

# Shark Attack Facts

(Data analysis from the years: 1964-2014)

On a global scale, shark attack incidents have nearly doubled over the past 50 years. There are many contributing factors to this, however one interesting theory is that the increase of CO2 emissions has an underlying effect on shark behavioral patterns.

## CO2 Emissions and the Ocean

Scientists believe that the oceans currently absorb 30-50% of the CO2 produced by the burning of fossil fuel. This results in higher temperatures, melting ice caps, rising sea levels, and ocean acidification.

Warmer temperatures may benefit some species and hurt others. Changes in carbon dioxide levels may not have a direct impact on sharks but related 'feedback loops' could be important.

## What is ocean acidification?

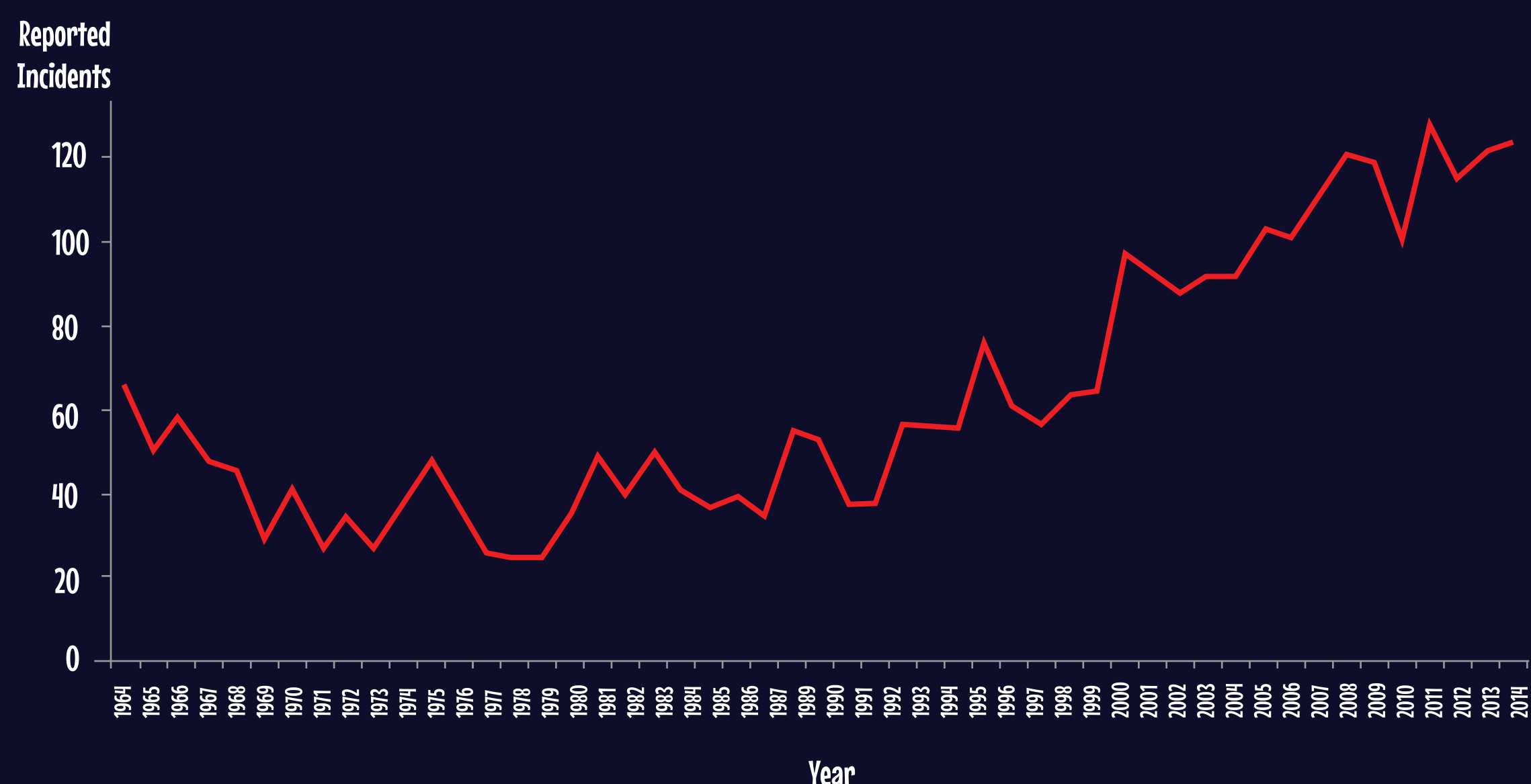
The ongoing decrease in the pH of the Earth's oceans, caused by the uptake of carbon dioxide (CO2) from the atmosphere.

Acidity is a measure of the concentration of hydrogen ions (H+) in a given solution. When CO2 from the air mixes with ocean water it combines and forms carbonic acid (H2CO3). The carbonic acid then dissociates into hydrogen (H+) and bicarbonate (HCO3-) ions.

## Ocean Acidification & Sharks

It's a myth that all sharks will drown if they stop moving. However, scientists discovered that as the oceans grow more acidic this century, sharks may swim for longer times than before. These new findings suggest that rising atmospheric carbon dioxide levels causing this ocean acidification could significantly disrupt the lives of these predators, which are already in sharp decline globally.

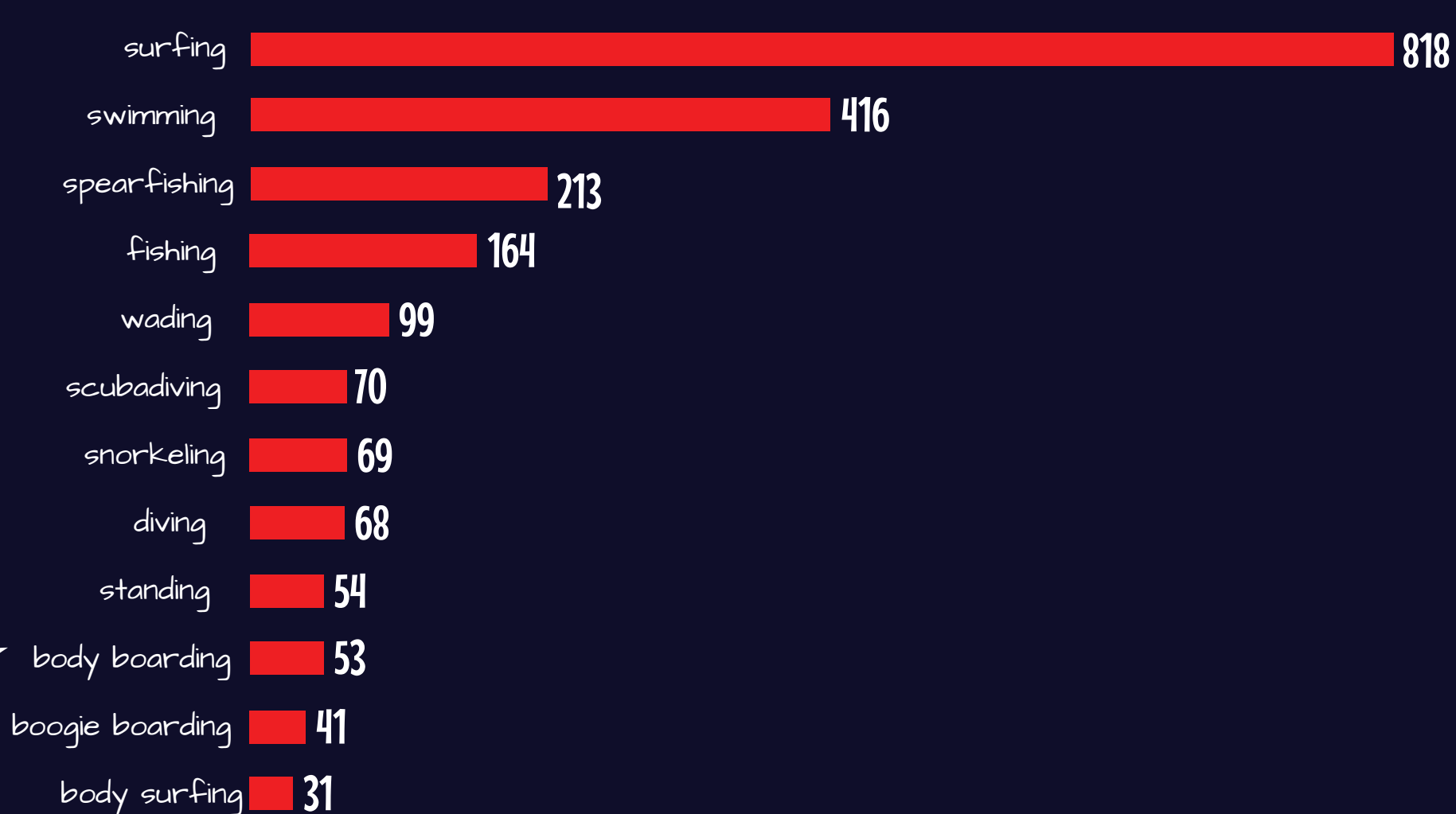
## SHARK ATTACKS INCREASE OVER THE PAST 50 YEARS



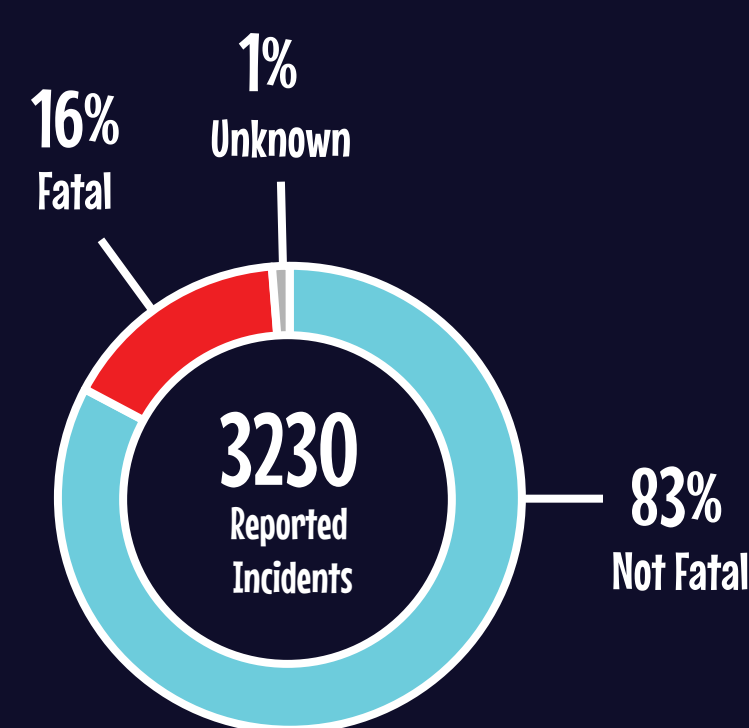
## REPORTED SHARK ATTACK INCIDENT LOCATIONS



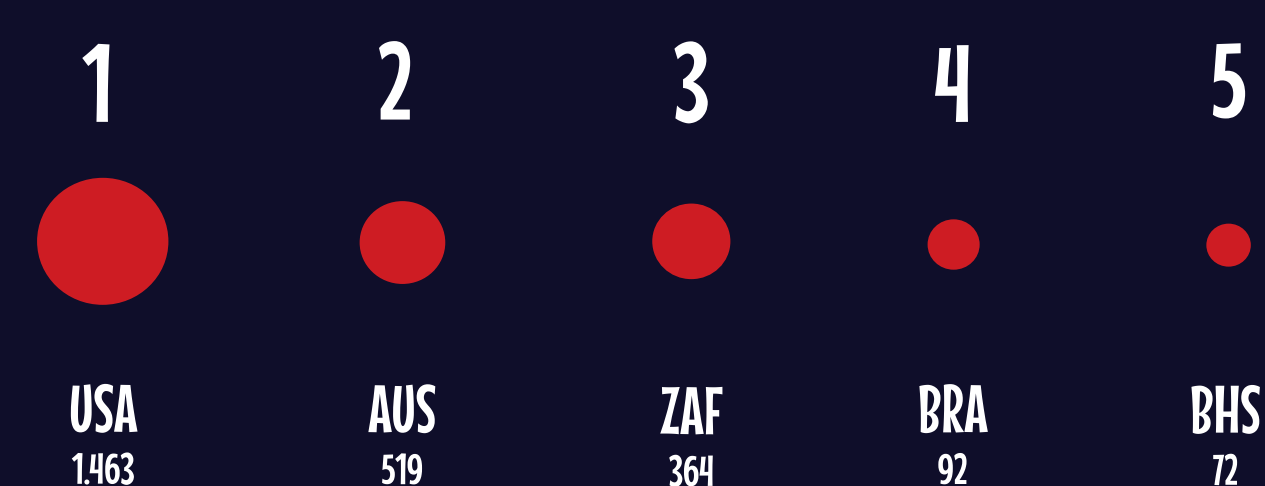
## INCIDENT BY ACTIVITY (TOP 12)



## FATALITIES



## TOP 5 SHARK ATTACK LOCATIONS



## Scientific Investigation

To investigate the impact of ocean acidification on sharks, researchers experimented with 20 small-spotted catsharks (*Scyliorhinus tuscus*), which live on the seafloor in temperate waters. The scientists exposed the sharks to atmospheric carbon dioxide levels that averaged either 401 or 993 parts per million for one month.

The researchers also filmed the swimming patterns of the sharks overnight using infrared cameras and infrared light the sharks could not see. While sharks exposed to current carbon dioxide levels had a nocturnal swimming pattern distinguished by many starts and stops, the investigators discovered that sharks exposed to high carbon dioxide levels had fewer but longer bouts of swimming, and swam to the surface more often.

The scientists are uncertain whether the abnormal behavior they saw is due to stress from the sharks' constant searching for better water or from changes in blood chemistry affecting the brains of the sharks. In either case, these findings suggest ocean acidification could directly affect sharks.