

## LETTERS

Wednesday, December 25, 1991 □ A-15

### **Sharks must be controlled, but not eradicated**

In my personal opinion, your Dec. 12 editorial, "Sharks and Justice," expressed the proper and prudent viewpoint.

It was also fully consistent with an editorial you ran 16 years ago entitled "Controlling Sharks." In that earlier piece you stated, in part: "Now that the horror of shark attack has been brought home to thousands of islanders by the film 'Jaws,' the legislators may be willing to revive the (shark) control program. Although shark attacks are not common here, even a few are too many. It would take only a few well-publicized attacks to do tremendous harm to the tourist industry."

The key word here is "control," not eradication. We need to be proactive in the matter rather than reactive.

*George H. Balazs*  
Hawaii Kai

HAWAII CLIPPING SERVICE  
P.O. Box 10242  
Honolulu, Hawaii 96816  
PHONE: 734-8124  
Victoria Custer Elaine Stroup  

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HONOLULU ADVERTISER

JAN 13 1992

## Let's control sharks

I want to register my personal disagreement with the view given in your editorial, "Shark attack: targeted hunt is right response" (12/11). You stated that it seems proper "To respond to attacks on humans with a well-targeted hunt in the area where the attack occurred."

But why wait for a tragedy to strike again, before doing something? Why not do some controlled remedial fishing now, at selected sites, like those heavily used for snorkeling, swimming and tourism, such as Olowalu? Why not take reasonable and prudent steps beforehand to lessen the risk? The key word here is "control," not eradication.

The last shark control program in Hawaii was conducted during the mid-'70s, about 15 years ago. According to a study done at the University of Hawaii, it takes approximately 15 years for a tiger shark to grow to 10 feet in length and weigh 1,000 lbs. At that size they have no natural enemies, except other, larger sharks.

The late Dr. Albert Tester of the University of Hawaii conducted a successful two-year shark research and control program in our coastal waters from 1967-69. At the completion of this program, Dr. Tester stressed that if fishing was not continued, the shark concentration would automatically rise again. I'm afraid we're seeing that happen right now.

GEORGE H. BALAZS  
Hawaii Kai

The statements made here represent the author's viewpoint. They do not reflect the agency position of the National Marine Fisheries Service.

TESTIMONY SUBMITTED BY GEORGE H. BALAZS IN FAVOR OF HB 2878 "MAKING AN APPROPRIATION FOR SHARK HUNTING"

COMMITTEE ON OCEAN & MARINE RESOURCES  
LEGISLATIVE HEARING FEBRUARY 5, 1992

MY NAME IS GEORGE BALAZS AND FOR THE PAST 13 YEARS I HAVE BEEN THE COMPILER OF SHARK ATTACKS IN THE HAWAIIAN ISLANDS. IN COLLABORATION WITH MY FORMER COLLEAGUE, ALAN K. H. KAM, THIS WORK WAS INITIATED IN 1979 WHILE WE WERE EMPLOYED AS BIOLOGICAL RESEARCHERS AT THE UNIVERSITY OF HAWAII'S HAWAII INSTITUTE OF MARINE BIOLOGY (HIMB) ON COCONUT ISLAND. THE MAIN REASON WE STARTED COMPILING THIS LIST WAS DUE TO THE FACT THAT NONE EXISTED AT THE TIME. IT WAS OUR DESIRE TO FULFILL A LEGITIMATE SCIENTIFIC NEED AND WE SET ABOUT TO MEET THAT GOAL BY DOING EXTENSIVE LITERATURE SEARCHES USING LIBRARIES, NEWSPAPERS FILES, AND OTHER SOURCES. THE LIST HAS SUBSEQUENTLY APPEARED IN A NUMBER OF DIFFERENT PUBLICATIONS, MOST RECENTLY THE JANUARY 1992 ISSUE OF HAWAII FISHING NEWS. THE LIST IS REGULARLY UPDATED AS NEEDED, AND IS READILY AVAILABLE UPON REQUEST FROM THE HONOLULU LABORATORY OF THE NATIONAL MARINE FISHERIES SERVICE (TEL. 943-1221) WHERE I HAVE BEEN PROFESSIONALLY EMPLOYED AS A BIOLOGIST FOR THE PAST 11 YEARS. HOWEVER, IT SHOULD BE NOTED THAT THE TESTIMONY I AM SUBMITTING HEREIN IS NOT ON BEHALF OF MY AGENCY, BUT RATHER AS A PRIVATE CITIZEN. THE OPINIONS EXPRESSED ARE MY OWN, AND NOT NECESSARILY THOSE OF THE NATIONAL MARINE FISHERIES SERVICE.

THERE ARE PRESENTLY 94 CASES ON THE LATEST REVISION (2/4/92) OF MY HAWAIIAN SHARK ATTACK LIST. THE EARLIEST KNOWN CASE OCCURRED IN 1779, AND THE MOST RECENT ONE ON NOVEMBER 26, 1991. SINCE THE YEAR 1980 THERE HAVE BEEN 31 CASES, 12 OF WHICH INVOLVED MORTALITY. DURING THE PREVIOUS 12-YEAR PERIOD, THAT IS FROM 1968 TO 1979, THERE WERE ONLY 14 CASES, 4 OF WHICH

Footnote: Since this statement was made 9 months ago, there have been 4 more significant shark attacks in Hawaii, 2 of which were fatal.

INVOLVED MORTALITY. ADMITTEDLY THERE ARE DIFFERENT WAYS THESE DATA MIGHT BE ANALYZED AND INTERPRETED. AS OFTEN HAPPENS IN SHARK ATTACKS WORLDWIDE, THERE IS INSUFFICIENT INFORMATION FOR MANY OF THE CASES UPON WHICH TO DRAW FIRM CONCLUSIONS FOR VARIOUS CRITICAL ASPECTS. NEVERTHELESS, THE LIST THAT I CONTINUE TO MAINTAIN PROVIDES VALUABLE INSIGHT INTO SHARK ATTACKS IN HAWAII, IN SO FAR THAT IT IS BASED ON THE BEST AUTHORITATIVE INFORMATION AVAILABLE. AS IN THE PAST, I UNDERTAKE THIS WORK WITH DEDICATION, PROFESSIONALISM, AND OFTEN ON MY OWN PERSONAL TIME, REALIZING THAT CONSIDERABLE HUMAN SUFFERING AND MENTAL ANGUISH ARE INVOLVED IN SOME OF THE CASES THAT OCCUR.

IT IS MY OPINION THAT SHARK ATTACKS IN THE HAWAIIAN ISLANDS ARE NOT SIMPLY A MATTER OF "STATISTICS" ALONE, ALTHOUGH THE AVAILABLE NUMBERS CERTAINLY SEEM TO SHOW THAT MORE CASES HAVE OCCURRED IN RECENT YEARS, AND THAT SOME OF THESE CASES HAVE BEEN OF A MORE SEVERE NATURE. OF COURSE, AS WE HAVE ALL HEARD, MORE PEOPLE ARE KILLED BY BEE STINGS, LIGHTNING, AND ANY MANNER OF OTHER UNUSUAL MISFORTUNE THAN BY SHARK ATTACK. THIS IS UNDOUBTEDLY TRUE. BUT SUCH STATEMENTS COMPLETELY MISS THE POINT, IN MY VIEW. THEY UNJUSTIFIABLY SERVE TO DOWNPLAY THE ESPECIALLY GRUESOME NATURE AND TRAGEDY OF SOME SHARK ATTACKS IN HAWAII, AND THE VERY REAL AND EXTRAORDINARY FEAR PEOPLE HAVE FOR THIS TYPE OF INJURY OR DEATH. BEING "EATEN" ALIVE, OR KNOWING THAT AN UNCONSCIOUS PERSON OR DROWNING VICTIM HAS BEEN DEVoured BY A SHARK, IS A VERY REPUGNANT THOUGHT UNIVERSALLY SHARED BY ALL HUMANS. THIS REVULSION WAS CAPITALIZED UPON (BUT NOT INVENTED) BY THE MAKERS OF THE "JAWS" MOVIE. THIRTY-ONE ATTACKS DURING THE PAST 12 YEARS, WITH 12 INVOLVING DEATH (ALTHOUGH NOT ALWAYS DEATH DIRECTLY FROM THE ATTACK), IS STATISTICALLY A VERY SMALL NUMBER. BUT THE CRITICAL

POINT THAT MUST BE CONSIDERED HERE IS THAT THE STATE OF HAWAII, UNLIKE ANY OTHER COASTAL STATE OR PLACE IN THE WORLD, IS ECONOMICALLY FOUNDED ON TOURISM USING THE "HAWAIIAN" AND "ALOHA SPIRIT" OF AN OCEANIC ISLAND PARADISE AS ITS CENTRAL IMAGE. FURTHERMORE, DURING RECENT YEARS THE TOURIST INDUSTRY HAS INCREASINGLY FOCUSED ITS ENERGIES VERY SUCCESSFULLY ON THE MARINE ENVIRONMENT BY PROMOTING "MARINE TOURISM." ACTIVITIES LIKE SURFING, SNORKELING, SCUBA DIVING, FISH FEEDING, UNDERWATER PHOTOGRAPHY, MARINE EDUCATION, WHALE-WATCHING, AND EVEN SEA TURTLE WATCHING HAVE ALL GROWN IN POPULARITY. THE PREVAILING VIEW, SHARED BY TOURISTS AND LOCAL RESIDENTS ALIKE, IS THAT HAWAIIAN COASTAL WATERS ARE SAFE PLACES WHERE ONE CAN SWIM AND RELAX WITHOUT JUSTIFIABLE FEAR OF THE DANGER OF SHARK ATTACK. GIVEN THIS PERCEIVED SENSE OF WELL-BEING, IT IS MY VIEW THAT EVEN ONE SHARK ATTACK IN HAWAII, SUCH AS RECENTLY HAPPENED ON MAUI, IS TOO MANY. AND ESPECIALLY WHEN THAT ONE CASE HAPPENS AS IT DID AT A SITE LIKE OLOWALU, LONG FELT TO BE PERFECTLY SAFE AND THUS ACTIVELY PROMOTED (EVEN TODAY) AS A SERENE SNORKELING SPOT FOR TOURISTS.

IF THERE ARE REASONABLE AND PRUDENT STEPS THAT CAN BE TAKEN RIGHT NOW TO HELP REDUCE THE RISK OF SUCH A CASE FROM HAPPENING AGAIN, THEN I BELIEVE THOSE SENSIBLE STEPS OUGHT TO BE TAKEN. A WELL-PLANNED SHARK FISHING PROGRAM TO CONTROL, THAT IS, TO THIN OUT OR REDUCE, BUT NOT "ERADICATE," SOME OF THE LARGE TIGER SHARKS AT SELECTED SITES AROUND THE STATE IS A REASONABLE AND PRUDENT PROPOSITION. SOUND RESEARCH AND, WHERE FEASIBLE, UTILIZATION OF THE SHARKS FOR FOOD AND OTHER PURPOSES SHOULD BE INCORPORATED INTO THE FISHING PROGRAM. WHY WAIT FOR ANOTHER TRAGEDY, AND THE ACCOMPANYING ADVERSE PUBLICITY, TO HAPPEN AGAIN BEFORE UNDERTAKING SOME REMEDIAL MANAGEMENT STEPS ALONG THESE LINES? THE LAST SHARK CONTROL AND

RESEARCH PROGRAM IN HAWAII WAS CONDUCTED DURING THE MID-1970'S, ABOUT 15 YEARS AGO. VIRTUALLY NO FISHING FOR COASTAL SHARKS LIKE TIGER SHARKS HAS BEEN DONE IN HAWAII SINCE THAT TIME. ACCORDING TO A STUDY DONE AT THE UNIVERSITY OF HAWAII, IT TAKES APPROXIMATELY 15 YEARS FOR A TIGER SHARK TO GROW TO 10 FEET IN LENGTH AND WEIGH 1000 LBS. AT THAT SIZE THEY HAVE NO NATURAL ENEMIES, EXCEPT FOR SHARKS THAT ARE EVEN LARGER. THE PRESENCE OF MAXIMUM NUMBERS OF APEX FLESH-EATING PREDATORS OF THIS SORT IS SIMPLY INCONSISTENT WITH THE TYPE OF COASTAL MARINE USE BY HUMANS (VISITOR AND RESIDENTS ALIKE) OCCURRING IN HAWAII DURING THE 1990'S. THERE ARE OTHER PLACES IN THE HAWAIIAN CHAIN, SUCH AS IN THE REMOTE AND UNINHABITED NORTHWESTERN HAWAIIAN ISLANDS, WHERE TIGER SHARKS CAN BE LEFT TO FLOURISH AT MAXIMUM NUMBERS. THE MAIN HAWAIIAN ISLANDS ARE NOT THE APPROPRIATE PLACE FOR THIS TO BE ALLOWED TO OCCUR. THE LATE DR. ALBERT TESTER OF THE UNIVERSITY OF HAWAII CONDUCTED A SUCCESSFUL TWO-YEAR SHARK CONTROL AND RESEARCH PROGRAM IN HAWAII'S COASTAL WATERS FROM 1967-69. AT THE COMPLETION OF THIS PROGRAM, DR. TESTER STRESSED THAT IF FISHING WAS NOT CONTINUED, THE SHARK CONCENTRATION WOULD AUTOMATICALLY RISE AGAIN. BASED ON INFORMAL REPORTS FROM AROUND THE STATE, IT WOULD APPEAR THAT HIS SCIENTIFICALLY-BASED PREDICTIONS ARE PROVING CORRECT.

IN CLOSING, I WANT TO OFFER COMMENT ON THE STATEMENTS SOME PEOPLE HAVE RECENTLY MADE THAT APPEAR TO "BLAME" OR AT LEAST HOLD PARTLY RESPONSIBLE OUR GRADUALLY INCREASING HAWAIIAN SEA TURTLE POPULATION WITH THE REPORTED HIGHER NUMBERS OF TIGER SHARKS. SEA TURTLES HAVE BEEN LEGALLY PROTECTED BY FEDERAL AND STATE LAWS IN HAWAII SINCE THE MID-1970'S. IN ESSENCE, TIGER SHARKS HAVE BEEN "PROTECTED" DURING THAT VERY SAME PERIOD OF TIME BECAUSE

NO ONE HAS FISHED FOR THEM, AND THEY HAVE FEW IF ANY NATURAL PREDATORS. WHILE IT IS TRUE THAT TIGER SHARKS FEED ON SEA TURTLES, IT IS ALSO A FACT THAT THEIR DIET ENCOMPASSES A VERY WIDE ARRAY OF PREY ITEMS, AND THAT TURTLES ARE ONLY A PART OF THAT DIET. FOOD ITEMS OF LARGE TIGER SHARKS INCLUDE SPINY AND SLIPPER LOBSTERS, RAYS, OTHER SHARKS, FISHES (SUCH AS SPINY PUFFERS), PORPOISE, WHALES, AND JUST ABOUT ANYTHING ELSE ALIVE OR DEAD DEEMED EDIBLE AND CATCHABLE IN THE TIGER SHARK'S COASTAL MARINE ENVIRONMENT. IF TIGER SHARKS HAVE INCREASED IN BOTH NUMBERS AND SIZE IN HAWAIIAN WATERS, AS MANY PEOPLE BELIEVE, IT IS BECAUSE FISHING PRESSURES FOCUSED ON THEM FOR MANY DECADES CAME TO AN ABRUPT HALT IN THE MID-1970'S. SEA TURTLES REPRESENT A COMPONENT PART OF THE TIGER SHARK'S DIET, BUT IN THE ABSENCE, OR SCARCITY, OF TURTLES TIGER SHARKS WILL SIMPLY TURN TO OTHER AVAILABLE FOOD SOURCES. THEY WILL NOT DIE OF STARVATION, NOR WILL THEY ABANDON THE COASTAL WATERS WHERE THEY ARE KNOWN TO RESIDE. THEY WILL SIMPLY EAT SOMETHING ELSE.

The statement was made that, "The experts in the (shark) task force have scientific information that shows every shark attack is a matter of mistaken identity by the shark for its natural food of turtles and seals." The fact is that there is no scientific information whatsoever to support such an idea.

There must have been a misunderstanding of information presented during one of the task force meetings. The proposition that tiger sharks have to "mistake" something floating at the surface for a turtle or other prey in order to attack it simply has no basis in fact. The idea also runs contrary to common sense, as well as the known feeding strategy of tiger sharks, a species that consumes an incredibly wide array of items, humans included.

Explorer Jean-Michel Cousteau summarized the situation correctly when interviewed last year following the tragic death of Mrs. Morrell at Olowalu. 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."

The 2,000-lb steer mentioned in Mr. Maxwell's column was in fact seen alive swimming off Maui when attacked and devoured by large tiger sharks. Certainly the steer wasn't "mistaken" by the sharks for a turtle, or even a Hawaiian monk seal, a very rare species around Maui.

Similarly, a surfer on a 6-foot, 4-inch long surfboard, 21 inches wide, bears little if any resemblance to a turtle. The common element, however, is that both the surfers and intermittently the turtles are at the surface where tiger sharks are known to feed.

Recent attacks on surfboarders, as well as the fatal attack on a boogie boarder took place during daylight hours in clean, clear water. It's hard to imagine that the sharks involved mistook the victims for something else.

Sincerely,  
George H. Balass  
Honolulu, O'ahu

cc. HAWAII FISHING NEWS

MARCH 1993 HFN

### **Shark Attacks are not Mistakes**

(Reprinted from the Maui News, January 7, 1993)

I am writing to correct a mistake made in the commentary (December 20) about sharks written by Charles K. Maxwell.



# Letters 1/7/93

## Shark attacks are not 'mistakes'

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## The Maui News policy on letters

The Maui News welcomes and encourages letters to the editor. The letters should be brief and to the point and on subjects of general interest. Letters must be signed and include an address and phone number where the writer can be reached during working hours for verification. The writer's name and community will be published.

Letters should be limited to 250 words or less with shorter letters being given priority. Letters of any length are subject to editing. Typed letters are preferred but others will be accepted if they are legible.

Letters may be mailed to The Maui News, 100 Mahalani St., Wailuku 96793; or may be faxed to 242-9087.

daylight hours in clean, clear water. It's hard to imagine that the sharks involved mistook the victims for something else.

George H. Balazs  
Honolulu

January 14, 1993  
992-A Awaawaanoa Place  
Honolulu, HI 96825  
Tel. 395-6409

OR 943-1240

Editor (Letters)  
Honolulu Weekly

May I please provide some clarification to statements made in a recent letter (12/23/92) expressing the "fisherman's point of view" on sharks and shark attacks in Hawaii. The letter stated that "...in some fisheries in the Pacific, 60 -70% of the tiger sharks that were examined are found to have turtle remains in their stomach contents." Taken by itself, readers might easily get the flawed impression from this statement that turtles are the overwhelming component of the tiger shark's diet. And that's simply not the case. As often happens with statistics, numbers don't always tell the whole story. In this instance some basic knowledge of tiger shark and sea turtle biology is required.

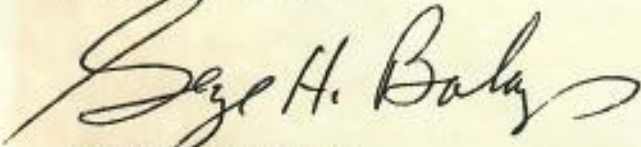
The digestive tract of tiger sharks functions in such a way that only paste-like material-- that is, the broken-down remains of prey items subjected to strong stomach acid-- can pass out of the stomach into the intestines. Objects of any size that can't be broken-down in the stomach are retained there for an unknown and likely extended period of time before being ejected by regurgitation. The outer surface of sea turtles, consisting of scales and scutes of the shell, are made of a tough keratin-like substance that is completely resistant to decomposition in the stomach. Consequently, these large and clearly recognizable items are held in the stomach, while the rest of the turtle including the meat, bones and all else is digested. The protective scales and scutes covering the turtle also lengthen the amount of time needed to digest the turtle's body.

These factors serve to overrepresent turtles in tiger shark stomach contents, and give a biased picture to persons cutting open the animals to see what they eat. In contrast, soft-bodied prey with far fewer and smaller indigestible parts, digests quicker and can be easily underestimated in stomach contents.

It is a biological fact that tiger sharks eat a wide variety of prey items, more so than any other shark. In a 2-year study

conducted by the late Dr. Albert Tester of the University of Hawaii, tiger sharks in Hawaiian waters were found to prey upon the following items (in descending order of % sharks containing these items): fish; crabs and lobsters; garbage; birds; sharks and rays; squid and octopus; turtles; porpoise or whales; and humans. Explorer Jean-Michel Cousteau summarized the situation correctly when interviewed last year following the tragic death of Mrs. Morrell at 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."

GEORGE H. BALAZS



DEPUTY CHAIRMAN  
IUCN MARINE TURTLE SPECIALIST GROUP

January 16, 1993  
992-A Awaawaanoa Place  
Honolulu, Hawaii 96825  
Tel. (808) 395-6409

Surfing Magazine- Letters  
950 Calle Amanecer, Suite C  
San Clemente, CA 92672

Your interesting article "Shark Attack" (March 93) stated in bold type that attacks on surfers by tiger sharks are "believed by some to start as cases of mistaken identity" for sea turtles. This is a misguided belief. There is no scientific information to support such an idea. Unfortunately, the news media in Hawaii has repeatedly voiced this speculation, thereby causing many to believe it is true.

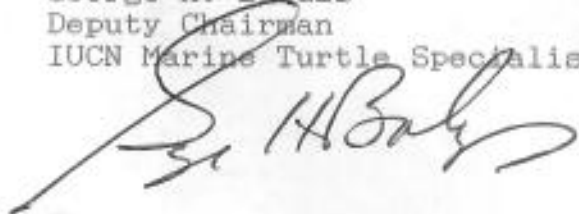
The fact is that tiger sharks don't have to "mistake" anything floating at the surface in order to strike, bite, or eat it. Taking things at the surface is a natural part of the tiger shark's feeding strategy. The theory by some scientists that great white sharks mistake surfers for seals off California simply can't be logically transposed to tiger sharks and sea turtles in Hawaii. Very different species of sharks and prey items are involved. All sharks aren't the same, and they certainly don't behave in a similar fashion. A surfer on a 6-to-7 ft board 2 ft (or less) wide bears little if any resemblance to a 1-to-3 ft oval sea turtle. The common element, however, is that both the surfers and (intermittently) the turtles are at the surface where tiger sharks are known to feed.

Recent attacks in Hawaii on surfers, as well as a fatal attack on a boogie-boarder, took place during daylight hours in

reasonably clean, clear water. It's hard to imagine that the sharks involved mistook the victims for something else. Several months ago there even was an eye-witness account (with photos) of a 2000 lb steer swimming in waters off Maui being attacked by tiger sharks. Certainly the steer wasn't "mistaken" by the sharks for a turtle.

Explorer Jean-Michel Cousteau summarized the situation correctly when interviewed a year ago following the death of a swimmer attacked by a large shark at Olowalu, 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."

George H. Balazs  
Deputy Chairman  
IUCN Marine Turtle Specialist Group



January 23, 1993  
992-A Awaawaanoa Place  
Honolulu, Hawaii 96825  
Tel.: 808-395-6409

SURFER MAGAZINE- LETTERS  
33046 Calle Aviator  
San Juan Capistrano, CA 92675

The warning to Hawaii's surfers (in More Bad Shark News 3/93) to "do your best not to look like a green sea turtle" if you "want to live to tell about it" was strange advice from misguided reporters. A surfer on a 6-to-7 ft board 2 ft (or less) wide bears no resemblance at all to a 1-to-3 ft oval sea turtle. The common denominator, however, is that both the surfers, and intermittently the turtles, are at the surface where tiger sharks are known to feed.

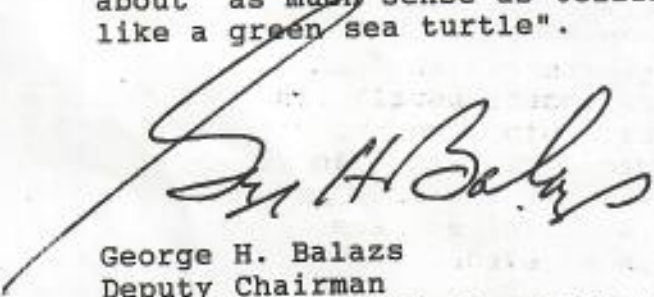
Do tiger sharks have to "mistake" surfers for turtles in order to attack them? Of course not. There is absolutely no scientific evidence of substance to show that mistaken identity is involved in such attacks. Unfortunately the news media in Hawaii has repeatedly voiced this flawed speculation, causing many to believe it's true. 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. Very different species of sharks and prey items are involved. All sharks aren't the same, and they certainly don't behave in a similar manner.

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 feeding strategy. It is well known that tiger sharks eat a wide variety of prey items, more so than any other shark. For example, in a two year study conducted by the University of Hawaii, tiger sharks were found to consume (in decreasing order of % sharks containing the items) fish, crabs and lobsters, garbage, birds, other sharks, rays, squid and octopus, turtles, porpoise and whales, and humans.

Turtles are frequently overestimated in the diet of tiger sharks by people cutting them open to see what they eat. This happens because the outer surfaces of a sea turtle, like the scutes of the shell, are resistant to being broken-down by the shark's strong stomach acid. Consequently these items stay in the stomach for a long time before eventually being regurgitated. In contrast soft bodied prey items, with far fewer (and smaller) indigestible parts, digest away quicker and therefore can be easily underestimated in stomach contents.

Explorer Jean-Michel Cousteau summarized the situation correctly when interviewed a year ago following the death of a swimmer attacked 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 everthing, and ...are more likely to attack anything on the surface whether it's a piece of wood, a surfboard, a boat, or a bird."

What's the bottom line? If you are really that worried about shark attack, "don't surf at the surface." But of course that makes about as much sense as telling someone to "do your best not to look like a green sea turtle".



George H. Balazs  
Deputy Chairman  
IUCN Marine Turtle Specialist Group

## Letters

### Deadly digestion

May I provide some clarification to statements made in a recent letter ("The fisherman's point of view," *HW* 12/23) on sharks and shark attacks in Hawaii. The letter stated that "...in some fisheries in the Pacific, 60 to 70 percent of the tiger sharks examined are found to have turtle remains in their stomach contents." Readers might easily get the flawed impression that turtles are the overwhelming component of the tiger shark's diet. That's simply not the case. Numbers don't always tell the whole story. In this instance some basic knowledge of tiger shark and sea turtle biology is required.

The digestive tract of tiger sharks functions in such a way that only paste-like material — the broken-down remains of prey — can pass out of the stomach into the intestines. Objects that can't be broken down in the stomach are retained there for an unknown and likely extended period of time. The outer surface of sea turtles is made of a tough keratin-like substance that is completely resistant to decomposition in the stomach. Consequently, these large and clearly recognizable items are held in the stomach, while the rest of the turtle, including the meat, bones and all else, is digested. These factors over-represent turtles in tiger sharks' stomachs, and give a biased picture to persons cutting open the animals to see what they eat. It is a biological fact that tiger sharks eat a wide variety of items. In a two year study conducted by the University of Hawaii, tiger sharks in Hawaiian waters were found to prey upon the

following items (in descending order): fish, crabs and lobsters, garbage, birds, sharks and rays, squid and octopus, turtles, porpoises or whales, and humans. Jean-Michel Cousteau summarized the situation correctly following the tragic death of Mrs. Morrell 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."

George Balazs  
Deputy Chairman  
IUCN Marine Turtle Specialist  
Group



February 6, 1993  
992-A Awaawaanoa Place  
Honolulu, Hawaii 96825  
Tel. 395-6409

Environment/Letters  
H30  
91-1052 Pohanhawai Street  
Ewa Beach, Hawaii 96706

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 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.

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

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.

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### Sherman's Lagoon



Dr. George Balazs  
Honolulu Laboratory  
National Marine Fisheries Service  
2570 Dole Street  
Honolulu, HI 96822-2396

# Legends Of The Sea

by Justin Rutka

Dear George:

I need your help in testing a hypothesis:

Ho: Pohaku Pa'akiki was sacred to local sweet potato farmers who offered 'awa (a natural narcotic drink) daily to Kamohoali'i, their shark god. Legend holds that a fisherman, trying to annoy the farmers, caught sharks and threw their severed tails into the water by this pohaku. Naturally, this annoyed Kamohoali'i, who caught the fisherman in the water one day and began to devour him, beginning with his feet. The shark god stopped at the fisherman's buttocks because of the smell of excrement, and the spirit of Kamohoali'i revealed to one of the farmers his pledge to never again eat human flesh or allow other sharks to harm anyone between Makapu'u and Waimanalo. For many years thereafter no shark-related injuries were reported in this area.

I've enclosed a map of how Kamohoali'i might view "between Makapu'u and Waimanalo." Zone A encompasses the waters between Makapu'u Point and Wailea Point connected by a straight line. I've added on Zone B to give the offshore area some curvature.

Please check your shark attack file and see if there are any attacks in either Zone A or B.

I say that the odds are on the side of Kamohoali'i on both scores. Some sharks do grind on humans in some areas, but I have done a thorough search of the scientific literature and I have not found even a single reference. Please let me know what you discover.

Sincerely,  
Justin Rutka  
Honolulu, O'ahu

Enclosure: Map of zone A and Zone B  
P.S. Since this legend predates Capt. Cook, I'm assuming that haoles are fair game.



An apparition appeared in Justin's recent photo of the pohaku mentioned in the legend. Could it be the spirit of Kamohoali'i?



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Dear Justin,

Thank you for sending me that wonderful story of Kamohoali'i and the picture of Pohaku Pa'akiki. Here's what I discovered from my shark attack file:

**Case # 1779**    **Date** 1779    **Location** Mallu, HI    **Victim** Nu'u-anu-pa'a hu  
**Circumstances:** Young male gashed on one side of buttocks after being pursued while surf boarding. Subsequently suffered "great pain" and died at Pololu (Kamakau 1961; Anonymous 1983c).

**Case 4\***    **July 14, 1900**    **Makapu'u E. Uhlbrecht**  
**Circumstances:** Believed to have drowned when carried out to sea while hunting sea shells with companions. "A thorough search was made for the body for several days." Victim's foot with skin and flesh intact "in a fair state of preservation" was found in the stomach of an 11-foot 9-inch shark hooked on the night of 8-17-00 off Kaka'ako, Honolulu, by John Kinipeki. Positive identification of victim was made by Mrs. Uhlbrecht based on an ingrown toe nail. Human pelvis and femur, blackened and totally denuded of flesh, were also recovered from the shark's stomach. These bones were thought to be from a different person, probably one of several Chinese fishermen lost overboard in the harbor during the past months (Anonymous 1900; McMurray 1991).

**Case 29**    **Sept. 19, 1948**    **Makapu'u N. Kalama**  
**Circumstances:** Bitten on leg while swimming (Anonymous 1948; Morse 1953; Gilbert 1963).

As far as shark attacks go, that's it for the area between Makapu'u and Waimanalo.

Sincerely,

George H. Balazs  
Zoologist, Honolulu Lab

P.S. Where did you find the legend of Kamohoali'i, and where did you get the map?

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