

Edited by
Don Silcock

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Large enough to get your complete and undivided attention is how American underwater photographer Marty Snyderman once summed up an encounter with the grey nurse shark (*Carcharias taurus*). Big and fierce-looking, with a set of prominent sharp teeth, the grey nurse moves through the water in a slow but determined manner, which creates a physically intimidating presence guaranteed to raise the blood pressure of the uninitiated observer.

My first such encounter was about 15 years ago at Flat Rock near Stradbroke Island in Moreton Bay, Queensland, Australia. I was diving the shark gutters on the northeast side of Flat Rock, where grey nurse sharks are known to gather from June to October each year. Although thoroughly briefed on what to expect and do prior to entering the water, I have to admit I was more than just a little concerned when I saw the first shark heading in my direction.

We had been told not to obstruct the shark's path in anyway and just stay calm while they swim past. Sure enough, the big female, almost three meters long, did exactly that... completely ignoring me!

Since that first encounter, I have been fortunate to spend a fair amount of time underwater with grey nurse sharks, and been so close that I could tell whether they had halitosis—bad breath. But I can honestly say that I have never once felt threatened or in any real danger.

So, why is it that in just 40 years the grey nurse has gone from one of the most

common sharks in Australia, to an endangered species, when it is not a dangerous shark?

A Bad Case of Mistaken Identity...

The early 1960's were a time of increasing prosperity for the "Lucky Country" and our urban population turned increasingly

to the sea for sport and entertainment. Surfing, spearfishing and game fishing became increasingly popular, and the macho image of these water sports suited the times well.

Marine science was also in its infancy; very little was known about the inhabitants of our coastal waters. Sharks were generally considered to be very danger-

ous creatures and large sharks like the grey nurse were automatically assumed to be man-eaters. Just as Australian newspapers today automatically assign a shark attack to the great white, back in the 1960's, the grey nurse was the "usual suspect".

Catching one of these supposed man-eaters was considered a heroic act and

Grey Nurse Shark

How to dive with the





one guaranteed to draw a big crowd back on the beach when the dead shark was hoisted up for all to see.

Grey nurses hunted

Although predominantly solitary in nature, grey nurse sharks congregate at certain times of the year as part of their mating patterns and these colonies added to the confusion because they were perceived as "shark infested" locations—particularly if they were anywhere near public beaches, such as with the one at Magic Point near Maroubra, just round the headland from Sydney's famous Bondi Beach.

Aggregating in such a predictable way meant that the grey nurse, compared to other large sharks, was relatively easy to catch or spear, and the sentiment of the

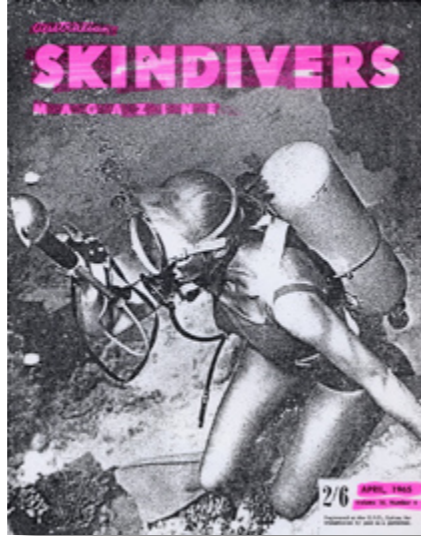
GREY NURSE SHARK BREEDING CYCLE

Grey Nurse sharks breed slowly and are ovoviviparous, which means the embryos feed on a yolk sac in the mother's uterus until all the yolk is consumed, when they turn on each other.

in what is known as "intra-uterine cannibalism". There are upto 15 embryos initially but this Darwinian survival of the fittest process results in only one pup actually making it, meaning a maximum of two pups per litter – one from each of the mother's two uteri.

The pups are between 80 to 100cm in length when they are finally born, meaning they are quite small and relatively vulnerable to attack, further adding to the pressure on the overall Grey Nurse population.

The gestation period is believed to be 9 to 12 months and the overall reproductive cycle about two years, because the mother rests for a year or so before mating again.



times was, *the only good shark, was a dead one.*

The 1960's was really not a good time to be a grey nurse, as later in that decade saw the introduction of the explosive underwater powerhead, which tilted the odds well away from the grey nurse and in favor of the many spearfishermen using them, resulting in hundreds of sharks being killed.

The impact of this widespread slaughter was two-fold. Initially, it decimated the grey nurse population on the east coast of Australia. But in the longer term, it had a compounding effect, because it takes between six to eight years for a juvenile grey nurse shark to

reach sexual maturity, and once they start breeding the birth rate is a maximum of two pups every second year (see sidebar)—meaning that the population grows very slowly even when things are normal.

Grey nurse sharks reach a maximum size of around 3.5 meters and are believed to live for about 25 years, hence the widespread killing of so many mature, and therefore, sexually active, sharks in the 60's and 70's meant that it doomed those

that survived the carnage to potential extinction unless dramatic changes occurred.

It seems sadly ironic that



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what we now know as a quite docile shark could be hunted to the verge of extinction in such a way.

Turning the conservation tide

Perception, as they say, is reality, and to change the public's widely held belief that a large and dangerous-looking shark such as the grey nurse was, in fact, no danger to them at all, requires exceptional effort. To get politicians to do anything is even harder, but the latter is virtually impossible until the wheels start to turn on the former.



GREY NURSE SPOT PATTERNS AND I3S

Exactly where the original concept of using the spot patterns came in the first place is not completely clear, but there is no doubt that Australian dive instructor Phil Bowman of Seal Rocks made a major contribution when he incorporated the principle into the PADI

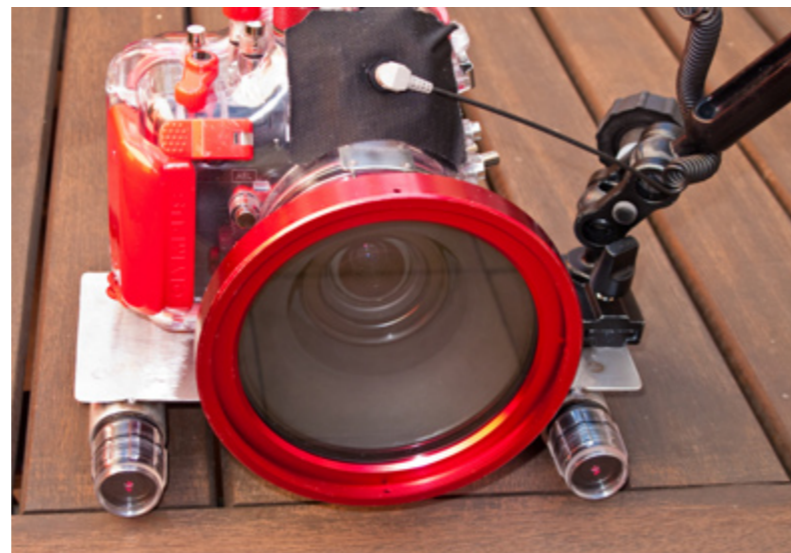
made a major contribution when he incorporated the principle into the PADI specialty "Shark Diver" course he developed back in 1987.

I3S was first conceived in 2003

by Dutch marine scientists Jurgen den Hartog & Renate Riejns while in South Africa studying the impact of divers on the Ragged Tooth (Grey Nurse) Shark at Aliwal Shoal, 40km south of Durban. They were diving with Anna Mieke van Tienhoven, who had published the idea of using the spot patterns on the flanks of the shark as a kind of unique identity fingerprint, but was using manual comparison to do the analysis – something that got harder & more time consuming the more sharks she photographed.

What Hartog & Riejns did was develop the theory of using a software algorithm to compare spot patterns, based on the principle that the pattern on each shark is unique. The I3S software they developed stores the pattern as a "fingerprint file" and uses that to compare each additional image added to the database.

Although initially for use in identifying Grey Nurse Sharks the I3S software has been used successfully with Whale Sharks identification, as they also have unique spot patterns, and a modified version has been used in the identification of Manta Rays.: www.reijns.com/i3s



Video camera used for capturing shark patterns used to identify individuals. It consists of a regular underwater video housing, but with a long flat bracket across its top and waterproof laser lights clamped to it on either side of the housing

help of Australian game fishing

role in changing public opinion.

The fight to protect the grey nurse from extinction was helped by numerous other people, many of whom went to great lengths, and

in 1984, a major breakthrough was achieved when the state government of New South Wales formerly declared the grey nurse as 'vulnerable'—making it the first protected shark in the world.

The lead of NSW was eventually followed in Queensland, Western Australia and Tasmania with fisheries legislation to protect the grey nurse, and then it was listing as 'critically endangered' under Commonwealth legislation. The highly-

rated Swiss-based International Union for Conservation of Nature (IUCN) has also listed it as vulnerable, meaning the grey nurse faces a high risk of endangerment in the wild—one step down from high risk of extinction in the wild.

Spot-A-Shark

About three years ago on a day trip to a grey nurse aggregation site at Magic Point, I noticed a rather unusual looking video camera, consisting of a regular underwater video housing, but

Australian diving icons Ron and Valerie Taylor were amongst the first to realize that the grey nurse should actually be protected, rather than hunted, and they were able to both use their high public profiles and enlist an unusual ally to the cause.

Ron, a former world spearfishing champion, told me that when they first started spear fishing back in the late 1950's both he and Valerie were utterly convinced that the grey nurse was a man-eater. However, over time, as they moved more into scuba diving, they came to understand that the grey nurse was relatively harmless to humans, and by the mid 60's, were both actively campaigning for its protection.

Ron highlighted two key events that helped to turn the tide of opinion—the first being enlisting the

legend Peter Goadby, who added significant weight to the conservation argument by confirming that the grey nurse was not a game shark at all.

Game fishermen in the late 1960's were not known for their environmental or conservational predisposition, so having such a well-known personality as the late Peter Goadby on the side of the grey nurse was a huge coup.

The second event was the film Ron and Val made in 1973 called, *The Vanishing Grey Nurse*, which went to air as part of a series of thirteen 30-minute documentaries made for Australian TV called, *Taylor's Inner Space*. The film was the first to challenge the public's perception of the grey nurse and introduce the reality of the situation. It played a significant



Sean Barker and Peter Simpson of Spot-A-Shark, which tracks grey nurse sharks



SPOT A SHARK

Sean Barker and Peter Simpson launched the Spot A Shark in 2009 with the aim of building on the work done by Phil Bowman of Seal Rocks in the early 1990s with his Grey Nurse Shark Migration Project.

Bowman's project was focused on the use of non-invasive to better understand shark movements and population and

Spot A Shark builds on this by attempting to harness the large number of previously unrecorded underwater encounters between divers and Grey Nurse Sharks to greatly enhance the size of the database. The basic concept being that many divers now carry a camera with them, so if the results of those encounters can be collated and entered into the existing database, a significant step forward may be possible with positively identifying the overall shark population & their migration patterns.

At the end of the day, the only way to ensure the long-term survival of the Grey Nurse is to get a full and proper understanding of their actual situation so that programs can be put into place to ensure that survival.

Sean and Peter are enthusiastically committed to the Spot A Shark project and the overall goal of Grey Nurse conservation, but are quick to point out the significant efforts of others in this field such as Queensland based marine scientist Carly Bansemer, Nick Otway and of course Phil Bowman.

Website: www.spotashark.com

with a long flat bracket across its top and waterproof laser lights clamped to it on either side of the housing.

Curious, I introduced myself to its owner, Sean Barker, and asked what the



Grey nurse shark swimming in the cave at Magic Point off Queensland, Australia

contraption was for? It turned out that he was working on a project to identify sharks using something called I3S—Interactive Individual Identification System—for an honors degree in marine science.

I subsequently learned that I3S is a software program that works on the basic premise that the pattern of spots on the flanks of the grey nurse sharks are unique, in the same way that fingerprints are with humans. Therefore, if sufficient images can be collected from the locations where grey nurse sharks are known to congregate, then migration patterns can be identified.

While the spot pattern remains the same, the distance between the spots increases as the shark grows, so I3S also provides a way to determine the growth rate of a previously identified shark, if the dates it is spotted and photographed are known. The laser lights Sean was using were to introduce a known dimension into the image of the shark, so that the growth rate could be calculated.

Sean explained that his prob-

lem was getting enough images to build a decent database, and being a one-man band, meant it was virtually impossible to gather enough to really get his project moving. So, he had approached one of the diving publications in Australia seeking support for an advertisement requesting copies and dates of grey nurse shark images taken in eastern Australia.

The advert produced a strong response and led to Sean teaming up with another Sydney-based diver and self-confessed shark addict, Peter Simpson, who had been diving Magic Point regularly since 2000 and had collected lots of images that could be used for the project.

Together Sean and Peter developed the Spot-a-Shark website (see sidebar), which greatly increased the number of images in the database, and together, they have now positively identified over 430 sharks and nearly 25 migratory patterns.

Face to face

An underwater encounter with any large creature is an exciting event, and the size and physical presence of the grey nurse shark makes interacting with them a truly memorable experience.

Most of my experience, and certainly all of my up close and personal, face-to-face contact, has been in the cave at Magic Point off from Maroubra in Sydney.

Typically, you are not allowed to enter the cave because of the potential impact on the sharks, but in the process of getting the images for this article, I was allowed to spend a reasonable amount of time in there, after being extensively coached on what and what not to do.

Sean Barker's and Peter Simpson's work with grey nurse sharks has shown that when they aggregate together at certain times

of the year, they establish swimming patterns that keep them away from each other's "personal space". So the presence of a large creature like a diver—with the curtain of bubbles they create—can disturb that pattern, stress the sharks and possibly drive them away from the area.

So, in a confined area like the cave at Magic Point, multiple divers entering it is certain to impact the swimming pattern and is a really bad idea. A lone diver on the other hand, with a slow and cautious approach can enter the cave area successfully from either end, which minimizes the impact on the sharks and gives them plenty of time to adjust their swimming patterns.

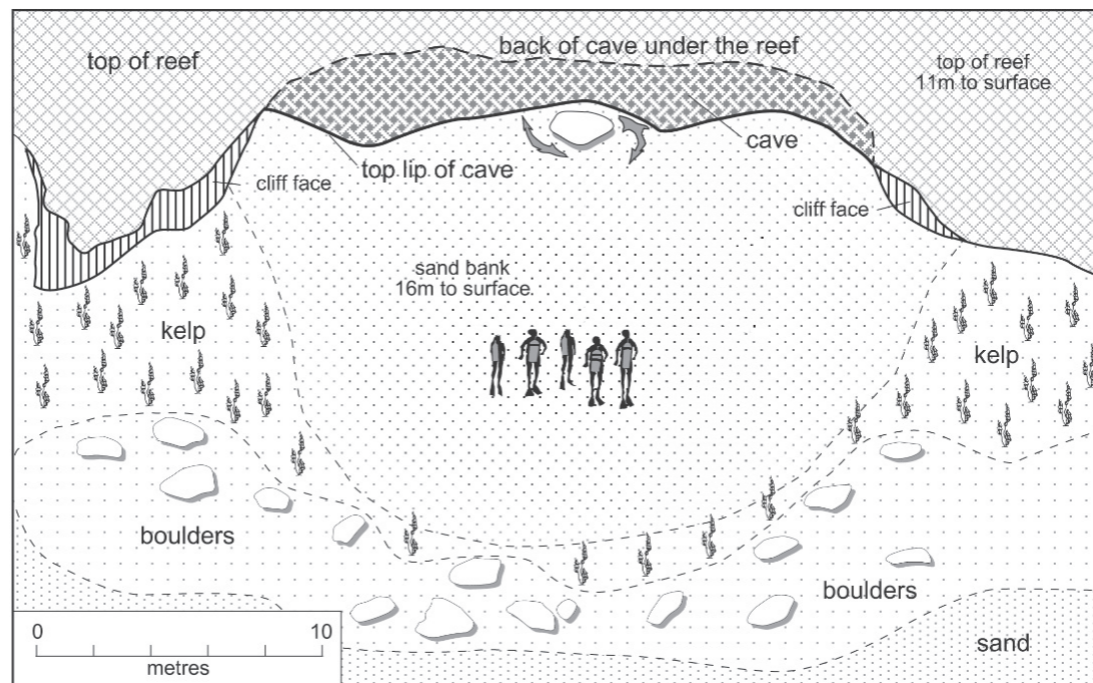
Clear signs of stress are changes in breathing rate, indicated by gaping of their mouths, and the speed at which they flick their tails. The two are linked because an unstressed grey nurse will swim in a relaxed manner at a rate

that provides enough oxygenated water passing through its mouth and over its gills. A stressed shark, on the other hand, has to move faster to increase the flow of water through the gills, and initially "gapes" its mouth to boost the oxygenation effect.

Sean believes that the stress threshold is around 24 tail flicks per minute, but the shark's overall "body language" is a sure sign that they are becoming stressed. If you observe that behavior, take it as your cue to back off and leave them alone—not that you are in any significant danger, but they are a big creature after all and so common sense should prevail.

The exact patterns of migration, aggregation and mating are still not fully understood, which is why the work of people like Sean and Peter is so important, but the basic fact is that, as divers, we are very lucky to be able to see the grey nurse in its natural environment—particularly in light of its vulnerable status. So, we owe it to them to respect them for the magnificent creatures that they are. ■

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