

Southern Shortfin Eel (*Anguilla australis*)

Assessment Authors and Year

This stock status summary condenses findings for Southern Shortfin Eel that were detailed in the following full stock assessment report:

Hall, K.C. and Schilling, H.T. 2025. Stock assessment report 2024/25 – River Eels – Longfin Eel (*Anguilla reinhardtii*) and Southern Shortfin Eel (*Anguilla australis*). NSW Department of Primary Industries and Regional Development – Fisheries, Coffs Harbour, 82 pp.

Stock Status

Current stock status	On the basis of the evidence contained within this assessment, Southern Shortfin Eel is currently assessed as undefined for the NSW part of the stock.
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Stock structure & distribution

The Southern Shortfin Eel (*Anguilla australis*) is widespread in coastal streams of south-eastern Australia, from the Pine River in southern Queensland to the Murray River in South Australia, and Tasmania, and also occurs in New Zealand and western Pacific Islands (Beumer, 1996; Allen *et al.*, 2002). This species is occasionally reported in inland systems west of the Great Dividing Range and typically prefers low-flow or still habitats. In NSW, Southern Shortfin Eel is found primarily in coastal drainages east of the Great Dividing Range and in the Snowy River catchment; however, because the latter drains into east Gippsland, Victoria, it is not fished for eels in NSW.

Genetic studies indicate that Shortfin Eel represents two geographically separate subspecies; *A. australis australis* in Australia and *A. australis schmidtii* in New Zealand and western Pacific islands (Shen and Tzeng, 2007). Because there is currently no cross-jurisdictional stock assessment undertaken for the shared stock, the assessment of the stock status is completed at the jurisdictional level.

The data presented in this summary relate to the New South Wales (NSW) part of the stock.

Scope of this assessment

This report provides a determination of stock status for Southern Shortfin Eel according to the Status of Australian Fish Stocks (SAFS) framework (Roelofs *et al.*, 2024), using data up to and including 2023/24. Where necessary data for Southern Shortfin Eel were adjusted or combined with

data for Longfin Eel (*Anguilla reinhardtii*), to support determination of a combined total allowable catch (TAC) for 'River Eels' in New South Wales (NSW) for the 2025-26 fishing season (1 May to 30 April). An interim total commercial access level (ITCAL, or transitional TAC) of 137 t for River Eels was first introduced in December 2017 and was set at the maximum annual combined catch weight reported during the 10-year period 2002/03 to 2011/12 (NSW DPI, 2014). This transitioned to an adjustable TAC and was initially set at 100 t for the 2024-25 fishing season.

Biology

The Southern Shortfin Eel is a slow growing species with a lifespan of 18–35 years for females and 14–24 years for males (Todd, 1980). The species is sexually dimorphic, with females reaching a larger maximum size (110 cm total length, TL) than males (60 cm TL) (Beumer, 1996). Both sexes are semelparous, spawning once at the end of their lifecycle and then dying, with a late and variable age and size at maturity of 10–35 years and 48–102 cm TL for females and 6–24 years and 34–60 cm TL for males (Todd, 1980).

Most of their lifecycle occurs in estuarine and freshwater systems, followed by migration downstream as mature adults to spawn in deep tropical ocean waters of the Coral Sea (Jellyman, 2016). Recent studies using otolith chemistry suggest that spawning migration patterns and behaviour may be more complex than originally thought, and that some eels may spend considerable time resident in tidal waters before leaving the estuary to spawn (e.g., Crook *et al.*, 2014). This would expose adult eels to greater exploitation by commercial fishing in tidal waters than predicted by the more generalised model of swift migration out to sea. The semelparous life history of eels already renders them more vulnerable to impacts from fishing, because of the exceptionally long generation time and long larval period (Hoyle and Jellyman, 2002). Larval eels pass through a range of developmental stages in the ocean before re-entering estuaries as juvenile glass eels, where they are targeted by commercial fisheries as they undergo initial pigmentation to yellow eels, after which they migrate further upstream to become resident and continue development into adults. Due to their smaller size at maturity and adult size, Southern Shortfin Eels have a smaller minimum legal length than Longfin Eels (30 cm TL versus 58 cm TL).

Fishery statistics

Catch information

Commercial

Reported commercial catches of Southern Shortfin Eel in NSW waters decreased rapidly during the early 2000s from 48.3 t in 1998/99 to 4.5 t in 2005/06 and since then have remained at less than 10 t, and were less than 1 t over the last seven years (Fig. 1). In 2023/24 no Southern Shortfin Eel was reported as landed.

Commercial catches of Southern Shortfin Eel have been taken almost exclusively by eel trapping in the EGF. Historical catches were reported from all seven regions, with 80% of catches taken from 15 main estuaries (Figs 2 and 3). More recent catches have been quite minimal and are largely reported from two main catchments, Clarence River and Myall Lakes, and to a lesser extent Wallis Lakes and Smith Lake (Fig. 3).

Many of the estuaries where Southern Shortfin Eel were historically taken, are still fished for Longfin Eel and it is unknown why Southern Shortfin Eel have almost disappeared from commercial catches since 2009/10. Anecdotal information from fishers suggests that their lower market value relative to Longfin Eels has resulted in reduced targeting of eels in still-water habitats preferred by Shortfin Eel and increased discarding of the species. Fishers have also indicated that historical species identification and reporting may have been inaccurate, which is supported by the regional breakdown of Southern Shortfin Eel (Figs 2 and 3) commercial landings data not matching that of the independent survey data, which suggests that the species rarely occurs north of Hawkesbury River (Harris and Gehrke, 1997). Therefore, Southern Shortfin Eel catches reported from northern catchments, such as Clarence River and Myall Lakes, may have been Longfin Eel.

Most of the commercial harvest of Southern Shortfin Eel is taken by trap fisheries in Victoria and Tasmania, with smaller catches also taken in Queensland (Victorian Fisheries Authority *et al.*, 2024). About 80% of the commercial catch of freshwater eels in Australia comes from Victoria, and Southern Shortfin Eel comprise up to 95% of the total catch (Jellyman, 2016). Victorian catches ranged between 131–310 t in the 1980s and 1990s, before declining to 32 t in 2010/11. This decline was attributed to the Millennium drought between 2000 and 2010. Since then, annual catches in Victoria have ranged between 36–95 t and are much larger than current NSW catches. Tasmanian catches of combined eels have historically ranged between 30–70 t and comprise approximately 95% Southern Shortfin Eel (Victorian Fisheries Authority *et al.*, 2024).

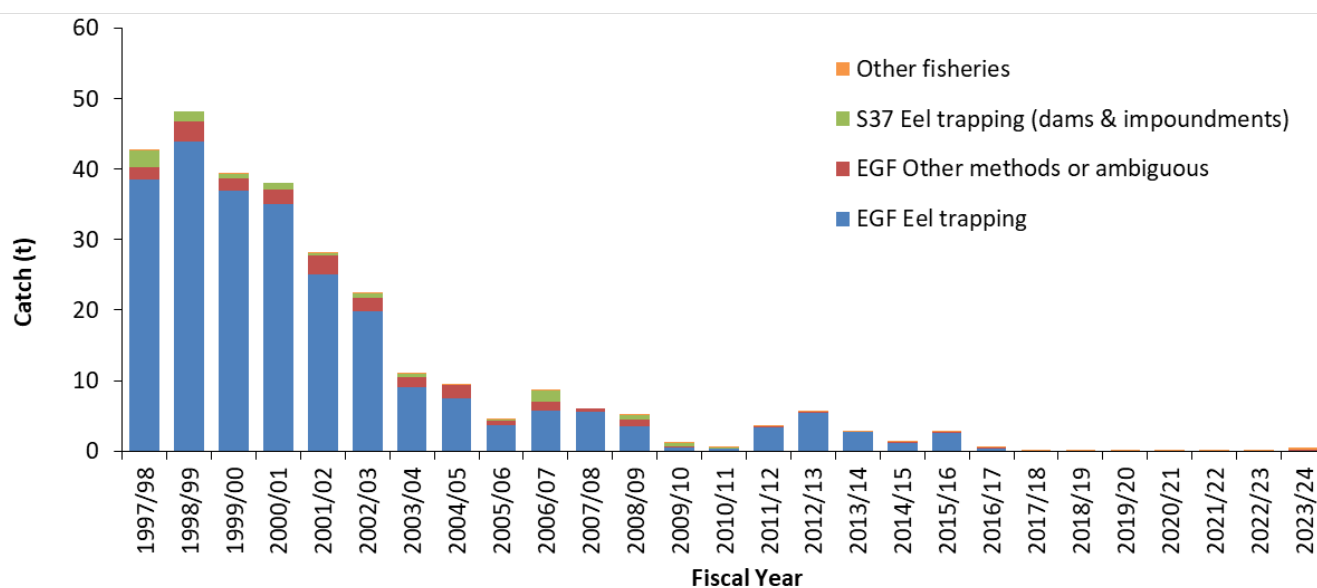


Figure 1. Annual commercial landings (tonnes) of Southern Shortfin Eel taken from NSW waters (1985/86–2023/24) for all fishing methods.

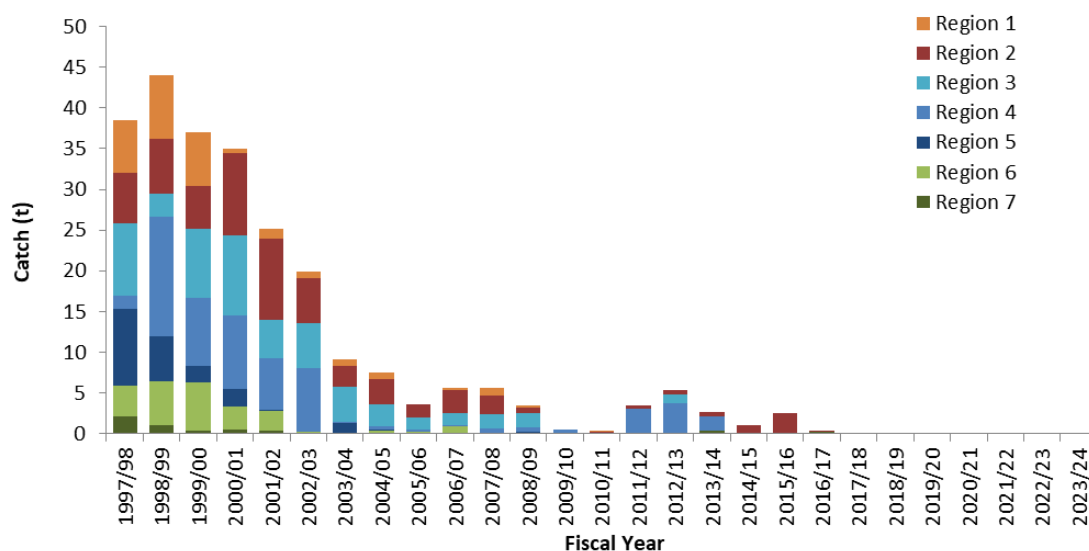
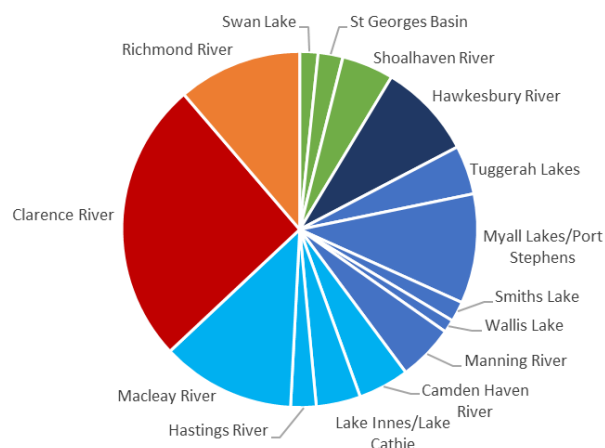


Figure 2. Annual commercial catches of Southern Shortfin Eel by the eel trapping sector in different regions of the NSW Estuary General Fishery (1997/98–2023/24).

(A) 1997/98–2008/09



(B) 2009/10–2022/23

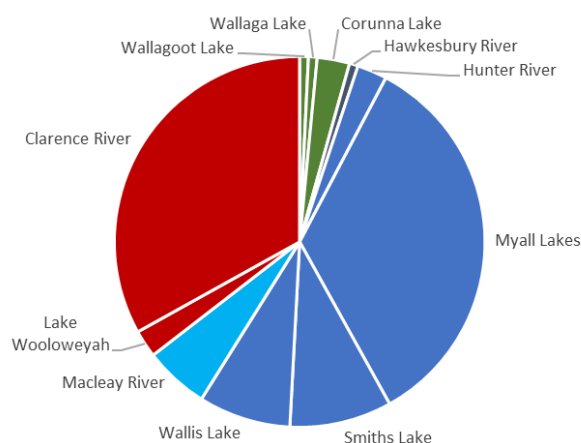


Figure 3. Southern Shortfin Eel catches landed from 15 main estuaries between 1997/98–2008/09 and 11 main estuaries between 2009/10–2023/24 (that accounted for 80% of total catches in each period) taken by eel trapping in the NSW Estuary General Fishery (colours indicate EGF regions).

Recreational & Charter boat

Recreational fishing for eels is covered in a biennial survey of recreational fishing in NSW, which collects data through telephone interviews of long-term (1- and 3-year duration) recreational fishing licence (ltRFL) holders and their household members over a 12-month survey period. Freshwater and saltwater eels are only reported as an undifferentiated group, so no species-specific information is available. In the most recent survey (2021/22, Murphy *et al.*, 2023), approximately 2% of households caught eels over the 12-month period, and only 0.2% of households retained any eel catch. This suggests that harvesting of eels is conducted by only a very small proportion of recreational fishers.

Expansion of survey data to the broader population of ltRFL households provided an estimated harvest of 2,993 eels in 2021/22, but given that only 2 households reported eel harvests this estimate had an equally high standard error (SE, 2,819 eels). A further 18,189 eels were estimated to be released following capture, and of the harvested eels, about 6% were reported to be taken from estuarine waters with the remainder harvested from freshwater rivers. Estimates of eel harvest from previous surveys were similarly low and with similarly high standard errors — i.e., 2,955 ($\pm$ 2,636 SE) in 2017/18 and 2,605 ($\pm$ 1,198 SE) in 2019/20 (Murphy *et al.*, 2020, 2022). Historically, relative to commercial catches, recreational harvests have been comparatively small, comprising less than 1–2% of the total harvest of eels from NSW waters. Weight-converted estimates of recreational catch have been <2.5 t in recent years, however, as the commercial catch has declined this has represented as much as 14% of the total (commercial and recreational) catch.

Indigenous

A survey of Aboriginal cultural fishing in the Tweed River catchment identified river eels as one of the main components of freshwater catches (Schnierer and Egan, 2016). However, Southern Shortfin Eel only accounted for 0.8% of the total Aboriginal catch from the area (Schnierer, 2011). Total catches in the region were estimated to range between 105–290 Southern Shortfin Eel per annum (Schnierer, 2011). Statewide estimates of the annual Aboriginal harvest of Southern Shortfin Eel in NSW waters are unknown.

Illegal, Unregulated and Unreported

The level of illegal, unregulated and unreported fishing is unknown; however, eels were specifically mentioned in submissions to a comprehensive compliance review of potential black market issues in NSW waters (Palmer, 2004). Compliance reports and feedback from stakeholders suggests that considerable illegal fishing for adult eels historically occurred in prohibited freshwater reaches. If such landings were reported by licensed commercial fishers as catch from permitted waters, it could create uncertainty in the catch and catch rate series.

Since quota management was introduced for the two river eel species, reported catches of Common Pike Eel have increased in other EGF sectors, and it is unknown whether some proportion of these may be Southern Shortfin Eel. These catches are now of similar magnitude to the river eel catches and account for approximately half of the current total eel catch.

Fishing effort information

Commercial fishing effort data for Southern Shortfin Eel was collected as number of days fished on monthly records prior to July 2009 and as numbers of traps fished per daily event after July 2009. To form a longer time series of effort, recent daily events were re-aggregated, with effort in days fished estimated from the number of fishing events entered for each fisher in each month where Southern Shortfin Eel was reported on at least one day.

Reported effort for Southern Shortfin Eel was stable at around 1 800 days fished per annum between 1997/98 and 2001/02, then declined rapidly to 252 days fished in 2006/07 and 16 days fished in 2009/10 (Fig. 4). Since then, reported annual effort has remained below 200 days fished in all years and has been less than 5 days per annum over the last 5 years.

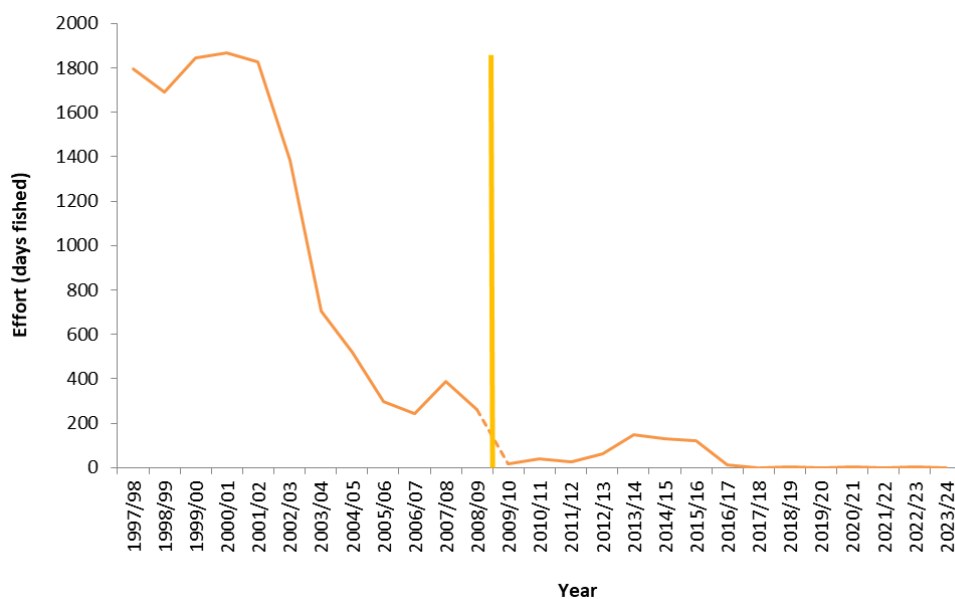


Figure 4 Annual effort (in days fished) for eel trapping in the NSW Estuary General Fishery for records where Southern Shortfin Eel was reported as landed on at least one day in each month (1997/98 to 2023/24). The vertical gold line indicates the change from monthly to daily catch reporting.

Catch rate information

Historical catch rates (catch-per-unit-effort, CPUE in kg per day fished) for Southern Shortfin Eel taken by eel trapping in the EGF were compiled from monthly records between 1997/98 and 2008/09. Insufficient data were available to compile a catch rate series from daily event records between 2009/10 and 2023/24. Historical catch rates were standardized for month, region, estuary and fishing business using the r-package 'rforcpue' (Haddon, 2023).

The historical standardised CPUE series from monthly records (in kg per day) of Southern Shortfin Eel declined by over 50% between 1997/98 and 2005/06 and then remained below the long-term average until 2008/09 (Fig. 5). Since then, there are insufficient data to produce a standardised catch rate series.

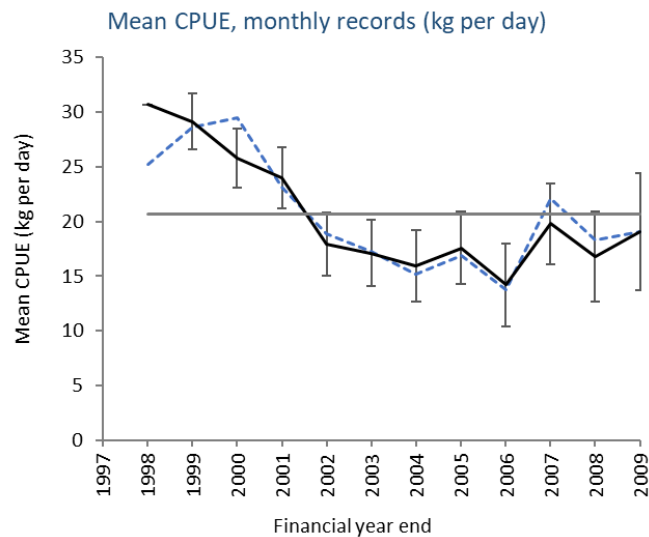


Figure 5. Mean annual standardised catch rates (catch-per-unit-effort, CPUE) of Southern Shortfin Eel (raw data) for the eel trapping sector in the NSW Estuary General Fishery, estimated from monthly records (1997/98–2008/09) in kg per day. The dashed and solid lines indicate the nominal and standardised mean CPUE ($\pm$ 95% confidence intervals), respectively; and the grey horizontal line indicates the long-term average for the series.

Stock Assessment

Stock Assessment Methodology

Year of most recent assessment:

Hall and Schilling (2025)

No quantitative joint stock assessment of the entire biological stock is undertaken.

Assessment method:

A weight-of-evidence approach was used to assess the stock status of Southern Shortfin Eel in NSW waters. It incorporated results from the following four data sources:

1. Standardised catch-rate analyses (catch-per-unit-effort, CPUE) of historical monthly records (in kg per days fished, kg per day) between 1997/98 and 2008/09 for the main commercial fishing method, eel trapping in the Estuary General Fishery.
2. Fishery-independent river surveys completed by electrofishing between 1994 and 2024 for catchments east of the Great Dividing Range. These cover a range of different studies that have varied in sampling intensity and distribution, and do not represent a stratified or regular sampling design.
3. Size distribution data from the above two data sources.
4. Fishing effort for eel trapping in the Estuary General Fishery as proxy for relative fishing pressure..

Main data inputs:

The main data inputs for the stock assessment included:

- Commercial catch and effort data for all NSW commercial fisheries by fiscal years (1997/98–2023/24).
- Historical commercial catch rates (catch-per-unit-effort, CPUE in kg per day) standardised from commercial logbook data reported by fishers of the EGF eel trapping sector by fiscal years (1997/98–2008/09).
- Fishery-independent freshwater river survey catch and effort data for boat and backpack electrofishing (in numbers of eels per 90 second shot) compiled from a range of projects and survey designs by fiscal years (1992/93–2023/24).
- Size distribution data compiled from: (1) fishery-dependent and research surveys using commercial eel traps in the tidal reaches of the Clarence River, Hawkesbury River and Port Hacking in 1998 to 2000 (Walsh *et al.*, 2004); and (2) electrofishing surveys in freshwater river reaches during the various fishery-independent river surveys (as above).

Key model structure & assumptions:

- **Standardised catch rates**

Mean annual commercial fishery catch rates were standardised using general linear models (GLM) fitted to monthly records for each fisher using a range of correlated factors via the R package 'rforcpue' v. 0.0.0.3 (Haddon, 2023). The CPUE standardisations and analyses assumed that the annual catch rates are a relative index of abundance and are not unduly influenced by other factors that are not accounted for through standardisation. Catch rates were standardised for the influences of different months, estuaries, regions and fishing businesses.

- **Fishery-independent river survey data**

Electrofishing catch rates from the freshwater river surveys were standardised using general linear mixed models (GLMM) models with a Tweedie distribution to generate an annual index of relative biomass. The GLMM models were run using data for all NSW coastal rivers pooled to generate a statewide index and separately for three bioregions (northern, central and southern). The models included financial year and method as fixed effects, site and sampling date as random effects and accounted for varying sampling effort with an offset effort term. The regional models also included a region by year interaction.

The relative biomass estimates calculated from the freshwater river survey data are not absolute, but rather relative indices, because only data for sites where at least one eel was observed were included in the analyses. The analyses involved several other assumptions, including:

- that eels measured during each sampling event were representative of others that were observed, but not measured; and
- that eels counted during a sampling event, where none were measured from that event, had a mean length similar to all eels measured in that financial year.

Biomass estimates were generated for each sampling event by calculating the mean length of eels in a sampling event, then applying a length-weight relationship and multiplying by the total number of eels.

Sources of uncertainty evaluated:

In addition to the standardised CPUE series produced from the as reported raw data, similar standardised CPUE series were prepared using data adjusted for potential inaccurate species reporting in northern NSW (Hall and Schilling, 2025). Furthermore, a sensitivity analysis of the influence of different CPUE standardisation modelling approaches (general linear models, GLM and general linear mixed models, GLMM) were assessed (Hall and Schilling, 2025).

Status Indicators - Limit & Target Reference Levels

There is no harvest strategy in place for Southern Shortfin Eel in NSW, so a weight-of-evidence approach has been applied in this stock assessment with nominated indicators and reference points in line with the current NSW Harvest Strategy Policy (NSW DPI, 2021).

Biomass indicator or proxy	Trend in annual standardised catch rates of the eel trapping sector of the commercial EGF is used as an index of relative abundance.
Biomass Limit Reference Point	Current catch rates are compared to the long-term averages of each time series.
Biomass Target Reference Point	None specified.
Fishing mortality indicator or proxy	Trend in the total fishing effort of the eel trapping sector of the EGF is used as an indicator of relative fishing pressure.
Fishing mortality Limit Reference Point	Current effort levels are compared against historic levels.
Fishing Mortality Target Reference Point	None specified.

Stock Assessment Results

Stock Assessment Result Summary

Biomass status in relation to Limit	There were insufficient recent commercial catch rate data to form a reliable time series for analyses of trends in relative abundance. Current catches are much smaller than historic catch levels prior to 2009, and standardised historical catch
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	rates of the commercial eel trapping sector of the NSW EGF indicated a declining trend. New relative biomass indices from fishery-independent electrofishing surveys spanning over 30 years suggest that, while there may have been a decline, the species may always have been found in lower abundance than Longfin Eel in NSW coastal rivers. Fisher identification of the two species may not have been reliable and current catch and discard rates are unknown. The assessment of current level of biomass is considered too uncertain to confidently assign a status determination.
Biomass status in relation to Target	Not assessed.
Fishing mortality in relation to Limit	Reported fishing effort for Southern Shortfin Eel by eel trapping in the Estuary General Fishery declined rapidly during the 2000s from 1 866 days in 2000/01 to a mere 16 days in 2009/10 and has been less than 5 days per annum over the last seven years. The current low level of fishing pressure is unlikely to cause the stock to become recruitment overfished; however, there is insufficient biomass information to confidently assign a status determination.
Fishing mortality in relation to Target	Not assessed.
Current stock status	There is insufficient information available to confidently classify the status of this stock. On this basis, the NSW part of the Southern Shortfin Eel stock is currently assessed as an undefined stock.

Fishery interactions

The EGF eel trapping gears interact with other commercial and non-commercial by-catch species, a range of endangered, threatened and/or protected (ETP) species and freshwater habitats. However, the current regulations for eel trapping in the EGF, which include restricting eel fishing to tidal estuarine waters and some farm dams and artificial impoundments and using wingless baited traps are likely to limit the amount of interactions with protected species such as platypus.

The use of traps with no wings reduces drowning of platypuses, and prevents mortality of small forage fish species, which might be captured by "gilling" in the wings of fyke nets (Grant, 1993). Furthermore, The EGF share management plan mandates that all eel traps must have a 100 mm rigid ring fit to funnel entrances to prevent air breathing animals (such as freshwater turtles and platypus) from entering the traps. Traps in freshwater dams and impoundments must also include an

air pocket in the cod end. Mesh size and other gear restrictions are regulated to increase the target species selectivity of the traps and cod ends. Research results suggest that these measures significantly decrease the levels of by-catch associated with these fishing gears (Grant *et al.*, 2004).

Interactions with animals protected under the *Environment Protection and Biodiversity Conservation Act 1999* were subjected to a detailed risk assessment in an environmental impact statement (EIS) for the fishery undertaken during fisheries management strategy development (NSW Fisheries, 2001). An updated threat and risk assessment for all components of the NSW marine estate was completed in 2017 (Fletcher and Fisk, 2017). The EGF was considered a moderate threat to species and communities protected under the *NSW Fisheries Management Act 1994* and *Biodiversity Conservation Act 2016*. Compulsory logbook reporting of all interactions with ETP species was mandated in 2005 and these are reported annually to the Department of Environment and Energy.

Stakeholder engagement

Results of this and the previous stock assessment were presented to industry members via video conference on 5 March 2024 and 5 March 2025. Feedback from industry members suggested that: current catches are limited by the lack of an export market, with fewer fishers actively targeting river eels at present; the lack of catches from Regions 1, 6 and 7 are due to some fishers not receiving share allocations in regions they previously fished and other fishers concentrating on areas closer to home while market demand has been low; species identification and reporting, particularly for historical data, is likely to have been inaccurate and may have contributed to an increased amount of Southern Shortfin Eel data than was actually caught; and there was potentially significant illegal fishing in freshwater reaches that was reported as tidal catches. This feedback should be considered when interpreting current stock assessment results.

Qualifying Comments

The extremely low catches of Southern Shortfin Eel in NSW since 2009/10, are difficult to interpret, given that targeting of Longfin Eel is still occurring in estuaries where the former species was historically reported in larger numbers. Several possible scenarios could explain the decline in Southern Shortfin Eel catches, including:

- the species is still caught, but is not retained because of their smaller size or lower market demand, however, this is contrary to information from Victoria;
- stillwater habitats within estuaries, preferred by Southern Shortfin Eel, are no longer targeted to avoid discarding the species in response to poor market demand;
- current eel catches are all reported as Longfin Eel, irrespective of the species caught;
- species misidentification or misreporting artificially inflated historic catches of Southern Shortfin Eel and the species was never particularly abundant in NSW rivers or taken in commercial catches;
- the species range has contracted further south in response to climate change and no longer occurs in large numbers in NSW coastal rivers; or

- the species is no longer caught due to recruitment failure in the main estuaries where commercial eel trapping still occurs.

Commercial catch rates of Southern Shortfin Eel declined substantially in the early 2000s, when sufficient data were still available for analyses, which raises further concerns regarding the current status of the stock. However, recent feedback from fishers suggests that species misidentification and misreporting may have contributed to inflated catches for the species in the past, particularly in northern catchments. Trends in the new relative biomass indices from fishery-independent electrofishing surveys spanning over 30 years suggest that the species may always have been found in relatively lower abundance compared to Longfin Eel in NSW coastal rivers. Furthermore, the NSW eel fishery has several management measures in place that decrease the risk of overfishing. Eel fishing is only permitted in tidal waters in a limited number of estuaries along the NSW coast, which provides some protection for a potentially large percentage of eel stock in closed waters. Other market factors are also currently influencing low fishing effort on stocks

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