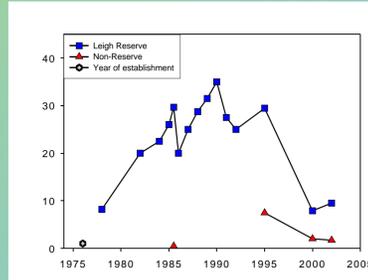




Increased numbers of crayfish !

Crayfish (*Jasus edwardsii*) are an important component of temperate reef ecosystems. They have shown a dramatic increase in numbers inside the marine reserve at Leigh, where crayfish numbers are about 4 times higher than in adjacent fished areas. In other reserves the protected population is even higher. Crayfish inside the Leigh reserve are about 10% larger than elsewhere.



Some fisheries have been mainly targeting male crayfish, creating a gender imbalance that affects breeding. Reserves provide a valuable baseline, allowing scientists to recognise the effects of such population trends at an early stage.

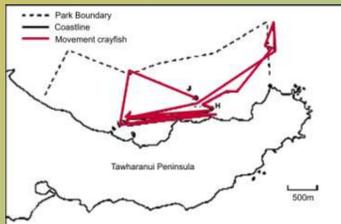
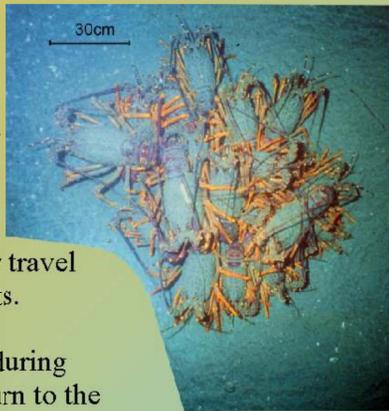


Movement patterns of crayfish

Protection from harvesting allows us to study the movement of individual crayfish with minimal human disturbance. Crayfish are very social animals aggregating in reef cracks and overhangs (dens). They need a healthy reef ecosystems to flourish.

Normally crayfish forage near their dens. However, during seasonal movements they travel away from the reefs onto adjacent sand flats.

Crayfish can travel for several kilometres during journeys that can last for weeks. They return to the same part of the reef they started from, even to the same den!



When crayfish venture onto open sand areas they form clusters with their antennae pointing outwards most likely as a defence mechanism against predators.



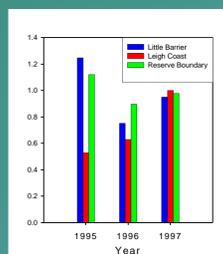
Normally fishers set cray-pots on reefs. By understanding crayfish movements, just as many crayfish are now caught on the sand flats at the boundary of the Leigh Reserve as anywhere else. Despite being "excluded" from within the reserve, Catch Per Unit Effort (CPUE) and value of catch are the same around the Leigh reserve boundary as they are for coastal Leigh and Little Barrier island.

The marine reserve at Leigh has protected and increased the crayfish population without adverse effects on fisheries. If enough reserves are created there may be actual benefits to recruitment into the fishery on a larger scale.

Egg production inside the Leigh reserve is approximately 4.4 times greater than outside and 5km of protected coast in the Leigh reserve would be equivalent to more than 22km of unprotected coastline.

Locked up in the reserve?

Marine reserves can provide the best protection to the resident marine life if the boundaries extend past the usual movement range of the species. However, the movement of crayfish in the current reserves often extends beyond the reserve boundaries.



New Zealand has a range of marine reserves in different parts of the country. Crayfish have been studied in many of these reserves. How crayfish interact with the environment and adjacent fisheries offers a variety of insights about their habits and their roles in different ecosystems. As most reserves have not been established for very long, we are only just beginning to understand the complex interactions between crayfish, humans and the marine environment.

Change in prey abundance and behaviour



Crayfish are an important predator of sea urchins (kina) and high numbers of crayfish can reduce the numbers of urchins as well as change their behaviour. Inside reserves, urchins spend more time hiding and less time grazing kelp.

As a result of the reduced urchin numbers, so-called urchin barrens, that are caused by high numbers of urchins grazing down all large seaweed on rocky flats, have declined. Now kelp forests have re-established in the protected areas.

Introduction

Marine reserves are becoming an important research and management tool because they protect both marine life and ecosystems. They also enable us to detect changes in ecosystems caused by our use and exploitation of the marine environment.

For further information on marine reserves:

- <http://www2.auckland.ac.nz/leigh>
- <http://www.marine-reserves.org.nz/>
- <http://www.doc.govt.nz/Conservation/Marine-and-Coastal/Marine-Reserves/index.asp>

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