

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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Risks of a Shark Attack

Great White Shark sightings along the central California coast, particularly juveniles, have become more frequent during the last two years at Seacliff, Morro Bay, Pismo Beach and a few other places. While there is no simple answer as to why, there are several factors that may help explain this increasing presence.

This past year or so saw both an odd very large Warm Blob of water off the west coast and then a major El Nino. While the effects of both have now dissipated, the future is unclear. June was the Earth's 14th straight record hot month, and this trend is expected to continue.

Why? One important reason is that the carbon dioxide content in the atmosphere is higher than it has been for 850,000 years. It continues to rise, which continues to trap heat. A warmer atmosphere and a warmer ocean result.

The warming of the waters off Central California has affected many of the coastal ecosystems, and we believe that juvenile sharks are following warmer water north.

There has also been a trend over the past decade or so of sea otters being bitten by sharks along the central coast. Of the 30 dead sea otters recovered along the California coast during the first two weeks of July, nearly one-half (14) showed evidence of a shark bite. While there are no reports of an otter ever being eaten by a shark, the increased fatalities from shark bites strongly suggests an increase in their presence.

The protection of sharks through eliminating gill netting, and the publicity and efforts to ban shark finning, may also be factors in their increasing abundance.

Truth be told, however, we still don't know a whole lot about great white sharks. Among the mysteries are: 1) how long they live, 2) where they mate and how many months they gestate, 3) how many of them are out there and where they

spend most of their lives. Some recent shark tagging may help us start to answer some of these mysteries, however.

A 2011 estimate indicated 219 individual great whites in California's coastal waters. Counting sharks in an area the size of California's offshore ocean, however, is challenging to put it mildly, as it typically involves some big assumptions and extrapolations from the few sightings. Others took the same data and concluded that there were ten times as many sharks out there, or 2000.

California shark attacks are more frequent between July and October, which is likely a result of these being the months of both warmest water and greatest beach and water use. Not surprising, winter months have the fewest number of attacks.

A California shark attack study a few years ago reported that the "risk" of shark attack is down 91% since 1950, although the study found that the actual "number" of attacks has increased every decade since 1960. There were six attacks in the 1960s, 13 in the 1970s, 15 in the 1980s, 20 in the 1990s, and 28 between 2000 and 2009. So why is the actual risk reported as declining?

The conclusion that the risk of attack is now lower than 60 years ago is based on the greater numbers of people going to beaches now (the study estimated 165 million beach visits in 2013) compared to 1950 (about 53 million visits). There have also been large increases in ocean recreational activities, in particular surfing and scuba diving.

Eleven attacks in the 1950s with 53 million beach goers give you odds of an attack of about 1 in 480,000 over that 10-year period; 28 attacks between 2000 and 2009 gives you odds in that decade of one in about 590,000. This looks to me like a 20% decline in risk, however, not 91%.

Equally important, how do the risks of shark attacks compare to other daily activities? Well, during the entire decade of the 1990s, there was one death from a shark attack along California's entire coast, but 177 people drowned.

Between 2000 and 2010, there were 114,000 accidental deaths in California from all causes; 41,277 of these involved motor vehicles, 30,445 involved some type of poisoning or drug overdose, and 18,472 were due to falls. Just five people died from shark attacks.

Drive, bike, skateboard, walk, swim and eat carefully, and don't text while doing any of the above.