

# Counting catches in the light of the moon



John Salini

Lunar phases affect prawn behaviour in various ways. Some prawns bury themselves in the sediment to avoid moonlight and predators, while juvenile prawns can ride tidal movements to favourable nursery habitats.

Animal behaviour is often acutely attuned to the phases of the moon. When the moon is full, wolves howl, corals spawn, and many other species migrate or become more active. So it comes as no surprise that the quantity of target and by-catch species caught by prawn trawlers also varies with lunar phases.

This variation influences the work of CSIRO Marine Research scientists studying the effectiveness of by-catch reduction devices (BRDs) in the prawn trawling grounds near Weipa in the Gulf of Carpentaria.

To test whether by-catch species are threatened by trawling, and whether BRDs are effective, the scientists need reliable estimates of species' abundances. These estimates are usually based on catch rates in trawls, but variations in catches due to the lunar phase could bias them.

To determine the effect of lunar phases on species catch rates, CSIRO scientists made four two-hour trawls each night for a full lunar cycle, towing a standard prawn net with no BRDs. Of the 26 most abundant species caught during this time, 10 were influenced by the moon. Four of these species peaked in the first quarter, three in the last quarter, two in the first and last quarter, one in the first quarter and full moon and one in the new and full moon.

Among these 10 species were two commercially important prawns: endeavour prawns (*Metapenaeus ensis*) and tiger prawns (*Penaeus esculentus*).

Commercial logbook records over three months, for the same region, confirmed the scientists' findings that endeavour prawn catches peaked during the first quarter and full moon, while tiger prawns peaked at the last quarter moon. Logbook records for other trawling grounds in the Gulf of Carpentaria also revealed significant effects of lunar phase on the endeavour and tiger prawn catches.

John Salini of CSIRO Marine Research says the reason for these 'lunar phases' in catch rates may be two-fold. Some prawns have a burying behaviour (in the sediment) which is directly related to avoidance of light, such as moonlight, to avoid predators. This means they are less likely to evade trawlers in the relative darkness of the new moon.

The other factor is tides, which are intimately linked to the moon phase. For example, juvenile prawns in estuaries and post-larval prawns returning from the ocean to estuaries, can utilise tidal movements for transporting themselves to favourable nursery habitats by 'riding' ebb or flood tides. Burying in the sediment can avoid transport with unfavourable tides. The daily activities of

many marine species are thought to be linked with the tidal cycle.

This research project has allowed the scientists to use endeavour and tiger prawns as 'proxies' for other by-catch species. Most tropical Australian trawl studies are based on prawn-trawl fisheries that do not record by-catch species' catch rates. But if catches of these commercial prawn species are influenced by the moon, then catches of by-catch species similarly affected by the moon, can be inferred.

The results of this study show that any assessment of the effects of trawling and BRDs on by-catch abundance should be conducted by studying species that do not show lunar patterns in catch rates.

The 16 species that were independent of the lunar cycle in this study, for example, could be considered reliable species for monitoring changes in by-catch abundance. Alternatively, sampling programs could be designed around a consistent lunar phase to minimise the effect of the moon on catch rates.

## More about lunar phases

Salini J Brewer D Farmer M and Jones P (2001)

Lunar periodicity of prawns and by-catch in trawls from the Gulf of Carpentaria, northern Australia. *Marine Biology*, 138:975–983.