

Snapper: what we have learned from marine reserves

Introduction

The influence of fishing has already permanently altered large portions of marine ecosystems worldwide, yet if left undisturbed by human activity, rich biological communities develop in marine reserves. Exploitation of the sea has become so pervasive that we now talk about “marine reserve effects” when in fact what we are really seeing is how nature could be, in the absence of human transformation.

Marine reserves provide opportunities for recreation and study. All marine life is protected from fishing and other forms of exploitation, enabling fish, shellfish, seaweed and other marine species to flourish and allowing degraded areas to recover.

At the same time marine reserves provide insurance that will guarantee the right of future generations to explore and appreciate New Zealand’s rich and diverse sea life. Here we present some of the most interesting findings of current research into snapper in marine reserves.

Increased Abundance of Snapper



Snapper (*Pagrus auratus*), one of the most sought after fish in NZ coastal waters, are around **14 times more abundant inside reserves** than in adjacent unprotected areas.

This has proven to be true **not only for the Goat Island marine reserve** but for at least **4 others** (Hahei, Tawharanui, Long Bay, Poor Knights). At each reserve the abundance of fish was **much higher** in the protected areas compared to the fished areas.

This is **despite initial expectation** that snapper would not respond, because they were believed to be too migratory.

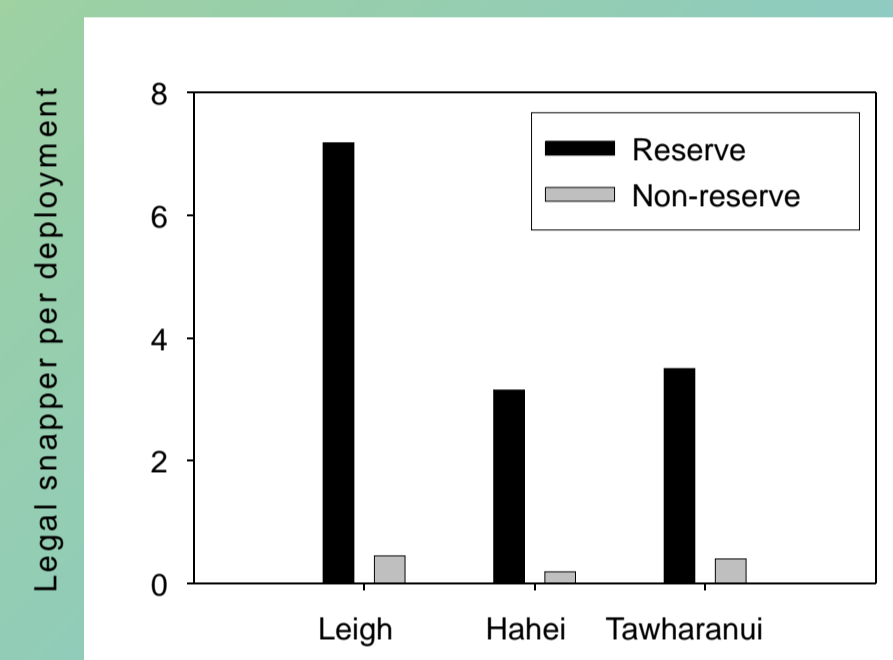


Figure 1: Number of legal sized snapper (>27cm) per deployment in and outside the reserve. Numbers are averaged for the maximum fish seen in 30 minute baited video drops.



Seasonal Fish Population Fluctuation

In addition to the increase of fish density another exciting **new discovery** about the snapper population dynamics was made.

Not only do the fish **numbers increase** in comparison with exploited adjacent areas, but also they **fluctuate over the seasons**. In **autumn** the numbers of snapper in coastal areas are approximately **double the spring** population.

Despite being protected, half the reserve’s summer population takes part in a **seasonal offshore migration**. We are not yet sure whether the same fish return the following year. Outside the reserve these changes are barely noticeable.

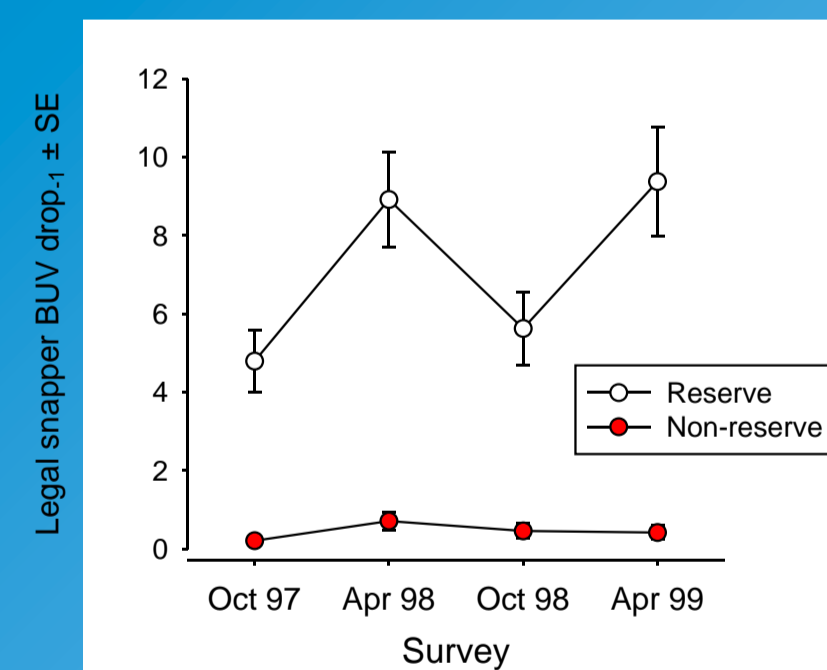


Figure 2: Number of legal snapper (>27 cm) estimated per deployment in spring and autumn.

Increased Egg Production

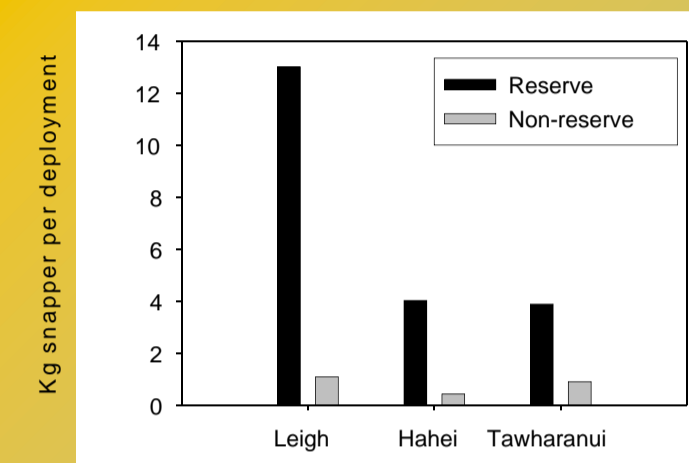


Figure 3: Biomass of snapper per deployment inside/outside the reserve.

The **egg production** (called batch fecundity, Fig. 4) of the snapper population is estimated to be **18 times higher on average in reserves**. For example snapper egg production in a 5km stretch of marine reserve **equals a 90km stretch of unprotected coastline**. This leads to **potential export of fish larvae**.

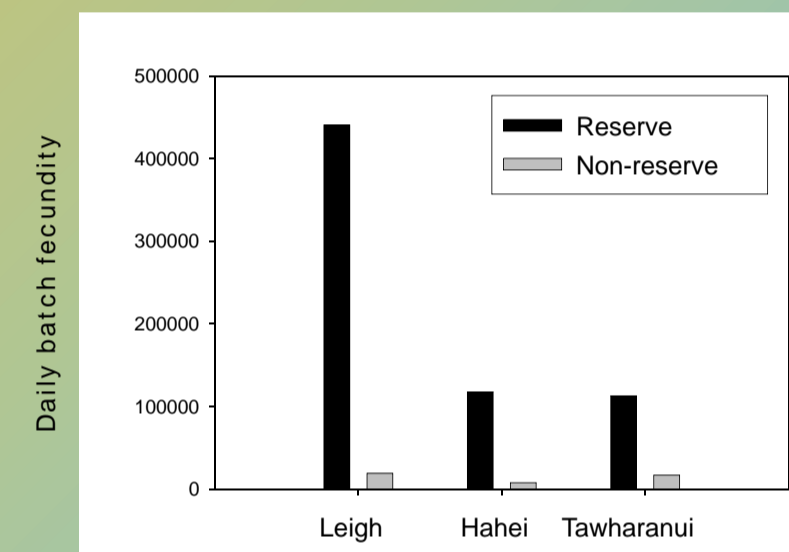


Figure 4: Daily batch fecundity inside/outside the reserve.



Home Range

So what are the fish doing when they are in the reserve? **Acoustic transmitters** allow us now to continuously follow the movements of individual snapper. The latest research in snapper movement patterns in the reserve reveals that many have very **small core areas** and stay within an area of 300m² for most of the year.

However, some of the **larger fish** regularly move throughout the reserve even **leaving the reserve** for periods up to 2 months before **returning**. Fish seem to be most active during summer when the fish numbers in the reserve are highest. In this way some snapper that **grow in a reserve** may end up as **fisheries statistics outside it**.

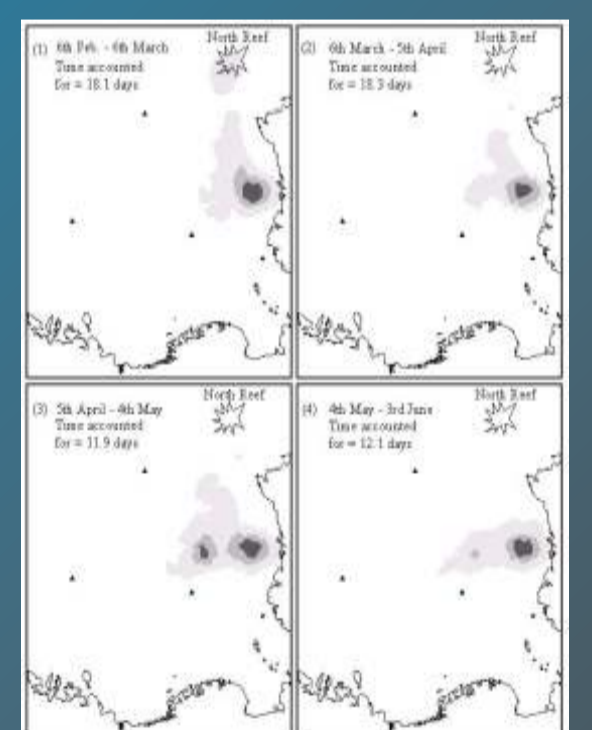


Figure 5: Home range size of a low movement fish during late summer.

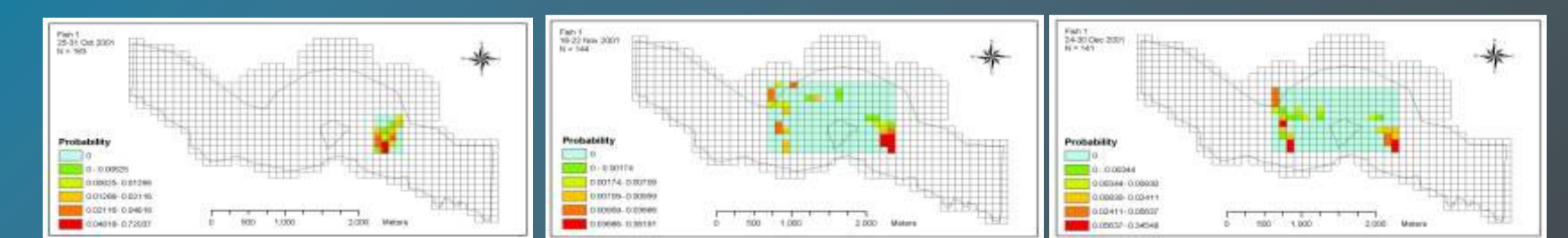


Figure 6: Range of movement in the reserve of a mobile fish from October to December.

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>



Created by: Daniel P. Egli & R. C. Babcock
 Technical advice: D. Parsons, T. Willis
 University of Auckland, Leigh Marine Laboratory
 Funded by Department of Conservation