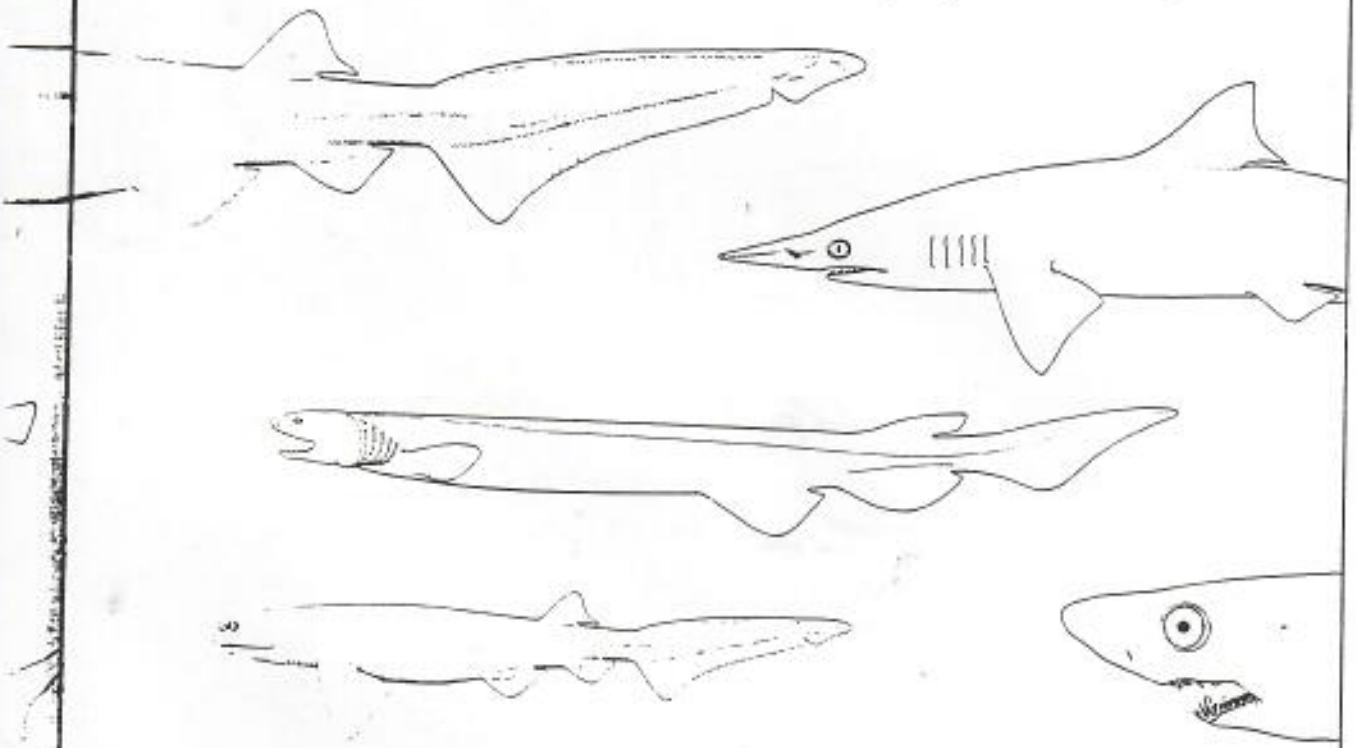
GHB
Cost $20 per ounce
Effect Alcohol-like drowsiness
Who Uses Body-builders, West Coast clubgoers

1989

SHARKS IN · QUESTION

THE SMITHSONIAN ANSWER BOOK

VICTOR G. SPRINGER JOY P. GOLD



SMITHSONIAN INSTITUTION PRESS
WASHINGTON, D.C. LONDON

PART THREE

Shark Attack

HOW SERIOUS IS THE THREAT?

Sharks do attack humans and are a potential threat to the life of anyone who spends time in the water. In recent years, the number of shark attacks may have increased, as some believe. If so, perhaps the increase is due to the increase in number of people engaging in water sports. As a result of the Marine Mammal Protection Act of 1973, there may also have been an increase in the populations of some species of sharks in response to increased populations of the marine mammals on which the sharks feed. On the other hand, the number of attacks may only be a manifestation of our interest. That is, the number of attacks may not have increased, but the proportion of attacks being reported and officially documented has increased. Whatever the circumstances, however, the threat of attack is not great. The dread of being eaten alive by a beast of the sea is far out of proportion to the number of attacks that occur. Less than 100 attacks are reported worldwide each year, and no more than 30 are fatal. To put this in perspective, over 50 fatal snakebites occur annually in Brazil alone. Many divers rarely catch a glimpse of a shark, and photographers may spend months or even years trying to attract one of the dangerous species within camera range. The sharks that do attack are mostly large individuals, between 2 m and 8 m in length, and more than half of these are members of the family Carcharhinidae, the requiem sharks.

WHICH SHARKS ARE DANGEROUS?

The four most dangerous sharks, which are those that always pose a danger to humans and have a record of numerous attacks with several fatalities, are the white shark, tiger shark, bull shark, and oceanic whitetip shark (not to be confused with the reef whitetip). These sharks are large, eat prey comparable in size to humans, and with the exception of the oceanic whitetip, visit shallow coastal areas where bathers are present. The oceanic whitetip is most often found well offshore in deep water, but occasionally ventures close to shore where the shelf is narrow. It is not a species to be taken lightly even though it has been implicated definitely in only one attack on man (nonfatal), almost 30 years ago. The oceanic whitetip is highly suspect and may well be responsible for many undocumented attacks on survivors of sea disasters.

Seventeen other species also considered dangerous, but with fewer numbers of recorded attacks and far fewer fatalities, are: the spotted and tasseled wobbegongs, nurse shark, spitting shark, sand tiger, shortfin mako, gray reef shark, narrowtooth shark, spinner shark, blacktip shark, blacktip reef shark, dusky shark, reef shark, sicklefin lemon shark, lemon shark, and possibly the Galapagos shark and blue shark. Several of these are unaggressive in situations where they meet divers, but will retaliate vigorously if they are disturbed, speared, or provoked. Blue sharks are rarely found in shallow areas, but because they travel in groups, unlike the other species, there is the potential for feeding frenzies to develop.

Four species, the Pacific angel shark, Atlantic angel shark, leopard shark, and whitetip reef shark, have bitten people, but ordinarily pose little danger because they are small or generally timid and have small teeth. Of greater danger than being bitten by the whitetip reef shark is the possibility of ciguatera poisoning from eating the liver of this shark, a favorite food item of the Gilbert Islanders.

Because of their massive size, the basking shark and whale shark should instill caution. Both these species are rather sluggish and lack sharp teeth, and normally pose no threat, even to divers intent on hitching a ride. When harpooned, however, the basking shark may ram boats.

Perhaps 40 other species are suspected of attacking people or are potentially harmful. These added to those known to be dangerous add up to less than 20 percent of all the known species of sharks.

WHERE DO ATTACKS OCCUR?

It has been reported that most shark attacks occur on sunny days in nearshore waters 20 degrees Celsius or warmer. This is probably true because the greatest numbers of swimmers prefer such conditions. But shark attacks also occur in deep waters and those at least as cool as 10 degrees Celsius. The white shark, in particular, normally patrols cold waters such as those off central and northern

California and Oregon. The "red triangle," from San Francisco's Golden Gate, about 40 km (25 miles) out to the Farallon Islands and north to Tomales Point, is the site of large sea lion and seal rookeries and is one of the most dangerous areas in which to surf or spearfish. The greatest number of white shark attacks off the North American coast occur near the Farallon Islands, but in general, for all species off North America, the greatest number of recorded shark attacks occur in Florida waters.

Several species are commonly encountered by divers on tropical reefs: nurse sharks, mackerel sharks of the family Lamnidae, hammerheads, and, most often, the requiem sharks of the family Carcharhinidae. More shark species may be found on tropical western Pacific reefs than on reefs elsewhere. The gray reef shark, blacktip reef shark, and whitetip reef shark are among the most common. Normally, there is little risk to divers unless the sharks are poked, pulled, harassed, or speared, or the warning signals or threat behavior exhibited by some species is ignored or the escape route of the sharks is blocked.

Prior to 1952, the beautiful bathing beaches of southeastern Australia and the Natal coast near Durban, South Africa, were the sites of frequent shark attacks. Since that time, offshore meshing, using a series of weighted gill nets set at overlapping intervals parallel to the beach and resting on the sea bottom, have practically eliminated shark attacks in those areas. The sharks seek the small fishes that are abundant in the rough, highly oxygenated, and turbid waters but frequently are caught in the nets and drown. The nets are regularly emptied of all sharks and other fish that have become entangled in them. One problem with the nets is that other animals, particularly marine mammals, occasionally are trapped in them and die.

WHY DO SHARKS ATTACK HUMANS?

Biologists are not sure. It is known that certain distress stimuli, such as the irregular, low-frequency sounds and odors emitted by speared fish or the sounds of splashing about in water, will attract sharks. But very little is known about when various species of sharks become hungry and how often they feed. A popular misconception is that all shark attacks are feeding forays. On the contrary, in his analysis of over 1,100 cases in the International Shark Attack File, David Baldridge estimated that from half to three-quarters may have been aggressive attacks that had nothing to do with feeding. The motivation for most unprovoked attacks in which the victim was not emitting distress signals may be hunger, but the examination of wounds on attack victims suggests other reasons as well.

Sharks are not infallible. They may mistake splashing waders for fish in trouble. They may mistake a surfer on his board for a seal. Some sharks attack humans once, then spit out their flesh and abandon them. The normal body secretions of a human even when not bleeding may be an attractant. Some sharks will test potential prey by "bumping" or ramming them before either attacking or departing.

In such encounters, victims often suffer painful abrasions and lacerations from the fins and rough denticles of the skin. Because the bites on some victims are similar to the courtship bites of males on females, even sex has been suggested as a motivating force. However, there is no proof that only male sharks perpetrate these attacks.

Some sharks will attack or display aggressiveness even though not directly provoked or excited by the presence of food. The victim may inadvertently intrude in the space a shark regards as his own, although the existence of such territorial behavior in sharks is still only a theory. Rather, as discussed in the section on the gray reef shark, some scientists believe that the series of threat postures performed when the shark is approached too closely by man or submersible is a reaction by the shark to a perceived danger of attack. If the shark's aggressive postures are not heeded, it will pursue and attack the interloper. At least five species of carcharhinid and sphyrnid sharks are known to exhibit some aspects of threat behavior.

WHERE ARE SHARK ATTACKS RECORDED?

In 1958, the U.S. Navy's Office of Naval Research convened a group of experts, known as the Shark Research Panel, with Dr. Perry W. Gilbert, then director of the Mote Marine Laboratory in Sarasota, Florida, as its chairman. Its function was to oversee the development of a shark research program, formulate the questions that were to be the basis on which shark research would be funded, and disseminate the results of their findings. The impetus for the creation of the panel was the realization that first, there was scant scientific information on the biology and behavior of sharks; and second, a serious morale problem had occurred during World War II, and could occur again, when servicemen realized they might have to abandon ship in shark-infested waters. These problems could only be addressed if an intensive research program were initiated.

In 1959, the International Shark Attack File was established by the Office of Naval Research for the purpose of providing a reliable data base for evaluating shark attacks. The nucleus of this file was a small cache of data collected over the years by the late Dr. Leonard Schultz, curator-in-charge of the Division of Fishes at the Smithsonian Institution. Cornell University, the Smithsonian Institution, and the American Institute of Biological Sciences worked jointly to collect and supply data to the file, which grew to 1,652 cases. In 1968, the data collected were sent to the Mote Marine Laboratory to be incorporated with their research data. The data were analyzed and presented in a report entitled, *Shark Attack against Man: A Program of Data Reduction and Analysis*, by Dr. H. David Baldridge, Mote Marine Laboratory, October 31, 1973. Mote Marine Laboratory provided the material, administrative, and technical support for the data reduction phase of preparing the report. The report attempts to explain how, when, where, and possibly why sharks attack, based on the cases analyzed. As a response to the public interest and

inquiries regarding shark attacks, a popular version of the report, *Shark Attack*, also by H. David Baldridge, was published in 1974 by Berkeley Medallion Books of New York, and it remains a good source of information for the layman.

For some years all shark attack records were kept at Mote Marine Laboratory, but currently the American Elasmobranch Society has undertaken the responsibility for maintaining, expanding, and analyzing shark attack data. The files are under the direction of George Burgess, American Elasmobranch Society, Florida Museum of Natural History, Gainesville, Florida 32611.

ARE THERE ANY EFFECTIVE SHARK REPELLENTS?

No, neither chemical nor physical. The first chemical shark repellent widely used was developed in 1943, during World War II. It represented an effort to protect military personnel in the sea after their planes were downed or vessels sunk. "Shark Chaser," as it was known, was a water-soluble cake consisting of a mixture of 80 percent nigrosene dye and 20 percent copper acetate. In preliminary tests it appeared that the dye acted as a visual screen, and the copper acetate inhibited feeding responses by captive smooth dogfish sharks. In actual practice, "Shark Chaser" proved to be more of a morale booster than an effective shark repellent. Additional tests of the compound in 1963 showed that any effectiveness of "Shark Chaser" was due to the visual effect of the opaque dye, which, unfortunately, dispersed all too quickly in the open sea, rather than the copper acetate which had no effect as a feeding inhibitor.

Various devices have been tested as attack deterrents. The use of gill nets off the beaches in Australia and South Africa has been reasonably successful in decreasing the number of attacks by decreasing the size of the local shark population. But the use of gill nets is time consuming and expensive. Electrified and electronic barriers are being tried, but these are also expensive and can be dangerous to divers and marine animals other than sharks. A large foldable, plastic bag called the "Johnson Shark Screen" is a promising solution for survival of victims of sea or air disasters. The bag can be carried in a pocket, and at the time the victim finds himself in the water, unfolded, filled with water, and entered. A flotation ring at the top of the bag suspends it near the surface and supports the victim. Odors, sounds, electric fields, visual shapes, and movement normally attracting sharks are masked by the bag.

Among the protective devices developed for divers are the shark billy (a short pole to ward off the shark), the "bangstick" (a pole with an explosive cartridge that detonates on contact with the shark), a gas-injection dart (that bloats the shark and causes it to float), an electric dart, and a toxin syringe. Most of these weapons are more dangerous than the shark to the untrained user. Furthermore, the diver must be in position to see the shark he plans to engage. With some sharks, the time it takes for a drug to be absorbed, transported through the circulatory sys-

tem, and incapacitate a shark is too slow to be safe. But these weapons seem to give some protection in specific situations, even though they may not always be relied upon.

In searching for a chemical repellent, several factors have to be considered: the repellent must be specific to sharks and it must have essentially no effect on the human user. It should be stable enough to be stored for a long time, be inexpensive, and effective in small amounts. The most promising naturally occurring chemical repellent derives from the shark-repellent properties of a flatfish from the Red Sea, the Moses sole (*Pardachirus marmoratus*). Dr. Eugenie Clark of the University of Maryland discovered that the Moses sole exudes a milky white secretion from glands along its dorsal and anal fins that has the effect of repelling sharks. The prime component of the secretion is the active toxin pardaxin, an extremely complex protein that affects the gills of sharks and is similar chemically to surfactants, detergents capable of emulsifying oils. Because pardaxin is too unstable and expensive to collect or synthesize, and because sufficient concentrations required for use in open water are difficult to determine, current research has focused on the production of a repellent based on industrial surfactants. Although surfactants have been found that are more effective than the freeze-dried toxic secretion of the Moses sole, the problem of swift dispersal in the water has not been solved. To date there is still no effective chemical repellent available in a small, handy cake or packet size for swimmers and divers. Current research efforts have diverged from the developing of chemical repellents to addressing the question of how to develop materials and products to protect undersea structures and devices from sharks.

Further readings

Baldridge, H. D., 1973, 1974; Brownlee, S., 1985; Coppleson, V. M., 1962; Davies, D. H., 1964; Gilbert, P. W., ed., 1963, Gilbert, P. W., 1977, 1984a, 1984b; Gruber, S. H., 1981a; Hodgson, L., 1984; Johnson, R. H., and D. R. Nelson, 1973; Nelson, D. R., 1981; Nelson, D. R., and R. H. Johnson, 1980; Nelson, D. R., et al., 1986; Wilson, R., and J. Q. Wilson, 1985; Zahuranec, B. J., ed., 1983.

HOW CAN SHARK ATTACKS BE AVOIDED?

The following advice, based on Perry W. Gilbert's chapter in *Sharks and Survival*, "Advice to Those Who Frequent, or Find Themselves in Shark-Infested Waters," chapter 18 in H. David Baldridge's *Shark Attack*, and information from Leonard J.V. Compagno's *Sharks of the World*, is rephrased and condensed. These are commonsense rules about where and when to swim or dive and how to avoid attracting sharks. They include some new warnings based on what is known of shark behavior.

1. Do not enter waters known to be frequented by large sharks.
2. Do not enter waters where there has been a recent shark attack.
3. Do not swim or dive alone. Always have a companion or stay in a group.

Most attacks occur on lone individuals. A companion can render assistance if close by.

4. People with open wounds, even slight cuts, and divers with injuries should stay out of the water or leave quickly if injured. Blood and human wastes may attract and excite sharks.

5. Swimming or diving in murky water should be avoided. The swimmer should be watchful in this situation.

6. Avoid swimming far offshore, in channels, or over dropoffs to deeper water—these are all areas where large sharks are most often encountered.

7. If groups of fish start to behave erratically or congregate in large numbers, leave the water.

8. Avoid entering the water if you are unevenly suntanned or wearing a swimsuit that is bright or contrasts with your skin. Low contrast is better. Dark-skinned swimmers should wear dark-colored swimsuits, and light-skinned ones should wear light blue or green. Do not wear colors such as yellow, orange, and red. Reverse countershading should also be avoided, for instance, a two-color suit that is dark on the front side and light on the back, like a floating dead fish. Wetsuit color should be chosen carefully so it does not mimic natural prey. The wearing of a black and white striped wet suit that mimics the coloration of small, venomous sea snakes, was reported by one ichthyologist to discourage sharks, but others have not had the same good experience. Indeed, some tropical Pacific and Indian Ocean sharks actually eat banded sea snakes. Although the gray reef sharks off the Australian coast appeared to be repelled by a diver in a black and white striped suit, blue sharks off California and gray reef, blacktip reef, and whitetip reef sharks in the Pacific were not.

9. Do not swim with dogs or other pets, or surf near seal and sea lion colonies.

10. Scan the water for sharks before jumping or diving from a boat.

11. Be alert for an entrapped shark when swimming in tide pools, bays, or small lagoons that have been cut off from the sea at low tide.

12. Avoid swimming or diving at dawn, dusk, or at night when many species of sharks feed more actively.

13. Do not provoke or molest a shark, spearing or riding it, or pulling its tail. Even small sharks can inflict painful or serious wounds.

14. Surfers should be aware that the risk of shark attack appears to be greater with the use of the newer short bellyboards than with the older larger surfboards. The overall silhouette of a surfer's arms and legs hanging from a bellyboard might be mistaken for the shape of a seal by a dangerous shark such as the white shark.

15. Avoid spearfishing in the same waters for an extended period. Erratic swimming movements and the body fluids of wounded fish increase chances of attracting sharks. Do not carry speared fish on or near your body; remove them from the water immediately.

16. Divers should leave the water as soon as possible if a large shark is sighted. Do not panic. Avoid erratic movements; swim smoothly to reach the shore or boat. If wearing scuba, swim along the bottom, where rocks or corals might provide protection, to below the boat before surfacing. Submerged divers should watch

sharks carefully to determine the best time to leave the water, or counter an attack should one occur. When menaced, back off, keeping your movements calm. Any rigid or jerky movements by a shark may represent a threat display, and the diver should retreat at once.

17. Shark cages or small sharkproof submersibles may be necessary for divers who must work in a specific area where they are harassed by dangerous sharks. Custom-made stainless steel, chain-mail suits have been made that provide limited protection from the bites of small sharks, but these suits are inconvenient to wear, generally unavailable, and too expensive to be practical.

Even if you do not or cannot conform with any or all the above recommendations, it may be reassuring to remember that the likelihood of being attacked by a shark is slight. On the other hand, conforming with all the recommendations is no guarantee that a shark attack will be avoided. If one desires absolute safety from shark attacks in marine waters, we recommend bathing in the Black Sea (bordered by Turkey, Bulgaria, Romania, and the USSR), which is about half the saltiness of normal seawater, its appendix, the Sea of Azov, or the landlocked Caspian Sea (both USSR), which is even less salty. No shark attacks have been reported from these waters, and no sharks exist in the Caspian Sea.

What to Do if a Shark Attack Appears Imminent

1. Keep calm and use any weapons you may have to fend off the shark. Divers should carry a tool or object such as a shark billy (a long club to fend off or push off a shark), a speargun, abalone iron, or the like.

2. Avoid injuring the shark unless all else fails. An injury may make the shark more aggressive. Spearguns, powerheads (bang sticks), or gas guns should be used as a last resort, as they may only excite the shark or attract other sharks to the area.

3. Sometimes an attack may be aborted by shouting underwater, blowing bubbles, or poking the shark, even with your hands, in its eyes or gills. At other times these actions have no effect and even provoke more aggressive behavior.

4. If you are bitten, make immediate efforts to stop the bleeding, even before leaving the water. Most victims die from loss of blood rather than from loss of body parts.

temperature of brooding adults (mean = 37.5°C) during the day is almost 1°C higher than that of brooding adults at night (Howell and Bartholomew 1961). Adults shade nestlings from intense solar radiation by standing over them (Whittow 1980a).

Feeding. During the post-guard stage the parent bird visits the nestling only briefly to feed it. Nestling is fed by regurgitation stimulated by nibbling at the adult's bill (Rice and Kenyon 1962b). Nestling inserts its bill crosswise between the adult's mandibles allowing the ejected oil and partially digested stomach contents to pour into its throat. During a single visit lasting 15–25 min, nestling may be fed 3–4 times. Prior to feeding, the nestling makes the begging "peep-peep" call. After feeding its nestling, adult often rushes to the nearest neighboring nest and attacks the unattended nestling. Attacking adult gives a high-pitched shriek and approaches the nestling with its head lowered and neck extended. Nestling being attacked exhibits facing-away behavior. Attacks may ultimately lead to the death of the nestling.

Pettit et al. (1984b) calculated that a hatchling could subsist on its yolk reserve for 4.4 d were it not fed. However, during the first 2 wk after hatching, the nestling is fed, on the average, every 0.88 d. When the nestling is guarded intermittently, the mean feeding interval is longer—1.42 d. After that, the mean interval increases to 2.46 d. The greatest recorded distance traveled by a Laysan Albatross in a day is 528 km (Kenyon and Rice 1958). Thus, the farthest from the nest that an albatross might travel in 2.46 d would be 650 km. Nestling is usually fed during the day.

For the first few days after hatching, nestlings are fed stomach oil exclusively; such oil also forms a large proportion of the diet of older nestlings. This is consistent with the low respiratory quotients (RQ) of nestlings because the metabolism of fats and oils results in a low RQ (Grant and Whittow 1984). The oil is derived from the adult's food and it represents an efficient method of storing energy nutrients in the adult's body for delivery to the nestling. By 6–7 wk post hatching, most nestlings are recognized by their parents who will not feed an unfamiliar nestling (Rice and Kenyon 1962b). A breeding pair cannot rear more than one nestling and a single parent cannot rear one nestling (Rice and Kenyon 1962b). Fisher (1967) weighed adults during the nestling period and found that their body mass fell until the nestling reached its maximal mass, and then rose (Appendix).

Nest sanitation. Nest is kept clean because the nestlings eject the feces in a forceful stream a meter or more beyond the nest (Rice and Kenyon 1962b). In general, the amount of feces is small.

Nest defense. During the guard stage, as during incubation, the adult bird will snap at intruders.

Nest site tenacity. Adults do not attempt to retrieve a displaced nestling; adult will choose the nest rather than a displaced nestling (Bartholomew and Howell 1964). Nestlings removed from their nests are ignored by their parents (Rice and Kenyon 1962b).

COOPERATIVE BREEDING

Nonbreeders will sit on an uncovered egg. LeFebvre (1977) described an abandoned nestling that was fed successfully by 6 other adult birds.

BROOD PARASITISM

None

FLEDGLING STAGE

Departure from the nest. Nestlings may be fed on their last day at the nest but the amount of food is inadequate. Departure may be stimulated by hunger. Fledglings leave the Midway colonies from 20 Jun to 2 Aug, but most leave between 5–25 Jul (Fisher and Fisher 1969, Fig. 3). Departure from the island itself may take place 2–3 d later, the birds moving towards the beach and making trial flights over the lagoon (Fisher 1967). They then fly northwest to the ocean east of Japan (Robbins and Rice 1974).

Period from hatching to departure. Mean = 165 d (Rice and Kenyon 1962b).

Condition of development at departure. Apart from tufts of down on the head, the fledglings are almost identical in appearance to adults. There may be a few grayish feathers on the upper thighs and gray flecks on the crown, while the bills are gray-black, distinguishing them from the adult (Rice and Kenyon 1962b). They leave the island at body mass of 2 kg, well below that of breeding adults at the same time (Appendix).

Association with parents or other young. Fledglings tend to leave at the same time as their neighbors (Fisher and Fisher 1969). They move in the direction of the reef and open ocean rather than the lagoon at Midway.

Predation. Fledglings fall prey to sharks as they swim away from their nesting islands (Fisher 1975b). Tiger sharks may kill 1 fledgling in 10 in Jul (Harrison 1990).

Ability to get around, feed, and care for self. Fledglings have to learn to swim, fly, and feed. Some leave the nest site too soon: Rice and Kenyon (1962b) found emaciated nestlings along the beaches—birds that had left the nest site before they were effective fliers and were no longer being fed. Most of them died.

IMMATURE STAGE

Do not return to breeding colonies until the 3rd yr after hatching (Rice and Kenyon 1962b). At sea

Plastic birds, tapes meant to entice Laysan albatross

Honolulu Star-Bulletin A2 JAN 94

OCEAN WATCH
By Susan Scott

HERE's a news quiz: Name the huge black-and-white seabirds that are sky-pointing, singing and standing over gray fuzzy chicks on Kaohikaipu Island (Black Rock) off Makapuu Beach Park.

Laysan albatrosses you say?

Wrong. The answer is Laysan albatross dummies.

Now some might believe that all albatrosses are dummies, hence the nickname goony birds, but that's not so. They're just a bit clumsy on foot. But the birds on Black Rock really are hollow heads.

The National and Hawaii Audubon Societies, U.S. Fish and Wildlife Service, Hawaii's Department of Land and Natural Resources, Sea Life Park and Dr. Causey Wittow have worked together to place 30 plastic birds, and song recordings, on the island in hopes of attracting living Laysans.

This isn't being done to entice Laysans to Oahu. They're already here. But they are nesting in places hazardous to their health.

One such place is Kaena Point, a state nature preserve. This might seem like a pretty good place for seabirds to set up housekeeping, but ground nesters aren't safe anywhere on the main islands anymore.

Besides dogs, cats and mongooses, humans also kill and harass the birds. Last year, several birds laid and hatched four eggs. One flew away and the other three were killed, two by humans, one by a dog.

Even so, Laysans continue to arrive there, attracted by other birds and by the preserve's wide-open space albatrosses need for takeoffs and landings.

Concerned biologists and bird lovers are hoping to lure these determined colonists to a safer place on Kaohikaipu Island, a state bird sanctuary with no ground predators.

But this would be just a breeding place. The true home of all albatrosses is the ocean, where they spend most of their lives on the wing in graceful splendor.

After fledging, a young albatross spends the first several years of life at sea, then comes to land in spring to find and court potential mates for future breeding.

AFTER some exuberant singing and dancing, the birds return to sea, coming back to the same place in subsequent years to breed with lifelong mates, established during these courtship rituals.

Most albatrosses breed in the same place they hatched, sometimes even choosing the same patch of sand or grass. This homing tendency makes the establishment of new colonies rare, but there are pioneers. Since the mid-1980s, the Laysans have increased dramatically in the main islands, numbering about 1,000 individuals.

Hopefully, a few of these will check out the new colony at Kaohikaipu Island. I did, and from a distance, it fooled me.

The decoys are amazingly lifelike, particularly the chicks, which are covered with fuzzy sheepskin stuff that ruffles in the wind like feathers.

The sounds from the recordings also are authentic, piercing through the sounds of wind and surf just like real albatross love songs.

It was only when my kayak drew closer to the island that something looked weird: All these albies were permanently sky-pointing.

SCOTT Hall, National Audubon biologist and my guide to the island, said that people already are working on decoys of birds standing in normal position. These will be placed along with the sky pointers next year.

You can help the Laysan albatrosses by volunteering to watch the decoy colony through a telescope set up at Sea Life Park.

Volunteers work in three-hour stints, noting details biologists need to know for starting and maintaining a successful colony.

Call Steve Carter at the Hawaii Audubon office at 528-1432 and leave a message. Or come to his information session at 7:30 p.m. tomorrow at Bishop Museum's Paki Conference Room.

The project needs volunteers through May when the courting albatrosses return to sea.

Another way to help the birds is to pass the word that a scientific experiment is taking place on Kaohikaipu Island.

Respect both the albatrosses and the people trying to help them by leaving the decoys and equipment untouched.

Susan Scott is a marine science writer and author of three books about Hawaii's environment. Her Ocean Watch column appears Monday in the Star-Bulletin.

"These foul and loathsome animals are abhorent because of their cold body, pale color, cartilaginous skeleton, filthy skin, fierce aspect, calculating eye, offensive smell, harsh voice, squalid habitation and terrible venum; and so their Creator has not exerted his power to make many of them."

Carolus Linnaeus, 1758

FORM CD-14 (2-76) Prescr. by DAO 214-2 — U.S. DEPT. OF COMM.

TRANSMITTAL SLIP

TO: George Balazs	DATE: 1/5/94
	REF. NO. OR ROOM, BLDG.: HL
FROM: John Naughton	REF. NO. OR ROOM, BLDG.: PAO

ACTION

- [ ] NOTE AND FILE
- [ ] NOTE AND RETURN TO ME
- [ ] RETURN WITH MORE DETAILS
- [ ] NOTE AND SEE ME ABOUT THIS
- [ ] PLEASE ANSWER
- [ ] PREPARE REPLY FOR MY SIGNATURE
- [ ] TAKE APPROPRIATE ACTION
- [ ] PER OUR CONVERSATION
- [ ] PER YOUR REQUEST
- [ ] FOR YOUR APPROVAL
- [x] FOR YOUR INFORMATION
- [ ] FOR YOUR COMMENTS
- [ ] SIGNATURE
- [ ] INVESTIGATE AND REPORT

COMMENTS:

George: Attached is summary of non-task force caught tiger sharks. The majority of stomach contents were reported to me — I only examined a few. Confidential because of names.

John

Tiger Shark Data - Non Task Force Caught Sharks - Oahu

1. June 18, 1992. 11'. Two bones (cow or horse) in stomach. Caught off Haleiwa. Tagged 12/19/89 off Kaena Point by Dale Simmons. Recovered by Bradley Hara.

2. November 25, 1992. 12' ♀. Stomach contents: u'u, oio, aweoweo, and parts of their gill net (which shark was caught in). Also, 18" awa. (Details on separate sheet in Task Force file). Mitchell Baluski.

3. November 28, 1992. Ewa Beach. TL 14', FL 12' ♀. Everted stomach. Pups (8" average). Robert Moncrief.

4. November 28, 1992. Ewa Beach. TL 78", FL 72" ♂. Chunks of shark (from line?). Robert Moncrief.

5. November 28, 1992. Ewa Beach. TK 84", FL 73" ♂. Empty stomach. Robert Moncrief.

6. December 25, 1992. 12', 1500 lbs. No data. Haleiwa. Arthur Kamisugi.

7. December 29, 1992. 12'1" ♀. Everted stomach. Kailua. Robert Moncrief.

8. December 31, 1992. 15' ♀. Stomach contents: wild pig, turtle (pieces), lobster, *fistularid*. Caught in "brown water" from Haleiwa Stream after heavy rain. Perry Dane, 637-7605.

9. December 31, 1992. 12'. Stomach contents: Turtle (pieces), bird feathers, coral blocks. Haleiwa. Perry Dane.

10. January 8, 1993. 6' ♂. Empty stomach. Kailua. Robert Moncrief.

11. January 17, 1993. Moku Manu. Approximately 10'. Chris Nee. (Report by R. Moncrief).

12. January 17, 1993. Between Mokapu and Mokulua Islands. Approximately 7'. Chris Nee. (Reported by R. Moncrief)

13. January 22, 1993. 11' ♀ (Slender). Left-Overs (near Waimea Bay). Large turtle 200 lb.+ (head, "wings" [no tags] bones and parts of shell.) Took photos. Caught in 60-70'. Perry Dane.

14. January 22, 1993. 6' ♂. Left-Overs. Only bait in stomach. Perry Dane.

15-19. NOSC has taken 5 in past 6 months. Very little data other than 3 turtles in one shark. TL between 10'-13'. Kaneohe Bay.

20-22. Kailua fisherman (anonymous) has taken 3 in past 6 months. Very little data. TLs: 11', 11', 12 1/2'. Kailua Bay.

23. February 27, 1993. 10'3" ♀. Waimanalo Reef (false pass). Stomach empty. R. Moncrief.

24. March 13, 1993. 130" ♂. Moku Manu. Reef shark in stomach. R. Moncrief.

25. March 13, 1993. 110" ♂. Moku Manu. Seabird remains in stomach. R. Moncrief.

26-27. End of March 1993. Two tiger sharks (10-12'TL) taken off Chinaman's Hat Island, Kaneohe. (more information will be obtained).

28. April 23, 1993. 13'10" ♀. Caught outside of Mokulua Islands, Lanikai. Stomach empty but stingray barbs (3) in jaws. Recently mated - bite marks on dorsal. Utilized shark: $15/lb. for fins, 80¢/lb. for fillets. (Anonymous, but confirmed.)

29. May 19, 1993. 12' ♂. Caught in gill net off "Pray for Sex Beach", Makua, Oahu. Homeless person set net parallel to shore, 20 meters offshore. Shark tangled in net. Turtle plates in stomach. Jim Beat, 623-2007.

30. June 12-1993. 10'♂. Off Mokulua Islands, Lanikai in 60'. Lost but killed with powerhead. S. Moncrief.

31. June 12, 1993. 14'♀. Off Mokulua Islands, Lanikai in 60'. Stomach: Galapagos shark from another hook. S. Moncrief.

32. June 12, 1993. 14'♀. Off Mokulua Islands, Lanikai in 60'. Stomach: Turtle remains (four flippers), shark remains (old). S. Moncrief.

33. June 21, 1993. 11'5" ♂. Off Mokulea Island, Kailua in 55'. Stomach empty. S. Moncrief.

34. June 21, 1993. 8'♂. Off Mokulea Island, Kailua in 55'. Stomach everted. S. Moncrief.

35. July 3, 1993. TL 16'3", PC 13'8" ♀. Off Pyramid Rock, Kaneohe in 60'. Numerous mating scars, dorsal fin tattered. Stomach everted but with moonfish bait. C. Schneider.

36. July 3, 1993. 5'♂. Off Pyramid Rock, Kaneohe in 60'. Stomach empty. C. Schneider.

37. July 14, 1993. 8 lb. pup. Off Kaneohe Bay. Taken to HIMB alive, died next day. C. Schneider.

38. August 7, 1993. 12'♂. Off Rabbit Island. Stomach: bait only. Damage to jaw. C. Schneider.

39. September 14, 1993. 13'6" ♀ with pups (30"). Off Dillingham Field. Stomach: Turtle remains, porpoise remains (unconfirmed - ribs and vertebrae). P. Dane.

40. September 14, 1993. 12'7" ♀ with pups (full term). Off Dillingham Field. Stomach: *Balistid* (humu humu), *Fistularid* (stickfish), turtle remains. P. Dane.

41. September 14, 1993. 10'2" ♀. Off Dillingham Field. Stomach everted. P. Dane.

42. September 14, 1993. 8 to 9' ♀. Much of tiger eaten by another shark. No stomach. P. Dane.

43. December 1, 1993. 13'8" ♀. Off Haleiwa. Stomach contents: wild pig remains, fish remains (Scorpanid). J. Hoffman.

44. December 1, 1993. 10'1" ♀. Off Haleiwa. Stomach contents: Complete green turtle, reef fish, sea bird. J. Hoffman.

45. December 9, 1993. Approximately 10' to 11', no sex. Off northern end of North Shore. Stomach contents (saved): Complete green turtle, sea bird feathers, bait. T. Enslow.

46. December 9, 1993. Approximately 10' to 11', no sex. Off northern end of North Shore. Stomach contents (saved): Green turtle remains, land mammal remains (hooves), sea bird feathers, spiny lobster, bait. T. Enslow.

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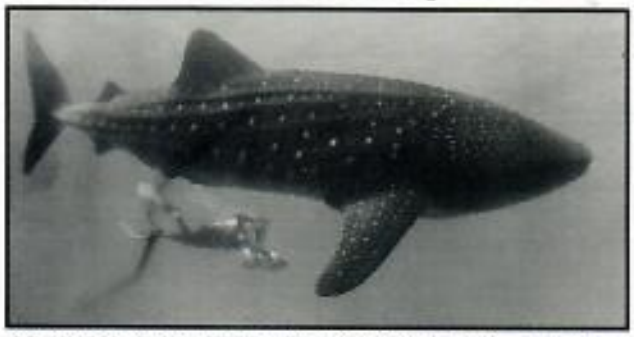

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FORM 11A (Rev. 9/93)

An encouraging new crop of three local books on the ocean environment

April 27, 1994 ■ Honolulu Weekly ■ 17

Wet Words

Local publishers are producing some good natural-history books these days, but one has to weed them out of the pasture of quick-and-dirty editions produced for tourist consumption. One of the best ways to weed is to look at the index: A well-thought-out index (for example, for a marine guide, one that gives scientific, common and Hawaiian names for fishes) will usually signal serious intent. As someone who relies on a combination of snorkeling and reading to get a grasp of marine natural history, I'm encouraged by the release of three locally produced and well-indexed books:

PAM FRIERSON

Shark!

Unless you are a veteran water person (and maybe even if you are), you are likely to be nervous about sharks, particularly after the heightened shark-anxiety of the last few years. It has been nearly four years since the last fatal shark attack, on Aaron Romento at Keaau Beach Park, Oahu. That tragedy — along with the fatal attack on Martha Morrell at Olowalu, Maui, the year before and a handful of nonfatal attacks within the last few years — has led to a widespread fear that sharks are on the increase or that they are running out of their normal food source and growing dangerously hungry.

Leighton Taylor's *Sharks of Hawai'i: Their Biology and Cultural Significance* (University of Hawaii Press, $19.95) is a nicely produced and much-needed book which may help quell the hysteria. *Sharks of Hawaii* is the first full-fledged guide to the sharks found in Hawaiian waters. (In 1991 Arnold Suzumoto authored *Sharks Hawai'i*, a small booklet for the Bishop Museum.)

Excellent photographs accompany Taylor's text, which discusses the basics of shark biology and includes a full descriptive catalog of species. *Sharks of Hawaii* includes a reasonably thoughtful chapter on "Sharks and Hawaiian Culture," in which Taylor speculates on relationships between shark populations and human behavior in ancient and contemporary Hawaii. Taylor's research among the coral atolls of the Northwestern Hawaiian Islands and Laysan Atoll leads him to the conclusion that larger numbers of sharks may have congregated off the main Hawaiian Islands in earlier times because "the nearshore waters of Hawaii were not crowded with noisy boats." He also theorizes that early Hawaiians might have had much more common interactions with sharks.

These aren't empty theories, for the author is eminently qualified: Taylor is a former director of the Waikiki Aquarium as well as a research scientist and an avid swimmer and diver. It was Taylor who identified the first megamouth shark, caught off Oahu in 1976, as a new species.

Sharks in Hawaii concludes with a brief section by George Balasz of the National Marine Fisheries Service, who has compiled a register of recorded shark attacks in Hawaii (current through December 1992). Balasz's comments help to clarify the information in the register, which has generally been misinterpreted during the debate over shark hunting. The register makes it clear that out of 44 recorded deaths possibly involving sharks since 1779, only 10 can be indisputably attributed to shark attack. Of the 34 other fatalities, six were likely due to shark attack, nine were likely due to another cause (such as drowning), and for 19 there was "insufficient information to base an opinion as to cause of death."

If you exclude from the list the incidents that are not indisputable attacks, then the rate of shark attack when averaged out over the years does not show a clear increase. Considering how many more people are out there in the water these days, it's hard to argue that shark predation against humans is on the rise. The one thing I miss in Taylor's book is a discussion of the issue of shark hunting, since surely the pressure to hunt sharks will continue, and if there is ever an attack in Waikiki, the pressure will become extreme. Taylor's book, with its tone of admiration for the animal, is in itself a plea for shark conservation, but I am surprised that it does not more explicitly champion the cause, or a least speculate on the possible domino effects of overfishing sharks, since there is evidence that shark culling has led to imbalances in ecosystems elsewhere.

Baywatch

Fish watching is like viewing art: The more you understand about your subject, the more you'll appreciate it. Hawaii is still one of the best places in the world to study marine life; our reefs are still, for the most part, healthy, and we have a high number of unique indigenous species. If you don't have a knowledgeable friend to introduce you to the wonders of coral reefs, you would do well to start with *Exploring Hanauma Bay* (University of Hawaii Press, $12.85) by Susan Scott, who writes a weekly "Oceanwatch" column for the *Honolulu Star-Bulletin*. After reading *Exploring Hanauma Bay*, those of us who have given up the bay to tourists may want to reclaim it, for it has, as Scott reminds us, an astounding variety of marine life. The book offers a series of "tours" from beginning shore exploring and wading to serious snorkeling and scuba diving.

Fish facts

John P. Hoover's *Hawaii's Fishes: A Guide for Snorkelers, Divers and Aquarists* (Mutual Publishing, $16.95) is a good general fish guide, with informative descriptions of commonly encountered species and decent photographs with captions that tell where the fish was found and at what depth. Hoover also describes the best snorkeling spots around the Islands and makes a plea for strengthening the marine parks system. The book has a good annotated bibliography and, most useful, a table of invalid or incorrect scientific names commonly applied to local fishes. Common, scientific and Hawaiian names are indexed separately, making this a good book for quick reference. ■

Influx of shark sightings could be deceiving

By Diana Leone
dleone@starbulletin.com

Immediately after a shark bites a person in Hawaii waters, people tend to be more vigilant about spotting sharks, experts say.

"It always happens that when sharks make the news, people start paying more attention," said Randy Honebrink, of the state Division of Aquatic Resources. "And when they do that, they see more sharks."

Whether the number of sharks is increasing is not clear, he said. "We know there's a lot of them out there" because researchers have no trouble catching sharks to tag them for tracking, Honebrink said. "And we know for the most part they leave people alone."

For the most part, but not entirely.

From 1990 through March, the Hawaii Shark Task Force has recorded 57 shark attacks on people or their gear (usually a surfboard), an average of three to four a year. Forty-six of the attacks resulted in injuries, and five in death. Only one year (1998) had no recorded shark attacks. The year with the most attacks recorded by the task force (eight) was 2002.

Five deaths by shark in Hawaii waters have been listed by the task force since 1990: surfer Willis McInnis at Kahana, Maui, in 2000; kayaker Nahid Davoodabai, west of Maui in 1999; body-boarder Aaron Romento at Keiau Beach Park, Oahu, in 1992; body-boarder Bryan Adona at Leftovers, near Waimea Bay, Oahu, in 1992; and snorkeler Martha Morrell at Olowalu, Maui in 1991.

IN THE LATEST incident, Ronald Deguilmo, 29, was spearfishing Wednesday when he was bitten in the arm by a shark at the Leftovers surf spot between Waimea Bay and Laniakea. He was listed as stable by his doctor yesterday.

Visiting surfer Liz Dunn, 28, was bitten in her left leg while surfing in murky conditions at Leftovers on March 24.

Some have questioned whether an increase in sea turtles on the North Shore could be leading to an increase in sharks, said George Balazs, lead sea turtle researcher for the National Marine Fisheries Service. Tiger sharks are known to eat turtles, though it is not known how often, he said. "So if you have more turtles, you could have more tiger sharks."

The number of green sea turtles has been increasing since they were listed as a threatened species in 1978.

Another question people have asked is whether boat tours that throw fish to attract sharks to underwater cages for tourists could be drawing sharks in. State law forbids feeding sharks in state waters, which is out to three miles from shore, said Gary Moniz, head of Department of Land and Natural Resources conservation officers.

Conservation officers have at times checked on boats that were closer to shore than that, Moniz said, and "they've been in compliance" with the no-feeding rule. The boats are free to be in state waters and to put their observation cages underwater, as long as there is no feeding of sharks, he said.

SAFETY ADVICE TO STAY CLEAR OF SHARKS

Ten safety tips to reduce the risk of shark injury:

1. Swim, surf or dive with other people, and don't move too far away from assistance.
2. Stay out of the water at dawn, dusk and night, when some species of sharks move inshore to feed.
3. Do not enter the water if you have open wounds or are bleeding in any way. Sharks can detect blood and body fluids in extremely small concentrations.
4. Avoid murky waters, harbor entrances and areas near stream mouths (especially after heavy rain), channels or steep drop-offs. These types of waters are known to be frequented by sharks.
5. Do not wear high-contrast clothing or shiny jewelry. Sharks see contrast very well.
6. Refrain from excessive splashing; keep pets, which swim erratically, out of the water. Sharks are known to be attracted to such activity.
7. Do not enter the water if sharks are known to be present, and leave the water quickly and calmly if one is sighted. Do not provoke or harass a shark, even a small one.
8. If fish or turtles start to behave erratically, leave the water. Be alert to the presence of dolphins, as they are prey for some large sharks.
9. Remove speared fish from the water or tow them a safe distance behind you. Do not swim near people fishing or spearfishing. Stay away from dead animals in the water.
10. Swim or surf at beaches patrolled by lifeguards, and follow their advice.

Source: Hawaii Division of Aquatic Resources

Shark: Ocean Safety lifeguard perceives an increase in sightings

Continued From A1

"It's a bad injury. Terrible," he said.

DEGUILMO, WHO is right-handed and works as a manager at Outback Steakhouse in Waipio Gentry, was bitten by a roughly 9-foot shark Wednesday afternoon while spearfishing with a friend about 250 yards off the "Leftovers" surf spot on the North Shore.

He received more than 100 stitches to close cuts, repair tendons, nerves and lost muscle, Brunel said. Even with months of physical therapy, it is unclear whether Deguilmo will regain full control of his fingers and hand, he said.

Brunel said he has treated a couple of shark attack victims, noting that the injuries are usually very serious.

"It's the kind of injury that can get worse before it gets better," Brunel said about the risk of possible infections. "He's just lucky to be alive."

THE SHARK bite was 2½ inches wide, 4 or 5 inches long and at least 2 inches deep, according to James Santiago, a co-worker at Outback who had been swimming with Deguilmo and helped him to shore. He said Deguilmo described the shark as between 9 and 12 feet long.

Wednesday's encounter was the second shark bite near the surf spot in three months and follows shark sightings that prompted warnings at nearby beaches last week.

North Shore lifeguards removed shark warning signs yesterday morning and had no reports of shark sightings yesterday, Ocean Safety Lt. Jeff Morelock said.

"It was calm and clear, with no surf. There were a lot of people but no shark sightings," he said.

Morelock, who has been a lifeguard for 19 years, said he has a perception that there have been more shark sightings than usual since August. "I can recall similar cycles, say back in 1993-94," he said.

ONE THING Morelock said he has noticed about recent sightings is that some have been in midday — compared with the traditional time to watch out for sharks near dawn and dusk.

Noting that friends spearfishing with Deguilmo were able to help him after he was bitten, Morelock said he would like solo divers and surfers to remember that "it's good to have a buddy around."

On March 24, visiting surfer Liz Dunn, 28, was bitten on her left leg while surfing at "Leftovers" in murky conditions.

Lifeguards also posted shark warning signs last week after sharks were seen off of Chun's Reef and Laniakea on May 22.

Star-Bulletin reporter Diana Leone contributed to this report.

2003

From George Balazs

By Star-Bulletin staff

▲▲▲

NEIGHBOR ISLANDS
Maui woman injured in Cove Park shark attack

A 41-year-old Waiehu, Maui, woman was attacked by a shark yesterday while she was swimming near Cove Park in Kihei.

Police said the attack took place 30 yards from shore about 12:55 p.m. The shark bit the woman's right knee and scraped her inner left thigh. Police said the woman cut her hand when she pushed the shark away.

Shark attack

A 41-year-old Maui woman was attacked by a shark while swimming near Cove Park yesterday. She received minor injuries.

The woman described the shark as gray, three to four feet long. It may have been caught in a fishing net that was left in the water, police said. Police said the woman was treated at the scene for minor injuries and puncture wounds to her knees.

The state Department of Land and Natural Resources closed the beach fronting Cove Park and other beaches in a two-mile radius, including the Kamaole Beach Parks and Kalama Beach Park for five hours. They were reopened at about 6:30 p.m.

Randy Honebrink, spokesman for the state Shark Task Force, said the unattended fishing net may have attracted the shark to the area. But given the limited description of the shark, he said it would be difficult to determine what kind of shark it was since the description could fit half a dozen sharks.

Bicyclist hospitalized after Lahaina crash

A 48-year-old bicyclist was taken to Maui Memorial Medical

Honolulu Star Bulletin

THURSDAY, DECEMBER 22, 2005

"His mouth was huge, long, gigantic. I heard a break, pretty much, and it was really crisp, you know, quick, very powerful."

Jonathan Genant
Shark attack victim

Shark bites off swimmer's finger

GARY T. KUBOTA / GKUBOTA@STARBULLETIN.COM

San Diego resident Jonathan Genant recuperated yesterday in an emergency room hospital bed at Maui Memorial Medical Center after surviving a shark attack earlier in the day.

Authorities close South Maui beaches after the former triathlete is attacked

By Gary T. Kubota
gkubota@starbulletin.com

WAILUKU — All Jonathan Genant saw was a shark's mouth with razor-sharp teeth coming from below in waters about 400 yards off South Maui.

"His mouth was huge, long, gigantic," said Genant, 29, a San Diego resident and former triathlete who was swimming at about 11:30 a.m. yesterday off the southern end of Keawakapu Beach.

"I heard a break, pretty much, and it was really crisp, you know, quick, very powerful."

The sound was the shark's mouth clamping down on his left hand and cutting away Genant's pinkie finger, the top portion of his ring finger and the side of his palm. He underwent surgery at Maui Memorial Medical Center and was reported in stable condition.

Authorities posted warning signs yesterday and closed the beaches within a 1-mile stretch in either direction from Polo Beach to Kamaole Beach Park III.

State aquatics education official Russell Sparks said a county helicopter crew con-

Please see **Shark, A6**

Shark: Victim feels fortunate to be alive after attack on Maui

Continued From **A1**

ducting aerial surveillance saw a 12-foot tiger shark swimming in the area yesterday.

Randy Honebrink, a state Department of Land and Natural Resources official who helps to coordinate responses to shark attack incidents, said authorities will reassess the condition of the ocean today and might reopen the beaches as early as noon.

"Sharks move around so much that whatever shark did that is probably long gone anyway," he said.

Genant said he saw the shark's white stomach and gray surface and initially thought it was a great white shark because of its large size.

But he said after talking with county lifeguards, he learned that tiger sharks are also large.

Genant said he was visiting Maui with his family, including his father and mother, and has usually visited the Hawaiian Islands every year since he was in grade school.

"I'VE BEEN swimming that stretch every year, ever since I've come to Maui. I had no problems," he said.

Genant said after swimming about a mile in the Kihei direction, he was on his return route going toward Wailea when the shark attacked him off Keawakapu Beach.

"I'm trying to back off a bit. ... I had my hands out in front of me. I hadn't really tried to take a strike at it or anything. Its mouth was so big there was no way to escape it. It was going to take a piece of me somewhere or another. ... It just snapped at me."

From his emergency room hospital bed with left hand bandaged, Genant gestured with his arms to show the shark's mouth was about 3 to 4 feet wide.

Genant said his left hand was bleeding, and he gripped his wrist with his other hand to slow the flow of blood, as he began to swim on his back to shore.

He said for a moment, he could not believe he had been attacked by a shark.

"The first thing that crossed my mind was when was I going to wake up. I thought, maybe this is a dream. I thought, I can't believe this is really happening."

Genant said he then felt frantic and wondered if the shark would return and strike again.

He said he yelled for help and swam about two-thirds of the way into shore before surfers and boogie boarders were able to come to his assistance.

"I just feel lucky to make it back on the beach," he said.

Genant said at first he also felt frustrated and upset, asking why the shark chose to attack him.

"But then it did spare my life, so I was grateful in that sense," he said.

Genant, co-founder of the Internet partnership Better Deal LLC, said he uses his hands to operate a computer keyboard.

But he said he is right-handed, and at least the brunt of the shark attack was upon his left hand.

"It's the best place it could have taken me. ... I do feel lucky," he said.

> "The first thing that crossed my mind was when was I going to wake up. I thought, maybe this is a dream. I thought, I can't believe this is really happening."
>
> **Jonathan Genant**
> *Attacked by shark yesterday*

STAR-BULLETIN / MAY 2006

Steven Hoyt points out to where a shark attacked him off Kuau, Maui, last year as he holds up the surfboard with tooth marks.

RECENT SHARK ATTACKS

There were five shark attacks recorded for 2005 in Hawaii, compared with four in 2004, according to the state Department of Land and Natural Resources.

2005

>> **Feb. 16:** A shark bit surfer Greg Long's surfboard 40 yards off Sunset Beach.

>> **May 2:** A shark bit surfer Scott Hoyt's surfboard 70 yards off Kuau, Maui.

>> **May 14:** A shark bit a kayak about a half-mile off North Kihei in South Maui.

>> **Oct. 13:** A shark bit surfer Clayton Sado's surfboard 100 yards off Honokowai in North Maui.

>> **Dec. 22:** A shark bit the hand of swimmer Jonathan Genant in South Maui.

2004

>> **March 16:** A shark bit a surfer's board 75 feet off Kalihiwai, Kauai.

>> **March 24:** A snorkeler received a laceration to her left foot in Punaluu.

>> **April 7:** Surfer Willis McInnis received fatal wounds to his right leg at Kahana in West Maui.

>> **Oct. 9:** Spearfisher Davy Sanada received lacerations to the face at Pukoo, Molokai.

A18 2/26/06 HSB

Cause of death uncertain for diver found with shark bites

By Mary Vorsino
mvorsino@starbulletin.com

Preliminary results of an autopsy were unable to determine whether a diver found off Maui on Friday was killed by a shark or died of other causes and then was bitten.

Maui Police Lt. Glenn Cuomo said it will take more time to determine Anthony Moore's exact cause of death.

Moore, 45, who was visiting from San Jose, Calif., went diving in South Maui at a place known as Five Graves, a popular snorkeling site about a mile offshore.

Moore's wife told police that he was planning to free-dive off Makena and was expected back at 5 p.m. On Friday morning Moore's body was found with shark bites about 400 yards offshore.

Officials closed a three-mile stretch of coastline Friday from Black Sand Beach to the Kea Lani Hotel as a precaution. The beaches were reopened about noon yesterday, after lifeguards and state Department of Land and Natural Resources officials searched the waters for sharks and found none.

Maui Kayaks tour guide Chris Corbat found body parts bobbing in the water Friday and called for a dive boat to pick up the remains.

"It was very unnerving. That was a live human being," Corbat said. "We dive there all the time. It's a beautiful spot, not only for scuba but for diving and paddling."

The last fatal shark attack in Hawaii waters happened in April 2004.

The Associated Press contributed to this story.

Shark-bite victim could lose agility in left hand

6/2/06 A1

By Alexandre Da Silva
adasilva@starbulletin.com

HSB

The 29-year-old man attacked by a shark this week is "stable" but could lose movement and sensation in his left hand because of severe damage to 21 tendons and two key nerves in his forearm, his doctor said yesterday.

Ronald Deguilmo, who underwent 6½ hours of surgery Wednesday night, might need to be operated on one more time to close some wounds, and stay at St. Francis-West Medical Center for a couple of weeks, said his doctor, Wiley Brunel.

Please see **Shark, A6**

Man's body is found with bites from shark

The 45-year-old diver from California went missing on Thursday

By Gary T. Kubota
gkubota@starbulletin.com

WAILUKU >> State officials closed a 3-mile stretch of coastline on South Maui yesterday after the shark-bitten body of a California man was discovered about 400 yards offshore.

The Maui County coroner's office confirmed that the body belonged to Anthony Moore, a missing 45-year-old diver, according to a Coast Guard spokesman.

Police Lt. Glenn Cuomo said authorities had not determined whether the shark bites caused the death or came after Moore died. Cuomo said the marks on the body were consistent with shark bites.

An autopsy was planned for today.

State Department of Land and Natural Resources officials

Please see **Shark, A6**

BODY FOUND

The body of a California diver was found offshore of Makena Landing in South Maui yesterday.

Shark: Man intended to have 2-hour free dive

Continued From **A1**

were expected to determine at about noon today whether to reopen the 3-mile stretch of coastline from Black Sand Beach to the Kea Lani Hotel, including Makena State Park. No sharks were seen in the area, but the coastal waters were closed to the public as a precaution, state officials said.

Moore, of San Jose, Calif., planned to free-dive for a couple of hours in waters off Makena and was expected back at 5 p.m. Thursday, his wife told authorities. She reported him missing at 6:58 p.m., and police and the Coast Guard began searching. The Coast Guard searched a 12-mile span from Polo Beach to Nukuele Point.

Cuomo said Moore's rental car was found in a parking lot at Makena Landing at 7:32 p.m. Thursday.

The body was found by a kayaker at about 8:44 a.m. yesterday in South Maui waters at "Five Graves," a place about a mile offshore that is frequented by snorkelers.

Coast Guard Chief Petty Officer Marsha Delaney said she was told that Moore went diving alone but was an avid athlete and did free diving often.

The last fatal shark attack in Hawaii waters occurred in April 2004 when 57-year-old surfer Willis McInnis was killed about 200 yards off Kahana in West Maui.

The Associated Press contributed to this report.

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3 January 1994

George:

Many thanks for your letter, although it brings worrisome news. I have enclosed three pages from the textbook I use for my introductory course for non-majors. It is a very simplistic approach to predator-prey models (which in papers in American Naturalist become incredibly complex), but it is all you need to understand the basic point made by the math professor. The graph in Fig. 45.6 shows that the predator population will continue to increase even after the prey population begins to decrease.

Do you think we should consider the shark/turtle issue at the MTSG meeting? We have to be careful that, by addressing the issue we don't give the issue credibility. However, if this idea is really taking hold, we need to address it. I will follow your judgement.

Thanks for your email on the Program Officer position. Debby left for vacation shortly after Marydele dropped her bombshell, and I couldn't get hold of references for any of the other candidates over the holidays. I really don't know what to do. I am concerned that if we re-advertise, we won't bring in any more candidates and it would be an insult to the candidates we have now. It is very discouraging to be back on square 1 five months after starting the search. I am beginning to wish that CMC had not gotten the money.

It feels funny to be writing to you again, rather than emailing! Hope all is well.

Karen

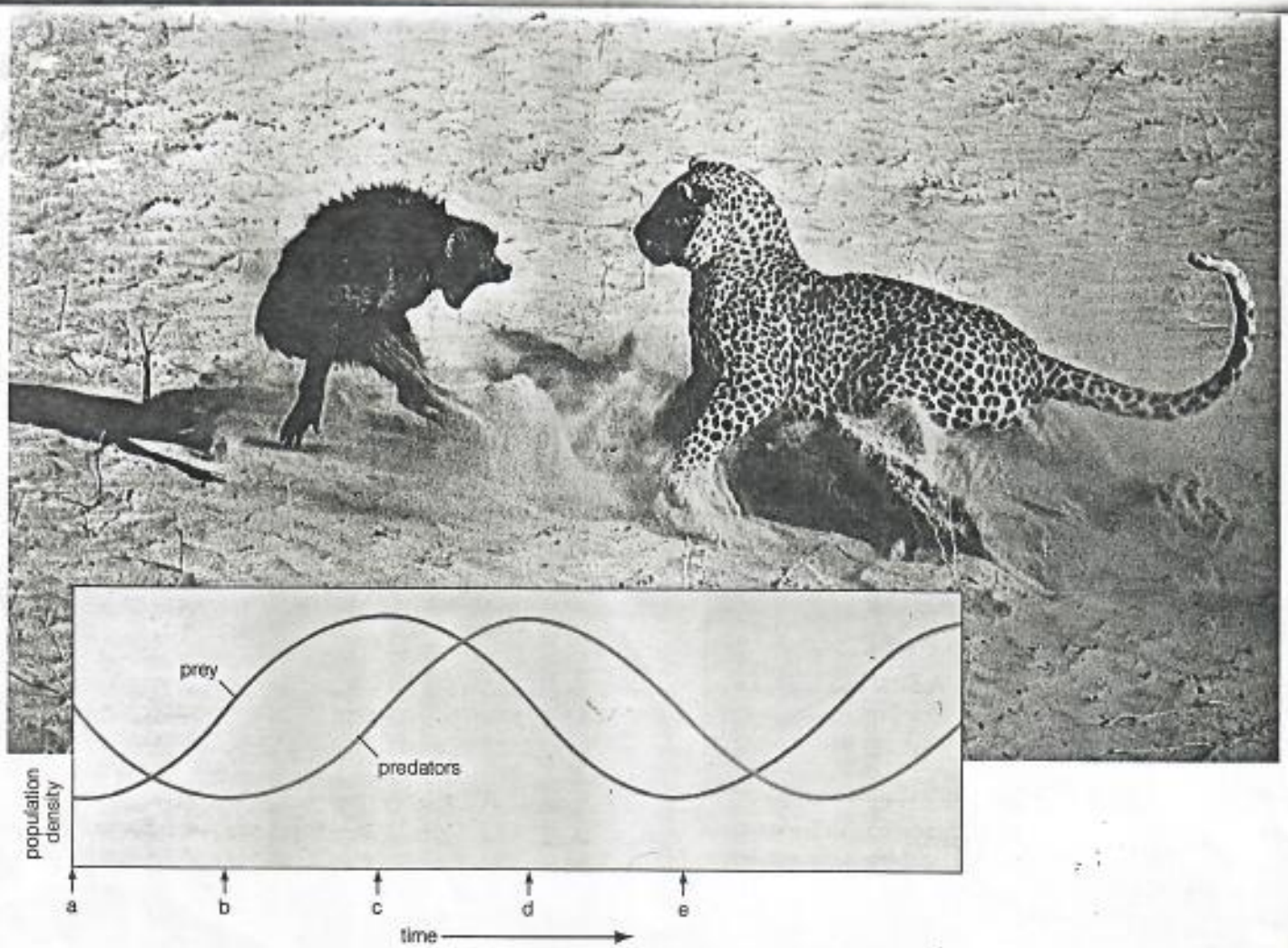


Figure 45.6 Idealized cycling of predator and prey abundances. (The scale exaggerates predator density; predators usually are less common than their prey at all points in the cycle.) The pattern arises through time lags in predator responses to changes in prey abundance. Starting at time *a*, prey population density is low, so predators are hungry and their population is declining. In response to the decline, prey start increasing, but the predator population does not start increasing until reproduction gets under way (time *b*). Both populations grow until predation causes the prey population to decline (time *c*). Predators continue to increase and take out more prey animals, but the lower prey density leads to starvation among predators and their growth rate slows (time *d*). At time *e*, a new cycle begins.

CONSUMER-VICTIM INTERACTIONS

"Predator" Versus "Parasite"

Of all community interactions, predation is the most riveting of our attention—as well as the prey's. Take a look at the leopard in Figure 45.6 as it closes in for the kill. A goat pulling up a thistle plant for breakfast, although less dramatic, is also a predator. Its prey is a living organism, killed for food. And what about a horse grazing on but not killing plants? What about a mosquito taking blood from your arm before it flies off? What about ticks or fleas taking blood for long periods before they get off one host and lay their eggs elsewhere? What about tapeworms, mistletoe, and other parasites that remain with their host?

For simplicity's sake, we will use only two broad definitions for all interactions between consumers and their victims. A **predator** gets food from other living organisms (its *prey*), which it may or may not kill, but it does not live on or in them. A **parasite** also gets food from other living organisms (its *hosts*), which it may or may not kill, but they do live on or in the host organism for a good part of their life.

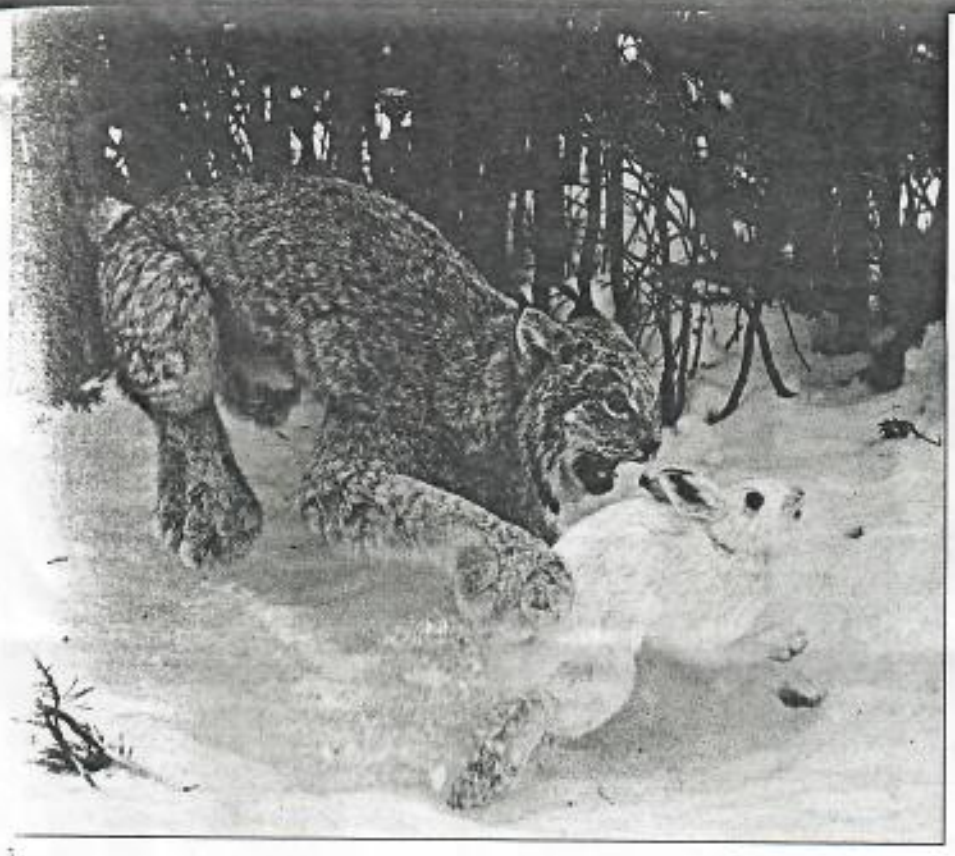
Dynamics of Predator-Prey Interactions

Predator and prey populations interact in diverse ways. Some interactions lead to stable coexistence at relatively steady population levels for both species. Others cause recurring cycles of abundance and population crashes, erratic population cycles, or even prey extinction. Three factors influence the outcome of the interaction:

1. Carrying capacity for the prey population, in the absence of predation.

2. Reproductive rates of the predator and prey.

3. Behavioral capacity of individual predators to respond to increases in prey density (by eating more or by moving to areas where prey are more abundant).



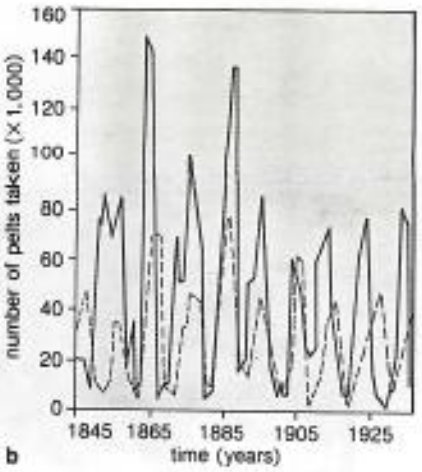


Figure 45.7 Predator-prey interactions between the Canadian lynx and snowshoe hare (**a**). The abundances of both populations, shown in (**b**), are based on counts of pelts that trappers sold to Hudson's Bay Company over a ninety-year period. The dashed line represents the abundance of lynx and the solid line, the abundance of hares.

This figure is a good test of how willing you are to accept conclusions without questioning their scientific basis. (Remember the discussion of scientific methods in Chapter 1?) What other factors could have influenced the relative abundances of lynx and hare? Did weather vary greatly, with more rigorous winters imposing greater demand for food (required to keep warm) and higher death rates? Did competition between lynx and other predators (owls, goshawks, coyotes, foxes) complicate the lynx cycle? Did predators turn to alternate prey species during low points of the hare cycle? Did trapping increase with rising fur prices in Europe, and did they decrease as pelt supply outstripped the demand?

Recall that *carrying capacity* means the number of individuals of a species that can be sustained indefinitely by the available resources in a given environment. When predators keep the prey population from overshooting its carrying capacity, the two populations tend to coexist in a stable relationship. Predators can do this by reproducing promptly and by eating more when there are more prey organisms around to eat. Population densities tend to fluctuate when predators do not reproduce as fast as their prey, when they eat only so many prey organisms at a time no matter how many are around, and when the carrying capacity for the prey is high. Sometimes the fluctuations are extreme and irregular.

Stable coexistence occurs when a predator population can keep a prey population from overshooting its carrying capacity.

Cyclic or irregular fluctuations in population density are likely when there are time lags in the predator's response to changes in prey abundance.

The graph lines in Figure 45.6 represent a cyclic fluctuation of predator and prey abundances. In this idealized case, time lags in the predator's response to changes in prey abundance lead to the cycling. In nature, correspondence between the rise and fall of predator and prey populations is frequent. Other factors besides predation may also contribute to such cyclic changes.

For example, long-term studies of the snowshoe hare in Canada provide evidence that cyclic changes in hare population density occur every nine to ten years. The cycle tends to be synchronized across much of Canada and Alaska. Records of pelts taken by trappers and sold to the Hudson's Bay Company show that Canadian lynx populations rise and fall with about the same periodicity as the hares (Figure 45.7). Careful studies have revealed, however, that lynx are not the only predators involved in the cycle. Great horned owls, goshawks, coyotes, foxes, and other predators also feast on the hares when they are near their peak abundance. Predator populations recover only when the hares begin to increase in density once again.

(over)

a A dangerous species (above) that serves as a model . . .
. . . and three of its mimics (below):

b

c

d

Figure 45.8 Mimicry. Many animals—especially those bite-sized morsels, the insects—avoid being eaten by having a bad taste, obnoxious secretion, or painful bite or sting. Among predators, knowledge of these traits is usually not inherited. Each young predator learns about them the hard way, by often unpleasant trials.

Among many prey species, dangerous or unpalatable individuals are easily recognized and remembered. If this were not the case, many individuals would be lost as inexperienced predators learned their lessons. Thus repugnant species tend to have distinctive, memorable appearances—bright colors (such as red, which predatory birds see so well), and bold markings (such as stripes, bands, and spots). These species make no effort to conceal themselves. Sometimes they even deliberately flash colors with an uplift of the body or the wings. Their coloration and patterning are called "aposematic" (*apo-*, meaning "away," and *sematic*, meaning "signal").

Each of the hundreds of dangerous or unpalatable species does not have a distinct warning signal. Too many signals probably would tax the learning capacity of predators. Instead there are whole groups of related species having nearly identical appearances, so the many benefit from a single taste trial. In turn, many less related

In field experiments, researchers provided extra food for the snowshoe hares when they were at peak densities, to see if food scarcity played a role in their subsequent decline. The hare populations declined anyway, suggesting that predators are the primary cause of the decline. To test this hypothesis, further experiments that keep predators out of experimental areas are under way. The food supply for hares probably does play an indirect role in population density. As food becomes scarce, hares are forced to take more risks to reach the remaining edible plants—exposing themselves to increasing risk of predation.

Prey Defenses

Predators and prey exert continual selection pressure on each other. When some new, heritable means of defense arises in a prey population, predators not equipped to counter the defense won't eat. *When the prey evolves, the predator also evolves to some extent because the change affects selection pressures operating between the two.* This is an example of **coevolution.** The word refers to the joint evolution of two (or more) species that are interacting in close ecological fashion. Let's take a look at some of the outcomes for consumers and their victims.

State, feds plan bird colony to help growing population

By ELOISE AGUIAR
News Editor

EAST OAHU — State and federal officials are planning to establish a seabird colony off Makapuu Point to accommodate the influx of Laysan albatrosses to the islands.

"The albatross population has been expanding (for many years) in the northwestern Hawaiian Islands," U.S. Fish and Wildlife refuge manager Ken McDermond said Dec. 7. "What's happening now is the birds are trying to recolonize the main Hawaiian Islands. They've already done so on Kauai at Kilauea Point National Wildlife Refuge and Barking Sands military base."

The albatross has been nesting for several years on Oahu at Kaena Point, Mokuleia's Dillingham Field and Kaneohe Marine Corps Air Station, he said.

The problems with these locations, he said, are that birds aren't safe from predators and they create hazards for airplanes.

Dogs, cats and mongooses attack and kill the birds, and humans shoot them, McDermond said. Albatrosses, which are about the size of turkeys, favor nesting on airplane runways. The largest known albatross colony lives on Midway Island airfield, he said.

> ***"What's happening now is the birds are trying to recolonize the main Hawaiian Islands.***
>
> — Ken McDermond, U.S. Fish and Wildlife refuge manager

McDermond speculated that the birds like open fields, but he couldn't say for sure why they are attracted to runways. They do need a running start before taking flight, he explained "but they don't need an airfield."

The plan to create a Laysan albatross colony on Kaohikaipu Island — Black Rock — will be discussed during the Hawaii Audubon Society's public meeting at 7:30 tonight in the Paki Conference Room at Bishop Museum. Volunteers are also being sought to monitor the island for albatross response.

The island off Makapuu is a safe environment, McDermond said, and the colony could be used for educational purposes. Sea Life Park is cooperating on the project and plans to provide a lookout point with educational material at the park.

At the meeting, Cornell University seabird experts Stephen Kress and Richard Podolsky will review successful attempts to develop bird colonies on the East Coast and in the Galapagos Islands. Podolsky wrote a master's thesis on the work he did to attract albatrosses to Kilauea Point, Kauai, McDermond said.

Kress and Podolsky have demonstrated that "social attraction" can work as a powerful aid to help seabirds recolonize areas, he said. "Using decoys, artificial eggs and recorded colony sounds, they are pioneers of the promising field they call seabird restoration."

McDermond, who obtained a grant for the project, said he isn't sure why albatrosses sought new nesting grounds, but speculated that overcrowding was a factor in the birds' search for new colonies.

The project is a cooperative effort of the Hawaii and National Audubon Societies, the U.S. Fish and Wildlife Service's Hawaii Biodiversity Joint Venture Program, U.S.D.A. Animal Damage Control, University of Hawaii seabird researcher Causey Whittow, the state Division of Forestry and Wildlife, and Sea Life Park.

John 7R

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Shark Research Committee

March 17, 1994

Mr. George Balazs
National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396

Dear George,

I've enclosed a reprint from a 1987 symposium, which was finally published late of 1993. I hope you find it of some interest. A current paper with editors should be out later this year, describing white shark strikes/attacks on boats and other inanimate objects. I believe you have had similar incidents from your area as well.

My current schedule has me booked into the Ritz-Carlton Kapalua, from April 20-24th for a convention. Unfortunately, my mother's health has been very poor, so these plans could change. Also, if I do attend, my commitments might not allow me enough time to come and visit with you. Do you ever travel to Maui on business? Hopefully, I'll be able to arrange things so we can meet.

I was pleased to see your name added to the shark attack file committee. George, thanks for your interest in my work. Hope to see you soon.

Best regards,

Ralph

Ralph S. Collier
RSC/ms
encl.-rpt, Islds.

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Nothing New Under Sun—or Water

Hawaii Has Had Shark Attacks as Long as Surfers Have Braved the Waves

Shark attacks are nothing new in Hawaii. Tiger sharks have been tangling with wave riders for as long as anyone can recall.

George Balazs, a National Marine Fisheries Service biologist and sea turtle expert, using several sources, has compiled a list of more than 100 attacks—most of them on surfers—dating to 1779, when a young male was gashed on the buttocks after being pursued while surfing. He later suffered "great pain" and died.

In 1828, "A man out riding surf [off Maui] was killed by a shark which bit off his limbs and left his body floating." The attack was reportedly witnessed by several Hawaiian chiefs.

In 1904, partial remains of a swimmer who had disappeared off Diamond Head were found inside a "monstrous shark." The body "was complete from the waist down with the exception of one leg."

Also found in the stomach were ducks, tin cans and wood.

In 1931, a Lt. Williamson had harpooned a 10-foot tiger shark off Pearl Harbor, and while he was using a gaff to bring it aboard, the shark bit off the tips of his fingers and chewed the two-inch oak pole of the gaff in half. In the shark's stomach were "the hind leg of a mule, two bathing suits nearly digested, a soldier's belt buckle, a pint of buttons, two horse shoes, the corner of a wooden soap box, an anchor chain, two small anchors and assorted bolts, nails and copper fittings."

In 1960, Harold Riley was swept to sea while net fishing off Maile Point, Oahu. A 20-foot shark was observed attacking the victim.

In 1976, Danson Nakima apparently passed out while diving for coral at 180 feet. About 30 large sharks were observed attacking the victim.

In 1980, Mark Skidgel was lying on his bodyboard off Lahaina, Maui, when a 14-foot tiger shark bit him on the left side of his body. The wound required 52 stitches.

The list goes on. And chances are, it will continue to grow. The average is is up to about four attacks a year, due more to an increase in the human population than to an increase in sharks, some experts say.

But it is an alarming statistic nonetheless for those who paddle out to the offshore reefs on almost a daily basis.

Also alarming, some might think, is a recent increase in green sea turtles around the Hawaiian islands. The turtles, which feed on algae in and slightly beyond the surf zone, were protected as a federally "threatened" species in 1976.

"It may be that [the sharks] are learning now, with more turtles here, to concentrate their feeding on turtles, which would put them into close proximity to surfers," said John Naughton, a NMFS biologist based in Honolulu.

"I can't say that is the case, but in the 1960s there was roughly a 20% occurrence of turtles in the stomach contents [of tiger sharks], and now we're seeing a 42% occurrence, which would make sense because turtles are more abundant than they were in the '60s."

Surfers have voiced a concern that tiger sharks might be mistaking them for turtles, which would help explain the rash of attacks—three confirmed—and sightings last winter at the North Shore.

Balazs discounted that theory, claiming there is "no credible evidence" to support it. But there is no disputing that turtles often swim near the surface, and tiger sharks often attack floating objects.

Said Naughton: "I don't think they mistake people for turtles. I think they just happen to be in there looking for turtles and they see something moving up there and they just whack it. They don't care what it is. They'll eat *anything*."

—PETE THOMAS

Ht. Times 3/10/94

P.S.

I think a reporting hotline would be a good idea.

For the record, I saw a shark through a wave at Laniakea about 10 AM on Sunday Nov 8 1992. Length approx 6-8 '. Other surfers saw the same or possibly a bigger one a few minutes later.

On May 24 1992, I saw a large shark attack a turtle on the surface at Laniakea about 8:45 AM. Length 8 foot plus. The tail had a hook or notch on the trailing edge.

Last year at Courts (S.Shore off Ala Moana Beach Park) I saw a shark 12', possibly bigger in the channel between Courts and Big Lefts.

I have seen big sharks at Courts on numerous other occasions over the past years mainly outside the lineup but a couple of times in the lineup. I saw one about 5' on the reef at high tide in the same locale.

Peter Metzinger

I don't know where this came from

call Capt. Goto

Regarding Keaau incident, check with Brian Keaulana (Waianae lifeguard lieutenant, 696-2487). I think his friend was an eyewitness.

P.S. Where else would you expect a nurse shark to bite a woman?

58-SHARK Reports - Oahu Jan 1 through Feb 28, 1993

Windward

Malaekahana		
1/12	2	big; outside Goat Is.
Laie		
1/7	1	>10' tiger; Hukilau Beach, late afternoon
Kaneohe Bay		
1/6	1	"big fin"; by Coconut Is. pier; several days
Zombies/Castle Point		
1/2	1	8'-10'; other sightings that day

North Shore

Mokuleia		
2/10	10-15	>5-10'; Air One spotted (2 reports)
2/25	1	10'-12'; outside Beach Park in lineup
Chun's		
1/19**	2	6', 12' (separate incidents)

CAN YOU SUPPLY PERSONS NAME AND/OR PHONE #? WE HAVE NO STRANDING RECORD FOR THIS DATE

Waianae

Pokai Bay		
2/19*/93	1	15' tiger; hanging around dead or dying 4' turtle
		Fritz Sandoz, South Seas Aquatics, 696-6614
Maili Pt.		
1/27	1	big tiger
1/29	1	8'-10' tiger; aggressive, followed divers 1-1/2 mi.
2/6	1	don't know size
Nanakuli		
1/21	2	8'-10'; seen while diving (2 reports, same incident)
Barbers Point		
1/8	2	large; NAS White Plains Beach closed
2/21	1	12'; off White Plains Beach

58-SHARK Reports Nov 20 through Dec 16, 1992

Oahu

Windward

Malaekahana		
11/26 (report)	1	>10' tiger; half way to Goat Island
11/30 (report)	1	10'; close to shore
Kaneohe Bay		
Continuous	2	15' tigers
Past 8 months	many	<8' tigers and hammerheads
Summer	3	12' tigers near sandbar
KMCAS/Pyramid Rock/North Beach/Mokapu		
12/2	3	6' tigers; harrassing people
12/2	1	8'
12/3	1	>8'; chasing people
12/16	1	very large; repeated sightings
Zombies/Castle Point		
11/29	1	10'; Zombie's (Waimanalo side of KMCAS)
continuous	lots	various; Zombie's
11/29	1	10'-12'; charged kids
Kailua Beach Park		
11/18	1	12-14' tiger
Makapuu		
11/30 (report)	1	12'; halfway to Rabbit Island

North Shore

Mokuleia		
12/1	2	6'; in shallow water
12/1	1	8-12'; in lineup
12/5	2	8'-10' tigers
12/6	2	10'
12/8 (report)	1	8'-12' tiger; repeated sightings
Haleiwa		
12/13	1	10' tiger
Laniakea		
X 5/24*	1	>8'; attacked turtle
11/8*	1	6-8'
12/11	1	8' tiger

CAN YOU SUPPLY ME WITH PERSON NAME AND/OR PHONE #? OR WAS THIS ANONYMOUS?

CORRECT MONTH?

See attached

Brett Dinkateo 486-4056
(I tried calling him a few times but couldn't reach him. Hope you have better luck)

CAN YOU please SUPPLY PERSON NAME AND/OR PHONE #?

South Shore

Ewa Beach		
x 2/26/93		Hau Bush; bit thru leash, dragged board 30'
Waikiki/Ala Moana		
1/4	1	14'; size from dorsal fin; Ala Moana Bowls
2/3	2	no size given; Suicides
Diamond Head		
1/20	1	large; surfers cleared out
1/23	1	8'; by Black Pt.; dead eel in water; signs up

** reported by lifeguards
* source other than 58-SHARK