

Rewilding the Ocean

By John Turnbull

Rewilding is a relatively new concept in conservation. It involves re-introducing previously lost species to an area, for example bringing bison back to the forests of Europe, wolves back to North America and Tasmanian devils back to mainland Australia. Large herbivores and apex predators play important roles in maintaining the wilderness, so re-introducing them can restore the balance of ecosystems. For example, the re-introduction of wolves to Yellowstone has restored forests, by controlling large herbivores such as elkⁱ.



Rewilding is relevant to our oceans as well as our terrestrial ecosystems. Humans have fished our oceans for centuries, often focusing on high-level or apex predators. Today, scientists estimate that global fish biomass has declined by two-thirds from historical baselines, with shark biomass down by a massive 93%.ⁱⁱ

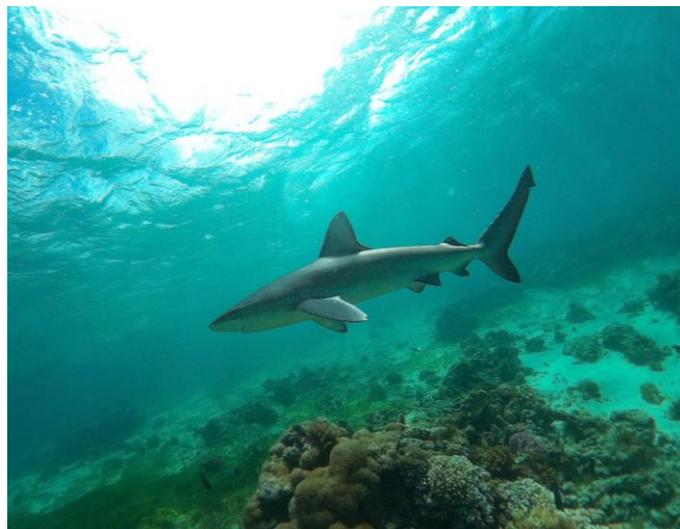
What effect does this have on our oceans? Unsurprisingly, it's not dissimilar to the story on land.

Removal of apex or high-level species removes predatory pressure on their prey. Depending on the complex web of interactions between species, this can lead to a boom in one species at the expense of others.

One of the best-documented marine examples of this is the interaction between sea otters, urchins and kelp in the north Pacific. Sea otters are a voracious predator of sea urchins, which they collect from the sea floor and consume at their leisure as they float about on the sea surface. During the 18th and 19th centuries, sea otters were hunted almost to extinction, leading to a boom in urchin numbers and dramatic decline in the urchin's prey – kelp. In recent years, thanks to protection of sea otters, the kelp has returned, providing much-needed primary production, habitat for important fish species and carbon storage. The similarities are obvious here with the wolves-elk-forests story in Yellowstone.

In NSW, we have our own urchin story, but in our case the predators of urchins are lobsters and large fish. The removal of predators can lead to growth in urchin barrens and a decline in our own kelp forests. Furthermore, warming oceans and strengthening currents have carried black urchins across to Tasmania, where they are wreaking havoc on kelp forestsⁱⁱⁱ.

So what is the solution? We could try re-introducing predator species, but in a vast ocean without fences this is hard to manage. Fortunately, oceans have large-scale currents allowing movement of species over large areas, so we don't necessarily have to physically re-introduce species to a region from which they have disappeared. We just have to create the conditions to allow them to return. Recent studies



have shown that marine reserves, by allowing the return of large fishes and lobsters, are an effective way of re-instating predator-prey relationships and increasing resilience of kelp beds^{iv}. Rewilding can happen in the ocean if we provide adequate protection and just let nature do her thing.

ⁱ http://www.cof.orst.edu/leopold/papers/RippleBeschtaYellowstone_BioConserv.pdf

ⁱⁱ Edgar et al 2014 *Global conservation outcomes depend on marine protected areas with five key features* Nature Vol 506

ⁱⁱⁱ <http://www.abc.net.au/science/articles/2013/07/31/3811486.htm>

^{iv} Ling et al 2012 *Marine reserves reduce risk of climate-driven phase shift by re-instating size- and habitat-specific trophic interactions*. Ecological Applications 22(4)