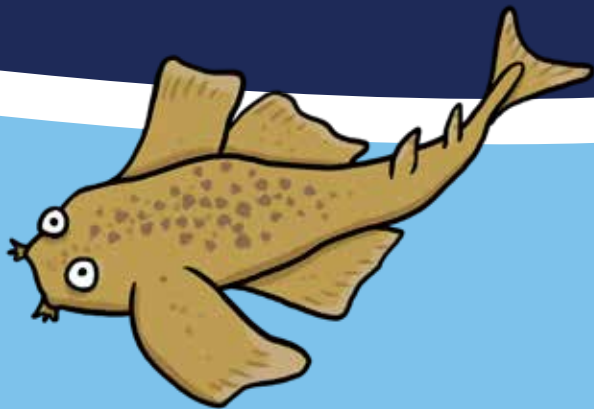




True-Blue Aussie Sharks & Rays

Uniquely Australian species that need our help



Campaign Overview

Australia is a global shark and ray “hotspot” with around one-quarter of the world’s shark and ray species calling our waters home. A total of 322 species are found in Australian waters, half of which are endemic – that is, they’re found nowhere else in the world (1).

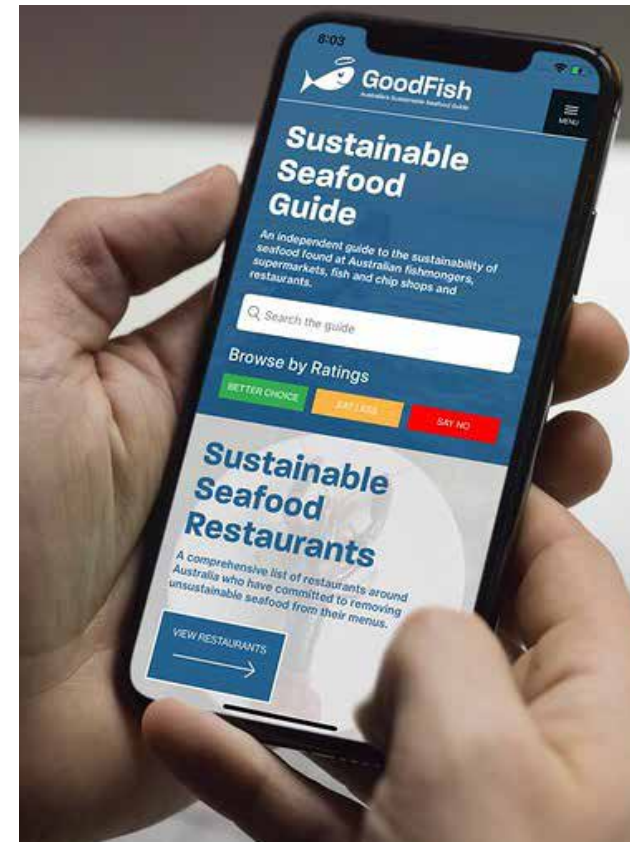
Sharks tend to get the most attention but did you know that most of our ‘true-blue’ endemic Aussies are actually rays? Nearly three quarters (69%) of rays are unique to Australian waters compared to less than half (39%) of shark species (1). Endemic species like the southern fiddler ray and the Australian blacktip shark can be found in coastal shallows where we dive and snorkel, but the majority of our endemic species are found in the deep, dark waters ranging from 100 meters to over a kilometre below the waves!

Sadly, Australia is also recognised as a global hotspot of extinction risk for some of the world’s most unique sharks and rays. The biggest threat to our endemic Aussie sharks and rays is trawl fishing on or near the sea floor. Trawl fishing often incidentally sweeps up our sharks and rays as bycatch in giant scoop nets. Another big threat are longlines that have hundreds or thousands of baited hooks stretching out for more than a kilometre on or near the seafloor. Those sharks killed, including the critically endangered whitefin swellshark, can often end up on our plates as the humble piece of flake from the local fish and chip shop.

Fortunately, Australia is also recognised as one of the few countries in the world best equipped to protect and save many of our threatened endemic species – but we need to act now (2). So how can we save our true-blue Aussie sharks and rays?

What Can You Do?

1. Sign the **petition** and ask the Australian Government to better protect uniquely Australian, endemic sharks and rays in Australia’s largest fishery
2. Take the pledge to **#GiveFlakeABreak** and choose a sustainable fish instead of shark meat next time you’re at the fish and chip shop.
3. **Download GoodFish: Australia’s Sustainable Seafood guide** to help you choose sustainable alternatives. It’s **EEEasy**:
 - Explore your sustainable seafood options using the GoodFish app.
 - Enquire with your fishmonger about their seafood options and ask questions like “What species of flathead is this and where does it come from?”
 - Enjoy sustainable seafood knowing you’re supporting healthy oceans, the local fish and chip shop, and the local fisher who’s doing a great job so we can fish for the future.
4. **Spread the shark love, and encourage others to #GiveFlakeABreak so that we can give our Aussie sharks and rays a chance to recover.**





Contents

- Australia: a unique hotspot **1**
 - Why are half of Australia's sharks and ray endemic to Australian waters?* 1
 - Where can you find them?* 1
- Why is Australia so important? **2**
- Whitefin Swellshark **3**
- Eastern Angel Shark **4**
- Greeneye Spurdog **5**
- Sydney Skate **6**
- Southern Fiddler Ray **7**
- Flake Fishing **8**
- An uphill battle against extinction **9**
 - Australia - a hotspot of extinction!?* 9
 - Why are they threatened with extinction?* 9
- How to save our Aussie battlers **10**
- Our sharky wins thanks to people like you! **11**
- References **12**

Image: MarineThemes
(Trygonorrhina dumerilii)

Australia: a unique hotspot

Australia's oceans are a biodiversity hotspot for the world's sharks and rays. Our waters are home to 322 species of shark and ray, making up for approximately one quarter of the world's species (1). **In much the same way many of Australia's land animals are unique and not found anywhere else in the world – that is, they're 'endemic' to Australia – about half of our shark and ray species are also endemic.** Looking a little closer, we find that we find that nearly three quarters (69%) of rays are unique to Australian waters compared to less than half (39%) of shark species (1).

Why are half of Australia's sharks and ray endemic to Australian waters?

Approximately 45 million years ago Australia split from the supercontinent Gondwana and drifted in isolation over millions of years to form the world as we know it today (3). During this time sea levels changed, and deep ocean trenches and basins formed creating extensive underwater barriers separating Australia from surrounding islands such as Indonesia and New Zealand. As a result, many sharks and rays evolved in isolation in Australian waters, much like how Australia's land animals evolved in isolation too.

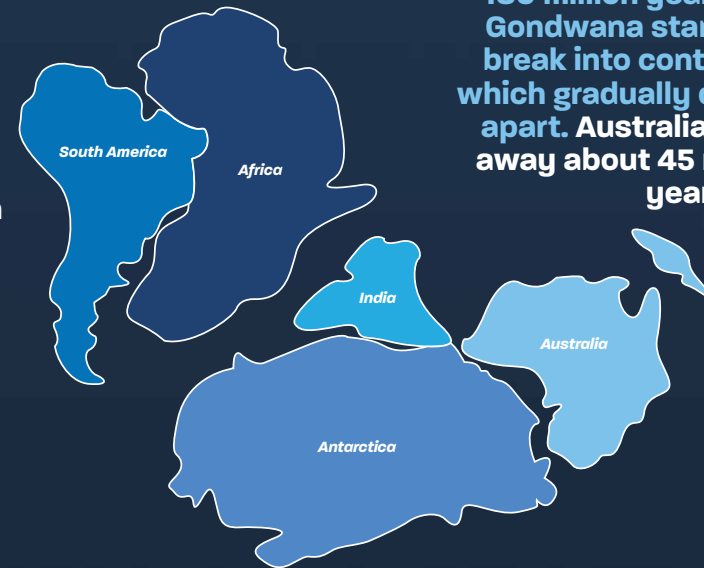
Where can you find them?

Approximately 60% of Australia's endemic species of shark and ray are found in the cooler, temperate and southern waters of Australia (4). **When we dive beneath the waves, more than half (56-64%) of our endemic species live as far as 70-500m deep,** along the continental shelf and its slope (4).

Although most live in the deep, dark depths, you may have encountered endemic Aussie beauties while snorkelling or diving and not known it! Of all the coastal sharks and rays living in waters up to 40m deep, 39% of species are endemic (4). Perhaps you saw the iconic southern fiddler ray? Maybe it was the enchanting sparsely spotted stingaree?

1.

Gondwana



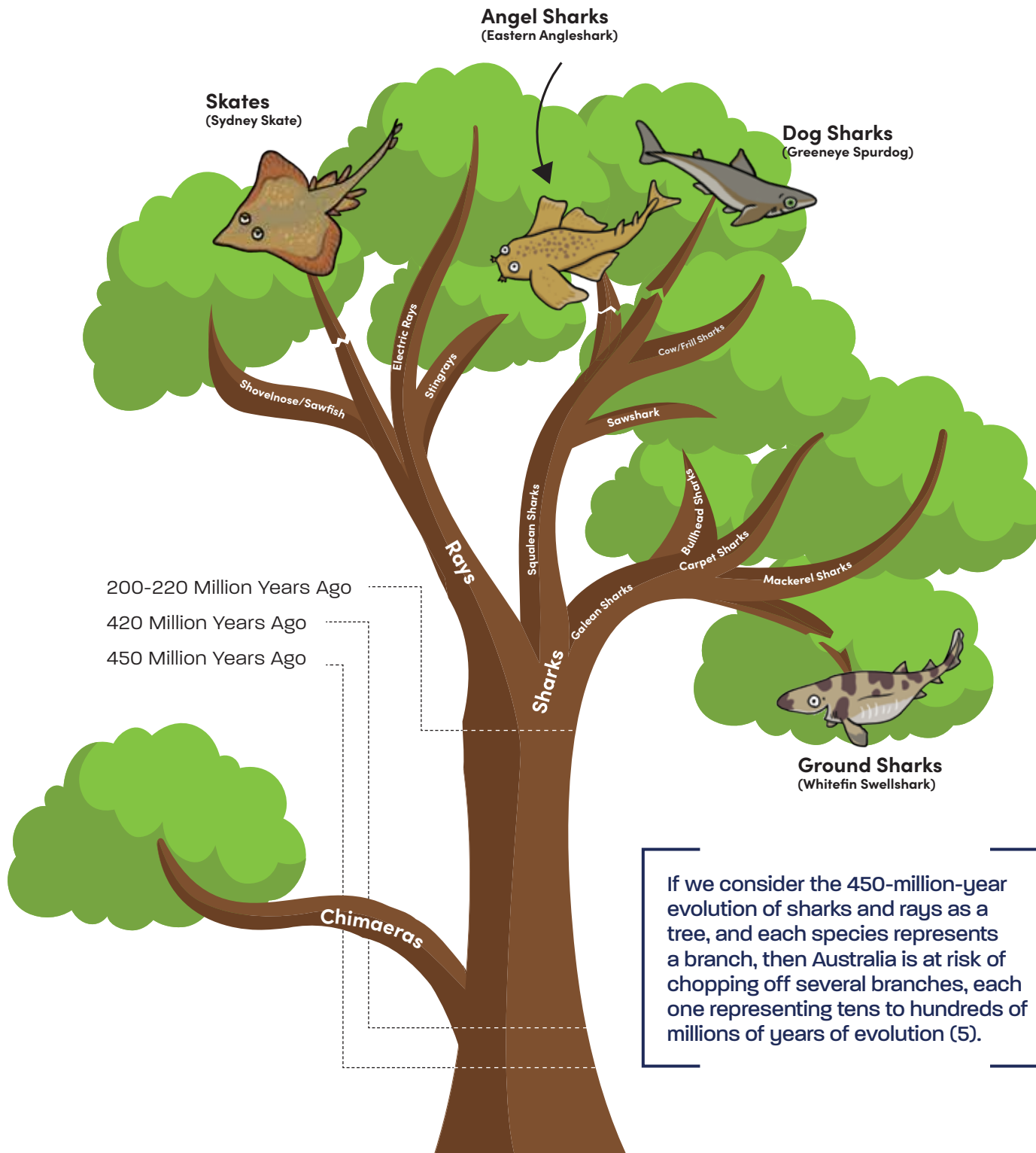
180 million years ago, Gondwana started to break into continents which gradually drifted apart. Australia broke away about 45 million years ago.

~60%

of Australia's endemic species are found in the cooler, southern waters.



Last PR, White WT (2011) 'Biogeographic patterns in the Australian chondrichthyan fauna' Journal of Fish Biology 79, 1193–1213.



Why is Australia so important?

Australia is one of 21 regions in the world containing 'triple threat hotspots' to sharks and rays (5). These 'hotspots' of the world are characterised by:

- the presence of threatened species in high levels of richness. Richness measures how many different species there are;
- endemism, which measures how many species are unique to a region;
- and evolutionary distinctiveness which measures how long ago a species split from their closest ancestor – the longer, the more distinct.

Because we are a 'triple threat hotspot', Australia is recognised as a global conservation priority in order to protect the evolutionary diversity of sharks and rays (2).

Remember, our endemic species only live in Australia. This makes Australia a living record of millions and millions years of evolutionary diversity. *If we can't save them, no one can.*

Whitefin Swellshark

Aint she just swell!? The whitefin swellshark (*Cephaloscyllium albipinnum*) literally 'swells' up by swallowing water to make herself appear larger when threatened by a predator. Unlike most shark species that give live birth, swell sharks lay eggs called 'mermaid purses'. The whitefin is found in cool southern waters of Australia at depths between 120 and 500m. It is listed as 'Critically Endangered' on the IUCN Red List, with an estimated decline of over 80% in the past 45 years (6). Despite the danger it's in, it is still legally harvested by trawl nets and deep-sea hooks, and can be sold for its meat which is commonly referred to as 'flake' in fish and chip shops.

Max size (total length): 110cm

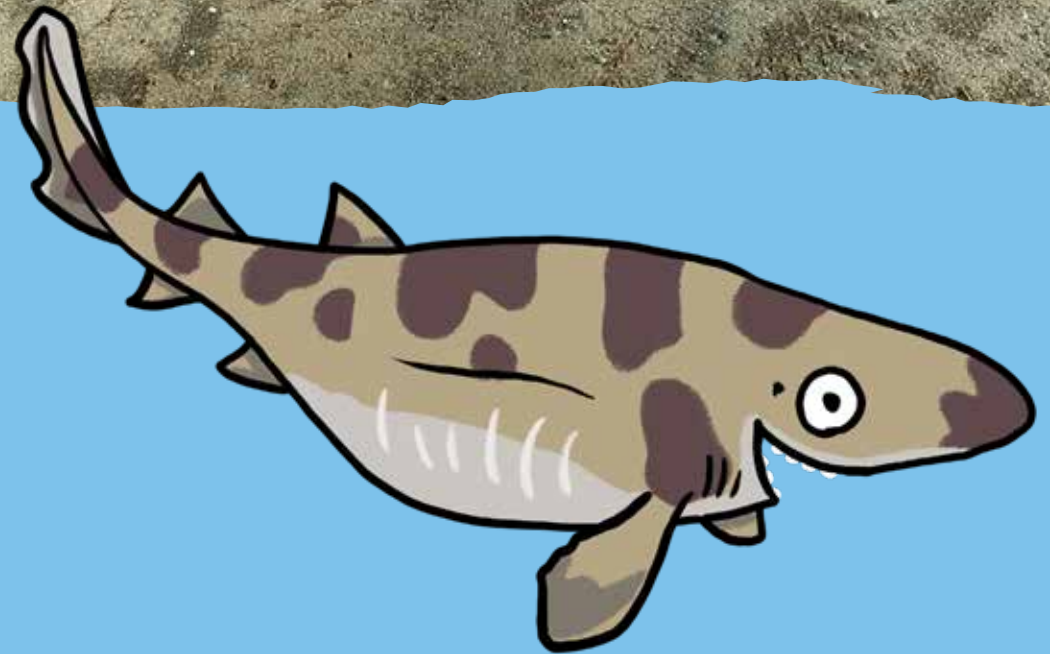
Depth found at: 126–800m

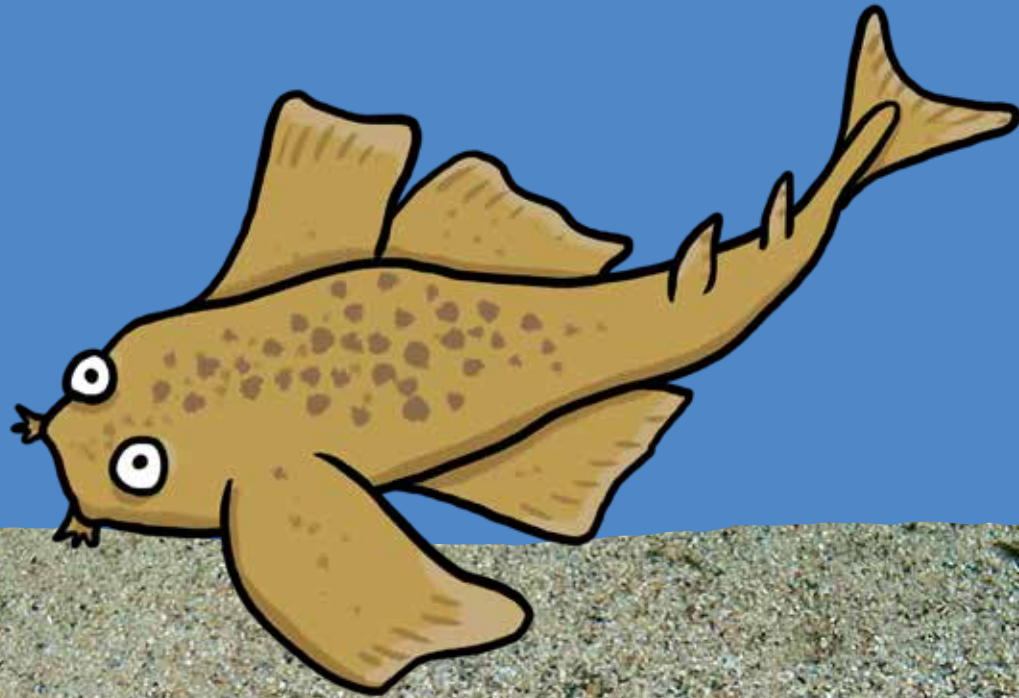
Sexually maturity (age or length): 13 years ♀
7 years ♂

Reproductive cycle: Lays eggs, possibly continuous cycle.

IUCN Status: Critically Endangered

Image: MarineThemes
(*Cephaloscyllium albipinnum*)





Eastern Angel Shark

The Aussie angel that needs saving. Our angelic eastern angel shark (*Squatina albipunctata*) can only be found in the eastern waters of Australia in depths between 30 and 400m, ranging from northern Queensland down through New South Wales and into south-eastern Victoria. Despite their angelic appearance, they can be devilish when it comes to feeding – angel sharks are perfectly camouflaged and hide in the sand, waiting to ambush their prey as they swim past. Angel sharks are often caught in trawl nets and can be sold for their meat, commonly known as “flake” in fish and chip shops. The eastern angel shark is listed as ‘Vulnerable’ on the IUCN Red List and its population is estimated to have declined by 60% from its initial size (7, 8).

Max size (total length): 130cm

Depth found at: 10–500m

Sexually maturity (age or length): 107cm ♀
80cm ♂

Reproductive cycle: Possibly three years, live birth of up to 20 pups.

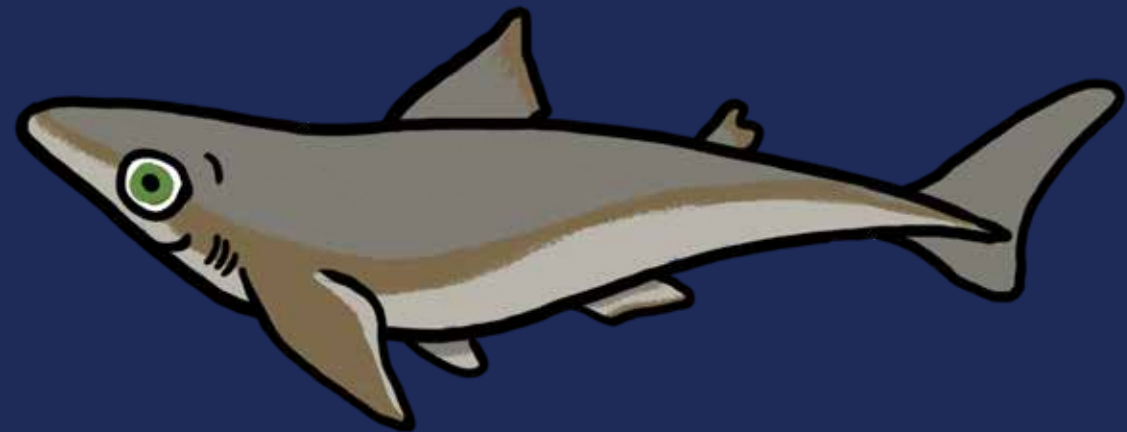
IUCN Status: Vulnerable

Image: MarineThemes
(*Squatina albipunctata*)

Greeneye Spurdog

Greeneye spurdog. What. A. Name. Right!? This shark lives at over 1km below the waves where it is pitch-black. Its green eyes act like night vision goggles that enable it to see other sharks and prey. Greeneye spurdogs (*Squalus chloroculus*) also have one of the longest pregnancies in the animal kingdom, reaching nearly 3 years! When giving birth, greeneye spurdogs can have as few as four pups. Given these two factors, it's no wonder that their population is especially vulnerable to trawl and deep-sea line fishing (9). The greeneye spurdog is listed as 'Endangered' on the IUCN Red List (10). Fortunately, it's illegal to keep these sharks and they have to be thrown back, but exactly how many survive the experience of capture is not known.

Image: CSIRO
(*Squalus chloroculus*)



Max size (total length): 99cm

Depth found at: 200-1,400m

Sexually maturity (age or length): 9-12 years ♀
16 years ♂

Reproductive cycle: Three years, live
birth of 4-15 pups.

IUCN Status: Endangered

Sydney Skate

Despite its name, the Sydney skate (*Dipturus australis*) is found as far north as Moreton Bay in Queensland and extends as far south to the bottom of New South Wales, living in waters 20 to 200m deep. Skates are the only group of rays that lay eggs. Sadly, we know extremely little about the Sydney skate, and worse still, they're often misidentified by fishers and lumped in a single category along with a range of other skates and rays. The wings of skates and other rays can be sold for meat and are marketed as 'flaps'. Sydney skates are listed as 'Vulnerable' of the IUCN Red List (11).

Max size (total length): 50cm

Depth found at: 20-200m

Sexually maturity (age or length): unknown

Reproductive cycle: unknown

IUCN Status: Vulnerable



Image: MarineThemes
(*Dipturus australis*)

Southern Fiddler Ray

Southern fiddler rays (*Trygonorrhina dumerilii*) are very common in shallow waters and can often be found in and around piers feeding off discarded scraps from recreational fishers. Because of this they are often caught accidentally and it's important they are released back into the water as soon as possible. Southern fiddler rays are also called 'banjo sharks' because of their shape, colouration and shark-like tail. There's also an extremely rare black and white southern fiddler ray which is commonly called a magpie ray and it wasn't until a DNA study in 2015 that it was thought to be a separate species (12). Southern fiddler rays reproduce each year, and give birth to 2-5 pups (13). They're at risk from trawl and line fishing, and recent studies have shown that when pregnant mums are caught, the stress of the experience can reduce the size of their newborn pups (14). Southern fiddler rays are listed as 'Least Concern' on the IUCN Red List (15).

Max size (total length): 146cm

Depth found at: 0–200m

Sexually maturity (age or length): 6-8 years ♀
4-6 years ♂

Reproductive cycle: One year, live birth
of 2-5 pups.

IUCN Status: Least Concern

Image: MarineThemes
(*Trygonorrhina dumerilii*)





Flake Fishing

In 2020, a survey by Essential Media found that 1/3 of Australians did not know that 'flake' was shark meat (16). Although some sharks and rays are thrown back, those killed are often sold for their meat which is commonly known as 'flake' or other names like 'boneless fillet'.

Shockingly, we could be eating some of our most imperilled Aussie sharks and not even know it! In 2018, more than an estimated 2,600 (8,000kg) individual critically endangered whitefin swellshark were harvested (17), and in 2020 it can still be legally harvested. Angel sharks are known for their 'excellent tasting' flesh, and unfortunately our eastern angel shark is often mixed in with the similar-looking sister species the Australian angel shark. Mixing together or identifying species incorrectly, makes it very difficult to estimate how many of a particular species is harvested and therefore more difficult to adequately protect their populations.

Currently there is no law in Australia to accurately label shark meat at the fish and chip shop for what species it is or where it's come from (18). According to the Australian Fish Names Standard (AFNS), 'flake' should only refer to gummy and rig sharks, both of which are not endangered (19). However, the AFNS is voluntary and this means that any shark can be called 'flake' at the fish and chip shop, even an endangered one!

In order to protect our unique sharks and rays, we need to support sustainable fishing practices and stop them from being fished from the water. We also need to know what is being sold and where it comes from.

An uphill battle against extinction

The biggest threat to sharks and rays across the world is overfishing. Why? Similar to humans, sharks and rays take several years before they can reproduce, and give birth to relatively few young over their long lives. Most sharks for example mature at 10 years old and give live-birth to 4-6 pups every two years (20). For our deep-water species, reproduction can be much slower – the greeneye spurdog that lives up to 1.2 km below the surface can be pregnant for 3 years and will give birth to as few as 4 pups (9)! **In short, we are fishing some of our sharks and rays faster than they can reproduce.**

Australia – a hotspot of extinction!?

Waters spanning from southern Queensland to south-eastern Victoria make up the “hottest” spot in Australia where the highest number of threatened species of shark and ray – many of which are endemic – face an extinction risk from commercial fishing (20). Ironically, Australia is not only one of the best equipped countries to save these species and prevent possible extinctions, but it is also **forecasted to be successful if we act now (2).**

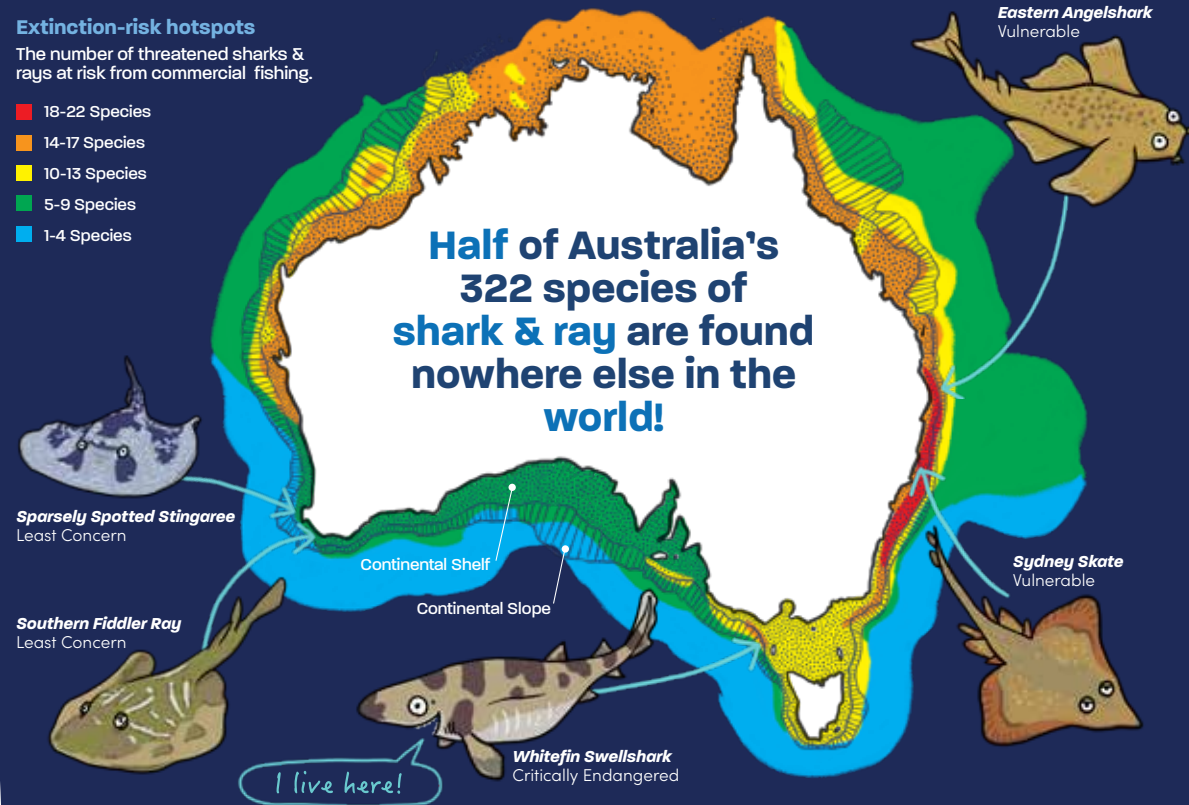
Why are they threatened with extinction?

For many of our endemic species, trawling on or near the seafloor is a major threat, causing them to be swept up in what are giant scoop nets. Longlines sunken to the seafloor are also a big threat, with hundreds or thousands of baited hooks that can be stretched out for over a kilometre. **In many cases, sharks and rays are caught incidentally, however those that are killed can be kept ('byproduct') and end up in our seafood,** often as the humble piece of flake from the local fish and chip shop. Although some species are released alive ('bycatch'), their chances of survival following such a stressful event are uncertain.

Extinction-risk hotspots

The number of threatened sharks & rays at risk from commercial fishing.

- 18-22 Species
- 14-17 Species
- 10-13 Species
- 5-9 Species
- 1-4 Species





How to save our Aussie battlers

What can you do to help save Aussie sharks and rays?

1. Sign the **petition** and ask the Australian Government to better protect uniquely Australian, endemic sharks and rays in Australia's largest fishery
2. Take the pledge to **#GiveFlakeABreak** and choose a sustainable fish instead of shark meat next time you're at the fish and chip shop.
3. Download **GoodFish: Australia's Sustainable Seafood guide** to help you choose sustainable alternatives.

It's **EEEasy**:

- Explore your sustainable seafood options using the GoodFish app.
 - Enquire with your fishmonger about their seafood options and ask questions like "What species of flathead is this and where does it come from?"
 - Enjoy sustainable seafood knowing you're supporting healthy oceans, the local fish and chip shop, and the local fisher who's doing a great job so we can fish for the future.
4. Spread the shark love, and encourage others to **#GiveFlakeABreak** so that we can give our Aussie sharks and rays a chance to recover.

Our sharky wins thanks to people like you!

Live shark finning banned in Australia. Thanks to AMCS, live shark finning at sea is now illegal in all Australian waters.

Secured the Great Barrier Reef as a marine park. AMCS led and built the campaign, resulting in the declaration of the Marine Park in 1974 and later a World Heritage Area in 1982.

Reduced the number of sharks harvested in the Great Barrier Reef. AMCS has reduced the number of sharks that can be harvested by 60,000 individuals (300 t) in Queensland's east coast fishery which spans the entirety of the Great Barrier Reef.

Protected 17,500 km² of WA coastline from shark fishing. In 2018, AMCS ensured areas surrounding Australia sea lion colonies were closed to commercial shark fishing.

Ningaloo Reef saved. Famous for whale sharks and manta rays, AMCS prevented a major marina development and secured 34% of the Ningaloo Marine Park as a sanctuary, and most recently a World Heritage listing in 2011.

Securing habitat protection for the Grey Nurse shark. AMCS improved the protection of the critically endangered grey nurse shark by securing the protection of critical habitats in New South Wales and Queensland.



Image: Grey nurse shark,
South West Rocks Dive Centre



Image: Shark diving in the Coral Sea, Great
Barrier Reef, by Xanthe Rivett

References

1. P. R. Last, J. D. Stevens, *Sharks and Rays of Australia* (CSIRO Publishing, Australia, ed. 2nd, 2009).
2. L. N. K. Davidson, N. K. Dulvy, Global marine protected areas to prevent extinctions. *Nature Ecology & Evolution*. 1, 0040 (2017).
3. Gondwana | Wet Tropics Management Authority, (available at <https://www.wettropics.gov.au/gondwana>).
4. P. R. Last, W. T. White, Biogeographic patterns in the Australian chondrichthyan fauna. *Journal of Fish Biology*. 79, 1193–1213 (2011).
5. R. W. Stein, C. G. Mull, T. S. Kuhn, N. C. Aschliman, L. N. K. Davidson, J. B. Joy, G. J. Smith, N. K. Dulvy, A. O. Mooers, Global priorities for conserving the evolutionary history of sharks, rays and chimaeras. *Nature Ecology & Evolution*. 2, 288–298 (2018).
6. S. A. Pardo, N. K. Dulvy, P.J., P. M. Kyne, *Cephaloscyllium albipinnum*. The IUCN Red List of Threatened Species 2019 (2019) (available at <http://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T42706A68615830.en>).
7. J. Pogonoski, D. A. Pollard, C. L. Rigby, *Squatina albipunctata*. The IUCN Red List of Threatened Species 2016 (2016) (available at <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T42729A68645549.en>).
8. V. Raoult, The biology and fisheries of angel sharks and sawsharks in south-eastern Australia (PhD Thesis, Macquarie University, 2016).
9. B. E. A. Rochowski, K. J. Graham, R. W. Day, T. I. Walker, Reproductive biology of the greeneye spurdog *Squalus chloroculus* (Squaliformes, Squalidae). *Journal of Fish Biology*. 86, 734–754 (2015).
10. T. I. Walker, B. E. A. Rochowski, *Squalus chloroculus*. The IUCN Red List of Threatened Species 2019 (2019) (available at <http://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T161360A68644464.en>).
11. J. D. Stevens, S. V. Valenti, *Dipturus australis*. The IUCN Red List of Threatened Species 2009 (available at <http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T161637A5470186.en>).
12. S. C. Donnellan, R. Foster, C. Junge, C. Huvneers, P. Rogers, A. Kilian, T. Bertozzi, Fiddling with the proof: the Magpie Fiddler Ray is a colour pattern variant of the common Southern Fiddler Ray (Rhinobatidae: Trygonorrhina). *Zootaxa*. 3981, 367–384 (2015).
13. L. J. Marshall, W. T. White, I. C. Potter, Reproductive biology and diet of the southern fiddler ray, *Trygonorrhina fasciata* (Batoidea : Rhinobatidae), an important trawl bycatch species. *Mar. Freshwater Res.* 58, 104–115 (2007).
14. L. Guida, C. Awruch, T. I. Walker, R. D. Reina, Prenatal stress from trawl capture affects mothers and neonates: a case study using the southern fiddler ray (*Trygonorrhina dumerilii*). *Scientific Reports*. 7, 46300 (2017).
15. C. Huvneers, M. B. Reardon, *Trygonorrhina dumerilli*. The IUCN Red List of Threatened Species 2015 (2015) (available at <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T43270317A43270336.en>).
16. Essential Research, The Essential Report for the Australian Marine Conservation Society. 25 June 2020. (2020), (available at essentialmedia.com.au).
17. Reported landed annual catch from Commonwealth fisheries catch disposal records | Datasets | data.gov.au - beta, (available at <https://data.gov.au/dataset/ds-dga-0cd2ec97-d13c-4b02-8071-fd778fdcdee7/details?q=Reported%20landed%20annual%20catch%20from%20Commonwealth%20fisheries%20logbooks>).
18. Food Standards Code, (available at <https://www.foodstandards.gov.au/code/Pages/default.aspx>).
19. Fishnames. Fisheries Research Development Corporation (2020), (available at <http://www.fishnames.com.au/>).
20. M. R. Heupel, P. M. Kyne, W. T. White, C. A. Simpfendorfer, “Shark Action Plan Policy Report” (report, NESP Marine Biodiversity Hub, 2019), (available at <http://epubs.aims.gov.au/handle/11068/15377>).



Cover Images

Left: Greenback stinagree (*Urolopus viridis*). Image by Anthony Pearson

Centre: Whitefin swellshark (*Cephaloscyllium albipinum*). Image by MarineThemes

Right: Spotted stingaree (*Urolophus gigas*). Image by Saspotato