BLUE SWIMMER CRAB AND GIANT MUD CRAB IN SOUTH-EASTERN AUSTRALIA

Recent research by the NSW Department of Primary Industries (DPI) and University of NSW has delivered greater insight into how populations of Blue Swimmer Crab and Giant Mud Crab in south-eastern Australia respond to environmental variability.

The findings will help inform and interpret future stock assessments and management of Blue Swimmer and Giant Mud Crab in NSW, including the setting of Total Allowable Commercial Catches and best times to stock crabs to enhance fishing in NSW.

RESEARCH APPROACH

The research focussed on the distribution, abundance, and reproduction of Blue Swimmer Crab and Giant Mud Crab and involved:

- Trapping Blue Swimmer Crab in Wallis Lake, Port Stephens and Lake Macquarie and collecting information on size and reproduction.
- Examining the influence of the environment on abundance and movement.
- Tracking the movement of Giant Mud Crab using acoustic telemetry.
- Modelling the dispersal of larvae for both species.
- Determining whether commercial catch data can be used to forecast future catch.

KEY OUTCOMES | BLUE SWIMMER CRAB

- Oceanographic modelling and genetic analysis indicate a single stock in NSW.
- Modelling suggests young crabs move into the estuary that their mother came from.
- For all three estuaries, there was usually only one major age-class of crab in any summer-autumn period.
- Abundance increases with temperature and salinity.
- Size-at-maturity is between ~51 and 52 mm carapace length. The smallest female with eggs was from Wallis Lake and measured 47 mm in length.
- There were proportionally more mature female crabs in Port Stephens and Lake Macquarie than Wallis Lake, but more berried crabs overall were found in Wallis Lake.
- Larger females had more eggs that smaller females, accounting for up to 55% of total crab weight which was higher than observed in other studies.
- Modelling of environmental variables against commercial catch indicates that harvesting females in winter and spring may impact catches in the following summer.
- Modelling also indicates that warmer sea surface temperatures result in higher summer catch rates.
- Summer and autumn catch patterns can be predicted with reasonable certainty based on commercial catches in the previous winter/spring and sea surface temperatures.
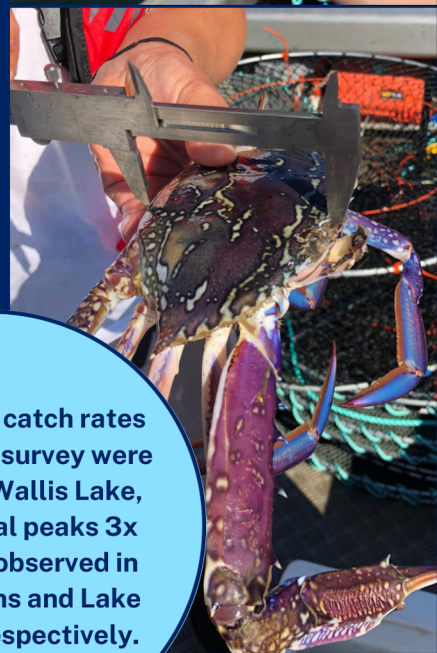
The greatest catch rates from the trap survey were observed in Wallis Lake, with seasonal peaks 3x and 5x that observed in Port Stephens and Lake Macquarie respectively.

NSW GOVERNMENT

KEY OUTCOMES | GIANT MUD CRAB

- Crabs are most likely to forage during low incoming tides, amongst submerged intertidal habitats including saltmarsh and mangroves.
- Modelling of commercial fisheries observer data indicates that temperature, river flow, wind speed and the lunar phase all influence catch rates to varying degrees.
- Females move out of estuaries in response to the following environmental triggers, which may help to explain annual variations in spawning and recruitment:
  - as temperatures declines each season (autumn/winter); and
  - as salinity declines following heavy rainfall (often in autumn).
- Females moving out of estuaries also coincides with larger tides associated with the new and full moon.
- All crabs caught in the ocean had migrated north from where they were tagged.
- Modelling shows that recruits to northern NSW originate from spawning in Queensland waters.
- Catch patterns can be predicted with reasonable certainty based on environmental triggers that influence spawning and recruitment.

WHAT'S NEXT?

- DPI-Fisheries is continuing the trap survey in Wallis Lake using the design developed during this project, and have now collected 5 years of data.
- Project data will inform future stock assessment and stock status determinations for Blue Swimmer Crab and Giant Mud Crab.
- Giant Mud Crab research is continuing as part of a collaborative project with Queensland Department of Agriculture and Fisheries to further explore spawning and stock structure along the east coast of Australia.
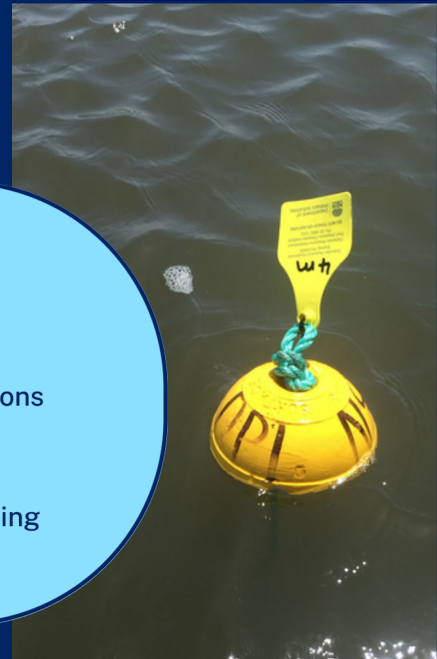
FURTHER READING

- Design and evaluation of novel research trap - https://doi.org/10.1071/MF21005
- Approach to imaging crab eggs - https://doi.org/10.1016/j.fishres.2021.106140
- Emigration of tagged Giant Mud Crab -
- https://doi.org/10.1007/s12237-022-01061-1
- Stock structure of Blue Swimmer Crab - https://doi.org/10.1016/j.fishres.2023.106757
- Coastal dispersal of Blue Swimmer Crab and Giant Mud Crab - https://doi.org/10.1111/fog.12608
- Habitat use by Giant Mud Crab -
- https://doi.org/10.1186/s40462-023-00384-3
- Reproduction in Blue Swimmer Crab - https://doi.org/10.1071/MF21191
- Factors driving catch of Blue Swimmer Crab - https://doi.org/10.1016/j.fishres.2022.106582