Eastern King Prawn Habitat

Managing land to grow more prawns

Photo credits: left, Doug Beckers; middle, Scott Nichols; right, Matt Taylor.

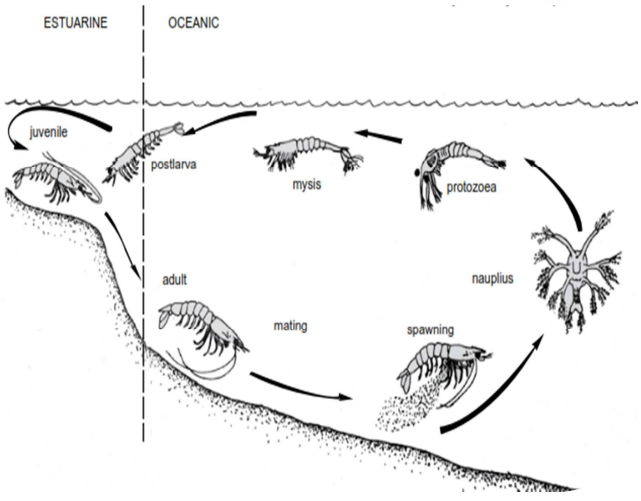
We now know more than ever about the ways in which healthy habitat and good quality water benefit Eastern King Prawn, helping them survive adversity and thrive in the good times. In NSW, the Clarence, Hunter and Lake Macquarie estuaries are particularly important for Eastern King Prawn. All of these estuaries have lost some of the essential habitat that helps sustain prawn populations, however, in recent years work has started to repair the damage and return important areas to a more natural state. Prawns are just starting to take advantage of these improved conditions, which is good news for the prawns, the commercial fishery and the local coastal communities they support.

The most important habitat for juvenile Eastern King Prawn (EKP) is the estuary. Juvenile prawns depend on nursery areas in estuaries to grow to adulthood, before moving out to sea to complete their life cycle. The healthier the mangrove and saltmarsh habitat the greater the carrying capacity of the estuary to support and grow more prawns. However, until now there has been little detail about which parts of the estuary are more important to young EKP. Researchers have spent several years using a combination of methods, including specialised research sled nets and chemical ‘signatures’, to identify where the prawns came from, what they had been eating and where their food was from. This is what they found out.

Good juvenile EKP habitat

- An estuary has different areas that are potential habitat for juvenile EKP. Where EKP are found depends on currents, salinity, and food availability.
- Ideal habitat areas have a supply of food, the salinity isn't too low, and the temperature isn't too cold.
- Shallow sand flats with low currents and marsh channels that are submerged across all tides are ideal. In some estuaries, the juveniles are more abundant along the littoral zone of shallow, muddy creeks near mangroves, while in others they were found mainly on seagrass beds.
- Stable temperature and salinity are best. Rapid declines in temperature and salinity levels, such as what can happen during flood events, can result in juveniles dying and any survivors generally don't grow well.
- Young EKP have a varied diet, eating plant material, crustaceans, microorganisms, small shellfish, and worms. Much of their nutrition is derived from saltmarsh habitats and is transported to the subtidal waters where the prawns live.
- Estuaries need to be connected to wetlands, saltmarsh areas and floodplains. Cutting-off tidal flows and draining wetlands reduces food availability and has had a significant impact on EKP populations. Restoration of more natural tidal flows is having a positive impact on EKP.

Eastern King Prawn (EKP) spawn at sea in waters off northern NSW and southern Queensland. The larvae develop as they drift south on the East Australian Current before moving into coastal estuaries. The tiny prawns spend 2 to 3 months over summer growing in the estuary, before heading back out to sea and swimming northwards; where they continue their growth to full maturity and complete the breeding cycle.



Supported by good land management

Understanding the nursery value of different areas within an estuary, and the processes that make some areas more valuable than others, allows managers to:

1) prioritise areas for rehabilitation that are likely to result in the greatest benefits for EKP

2) consider factors that may increase nursery value when engineering rehabilitation works

3) estimate the potential outcomes of different rehabilitation scenarios.

Keep it all connected

- **Hydrological connectivity** in estuaries needs to be maintained or restored. This includes both connections along creeks and rivers to the ocean, and connections to floodplain wetlands, both saltwater and freshwater.
- **Tidal flow** should be as natural as possible. Tidal flushing ensures food supply from saltmarsh and mangroves, helps maintain stable salinity, and enables prawns to move into and out of habitats as their suitability changes or as the prawns' needs change.

Protect Seagrass

- Reduce the impacts of **marine infrastructure** on seagrass beds. For example, replace traditional moorings with environmentally friendly designs to reduce scour.
- **Water quality** affects seagrass. Good quality water means less algal growth on the seagrass, higher productivity and greater resilience to flood and other adverse events.
- Turbidity and sedimentation can reduce the productivity of seagrass. Fencing waterways to better manage livestock access, controlling erosion and managing urban stormwater helps **reduce sedimentation** and nutrient loads to the estuary.

Give Saltmarsh room

- Saltmarsh **wetlands** are an important source of food for juvenile EKP. These areas also protect estuary foreshores by absorbing the energy of wind and wave action and providing a natural buffer that helps minimise erosion and play a major role in carbon sequestration.
- As sea level rises, **mangroves** and saltmarsh migrate landward. Areas where these plants can retreat, with sea level rise need to be identified and protected to allow mangroves and saltmarsh to adapt.

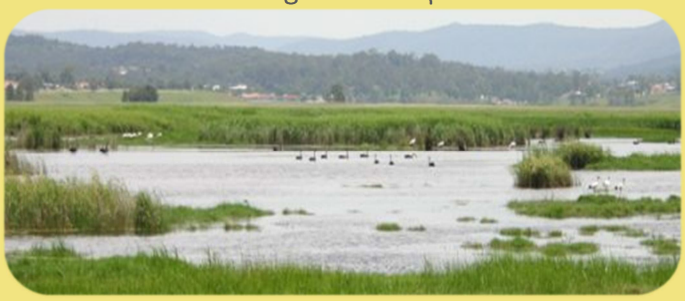
Saltmarsh has a significant economic value. For example, in the Clarence River, the fisheries harvest derived from saltmarsh productivity is around $25,000 per hectare per year.

Case study: The Hunter – rehabilitation in action

Shallow estuarine areas in the lower estuary are high value habitat for juvenile EKP, highlighting the likely impact of the extensive loss of this habitat through land reclamation. Before floodgates were installed in the early 1970s, Hexham swamp was considered to be the main EKP nursery for the Hunter River and as far as Brisbane. In the 1920s, locals saw a stream of EKP 50cm wide and 50cm deep coming past the Heads and out to sea for over 7 miles towards the north. Between the 1950s and 1990s, approximately 21 ha of channel habitat and 1426 ha of saltmarsh were lost in the lower Hunter. This could equate to a loss of 100,000 to 500,000 emigrating prawns each year.

Rehabilitation projects have been restoring hydrological connectivity of saltmarsh and mangrove habitats to the estuary, thus allowing tidal flushing and recruitment of important species.

Monitoring indicates that prawns are moving into the recently rehabilitated habitat around Hexham with the reopening of the floodgates on Ironbark Creek. When the floodgates were closed, the numbers of EKP were negligible. Commercial catches increased after the first gate was opened and have further increased now that all the floodgates are open.



EKP are being found much further into the tributary, with strong recruitment occurring. This provides the first clear demonstration of the impact of restoring connectivity with estuarine wetlands for commercial species of prawns in New South Wales.

Researchers used a combination of methods to understand where the prawns were in each of the estuaries, and what they had been eating. Specialised research sled nets were used to capture early juvenile prawns. Researchers were able to identify where in the estuary the prawns were sourcing their food by analysing isotopes from the prawns and comparing these against the unique isotope signatures of plants and algae that grow within the estuary.

About the project

Commercial fishers have provided many anecdotal reports of the extensive use of estuarine swamps by young EKP prior to wetland degradation, and of the adverse effects of freshwater inundation and lowering of salinity in estuarine nurseries on the growth and abundance of prawns. However there has been a lack of quantitative research on the early estuarine stages of EKP in NSW to support this. Quantitative knowledge on the use of estuarine nurseries by EKP is essential to accurately value coastal wetland habitats, and assess the benefits of rehabilitation.

This project is supported by funding from the Fisheries Research and Development Corporation on behalf of the Australian Government, with significant in-kind support from NSW Department of Primary Industries. Additional funding is being provided by the Hunter and the North Coast Local Land Services, as well as Hunter Water, the Newcastle Ports Corporation, and Origin Energy. The project is supported by the NSW Professional Fisherman's Association, the Newcastle Commercial Fishermen's Co-operative and OceanWatch.

The results of the research are summarised in the Project Updates and detailed methods and data have been published in scientific journals. Both the updates and details of the papers published are available on the project website, www.dpi.nsw.gov.au/fishing/habitat/rehabilitating/ekp, or contact Dr Matt Taylor, NSW DPI Fisheries.