

*Why the increase in rock lobster fishing activity in the Capes region?*

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(I have slightly modified this report to include recent years – Simon de Lestang)

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The rock lobster Fishery in the Capes region (Cape Naturaliste to Cape Leeuwin) has increased from about 5 boats that normally operate in the area to up to 50 boats in some months during 2002 and 2005. This increased fishing activity raised a number of questions from the local Capes community and fishermen: What is the reason for the increased activity? Is it likely to be a permanent increase in the level of fishing? Has the abundance of rock lobsters in the area increased and if so, why? What is the effect of the increased fishing on the sustainability of the stocks in the region?

The Capes region lies at the southern extremity of the western rock lobster's (*Panulirus cygnus*) geographical range. Western rock lobsters are usually not found in significant numbers north beyond North West Cape 21°45' S and south or east of Cape Leeuwin 34° 22' S (see Fig. 1).

The Capes region lies within the southern zone (known as Zone C) of the Western Rock Lobster Managed Fishery whose southern boundary is 34°24' S and the northern boundary 30° S. There are about 256 boats fishing in this zone with about an equal number licensed to fish north of 30° S. Adjacent to the Capes region is the Windy Harbour/Augusta rock lobster fishery that has also experienced good catches in recent seasons with a particularly high catch in the 2003/04 season and which are the highest since the early 1990's when good catches were last experienced.

The historical catches south of 33° S have generally been below 150 tonnes until the 1999/2000 season and steadily increased to over 700 tonnes in 2003/04 (Fig. 2). This catch information is based on the compulsory monthly returns provided by fishermen in one degree statistical blocks, hence catches are summarised by 33° transect (representing catches between 33 and 34°S) and the 34° transect (representing catches south of 34°S but not including the Windy Harbour fishery). The fishing effort south of 33°S has also increased from about 50 000 pot lifts in the late 1990's to about 400 000 pot lifts in 2003/04 (Fig. 2).

The rock lobster recruitment in the Capes area is measured by the puerulus (first post-larval stage - about 9-11 months old) settlement on artificial seaweed collectors at Cape Mentelle (near Kilcarnup, just north of Margaret River). Settlement in this area is generally much lower and more sporadic than that in the centre of the fishery off Dongara and Jurien. Puerulus settlement occurs in the Capes area when the south-flowing Leeuwin Current (Fig. 3) is particularly strong and this generally occurs in years of La Nina environmental conditions (Fig. 4). These conditions are opposite the much-publicized El Nino or ENSO conditions, when the Leeuwin Current is weaker and generally results in little or no settlement at Cape Mentelle. The level of puerulus

settlement has been shown to be positively related to the strength of the Leeuwin Current (Pearce and Phillips 1986).

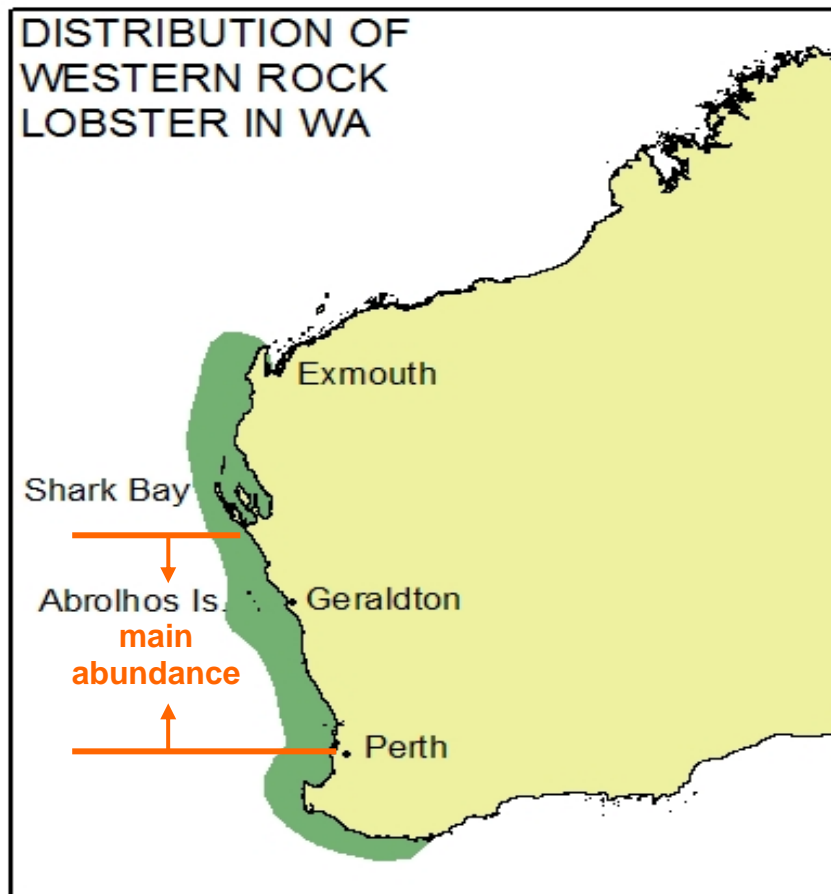


Fig 1. Map of rock lobster species distribution and showing area of higher stock abundance.

The relationship between the puerulus settlement at Cape Mentelle and the strength Leeuwin Current, as measured by the Fremantle Sea Level indicates that when the FSL falls below 74 cm (usually at a time of an ENSO period) settlement is usually negligible (Fig. 4). However when the sea level is above 74 cm the puerulus settlement at Cape Mentelle ranges between 1 and 11 puerulus per collector per year. In 1999 and 2000 the sea level was at its highest level for over 70 years indicating a strong Leeuwin Current together with a high puerulus settlement and subsequently a record catch in 2003 and 2004, taken by a large number of boats which had moved into the area to take advantage of the large number of rock lobsters on the grounds. The ranges of puerulus settlement at Cape Mentelle (0-11) can be compared to those at the centre of the stock distribution, Dongara and Jurien, which range from 27 to 239 puerulus per collector per year.

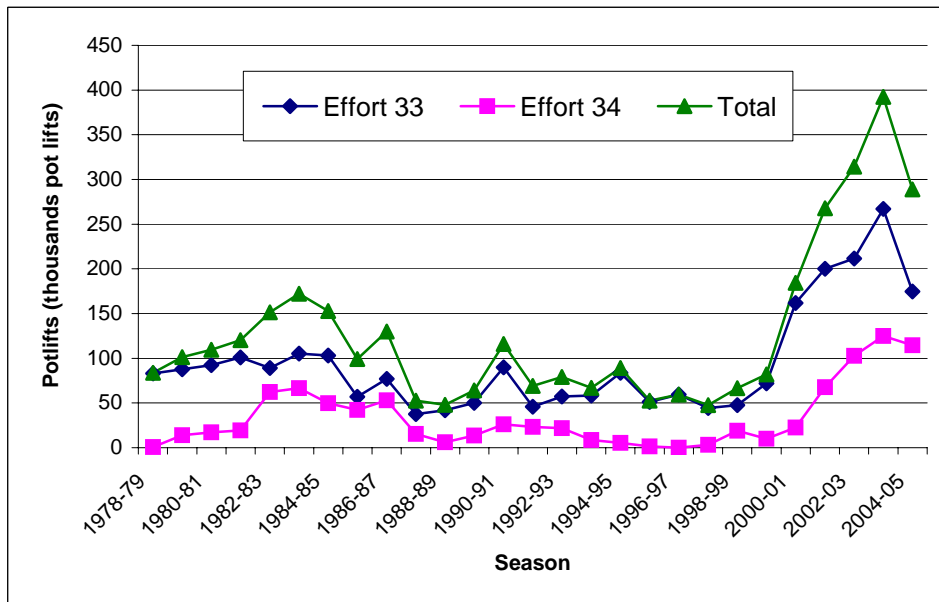
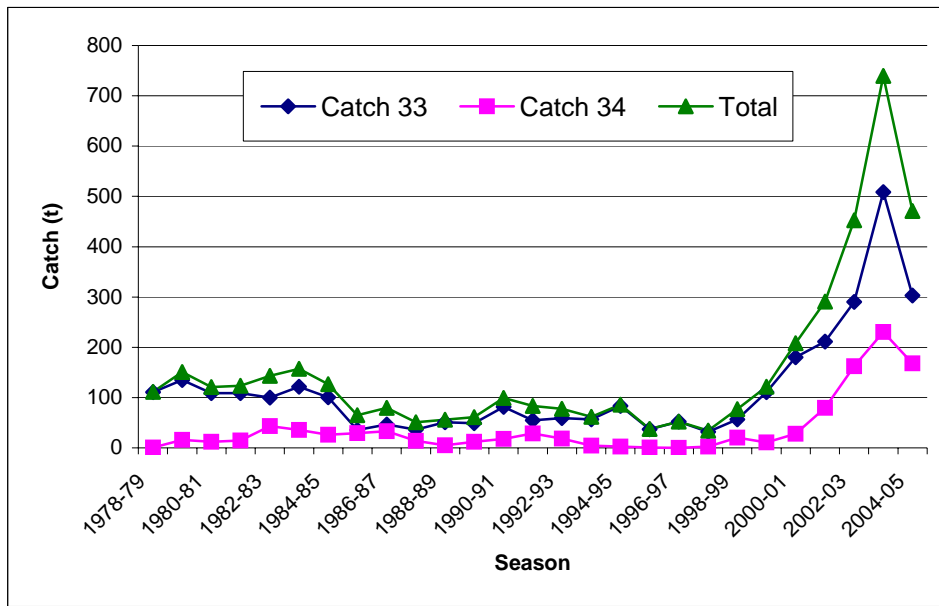


Fig 2. Catch and fishing effort in 1° latitude transects 33° and 34° S and combined catch and effort south of 33° S

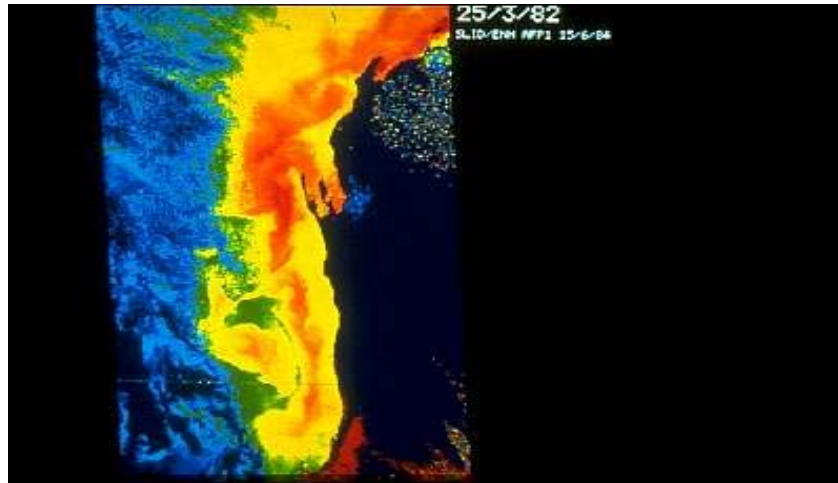


Fig 3. Satellite NOAA image showing movement of warm water down the Western Australian coast courtesy of Mr Alan Pearce CSIRO Floreat, WA.

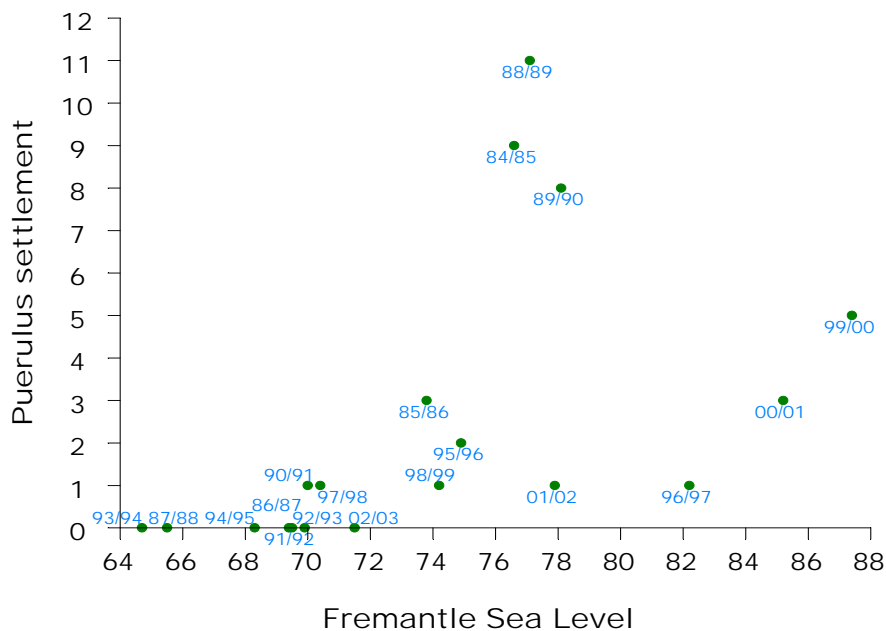


Fig 4. Relationship between puerulus settlement at Cape Mentelle and Fremantle sea level (cm) that is an indicator of the strength of the Leeuwin Current.

Computer modelling of larval movement has been undertaken that takes into account larval behaviour (ie. ability to undertake vertical movements in the water column) and oceanographic conditions in particular the Leeuwin Current (Griffin *et al.* 2001). This modelling indicated that there is a thorough mixing of the larvae that originate from the whole coast and most of the settlement that occurs in the Capes region would come from larvae that originate from near the centre of the fishery and are swept south during years when the south-flowing Leeuwin Current is particularly strong. Thus the lobster abundance in the Capes region is not dependent on the breeding stock from that region but from the whole fishery.

The puerulus settlement, that is currently measured at nine locations throughout the fishery, has been shown to be a reliable predictor of the catch in the overall fishery 3

to 4 years after the settlement has occurred. The puerulus settlement at Cape Mentelle has also been shown to be a good indicator of the catch in Windy Harbour 3-4 years later (Fig. 5). Windy Harbour experienced good catches in the early 1990's as a result of the good settlement in the late 1980's and has experienced good catches in last 2 years as a result of the good settlement in 1999/2000 and 2000/01. However the puerulus settlement at Cape Mentelle does not provide a good indicator of the Capes catch eg the catches in 1991/92 to 1993/94 were average despite good puerulus settlement 3-4 years before.

The anomaly in the Capes region may be due to low and sporadic nature of fishing effort in the early 1990's (50-80,000 pot lifts) compared to 392,000 pot lifts in 2003/04. Also, the low level of puerulus settlement with zeroes in many years is unlikely to be as reliable an indicator of local recruitment as the puerulus settlement from locations near the centre of the fishery.

An alternative indicator of future catches in the Capes region may be obtained by comparing the catch rate (kg per pot lift) to the strength of the Leeuwin Current 3-4 years before (Fig. 6). This allows us to explore the relationship for a longer period as the sea level data is available for the years before when the puerulus data was first available at Cape Mentelle in 1984/85. This results in a much-improved relationship with catch rates of 1.3-1.5 kg/pot lift resulting 3-4 years after the Leeuwin Current was very strong and catch rates of 0.6 to 0.85 associated with the weaker Leeuwin Current (Fig. 6).

As the Leeuwin Current was at record levels in 1999 and 2000 resulting in good puerulus settlement during 1999/2000 and 2000/01, a good catch was achieved in 2002/03 and 2003/04 seasons. Catches remained above average for the 2004/05 season and returned to lower, more 'normal' levels in 2005/06. This trend is expected to continue in the 2006/07 season, as the Leeuwin Current has been weaker in recent years and the puerulus settlement has subsequently declined.

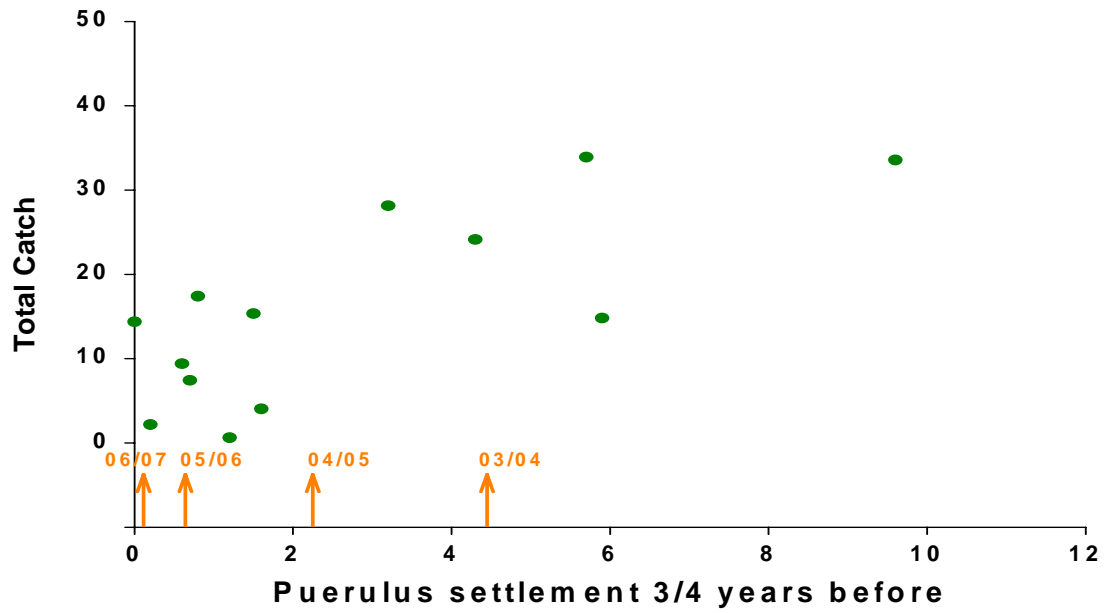


Fig. 5. Relationship between catch (t.) at Windy Harbour and the puerulus settlement at Cape Mentelle 3-4 years before. The puerulus settlement that will contribute to catches in 2003/04 to 2006/07 are indicated by arrows.

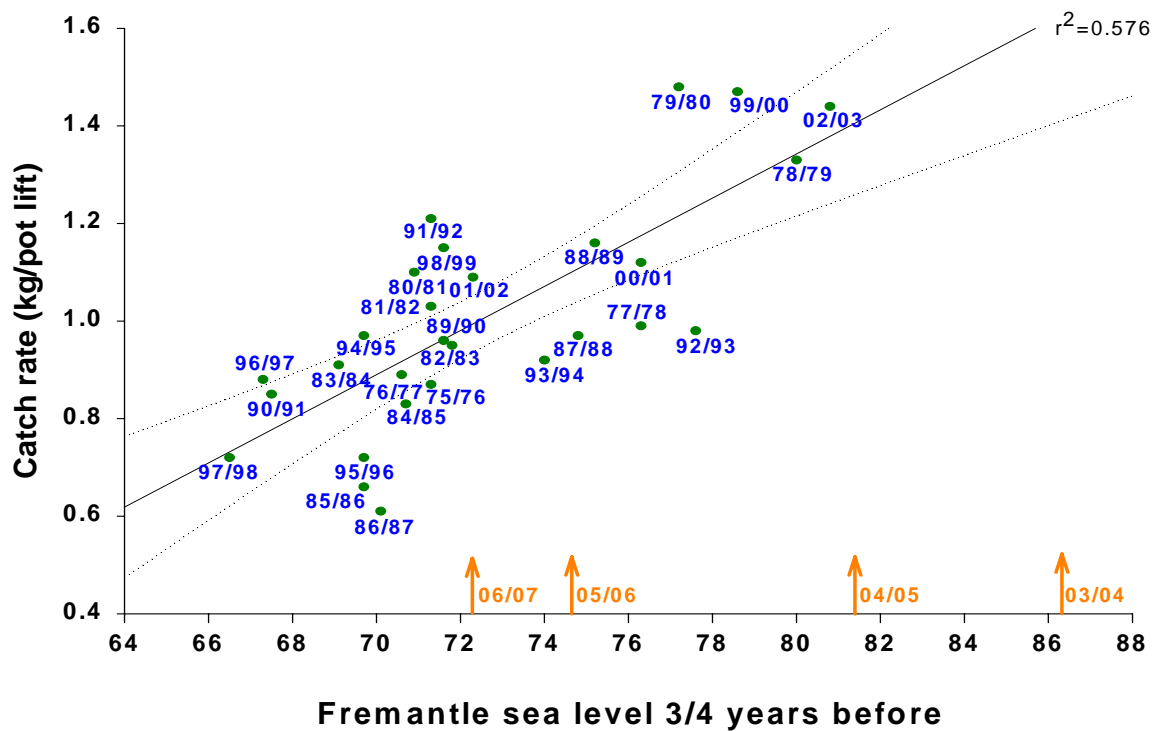


Fig. 6. Relationship between the catch rate from south of 33° S and the Fremantle sea level 3 and 4 years previously. The year of fishing is shown. The sea levels that will predict the catch rates in 2003/04 to 2006/07 are indicated by arrows.