

A composite image featuring a shark swimming in the water in the upper half and a tiger's stripes in the lower half. The shark is a greyish-brown color, swimming towards the left. The tiger's stripes are orange and black, running vertically. The text is overlaid on the image.

BOYS + girls in the Hood

**Debunking the myth
of shark territoriality**

WORDS **NICK WHITNEY**

PHOTOGRAPHS **CYNTHIA HANKINS + DOUG PERRINE +
NICK WHITNEY**

Hey, have you heard about the 17 foot tiger shark with the stumpy tail that lives just outside of Barbers Point Harbor? How about the Galapagos shark off Diamond Head that shows up as soon as you pull the trigger on your gun? What about the 14 ft tiger named “Laverne” who frequents the mouth of Honokohau Harbor on the Kona coast? If you’ve done much spearing in Hawaii, you’ve probably heard these stories and you may have even told them yourself – stories of sharks that have staked out their territories in inconvenient places that should make you think twice before diving there. We hear about “territorial sharks” from surfers, divers, fishermen, and a lot of self-proclaimed experts, but is any of it actually true?



PHOTO TOP_PERRINE > PHOTO OPPOSITE_HANKINS

What is territoriality?

First let’s discuss what the word “territorial” means. As far as scientists are concerned, territorial animals are those that defend a given area from intruders. These could be intruders of the same species, or other animals, but typically a territorial creature stakes out a certain area that contains some valuable resource (like a good place to feed, breed, or both) and then works hard to keep someone else out of that area. In theory, animals should be territorial when resources (let’s say food) are patchy in distribution. So a defended territory should not only be rich in food, but the surrounding areas should have very poor food sources. If nearby areas have just as much food as the territory, then why defend it? It would make more sense to just cruise around and enjoy the same amount of food wherever you go, and forget about territoriality – and that’s basically what sharks do.

So if sharks aren’t territorial then who is? Examples of territorial animals include wolves, damselfish, silverback gorillas, and Pipeline surfers. But wait, sharks are even tougher than Pipeline surfers, right? So why wouldn’t they be territorial? Well it turns out that no matter how tough you are, defending a territory is a lot of work. You either have to constantly patrol the boundaries of your territory, or you have to

rub your scent on things and make a lot of loud noises so everyone knows to stay away. Not only is this a big hassle, but it can be incredibly hard to sneak up on your food when you’re being loud, stinky, and territorial. So it’s only in an animal’s best interest to be territorial if the area it’s defending has enough food to sustain it for a long time and is worth the extra energy required to defend it.

Still, why wouldn’t a shark just find a really nice, fishy reef somewhere, claim it, and defend it from other sharks? Anyone who fishes knows that some areas are much better than others, but you also know that the best areas are usually those that don’t get fished very often. Fishing an area constantly not only decreases the number of good fish, but also makes the remaining fish harder to catch. That’s why the fish that will stare blankly and wait for you to pull the trigger along the Kohala Coast won’t let you come within 30 feet of it at Kakaako. They learn pretty quickly what those sticks with the rubber bands are for, and a shark trying to feed in the same territory all the time would likewise find it hard to catch fish that were always looking out for her. These are just a few of the reasons why sharks are not territorial from a scientific perspective.

So far we’ve been talking about the scientific definition of territoriality, but that’s probably not what your dive buddy means when he tells you about the “territorial” tiger outside

Chinaman’s Hat. What he probably means is that the shark stays around that area for a long time or “is always there.” A more accurate description of this behavior would be to say that the shark is strongly “site-attached” or has a very small “home range.” This would certainly explain repetitive sightings of the same shark in the same area, and would also mean that if there was a shark attack, you could fish the area of the attack and have a pretty good chance of catching and killing the shark that was responsible. This was a commonly held belief in Hawaii until the early 1990’s, when Dr. Kim Holland and the UH shark lab started a tracking study of tiger sharks around Oahu. The researchers caught 8 tigers off the south shore of Oahu, tagged them with electronic transmitters, and tracked their movements for 7 to 50 hours straight. All of the sharks moved offshore after being released, and 6 of the 8 sharks headed nearly straight to Penguin Banks (off the coast of Molokai). They moved at an average rate of 2.4 miles per hour, and 5 of them had made it all the way to Penguin Banks within the first 24 hours after being tagged. Subsequent studies have shown movements between islands (and further) to be common, and probably representative of typical behavior for tiger sharks in Hawaii.

All of this is not to say that sharks won’t occasionally remain in a fairly narrow area for



days at a time, but these events can often be traced to some sort of large feeding opportunity such as a whale carcass (like the one off Kona in 2006), a shipwrecked fishing boat full of ahi (Diamond Head 2002), or the repeated cleaning and disposal of fish carcasses around harbors during peak sport-fishing months. For instance, the shark pictured here with the “sawed-off” dorsal fin is nicknamed “Shirley,” and was sighted by divers around Honokohau Harbor on July 8th, 9th, and 11th, during – and just after – the 16th Annual Skins Marlin Derby on the 6th, 7th, and 8th. The timing may be a coincidence, but Shirley hasn’t been seen since (oh – and “Laverne” has turned out to be one of at least 11 tigers photographed around Honokohau in the last two years alone). Interestingly, even the long-term promise of free handouts doesn’t seem to be enough to keep a shark around for long. Shark cage-diver operators working offshore of Haleiwa see large daily and seasonal fluctuations in the numbers and species of sharks approaching their cages. So even regular, free meals won’t necessarily keep sharks in one place. How’s that for “territorial?”

Keeping the myth alive

The main reason that the myth of territoriality in sharks seems to persist is the assumption that if we see a shark somewhere, then see a shark there again later, it must be the same shark. Evidence used to support this assumption includes a long list of characteristics that people assume are unique, but are actually much more common than you might expect. These include things like large size, ragged dorsal fins (see sidebar), stumpy tails, and hooks in the jaw. The reality is that there are hundreds of sharks in Hawaii’s waters that share each of these characteristics, and unless there is something truly unique about the shark (a Mohawk hairdo, gang tattoos, etc.) then you really need clear photos in order to make a match.



PHOTO_PERRINE

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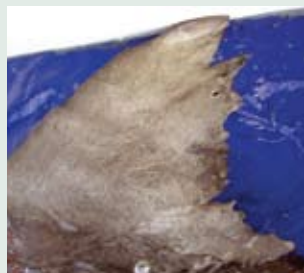
Applying photo-identification and some critical thinking often leads to results far different than what you would otherwise expect. For instance, at the beginning of a study of whitetip reef sharks off East Oahu, we asked some local dive masters how many different sharks come in to a specific dive site where they were diving regularly. These were experienced divers who were coming out every day, and seeing the sharks up close and personal, since whitetips often lie still on the bottom or under ledges. The most observant divers we could find told us that there were six different sharks that occasionally used the area. Because whitetips have unique spot patterns on their sides that can be used to identify individuals, we started diving the site a couple of times per month to take ID photos and record which sharks were there.

After six months, we had identified a minimum of 18 individual sharks that used the site! The problem was not that the divers weren’t paying close enough attention, but that sharks of the same size tend to look a lot alike unless you have pictures of them that you can compare side by side.

On that note, you can help with the study of shark movements if you have any pictures of whitetip reef sharks from the Hawaiian Islands. Please send the photos, date, and location to whitetip@hawaii.edu, or check out our website at www.whitetip.hawaii.edu. We also dabble in photo-ID of tiger sharks in Kona, you can find them on our website as well. Until then, don’t worry about large territorial animals in the ocean...unless you’re surfing at Pipeline! **PAU**

The myth of a “successful” shark hunt

In November of 2003, an adult female tiger shark was caught and killed off the North Shore of Kauai, two weeks following an attack on a surfer at a site four miles down the coast. As in all post-attack shark hunts, the accused was first executed, then searched for evidence, then declared guilty after none was found. Depending on who you talk to, the shark killed was either the same shark that attacked the surfer (as she later wrote in her bestselling autobiography), or the same shark that had been seen frequently by other surfers at a nearby surf spot, or both. All of these theories are likely wrong. While no one saw the shark that bit the surfer, bite marks left on the surfboard showed that it was similar in size (over 13 ft) to the dead shark. Unfortunately this is not an uncommon size for a tiger shark (4 of 10 recently measured off the Big Island were this size or larger), and shark bite marks aren't like fingerprints, so jaw-size similarity is inconclusive evidence at best. Theories that the dead shark was one that had been seen repeatedly by surfers in the area were based on the fact that it had a “ragged” dorsal fin with notches taken out of it, which matched surfers' descriptions. But this is also a much more common characteristic of tiger sharks (especially adult females) than most people realize. Tiger sharks have never been seen mating, but if they do it like other sharks then there's probably a lot of biting involved (usually males bite the females). For adult female sharks, this leads to a high incidence of bite wounds, scars, and yes – ragged dorsal fins. A few examples are shown below, all from female tiger sharks in Hawaii, and all of which could be described as having a ragged dorsal fin.



So although this was considered by many people to be a “successful” shark hunt, and likely provided a sense of relief to the community, any sense of safety was probably a false one. Studies show that tiger sharks roam widely, and rarely, if ever, stay along one stretch of coastline for long periods. While the killing of this single shark probably wasn't harmful to the overall population, the false logic that led to it is dangerous if applied more broadly. Sharks are generally slow-growing and slow to reproduce, which makes their populations extremely vulnerable to fishing pressure. In fact, recent research shows that female tiger sharks may only be able to reproduce once every three years after they reach adulthood, or zero times every three years after they're dead. **PAU**