Chapter 37

Where are the sharks?

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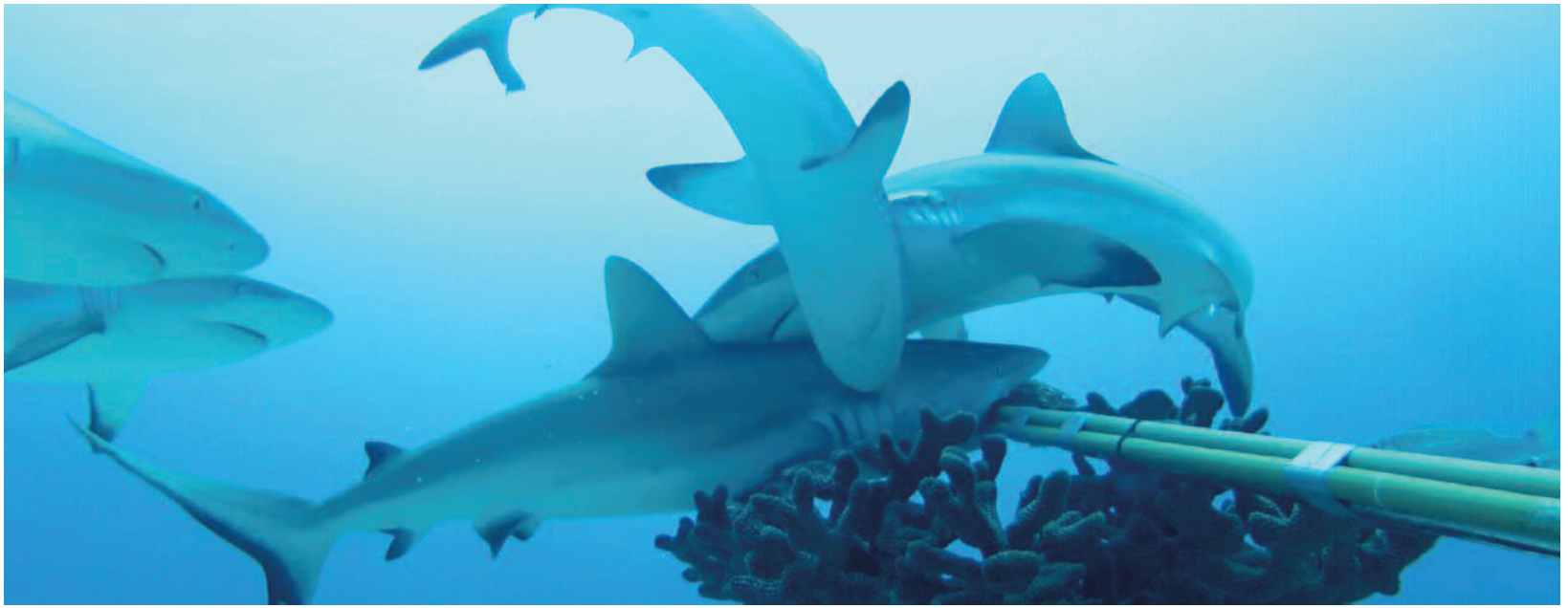

Grey reef sharks recorded by a baited stereo camera at Astrolabe Reef. © IRD/L. Vigliola

Although they are among the most powerful predators of the oceans, sharks are highly vulnerable and many species face a significant risk of extinction throughout the world's oceans. Recent studies show that 97 million sharks are killed each year by fishing and that some populations have declined by 99% (WORM *et al.*, 2013). Unlike other fish that lay millions of eggs every year, sharks can only give birth to a few pups in their lifetime. For example, the grey reef shark, *Carcharhinus amblyrhynchos*, reaches sexual maturity at 10 years of age, at which point females can start giving birth to one to five pups every two years. The gestation period is one year. With such a slow reproductive rate, it will take decades for decimated shark populations to recover.

With a relatively small human population compared to the size of the lagoon, and with no history of industrial shark fishing and a recent formal ban, New Caledonia sharks should have been relatively spared. However, that is not the case. As part of the PRISTINE[25] and APEX[26] projects, we deployed 385 baited camera units and carried out 2,790 underwater dives to sample reef shark communities throughout the New Caledonia Archipelago.

[25] http://pristine.ird.nc
[26] http://apex.ird.nc

Carcharhinus amblyrhynchos (grey reef shark); the behavior of the two animals suggests a mating episode. © M. Juncker

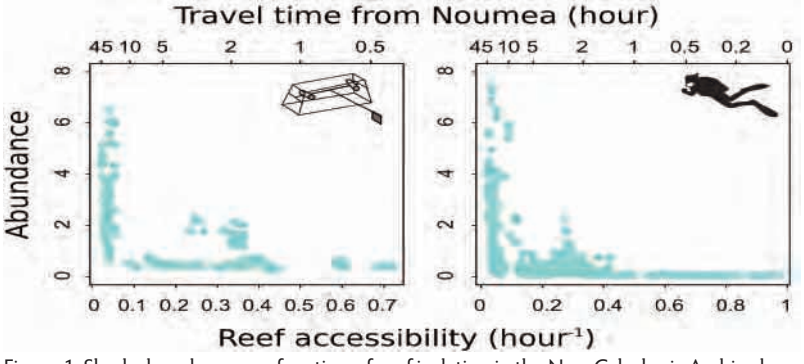

Figure 1: Shark abundance as a function of reef isolation in the New Caledonia Archipelago using baited stereo-camera (left) and visual census by scuba divers (right). Adapted from JUHEL *et al.*, 2018

Our results show that reef sharks are more diverse and abundant in the isolated reefs of the archipelago. There, more than 25 hours away from the capital Nouméa, they are sheltered from most human impacts. However, these emblematic animals have virtually disappeared from reefs close to human populations (JUHEL *et al.*, 2017). The impact is very severe, with a decline of 97% in shark abundance and 94% in species richness in reefs within an hour of Nouméa compared to isolated reefs (Fig. 1).

Many hypotheses could explain this disappearance, the exact causes of which are not identified. For example, the residual effects of historic, illegal or accidental fishing, overfishing of prey, habitat degradation, pollution, or disturbance during reproduction. Whatever the causes, the disappearance of sharks is worrying because, as large predators, sharks have a major structuring role in natural ecosystems (RUPPERT *et al.*, 2017). However, solutions to these problems do exist. Large marine nature reserves (over 200 km^2), where human presence is strictly prohibited, have positive effects on shark abundance and diversity. The creation of this type of reserve (strict nature reserve) requires large areas and some degree of isolation. These conditions are found in the vast southern and northern lagoons in particular, but also in the immense Natural Park of the Coral Sea, where sharks can find an ultimate refuge. With the use of these parks and reserves, New Caledonians still have the opportunity to effectively and sustainably protect sharks occurring on their reefs.

References

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