Stock status summary – Yellowtail Scad - 2020

This stock status summary presents available information to inform criteria required to determine a stock status consistent with the Status of Australian Fish Stocks reports (www.fish.gov.au)

Where data are unavailable or insufficient to reliably inform the SAFS criteria outlined below this has been indicated by 'NA', rather than removing the criteria. This has been done to clearly indicate what data are and are not available for assessment and to highlight areas where alternate or additional data sources or analyses may be required to improve species status determination in the future.

Assessment authors and Year

Broadhurst. 2020. Stock assessment summary report 2019 – Yellowtail Scad (*Trachurus novaezelandiae*). NSW Department of Primary Industries. Fisheries NSW, Port Stephens Fisheries Institute. 7 pp.

Stock structure

Yellowtail Scad have an Australian distribution from southern Queensland to northern Western Australia and also occur off New Zealand. While Yellowtail Scad's distribution encompasses Victoria and South Australia, only negligible catches and effort are reported from these states. The biological stock structure of Yellowtail Scad remains unknown; but in New South Wales there is evidence of spatial differences in growth rates which might be indicative of subpopulations. Similar population variability has been observed for Yellowtail Scad in New Zealand.

Here, assessment of stock status is presented at the biological stock level—Eastern Australia; and jurisdictional—Western Australia.

Stock status and assessment method

On the basis of the evidence provided, the Eastern Australia biological stock is classified as a **sustainable stock.**

The above conclusion was derived from both peer-reviewed and weight-of-evidence approaches. In particular, formal stock assessment has indicated the species currently has a very low catchability and that fishing mortality is substantially lower than natural mortality. A predicted five-fold increase in effort would be required to inflict a fishing mortality approaching the estimated natural mortality. The estimated natural and fishing mortalities imply the biomass is close to virgin state.

Fishery statistics summary

Catch trends

Commercial

Partitioned annual reported commercial catches of Yellowtail Scad in NSW are available from 1997–98 to the present and encompass six fisheries (Fig. 1). Total reported commercial catches have ranged from 298 (2009–10) to 600 t (1997–98), but mostly have remained fairly stable at 450–520 t (mean of 472 ± 85 t; Fig. 1). Typically, around 80–90% of all landed Yellowtail Scad are purse seined by vessels working in the NSW ocean-haul fishery or caught using submersible lift nets and/or purse seines in the Commonwealth tuna-bait fishery (the latter under a Section 37 permit). Within these two fisheries, NSW ocean-haul purse seiners have historically landed at least 60% of the total catch for a mean of 307 ± 64 t p.a. Commonwealth vessels land 93 ± 46 t p.a.; although data are unavailable prior to 2008–09, and have been populated in Figure 1 based on the average of recent reported fiscal years.

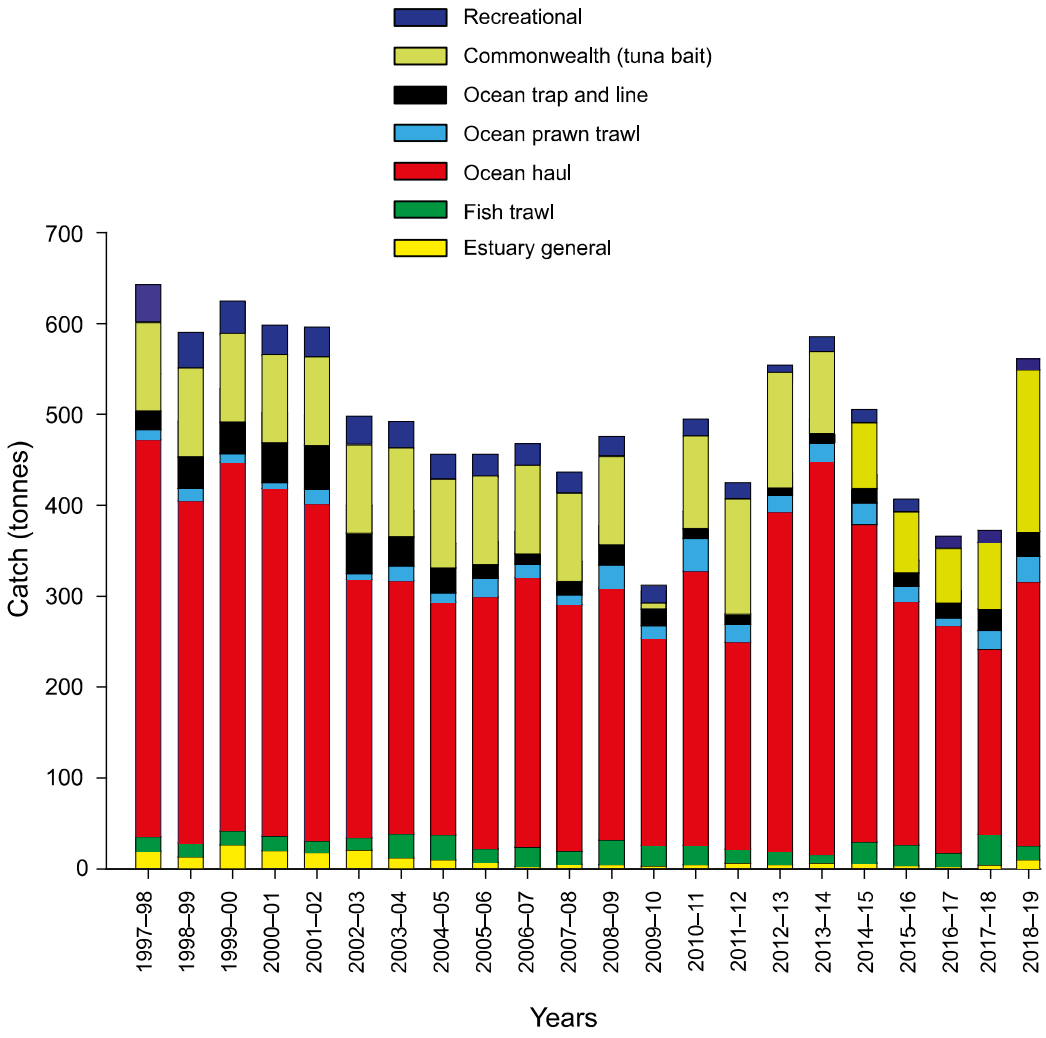

Fig. 1. Annual catches (t) of Yellowtail Scad reported by all sectors for which there are data in NSW waters by fiscal year from 1997–98 to 2018–19. Recreational catch data are only available from surveys completed in 2000–01 and 2013–14, with preceding, intervening and subsequent years interpolated based on these two-point differences.

Reported fish- and ocean prawn-trawl catches have remained fairly consistent among years at means of 19 ± 6 and 17 ± 7 t p.a. By comparison, estuary general and ocean trap-and-line catches peaked at 21 and 49 t p.a. respectively before 2006–07, and then stabilised at 4 ± 1 and 14 ± 4 t p.a. over the subsequent decade (Fig. 1).

Recreational and Indigenous

Estimates of the recreational harvest (hook-and-line) of Yellowtail Scad are available from two recreational fishing surveys and also charter-boat catches and are minimal compared to commercial catches. Both recreational surveys estimated catches in terms of numbers, which have been crudely transformed to weights using mean sizes. Specifically, in 2000–01, the estimated harvest was ~152 000 fish weighing 33 t, while in 2013–14, 90 000 fish or 16 t was retained.

Yellowtail Scad are also caught from charter boats (hook-and-line) in NSW, but until recently (2016) catches had not been separated from Jack Mackerel (*Trachurus declivis*) and therefore are excluded. Nevertheless, the total annual combined catches of both species over the decade to 2016 were only reported at between 1500 and 9500 fish p.a. Even if all individuals were Yellowtail Scad then, using mean weights, the harvested numbers still only equate to ~0.4–2.2 t p.a. during this period. More recent charter-catch data pertaining only to Yellowtail Scad suggest a slight increase in annual catches. Specifically, the estimated total number over the past three financial years was ~8000, 13,00 and 12,000 individuals, but this may also reflect more accurate reporting mechanisms, rather than any absolute increases in catch.

The indigenous catch is unknown but presumed to be negligible.

Effort trends

Commercial

Historical effort data describing the targeting of Yellowtail Scad are only available for vessels in the NSW ocean-haul and Commonwealth tuna-bait fisheries, and the latter only date to 2009–10. Further, prior to 2009, logbook effort data in the NSW ocean-haul fishery were calculated on monthly rather than daily returns, and so to standardize comparisons, data have been adjusted accordingly.

New South Wales (ocean haul) purse-seine effort peaked at over 2000 days in 1999–00, fell sharply the following year to 1300 days, and then steadily declined within a range of 950–680 days over the subsequent 15 years following reductions in vessel numbers. By comparison, revised estimates of Commonwealth tuna-bait effort show this has remained quite low and fairly steady, but did increase to 287 days in the last year.

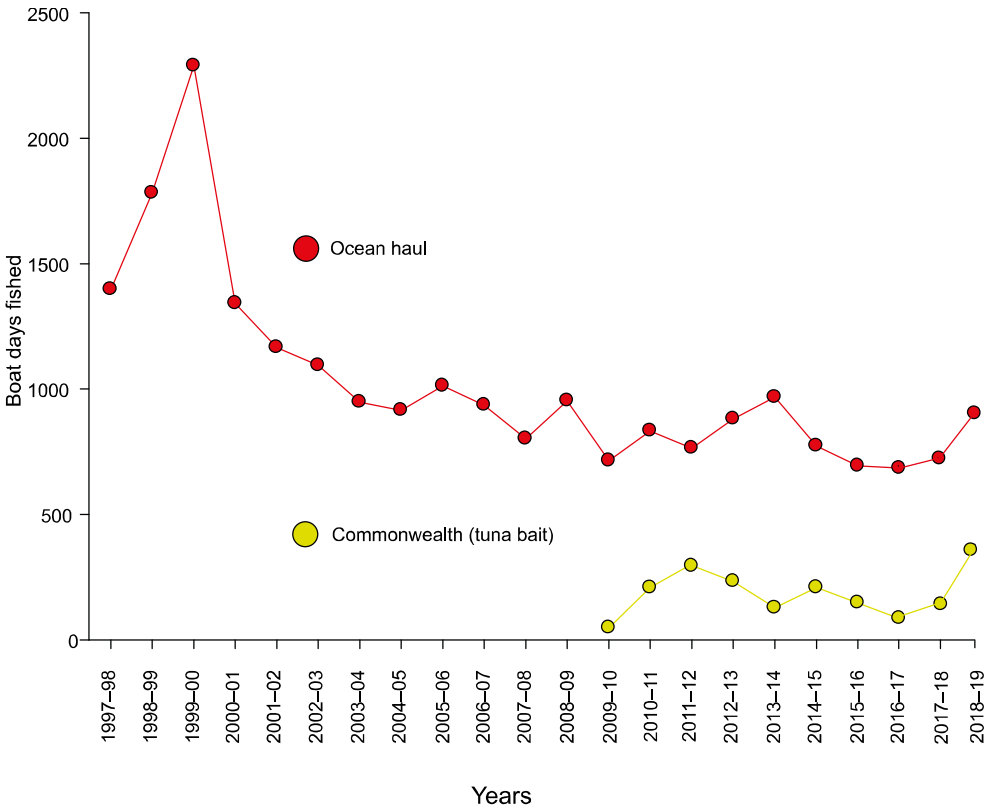

Figure 2. Purse-seine effort (days fished) for New South Wales ocean-haul (red) and purse-seine/lift-net effort for Commonwealth tuna-bait (green) fishers that reported targeting Yellowtail Scad.

Recreational and Indigenous

Along with catches, state-wide estimates of recreational fishing effort are limited to the two surveys: 2000–01 and 2013–14. Further, these effort estimates are not species-specific, but rather encompass broad spatial (e.g. coastal region, fresh vs. saltwater, boat- vs. shore-based, etc.) and technical categories (gear type). Nevertheless, for saltwater fishing there was a 37% decadal decrease in effort from ~4 000 000 fisher days to 2 500 000 fisher days. In terms of spatially separated effort, there were 32, 53, and 29% declines in offshore, inshore and estuarine fishing, respectively.

For charter boats, there were no separated effort data catching only Yellowtail Scad until 2016, because these data were combined with those for Jack Mackerel. A revision of reporting requirements means the two species now have to be separated, which confounds any historical trends. Nevertheless, the historical effort has been quite low at < 1500 boat-hours fished each year.

Catch rate information

Commercial

Since 1999, the purse-seined catch rate (kg per boat-day fished) of Yellowtail Scad in the NSW ocean-haul fishery steadily increased to 2011–12, but more recently remained at 300–400 kg per boat day (Fig. 3). The reported catch rates of fishers in the Commonwealth tuna-bait fishery are only available post 2008–09. While catch rates also increased until 2011–12, there was a subsequent reduction that appeared slightly (and negatively) correlated to the catch rate by purse seiners in the NSW ocean-haul fishery (Fig. 3).

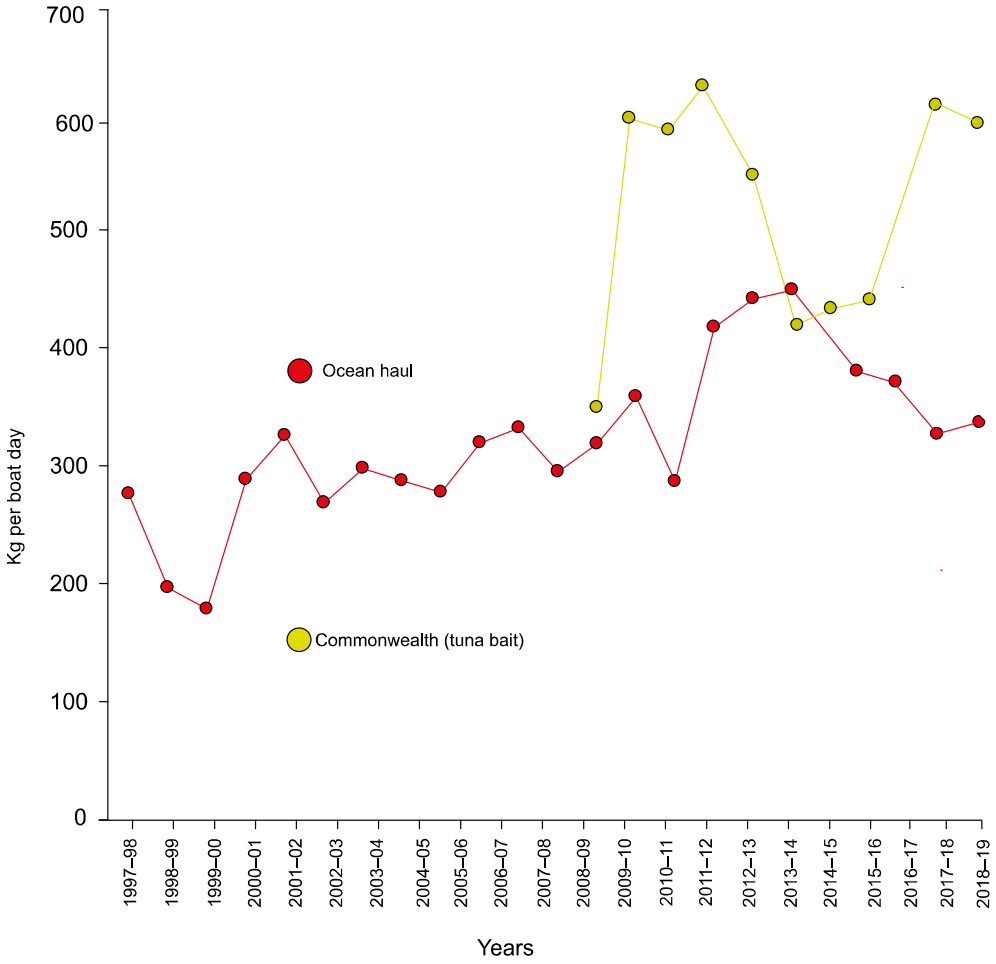

Figure 3. Standardized commercial catch rates (kg per boat day) of Yellowtail Scad purse seined in the New South Wales ocean-haul fishery and caught in the Commonwealth tuna-bait fishery.

Stock assessment methodology

Year of most recent assessment	2020
Assessment method	Published stock assessment, weight of evidence, and interpolation.
Main data inputs	Commercial fishing catches: reported annual catches for all sectors by fiscal years (1997–98 to 2018–19; Recreational fishing catches: interpolated annual catches preceding, intervening and subsequent to two survey points (national recreational and indigenous fishing survey in 2000–01 and a NSW state-wide recreational fishing survey in 2013–14); Charter-boat fishery catches: reported annual catches by fiscal year (2000–2019); Size-at-age data comprising 2347 otoliths of fish ages 0+ to -18 years;

Stock assessment methodology

	Estimated discards: all fisheries and based on published single time point observer-based accounts extrapolated among years using ratios to retained catches; Commercial catch rates: reported annual catch-and-effort data for purse seiners (responsible for 80–90% of the total catch); Length compositions: port monitoring (2000–2015); and Growth: estimated from otoliths and sizes.
Main data inputs (rank)[†]	Size at age: high Commercial fishing catches: high Recreational fishing catches: medium Estimated discards and rates: low Commercial fishing catch rates: high Length compositions: high
Key model structure and assumptions	The published stock assessment involved hazard functions applied to two decades of data to enable survival analyses. Key assumptions are that: 1. Annual intervals among collected size-at-age data did not affect modelling outputs (not evident based on model convergence and fits); 2. Purse-seine selectivity is defined by a logistic regression (needs to be formally assessed); Fishing mortality was not overly affected by variable fishing power.
Sources of uncertainty evaluated	The models were successfully converged, and not affected by variable inputs within the above assumptions.

[†] Main data inputs (rank)

1 – High quality: data have been subjected to documented quality assurance and peer review processes, are considered representative and robust and provide a high level of confidence to support fisheries management decisions.

2 – Medium quality: data have been subjected to some internal quality assurance processes, have some documented limitations, but are still considered sufficiently accurate and informative to be useful to inform management decisions with some caveats.

3 – Low quality: data have been subjected to limited or no quality assurance processes, may be compromised by unknown or documented limitations that have not been fully explored, but are considered the best available information and require a high level of precaution to be exercised when interpreted to inform management decisions.

Status indicators and limits – reference levels

Biomass indicator or proxy	Formal stock assessment indicated very low catchability and that fishing mortality was substantially lower than natural mortality (0.22 p.a.). These are the proxies for biomass. A predicted five-fold increase in effort would be required to inflict a fishing mortality approaching the estimated natural mortality.
Biomass limit reference level	None specified in a formal harvest strategy, but natural mortality ≤ fishing mortality.
Fishing mortality indicator or proxy	Fishing mortality compared to natural mortality.
Fishing mortality limit reference level	The estimated natural mortality of 0.22 p.a and this would be the limit for fishing mortality.
Target reference level	NA

Stock assessment results – review of indicators

Biomass status in relation to limit	Results of the stock assessment indicate that natural mortality comprises much of the total mortality, and so the biomass apparently is close to virgin state.
Fishing mortality in relation to limit	Negligible
Previous stock status	Yellowtail Scad was be assessed under the SAFS framework for the first time in 2018. For the preceding 15 years, the species was assessed as 'fully fished' under the NSW RAW framework. A quota of 864 t was set for 2019, but was not achieved (short fall of ~300 t).
Current stock status	**Sustainable**

Qualifying comments

Based on formal stock assessment, there appears to be minimal fishing mortality on Yellowtail Scad, implying an underutilised fisheries resource, albeit with some caveats. First, the collected size-at-age data use in the stock assessment were sporadic. Ideally, the chosen modelling approach (survival analysis) supports long-term (5–7 consecutive years) of size-at-age data, although based on meaningful model convergences, gaps between years clearly are feasible. Second, purse-seine catchability and selectivity should be validated, which would be best done by applied work following empirical methods used among similar fishing gears. Third, it is important to appreciate that various factors can affect fishing mortality, including chronological variations (typically an increase) in fishing power. Certainly, the observed increase in catch rate by the NSW ocean-haul purse-seine fleet among recent years supports an enhanced capacity to target Yellowtail Scad. However, information

concerning variable fishing power remains unavailable, and an annual increase in fishing power of 2 and 4% failed to improve model fit.

Like most species subject to quota, ongoing size-at-age, and catch-and-effort data are required to inform future decisions regarding management. Another consideration is that ~90% of the commercial catch is reported from only 5 degrees of latitude (32–37°S). The importance of this area to life-history (e.g. reproduction) warrants assessment; particularly given the observed differences in growth rates among sampled specimens between northern and southern regions. Pelagic species like Yellowtail Scad are quite vulnerable to capture in purse seines and appropriate spatial consideration of effort might be required.