NSW TOTAL ALLOWABLE FISHING COMMITTEE

ESTUARY GENERAL FISHERY

- MUD CRAB
- BLUE SWIMMER CRAB
- EELS

DETERMINATIONS FOR THE 2024/25 FISHING PERIOD

6 May 2024

Executive Summary

Preamble

The New South Wales (NSW) Total Allowable Fishing Committee (TAFC) has statutory responsibilities set out in Part 2A of the *Fisheries Management Act 1994* (the Act) to determine the Total Allowable Commercial Catch (TACC) or Total Allowable Commercial Effort (TACE) by NSW fishers holding the relevant endorsement in some commercial fisheries. Various fishing regulations under the Act also contain provisions requiring the making of fishery determinations.

The TAFC is an independent statutory body established under Schedule 2 of the Act. In making a determination on catch or effort in a commercial fishery, the TAFC must consider the ecological, economic and social issues associated with each fishery and make determinations that 'on balance' pursue the objectives of the Act.

The TAFC is not subject to the control or direction of the Minister as to any determination made. However, the Minister may direct the TAFC on the procedures to be followed and the matters to be taken into account in making a fishing determination.

This determination is for Mud crab, Blue swimmer crab (BSC) and Eels in the Estuary General Fishery for the fishing period 1 July 2024 to 30 June 2025.

Management recommendations & supporting actions

The TAFC provides the following recommendations to the Minister, NSW Fisheries and the fishing industry towards improving the management of the fishery:

1. Given the high risk and potentially increasing illegal catches of crab, the TAFC recommends that DPI Fisheries utilise compliance data to estimate illegal catches of Mud crab and Blue swimmer crab to inform future TACC determinations and management processes.
2. CPUE and FIS results for BSC should continue to be closely monitored to detect whether early signs of recovery of the population in Wallis Lake continue.
3. There appear to be adequate data available for BSC to justify developing an integrated stock assessment to provide estimates of relative biomass and fishing mortality rate.
4. Progress should be made with development of a BSC harvest strategy, or at least of biomass and fishing mortality target and limit reference points, so that results of an integrated stock assessment can be used to provide the basis for improved scientific advice on a TACC.

Determination

The Total Allowable Fishing Committee, pursuant to Part 2A of the *Fisheries Management Act 1994*, determines that the commercial catch of Mud crab, Blue Swimmer crab and Eels in the Estuary General Fishery should be controlled and allocated through the following measures:

1. A TACC for Mud crab during the fishing period 1 July 2024 to 30 June 2025 of **185.0 tonnes**;

2. A TACC for Blue swimmer crab during the fishing period 1 July 2024 to 30 June 2025 of **185.0 tonnes**; and

3. A TACC for Eels during the fishing period 1 July 2024 to 30 June 2025 of **100.0 tonnes.**

Introduction

The Estuary General (EG) Fishery is a diverse multi-species, multi-method fishery that may operate in 76 of NSW estuarine systems. It is the most diverse commercial fishery in NSW and comprises approximately 450 fishing businesses authorised to utilise 17 types of fishing gear. The EG Fishery includes all forms of commercial estuarine fishing (other than estuary prawn trawling) in addition to the gathering of pipis and beachworms from ocean beaches.

Generally, the 10 species that make up over 80% of landings by weight are Sea mullet (*Mugil cephalus*) Luderick (*Girella tricuspidata*), Yellowfin bream (*Acanthopagrus australis*), Eastern school prawn (*Metapenaeus macleayi*), Blue swimmer crab (*Portunus pelagicus*), Dusky flathead (*Platycephalus fuscus*), Sand whiting (*Sillago ciliata*), Pipi (*Donax deltoides*), Mud crab (*Scylla serrata*) and Silver biddy (*Gerres subfasciatus*).

The EG Fishery is divided geographically into seven regions. Appendix 1 describes the waters within each region of the EG Fishery. A reference to an estuary in the table includes all creeks, rivers, lakes, lagoons and tributaries flowing into or from that estuary. Hand gathering is also permitted on more than 100 beaches throughout NSW. The EG Fishery is subject to many spatial and temporal closures within these waters[1].

Interim Total Allowable Catch Levels (ITCALs) were set for these fisheries in December 2017. The maximum catch over the 10-year period 2002/03 to 2011/12) was used, due to the implementation of recreational fishing havens and marine parks and associated loss of access to fishing grounds and commercial fishery buyouts. This Determination is the first time the TAFC has been requested to recommend the TACCs.

The TAFC met with DPI Fisheries and a number of shareholders in the Estuary General Fishery on-line on 9 and 10 April 2024 to discuss fishery biology, catch and associated management issues concerning the Mud crab, Blue Swimmer crab and Eel fisheries. Written submissions by shareholders on the stock status of the fisheries and other fishery management issues were provided to the Committee by DPI Fisheries. Current stock assessment reports on Mud crab[2], Blue Swimmer Crab[3] and Eels[4] were also provided to the Committee by DPI Fisheries.

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[1] Osterloh, I (2024). Management Report 2024 – Estuary General Fishery. Total Allowable Catch Determinations 2024-25. Department for Regional NSW. 53 pp

[2] Johnson, D.D. 2024. Stock assessment report 2023/24 – Estuary General Fishery – Giant Mud Crab (*Scylla serrata*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute: 69 pp.

[3] Johnson, D.D. 2024. Stock assessment report 2023/24 – Estuary General Fishery – Blue Swimmer Crab (*Portunus armatus*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute: 88 pp.

[4] Hall, K.C. (2024) NSW Stock assessment report 2023/24 – River Eels – Longfin Eel (Anguilla reinhardtii)
and Southern Shortfin Eel (Anguilla australis). NSW Department of Primary Industries, Coffs Harbour, 38 pp.

Biological considerations

Mud Crab

Distribution and stock structure

Giant Mud Crab (*Scylla serrata*, GMC) inhabit tropical to warm temperate waters from Exmouth in Western Australia up and along the coastline of the Northern Territory and Queensland to the Bega River in southern New South Wales. There are two genetic stocks divided at the eastern Torres Strait, with the East Coast biological stocks showing connectivity along the east coast, although with a north – south movement of larvae, with contributions to populations in NSW estuaries from female crabs in Queensland decreasing with distance southwards.

The East Australian Current separation acts as a barrier to recruitment between spawning and settlement to the north and south of this region, with estuaries to the south obtaining most of their larvae from within NSW, and those to the north obtaining larvae from Queensland. Contributions from the north range from 89% for the Richmond River to around 60% for Port Stephens and the Hunter River. Measures that protect female crabs in Queensland therefore contribute to maintaining Mud crab populations in northern NSW estuaries.

Fishery catch and effort

Recent catches of Mud crab in the EGF have been subject to an interim total allowable catch level (ITACL) of 206.3 tonnes implemented in December 2017. Prior to quota implementation, catches rose rapidly to reach 204.6 tonnes in 2014/15, close to the level at which the ITCAL was set. After transition to quota management, reported total landings declined rapidly to 116.9 tonnes in 2019/20, 103.9 tonnes in 2021/22, and 81 tonnes (incompletely reported at the time of the report) in 2022/23[5]. This decline in landings was associated with a decline in fishing effort from over 20,000 days fished over 1998 – 2000 to around 16,000 days fishing in 2007/08, dropping substantially after introduction of the ITCAL to average around 6,700 days over 2010 – 2013. Effort increased again to over 12,000 days in 2015/16, but has since declined steadily to average a little over 7,000 days over 2021 – 2023. There has also been a ~70% decline in estimated recreational harvest from ~58, 000 crabs in 2017/18 to ~17, 000 crabs in 2021/22.

Stock assessment and stock status

The East Coast Mud crab stock is shared with Queensland, which takes some 86% of the commercial harvest of the east coast Mud crab biological stock. Female crabs may not be landed in Queensland (although there is likely some handling discard mortality), and male crabs are protected by a minimum size limit of 150 mm carapace width, above the size at first maturity in Queensland.

The NSW Estuary General Fishery accounts for about 15% of the commercial harvest from the East Coast Mud crab biological stock, with about half the catch

[5] Johnson, D.D. 2024. Stock assessment report 2023/24 – Estuary General Fishery – Giant Mud Crab (*Scylla serrata*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute: 69 pp.

being females, with a minimum size limit of 85 mm carapace length. There are several no-take zones across Queensland and NSW that afford some protection to components of the stock, but these spatial closures are relatively small and fragmented, and their cumulative benefit on a fishery-wide scale has not been quantified. The 2019 assessment of the Queensland component of the stock was reported in the 2020 *Status of Australian Fish Stocks* report (www.fish.gov.au), which concluded that this management unit was Sustainable (i.e. not depleted to a level at which recruitment would be expected to be impaired), with biomass at about 62% of unfished levels. The sustainable status of the Queensland component of the stock contributes to recruitment in northern NSW estuaries.

The main indicators for fishing mortality and biomass of the NSW component of the stock are derived from commercial catch and standardised commercial catch rate (CPUE). After introduction of quota management in 2017/18, nominal catch-per-unit effort (CPUE) across the fishery declined steadily from 15.2 kg/day in 2017/18 to 11.3 kg/day in 2021/22 and 10.5 kg/day in 2022/23. Standardised CPUE (sCPUE) has generally declined in all regions, although trends have differed by region. In EG Region 1 recent (2022/23) sCPUE was 19% below the long-term average; in Region 2 it was 39% below the long-term average; in Region 3 it was 30% below the long-term average; and in Region 4 it was 20% below the long-term average.

Fishing effort and catches have also declined over this period, so it would be expected that fishing mortality rate has decreased. CPUE is, in fact, inversely related to fishing effort, with higher effort over 1997 – 2009 (average ~17,600 days) associated with low nominal CPUE (average 6.1 kg/day), and lower effort over 2009 – 2023 (average ~8,550 days) associated with higher nominal CPUE (13.9 kg/day). However, since 2017, while effort has continued to decrease, CPUE has also decreased, indicating an actual decrease in crab availability. Mud crab catches have been observed to decline one to two years after heavy and prolonged flooding, likely as a result of reduced recruitment. La Niña induced heavy rainfall from mid-2020 onwards resulting in several major flooding events in northern NSW in 2021 and 2022, likely contributing to the declines in CPUE seen over that time.

Given the current state of catches and sCPUE trends, the ITCAL for Mud crab was set too high. The ITCAL of 206.3 tonnes was close to the maximum catch ever reported in 2014/15, but catches over the past six fishing periods have been well below this level at 140 tonnes. If the period 2013 - 2018 is taken as a target reference period for catch and CPUE, the ratio of the recent three-year CPUE over the average CPUE in that reference period indicates that the TACC should be reduced to about 145 tonnes. However, noting the known effects of flooding on recent Mud crab availability and the possibility that the stock could rebuild in the absence of regular floods, a more moderate TACC reduction of about 10% is appropriate. CPUE should continue to be closely monitored to detect whether declines continue, indicating the need for further TACC reductions, or whether the stock indices show some rebuilding.

In summary, given the declining trend in CPUE in most regions over the past five or more years, but noting the likely effect of flood events on recent Mud crab

availability, a precautionary reduction should be applied to the ITCAL, reducing the TACC to 185 tonnes.

Blue swimmer crab

Biology and distribution

Blue Swimmer Crabs (*Portunus armatus*, BSC) occur in coastal and estuarine waters along the entire NSW coastline. Populations of BSC in NSW and Queensland are genetically similar, but oceanographic modelling of larval distribution patterns indicates that these constitute separate stocks. Within NSW, modelling indicates that larvae are generally sourced from within about 50 – 320 km of a settlement estuary. BSC is therefore managed as a single stock within NSW.

Fishery catch and effort

The NSW BSC fishery is subject to an ITCAL of 225 tonnes set in December 2017, calculated from the sum of the maximum reported catch for each of the Estuary General Fishery regions over the period 2002/03 to 2011/12.

Commercial estuarine catches of this species fluctuated around a long-term average of ~132 tonnes over the period 2000 - 2017, but declined to 76.7 tonnes in 2018/19; 52.2 tonnes in 2019/20 and 49.9 tonnes in 2021/22. The reported estuarine catch in 2022/23 at the time of this report was only 21.9 tonnes, probably not yet completely reported. There has also been a considerable decline in estimated recreational catches, from ~63,000 crabs in 2017/18 to ~13,000 crabs in 2021/22[6].

The main estuarine fishing region is Region 4, which has accounted for ~75% of total landings. Within Region 4, the most important estuary is Wallis Lake, accounting for ~80 per cent of the Region 4 landings, with most of the catch being taken using fish and crab trapping. Catch composition is biased towards males, which accounted for about 65% of the total landings from 2009 - 2022.

Since 1998, fishing effort has also decreased substantially, particularly in the crab trapping fishery. Reported effort (days) for crab trapping for BSC decreased from ~10,900 days in 1997/98 to ~6,900 days in 2003/04, then declined rapidly to 3,460 days in 2004/05. Following the introduction of daily catch and effort reporting in 2009/10, crab trapping effort has remained below 2,200 days per year.

In contrast, fish trapping effort increased rapidly from low levels prior to 2004 to exceed 3,500 days in 2007. Since then, effort has fluctuated, declining to ~1,460 days in 2011, increasing to ~4,360 days in 2015 and declining steadily since then to ~2,300 days in 2022. Reported fish trap effort has exceeded crab trap effort since 2005.

[6] Johnson, D.D. 2024. Stock assessment report 2023/24 – Estuary General Fishery – Blue Swimmer Crab (*Portunus armatus*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute: 88 pp.

Stock assessment and stock status

The main indices used in the weight of evidence evaluation of stock status for BSC are standardised catch rates (sCPUE) and fishery independent surveys (FIS). sCPUE for the main fish trapping fishery in Wallis Lake in 2022/23 was ~55% below the long-term average and 40% below 2021/22. sCPUE for crab trapping in Wallis Lake in 2022/23 was ~70% below the long-term average and 68% below 2021/22. sCPUE for fish trapping and crab trapping in other main estuaries in 2022/23 has also declined below the long-term average.

Annual FIS have been conducted in Wallis Lake providing indices of abundance and catch rates. Catch rates of undersize crabs in 2022/23 were 25% lower than 2021/22 and ~90% lower than 2020/21, 2019/20 and 2018/19. However, catch rates in 2023/24, while still below those over 2018 – 2021, increased substantially over 2022/23. Catch rates of legal-sized crabs from the FIS in 2022/23 were similarly lower that over 2018 – 2022, but in 2023/24 were 86% above 2022/23 and close to peak catch rates recorded in 2018/19.

Bayesian space-state production modelling provided estimates of maximum sustainable yield (MSY) ranging from 164 – 271 tonnes, depending on the CPUE series used. Estimates of current relative biomass compared to the biomass that could support catches at MSY (B_{2022}/B_{MSY}) were less than 0.5. This indicates that, under the productivity assumptions of the model, the stock is at about half of a level that would allow for harvesting at the level of MSY, and that catches should be limited to substantially less than the MSY level.

Predictive analysis of catches and catch rates in Wallis Lake[7] has shown that high winter harvesting of females is predicted to result in reduced catches in the following season. However, these analyses were based on a full winter closure (June- Nov) and on data collected prior to the increase in minimum legal length (MLL). A full winter closure for female crabs would have a substantial impact on total catches and a partial closure would have little benefit for catch rates in the next season. The increase in the MLL from 60 mm to 65 mm in 2017 has provided additional protection to mature female crabs and additional temporal closures are not considered necessary.

Based on all of the above evidence, the NSW Blue Swimmer Crab stock has been classified under the *Status of Australian Fish Stocks* (SAFS) framework as **depleting**. Given the current state of catches and CPUE trends, the ITCAL for BSC was set too high. The ITCAL of 225 tonnes is over three times the average catch of ~65 tonnes over 2019 - 2022, when the ITCAL was implemented. Steadily declining CPUE in the main fish trap fishery over 2015 - 2023 to historically low levels is of concern and stock assessment results indicate that the TACC should be well below 200 tonnes. However, noting the likely effects of flooding on recent BSC availability, and indications of increases in abundance and catch rates in Wallis Lake in 2023/24,

[7] Schilling, H., Johnson, D.D., Hanemseth, R., Suthers, I.M., and Taylor, M.D. (2023) Long-term drivers of catch variability in south-eastern Australia's largest portunid fishery. *Fisheries Research* 260, 106582.

indicating possible recovery from flood impacts, a moderate precautionary reduction may be appropriate.

In summary, given the declining trend in CPUE in most regions and fisheries and stock assessment results indicating that the stock may be depleted to about half of B_{MSY}, (but noting the likely effect of flood events on recent mud crab availability and signs of recovery from that impact), a precautionary reduction should be applied to the ITCAL, reducing the TACC well below 200 tonnes.

Recommendations

- CPUE and FIS results should continue to be closely monitored to detect whether early signs of recovery of the population in Wallis Lake continue.
- There appear to be adequate data available for BSC to justify developing an integrated stock assessment to provide estimates of relative biomass and fishing mortality rate.
- Progress should be made with development of a harvest strategy, or at least of biomass and fishing mortality target and limit reference points, so that results of an integrated stock assessment can be used to provide the basis for improved scientific advice on a TACC.

Eels

Distribution and stock structure

Two species of river Eels are taken in NSW waters – Longfin Eel (*Anguilla reinhardtii*, LFE) and Southern Shortfin Eel (*Anguilla australis*, SFE). Longfin Eel distribution extends along the entire eastern Australian coast from Cape York to Tasmania and also occurs in northern New Zealand. Genetic studies indicate a single biological stock across this range. Southern Shortfin Eel are widespread in coastal streams of south-eastern Australia from southern Queensland to South Australia and Tasmania and also occur in New Zealand and western Pacific Islands. Genetic studies indicate that Shortfin Eel consist of two geographically separate subspecies – *A. australis australis* in Australia and *A. australis schmidtii* in New Zealand and western Pacific islands[8].

As there are currently no cross-jurisdictional stock assessments undertaken for either of these shared eel stocks, the NSW components are assessed and managed as NSW jurisdictional stocks.

Fishery catch and effort

Commercial catches of river Eel in NSW waters are primarily taken by Eel trapping in the Estuary General Fishery (EGF), which targets the sub-adults as they return to estuaries on their migration back into freshwater systems. No Eel trapping in

[8] Hall, K.C. (2024) NSW Stock assessment report 2023/24 – River Eels – Longfin Eel (*Anguilla reinhardtii*) and Southern Shortfin Eel (Anguilla australis). NSW Department of Primary Industries, Coffs Harbour, 64 pp.

freshwater rivers above tidal waters is permitted in NSW, affording protection to maturing Eels in the upper reaches of river systems.

Commercial catches of river Eel landed from NSW waters rapidly increased in the early 1990s to supply a newly established live export market to China, with combined catches peaking at 469 tonnes in 1992/93, much of which was reported as 'unspecified Eels' at that time. After 1998, when reporting by species improved, it appears that Longfin Eel catches north of the Hawkesbury River continued to be incorrectly reported as Shortfin Eel. Adjusting for this gives recent peak catch of 234 tonnes of combine Eels in 2001 and an average catch of ~90 t/year over 2003 – 2016. More recently, associated with loss of the export market to China, annual catches have averaged only ~15 t. Since 2000, Shortfin Eel has contributed only ~1.5% of the total reported Eel catch.

Estimated recreational catches of Eel from five surveys conducted over 2000 - 2022 are low, with little recreational targeting for Eel with most caught Eels returned. Weight-converted estimates of recreational catch have been <2.5 tonnes in recent years. Statewide estimates of Aboriginal cultural harvest of Eel are unknown, but they are potentially significant.

A combined-species interim total commercial access level (ITCAL) of 137 tonnes was implemented for River Eel in December 2017, set at the maximum annual combined catch weight (in 2002/03) for both Eel species reported over the 10-year period 2002 - 2012. Total reported catches of combined Eel species have been well below this ITCAL level since 2003/04.

Reported fishing effort from 1998 onwards has shown a steady decline from a peak of over 8,500 days combined effort for both Eel species in 2001/02 to ~1,120 days in 2010/11, increasing to just over 2,000 days in 2013/14 and averaging just over 250 days/year since 2017/18. Effort directed at Shortfin Eel has particularly declined, from a peak of just over 1,860 days in 2000/01 to only 12 days in 2016/17, with almost no effort being reported for Shortfin Eel since 2017/18.

Stock assessment and stock status

In the most recent *Status of Australian Fish Stock* (SAFS) reports, Longfin Eel and Southern Shortfin Eel stocks are assessed as **sustainable** and **undefined** for the NSW part of each stock, respectively. Jurisdictional components of these stocks were assessed as **sustainable** in Victoria and Tasmania and **undefined** in Queensland.

The main indices used in the weight-of-evidence approach taken in 2024 to assessing status of Eel stocks in NSW are standardised catch-per-unit-effort, (sCPUE) of commercial catch return records. sCPUE derived from monthly records of Longfin Eel declined substantially over 2002/03, but then increased steadily to above the 1998 - 2009 average. sCPUE from daily event records (since 2009/10) shows a slow decline over 2011 - 2015, but then a steady increase to well above the 2010 - 2023 average by 2023. This increase appears to have been largely driven by an increase in catch rates in Region 5, although regional indices show increases

over the recent few years in Regions 2, 3 and 4, with no recent indices available for Regions 1 or 6.

sCPUE for Shortfin Eel declined over 1998 - 2006, then increased again to just below the 1998 - 2009 average by 2009. There are insufficient data for Shortfin Eel catch rates to produce a sCPUE index after 2009. However, effort and catches of this species have been so low that recent fishing impact on the stock can be assumed to be low, facilitating rebuilding of biomass.

The Eel trapping sector of the commercial EGF is only permitted to operate in the tidal waters of a limited number of estuaries along the NSW coast and is excluded from freshwater and inland river reaches. This provides protection for a large proportion of the maturing Eel stock in closed estuaries, freshwater river reaches and impoundments.

It is clear that the ITCAL was initially set too high, given that catches have been below 100 tonnes since the ITCAL was implemented and well below that level in recent years. It is also clear that the loss of the export market to China has depressed the fishery substantially and that current low effort and catch are partially attributable to low market opportunities. The combination of low catches and protection of a substantial proportion of the stocks in closed estuaries and freshwater river reaches has resulted in rebuilding of the stocks, with most CPUE indices showing increases to above historical average levels over the past four fishing periods.

Using the period 2010 - 2017 as a stable reference period, comparison of the recent 3-year (2021 - 2023) average sCPUE with the average sCPUE over the reference period indicates that an annual catch of 100 tonnes could be taken under conditions of stock productivity. CPUE should continue to be monitored to determine whether CPUE continues to increase, particularly if market conditions improve and catches increase to approach the recommended 100 tonne TACC level.

Economic considerations

Mud crab, Blue swimmer crab and Eels are components of the Estuary General Fishery (EGF). The reliance of fishing businesses on these components is highly variable although Mud crab and Blue swimmer crab are substantially more important components than Eels.

Mud crab

The reliance of fishing businesses that have Mud crab shares on the catch of Mud crab is highly variable. Most fishers that access Mud crab also use other share classes with the EGF or other commercial fisheries. The BDO Econsearch (2023) report provides information on the economics of those participants that focus on the take of mud crabs. Nine EGF fishing businesses that responded to the survey identified that 79.8% of their fishing revenue was derived from the catch of Mud crab. The catch from these nine businesses was 4.5 tonnes equating to an estimated GVP of approximately $61,000 per fishing business.

There are a total of 18,770 Mud crab quota shares and at the commencement of the 2023/24 fishing period these were distributed among 281 shareholders. Mud crab quota shareholdings range between one and 3,045 quota shares. Five shareholders hold 27% of Mud crab quota shares. The ITCAL determination for Mud crab for the 2023/24 fishing period was 206.3 tonnes, with one Mud crab quota share equating to approximately 11 kilograms of Mud crab. 203 quota transfers have occurred during the 2023/24 fishing period, equating to approximately 44% of the TACC. This is a relative high number of transfers and advice received from industry and DPI Fisheries is that many of these trades are between related business entities. As such, they do not represent trades in an open market.

Since the implementation of quota management in the Mud crab fishery in 2017 and with the likely exception of the current fishing period, the ITCAL has not limited the Mud crab catch. This means that Mud crab quota should have been available to be transferred between fishing businesses that desired to do so. The availability of quota should not have been a factor that limited catches. Nonetheless, a reduction in TACC will have an impact on some fishing businesses. The impact will not be felt evenly across fishing businesses and cannot be quantified on available data. Quantification would require accounting information from individual businesses, as well as information obtained through surveys of individual business owners, to gauge their status and future aspirations. It would be expected that businesses with a higher reliance on Mud crab would be most impacted, however this will depend on their quota holding relative to desired actual catch.

The ability of individual fishing businesses to adapt to a reduced TACC will be variable. Possible responses from individual businesses to a reduction in Mud crab TACC can include the following:

- Purchasing more quota to maintain their catch at or near current levels. This is dependent on businesses being able to have the financial resources to do so and being able to access quota to transfer.
- Catching their allocated lower quota and make no other significant changes to their business or the way they fish.
- Catching their allocated quota and attempt to obtain greater economic benefit from it. This may be through focussing on retaining a higher proportion of A-Grade crabs, changing when they catch mud crabs to take advantage of any supply gaps, or undertaking changes to marketing and market destinations to obtain a higher average price.
- Increasing effort in other fisheries that can be accessed to make up for any economic shortfall. Depending on which fisheries and their management regime, this may have unintended consequences for these fisheries.
- Ceasing commercial fishing altogether.

It is an inherent feature of a fishery managed by a TACC that the level of TACC can go up and down, dependent on the status of the stock. This is clearly evidenced by the NSW lobster and abalone fisheries, which have a long history of management under a TACC, which has changed through time. The TAFC has endeavoured to lessen the economic impact on individual businesses by applying a modest TACC

reduction for Mud crab for the 2024/25 fishing period. The recommended Mud crab TACC for the 2024/25 fishing year is still above the actual long-term average catch in the fishery. Commercial fishing businesses need to expect that an annually assessed TACC will fluctuate over time and be able to adapt to changes when they occur. While a ITCAL has been in place in the mud crab fishery since 2017, this is the first time that the TACC level has been re-evaluated since the ITCAL.

Any reduction in Mud crab quota on Mud crab supply to seafood markets in NSW is likely to be at the margin, given the substantially larger Mud crab quota (770 tonnes on the east coast and 108 tonnes in the Gulf of Carpentaria) able to be accessed in Queensland. However, some local businesses that have a strong preference for local supply may be affected, as well as any that prefer female Mud crabs. It is unlikely that given the size of the recommended TACC reduction relative to the overall potential supply of mud crabs when taking into consideration the Queensland catch that price per kg will be substantially impacted by a TACC reduction. The grade of Mud crab will remain a strong determinant of price per kg.

Blue swimmer crab

There are a total of 44,904 Blue swimmer crab (BSC) quota shares and at the commencement of the 2023/24 fishing period these were distributed among 288 shareholders. BSC quota shareholdings range between one and 3,649 quota shares. Five shareholders hold 21% of the total quota shares. The ITCAL determination for BSC for the 2023/24 fishing period was 225 tonnes, with one BSC quota share equating to approximately 5 kilograms. Sixty-eight quota transfers have occurred during the 2023/24 fishing period, equating to approximately 15% of the TACC. Like Mud crab, this is a relative high number of transfers and advice again received from industry and DPI Fisheries is that many of these trades are between related business entities. As such, they do not represent trades in an open market. BSC are destined for sale solely within NSW (BDO Econsearch, 2023).

The BSC catch remains substantially lower than the ITCAL and has not exceeded 150 tonnes for the last seven fishing periods. As such, the ITCAL is not working effectively and efficiently to cap catch. Quota usage as at the 20 March 2024 is 32.1% with 72% of the fishing period having passed. Therefore, the trend of a substantially low BSC catch relative to the TACC will continue.

The TAFC have recommended a modest reduction to the TACC. The economic considerations and potential impacts of the recommended reduction in the BSC TACC are similar to those described above for the reduction in Mud crab TACC.

The TAFC discussed the possibility of a winter closure for female blue swimmer crabs (discussed elsewhere in this report). However, it was recognised that from an economic perspective the unit value of a female crab was higher than that for males and as such there would be a potential impact on the income able to be generated per quota unit. To be practical and effective, such a closure would also need to extend to the recreational fishing sector and the views of that sector on such a change had not been garnered.

Eels

The take of Eels makes only a minor contribution to economic activity within the EGF. There are a total of 21,200 Eel quota shares and at the commencement of the 2023/24 fishing period these were distributed among 82 shareholders. Eel shareholdings range between 50 and 3,120 quota shares. Three shareholders hold 25% of Eel crab quota shares. The ITCAL determination for Eels for the 2023/24 fishing period was 137 tonnes, however all annual catches since 2003/04 have been under 100 tonnes. As such, the TACC does not effectively or efficiently limit catch. Quota usage as at 20 March is only 8.5% with 72% of the fishing period having passed. Therefore, the trend of a substantially low Eel catch relative to the TACC will continue. Only seven quota transfers occurred during the 2023/24 fishing period, equating to just 4% of the TACC.

The domestic demand for Eels remains limited and at a low price point. Eel catch was historically driven by export demand and the ability to process product to meet the export demand. Processing capacity is no longer available and it would take a substantial amount of time to reinvigorate it and to confidently re-establish the export market. As such, demand for Eels is likely to remain low and limited to domestic demand only.

The recommended TACC reduction is not likely to impact the supply of Eels relative to domestic demand and is unlikely to substantially impact commercial fishing businesses.

Fishery management considerations

General Issues

The Estuary General Fishery is a multi-species, multi-gear fishery, comprising of 450 fishing business that operate in NSW estuaries detailed in Appendix 1. The fishery has seven regions, which form management zones for the purposes of allocating endorsements and the application of some management measures. Many commercial fishers hold multiple endorsements and quota, allowing them to fish in multiple regions for multiple species.

Mud crab, Blue swimmer crab (BSC) and Eel form a sub-sector of the Estuary General Fishery, called the Estuary General (Trapping) Fishery (EGTF). The EGTF is managed using Individual Transferable Quotas (ITQs) and TACCs, together with a suite of input and output controls, including minimum size limits, gear restrictions, and spatial and temporal closures.

The Recreational Fishing Survey undertaken in 2022/23 indicated Mud crab catches of approximately 6.9 tonnes per year (with previous surveys indicating between 20-39 tonnes); 10.2 tonnes of BSC (previous surveys indicating 22-33 tonnes) and 2.2 tonnes of Eels. The recreational fishery is managed via minimum size limits and bag limits for Mud crab, BSC, Longfin eel and Shortfin eel.

Catches by the Aboriginal fishing sector of Mud crabs and BSC are unknown. While there is some data on catches of Eel by the Aboriginal Fishing Sector in the Tweed area, recording 117-350 individual Eels in 2017/18, catches across the State have not been estimated. Possession limits and special cultural access arrangements apply to the sector.

DPI Fisheries uses a risk-based approach to fisheries enforcement activities that uses State-wide and fishery specific risk analysis. Compliance strategies employed include intelligence gathering and analysis, education, targeted patrols and covert and overt operations. Compliance rates in the commercial fishery are relatively high (93%) and steady, with the majority of quota evasion detected having been carried out by one fisher, who is subject to an ongoing investigation.

A high number of offences have been detected in the Mud crab and BSC fishery, and a significant number of prosecutions and penalties have been issued. Offences include exceeding possession limits, prohibited sized crabs, unlawful nets and traps, as well as trap, net and crab theft. An increased level of targeting crabs has been observed in recent months, correlating with higher catch rates in the commercial fishery. The fishery has been rated as high risk by the Compliance Team and expected IUU take is unknown, but also likely to be high.

Recommendation

- Given the high risk and potentially increasing illegal catches, the TAFC recommends that the Department utilise compliance data to estimate illegal catches of Mud crab and BSC to inform future TAC determinations and management processes.

The TAFC noted that DPI Fisheries have commenced a trial of VMS in the Estuary General Fishery and are currently considering extension of this technology across operators in the EGTF. In addition to supporting improved compliance and reporting, the enhancement of spatial data could also facilitate the implementation of finer scale spatial management mechanisms.

There are a number of issues with reporting in the commercial fishery, with discrepancies between reported catches and quota usage, and gaps in spatial and effort data. While there have been some improvements recently, this issue remains significant. The reporting issues undermine confidence in the data being used to inform management and increases uncertainty in stock assessments.

Seasonal weather conditions such as floods, storms, water temperature, ocean currents and sea conditions can impact both catch and catch rate of estuarine species, including crabs. These matters are important when interpreting fishery dependent data (including in stock assessments) and calculating the standardised catch rate, and both industry and DPI Fisheries are of the view that the floods in early 2022 are likely to have affected catches and catch rates of both crab species.

Noting the increased variability in weather and climatic conditions expected due to climate change, improved understanding of the influence of these factors on estuarine populations will be increasingly important to management of the EGTF.

Mud crab

There is a single genetic stock for Mud crab shared between QLD and NSW, with catches in NSW accounting for around 15% of the commercial east coast catch. The NSW fishery relies on larvae from the QLD portion of the population and as a result, the management measures in place in QLD, including a prohibition on catching females and the minimum size limit, are important protections for the NSW fishery. Given the dependence of the NSW fishery on the settings in QLD, the TAFC encourages DPI to continue working with QLD to collaborate on the management of the east coast Giant Mud Crab stock.

Reported landings of Mud crabs in the EGTF fishery have declined from around 150 tonnes in 2017/18 to around 100 tonnes per year in 2020/21 and 2021/22. The stock assessment also shows that standardised CPUE has declined across NSW, with standardised CPUE in 2022/23 being 25% below the long-term average. CPUE declines are also evident in regions 1 to 4, which account for 95% of catches. There are however positive signs of recovery, with landings and catch rates increasing in 2023/24. Nonetheless, given the declining indicators in the data available to the stock assessment, DPI Fisheries has concluded that the NSW Mud crab stock is "**depleting**".

According to the NSW Fisheries Harvest Strategy Policy (HSP), a "depleting" status indicates when the stock biomass is not yet depleted and recruitment is not yet impaired, but fishing mortality is too high. The HSP therefore indicates that management is needed to reduce fishing mortality to ensure that the biomass does not become depleted.

The Mud crab ITCAL was set at 206.3 tonnes, however catches have been significantly below that figure every year. The ITCAL was considered a "transitional TACC" based on principles and methodology used for calculating Interim Total Commercial Access Levels (ITCALs). At the time there was a recognition that more robust TACCs would be developed over time, once the TACC and ITQ framework was more established, as demonstrated in the use of terminology such as "transitional" and "interim".

There is recognition that the ITCALs were initially over-allocated and that they need to be transitioned to more sustainable and workable levels. Given the "**depleting**" status of the stock and catches being well below the current TACC, there is a need to reduce the TACC and remove the potential for an increase in fishing mortality. The TAFC however notes the positive indicators in recent catch data in both NSW and QLD and the significant influence of environment factors on the fishery. The TAFC therefore recommends a reduction of TACC to 185 tonnes for the 2024/25 season.

Blue swimmer crab

Commercial catches of BSC fluctuated around a long-term average of approximately 132 tonnes during the period 2000/01 to 2016/17, but have since declined to below 50 tonnes in 2021/22 and 2022/23. Standardised catch rates from fishery dependent data in both fish and crab traps show declining trends and catch rates in the FIS have also declined for both undersized and legal crabs. The estuary contributing the majority of catches, Wallis Lake, has also seen a large drop in catches and there have been significant declines in recreational catches.

As noted above, when the ITCALs were set in 2019, they were set at levels that allowed flexibility during the implementation period. However, there was recognition that they would require adjustment and transitioning to more sustainable levels, once the new approach had become established. The TACC for BSC was set at 225 tonnes, well above the long-term average for the period 2000/01 to 2016/17 (i.e. before the recent declines) of 132 tonnes. Catches since the introduction of the TACC have been variable, but have not exceeded 83 tonnes (or 37% of the TACC).

The updated stock assessment for BSC concluded that the stock is "**depleting**", as the biomass of BSC has decreased, but is not yet depleted and recruitment is not yet impaired, but fishing mortality is too high.

The recent updated FIS data shows below average recruitment has been evident in the fishery for a number of years, however data for the 2023/24 indicates a number of legal and undersized crabs are entering the fishery, indicating a possible recovery trend for the stock. Shareholders and DPI Fisheries are of the view that the 2022 floods are likely to have affected BSC catches and catch rates. The recent fishery dependent and independent data suggests the stock may be starting to recover from those impacts. While promising, caution should still be taken until the trends are clear.

The TAFC therefore determines that the TACC be set at 185 tonnes for the 2024/25 season, in order to remove a proportion of the latent effort in the fishery and improve protection of the stock from future unsustainable levels of fishing mortality. Although an 18% reduction from the ITCAL, this TACC would still represent the highest catch in the fishery since 1999/2000 (the past 24 fishing periods).

Eels

The east coast populations of Longfin eel and Shortfin eel are shared with other jurisdictions and while NSW dominates the east coast harvest of Longfin eel, Victoria and Tasmania catch larger proportions of Shortfin eel. Longfin and Shortfin eel can only be harvested commercially in NSW using an eel trap, although some Eel may be taken inadvertently using other methods. The majority of eel trap endorsements are for the central region (region 4, and regions 2 and 3 to a lesser degree) and most eel endorsement holders also hold endorsements for other species.

The ITCAL for Longfin and Shortfin eel collectively was set at 137 tonnes since it was established in 2017, however total landings have been below 15 tonnes per year since the ITCAL was introduced. Shareholders have advised that these low catches are a consequence of low Eel prices and minimal market demand, with fishers choosing to harvest other more profitable species. Indices of abundance in the fishery are compromised by the small amount of data available, the complexities of Eel biology and the likely influence of market conditions. Noting the uncertainties however, the available data does not indicate any issues with stock abundance under current fishing mortality.

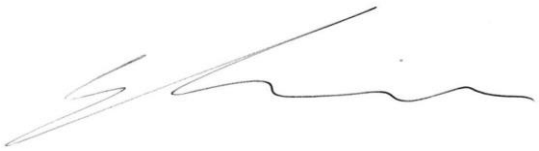
The ITCAL in 2017 was based on the maximum catch during the period 2002/03 – 2012/13, which occurred in 2002/03, when 34.1 tonnes were caught in farm dams and impoundments under Section 37 permits. Since the TACC was introduced however, changes have been made to the management arrangements and most Section 37 permits have been phased out. This means that those farm dams and impoundments can no longer be commercially fished in practice, reducing the area and stock available to the fishery. Given these changes in the management arrangements, the TACC needs to be set to reflect the reduction in the area available to the fishery. This results in a recommended TACC of around 100 tonnes. Current catch is about 12 tonnes, so the TACC provides plenty of scope for increased catches if export markets can be sourced.

Determination

The Total Allowable Fishing Committee (TAFC), pursuant to Part 2A of the *Fisheries Management Act 1994*, determines that the total allowable commercial catch of Mud crab, Blue Swimmer crab and Eels in the Estuary General Fishery should be controlled and allocated through the following measures:

Species	Catch Limit 2024/25 (tonnes)
Mud crab (*Scylla serrata*)	185.0
Blue Swimmer crab (*Portunus pelagicus*)	185.0
Eel Longfined River eel (*Anguilla reinhardtii*) Shortfined River eel (*A. australis*)	100.0

Signed (for and on behalf of the TAFC)



William Zacharin
Chair, TAFC

6 May 2024

Alice McDonald – Fisheries Management member

Daryl McPhee – Natural Resource Economist member

Andrew Penney – Deputy Scientific member

Appendix 1 - Regional Estuarine waters (from McKinnon 2024)

Region 1 – Upper North Coast Tweed River
Cudgen Lake
Cudgera Creek
Mooball Creek
Brunswick River
Richmond River
Evans River
Jerusalem Creek

Region 2 – Clarence Clarence River
Sandon River
Region 3 – North Coast Wooli Wooli River
Station Creek
Region Estuarine waters within region
Corindi River
Arrawarra Creek
Darkum Creek
Woolgoolga Lake
Hearns Lake
Moonee Creek
Region 3 – North Coast Coffs Harbour Creek
Boambee Creek
Bonville Creek
Dalhousie Creek
Oyster Creek
Nambucca River
Macleay River
South West Rocks Creek
Saltwater Creek
Korogoro Creek
Killick Creek
Lake Cathie (Lake Innes)
Camden Haven River

Region 4 – Central Manning River
Khappinghat Creek
Wallis Lake
Smiths Lake
Myall Lakes (Myall River)
Port Stephens (Karuah River)
Hunter River
Tuggerah Lakes

Region 5 – Metropolitan Hawkesbury River
Port Hacking

Region 6 – Upper South Coast Towradgi Creek
Lake Illawarra
Minnamurra River
Spring Creek
Werri Lagoon
Crooked River
Shoalhaven River

Lake Wollumboola
Jervis Bay
Swan Lake
Berrara Creek
Nerrindillah Creek

Region 7 – Lower South Coast
Termeil Lake
Willinga Lake
Region Estuarine waters within region
Durras Lake
Clyde River (Batemans Bay)
Moruya River
Congo Creek
Coila Lake
Lake Brou
Wagonga Inlet
Corunna Lake
Tilba Tilba Lake
Wallaga Lake
Barragoot Lake
Cuttagee Lake
Murrah Lake
Bunga Lagoon
Wapengo Lake
Middle Lake (Bega)
Wallagoot Lake
Bournda Lagoon
Merimbula Lake
Pambula Lake
Curalo Lake