

Yellowtail Kingfish (2020)

Seriola lalandi



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth, Queensland, New South Wales, Victoria, South Australia	Eastern Australia	Sustainable	Catch, Catch Rates, Depletion Estimates, Size Composition, Mortality Rates, Spawning Potential Ratio
Western Australia	Western Australia	Sustainable	Catch, indicator species status, risk analysis

STOCK STRUCTURE

Yellowtail Kingfish are a highly mobile pelagic species with a widespread distribution extending throughout temperate waters of the Atlantic, Pacific and Indian Oceans [Nugroho et al. 2001]. In Australian waters, the species occurs along the entire southern seaboard of the continent from North Reef in Queensland (23°S) to Trigg Island in Western Australia (32°S) including the east coast of Tasmania, and around Lord Howe and Norfolk Islands [Love and Langenkamp 2003] where they inhabit rocky reefs and adjacent areas in coastal waters to depths of more than 300 m [Stewart and Hughes 2008]. Yellowtail Kingfish are considered a range extending species in south-eastern Australia with their presence increasing concurrent to ocean warming off the east coast of Tasmania [Stuart-Smith et al. 2018, Champion et al. 2018]. Species distribution modelling indicates a poleward shift of 94.4 km/decade in core oceanographic habitat and 108.8 km/decade in the poleward edge of the preferred oceanographic habitat of Yellowtail Kingfish [Champion et al. 2018].

Genetic analyses have shown the population in Western Australia to be genetically distinct from the Yellowtail Kingfish found on the eastern (New South Wales) and southern (Victoria, South Australia) Australian coasts or New Zealand waters [Miller et al. 2011; Green et al 2020]. This is consistent with the results of tagging studies which show bi-directional movements between NSW and SA [Hughes and Stewart 2020] and otolith oxygen stable isotope analysis which suggests seasonal migration between NSW and Victoria [Green et al. 2020]. Growth rates and length/age at maturity for Yellowtail Kingfish from Victoria [Green et al. 2020] are also generally consistent with previous studies from fish collected in NSW [Gillanders et al. 2001, Stewart et

al. 2001]. These findings also confirm results from previous analyses that found no evidence of genetic differentiation between New Zealand and New South Wales Yellowtail Kingfish [Smith et al. 1991] and results of tagging studies which show that Yellowtail Kingfish undergo bi-directional movements between Australia and New Zealand [Gillanders et al. 2001, Holdsworth et al. 2016].

Here, assessment of stock status is presented at the genetically-determined biological stock level—Eastern Australia and Western Australia.

STOCK STATUS

Eastern Australia

Yellowtail Kingfish are caught in Queensland, New South Wales (NSW), Tasmanian, Victorian and South Australian (SA) waters, as well as in the Commonwealth Southern and Eastern Scalefish and Shark Fishery (SESSF) and in the South Pacific Regional Fisheries Management Organisation (SPRFMO) Convention Area. The stock status presented here for the entire biological stock considers evidence from the six Australian jurisdictions.

Catch in Commonwealth Trawl and Gillnet, Hook and Trap sectors of the SESSF was 1 t in 2019. Vessels operating on the high seas also catch the species, with 7 t reported in logbooks in the SPRFMO Convention Area in 2019.

Reported commercial catches from the Queensland fishery are relatively minor, ranging from 3–14 t per year over the period from 2004–19 [QFISH 2020]. Recreational catch was estimated to be less than 10 t in 2013-14 [Webley et al. 2015]. There are no current estimates for Indigenous harvest, although these are likely to be minor.

In Victoria prior to the early 1990's, Yellowtail Kingfish were commonly caught by recreational anglers at various offshore locations across the breadth of the state from the southwest off Portland through to Gippsland in the east, primarily in the warmer months. While the historic abundance of Yellowtail Kingfish in Victoria waters was not as high as in NSW waters, fish were often very large (up to 30+ kg), particularly around the entrance to Port Phillip Bay ('The Rip'). During the mid-1990's both the number and size of Yellowtail Kingfish taken by recreational anglers in Victorian waters decreased dramatically. This decrease was also observed in the commercial sector where 2–12 t were landed between 1980 and 1993, declining to <1 t per year for almost two decades. Consequently, interest in targeting Yellowtail Kingfish declined among both recreational and commercial fishers. The low availability of Yellowtail Kingfish to Victorian anglers continued until about 2010 when exceptional Yellowtail Kingfish catches were reported during summer and autumn were reported. It is clear from the resurgence of targeted recreational fishing that their availability has increased considerably over the last decade. Most fish caught in Victoria are currently less than 100 cm total length, less than 6 years of age, and immature [Green et al. 2020].

In Tasmania, Yellowtail Kingfish are a popular species targeted by the recreational sector, however, catches are still estimated to be small with approximately 1,000 fish retained and 500 released according to the last state-wide recreational fishing survey in Tasmania [Lyle et al. 2019]. Minor catches of Yellowtail Kingfish are reported by commercial fishers but given the low numbers and recent emergence of the fishery the species is not currently reported in the annual Scalefish assessment report for Tasmania. Reported commercial landings in Tasmania have been < 1 t from the most recent reporting years dating back to 1995/96. If the rapid warming of the waters off Tasmania persists, availability of Yellowtail Kingfish in Tasmania is likely to increase [Champion et al. 2019].

Yellowtail Kingfish makes a minor contribution to the total production and value of SA's commercial multispecies, multi-gear and multi-sectoral Marine Scalefish Fishery (MSF). Historically, the commercial catch has rarely exceeded 3 t per

year, with most of the catch taken incidentally and retained as by-product. The SA State-wide recreational catch of Yellowtail Kingfish is substantial, with the past three phone-diary surveys estimating increasing annual catches from 62 t in 2000–01 [Henry and Lyle 2003], to 100 t in 2007–08 [Jones 2009] and 199 t in 2013–14 [Giri and Hall 2015]. Despite this large estimated recreational catch, there have been no formal stock assessments for Yellowtail Kingfish in SA state waters.

Despite catches of Yellowtail Kingfish reported from the above jurisdictions, the "Eastern Australia" biological stock is assessed here using data primarily from the NSW fishery. Commercial landings of Yellowtail Kingfish in NSW have declined from an average of approximately 550 t per year in the period 1983–84 to 1989–90, to an average of approximately 150 t per year since the mid-1990s. More recently, a continuous decline in landings has been recorded from 266 t in 2009–10 to 76 t in 2018–19. Standardised catch per unit effort (CPUE; in days) for handlining (the main commercial method landing Yellowtail Kingfish in NSW) showed an increase from around 23 kg.day⁻¹ in 1997-98 to approximately 45 kg.day⁻¹ in 2001-02; CPUE since has remained stable at 40-50 kg.day⁻¹ [Hughes and Stewart 2020].

The most recent estimate of the recreational harvest of Yellowtail Kingfish in NSW was 41,241 (\pm 16,450 SE) individuals weighing an estimated 129 t in 2017-18 [Murphy et al. 2020]. This estimate only encompassed harvest from NSW households within which a long-term NSW Recreational Fishing Licence holder resided (RFL household). Re-analysis of the previous survey [West et al. 2015] produced an estimate of 45,578 (\pm 19,419 SE) individuals weighing an estimated 120 t harvested by RFL households during 2013-14 [Murphy et al. 2020]. In 2000-01, estimated recreational harvest by all fishers in NSW waters was 59,029 (\pm 25,232 SE) individuals weighing between 144 and 219 t [Henry and Lyle 2003]. While these survey results are not directly comparable due to different sampling frames, the two most recent surveys likely represent a slight increase in recreational harvest through time. Total historical harvest of Yellowtail Kingfish in NSW was also reconstructed by estimating recreational harvest prior to, and between, survey estimates [Hughes and Stewart 2020].

For NSW, a catch-MSY model-assisted catch-only assessment [CMSY+; Martell and Froese, 2013] combined with a surplus production model [BSM; Froese et al. 2019] was used to model biomass depletion over time under thirteen scenarios using various reconstructed catch histories (including both commercial and recreational components) and standardised commercial CPUE time series [Hughes and Stewart 2020]. Modelling indicated that the stock underwent a dramatic decline in biomass from the early 1980s through to the mid-1990s when it approached the 20 per cent limit reference point (B0.2). Biomass has steadily increased since with current biomass estimated to be above B0.2 with reasonable probability for the most likely catch and CPUE scenarios [Hughes and Stewart 2020]. Only two scenarios (using short or modified CPUE time series) estimated current biomass to be below B0.2, but with lower probability. Spawning potential ratio (SPR) modelling indicates SPR for the period 2010-11 – 2018-19 to be between 13 and 31% of unfished levels [Hughes and Stewart 2020], which spans the limit reference level of 20% [Goodyear 1993, Mace and Sissenwine 1993].

The size composition of landings indicates that the NSW fishery is dominated by immature individuals smaller than 850 mm, the approximate size at maturity for female Yellowtail Kingfish in NSW [Gillanders et al. 1999]. Since routine commercial length frequencies have been generated for Yellowtail Kingfish in the 1990s, the size distribution of the catch has not changed, except for the effect of increasing the minimum legal length in 2007 [Hughes and Stewart 2020]. A stakeholder survey conducted in 2020 indicated a perception that the NSW fishery currently contains fewer large fish [Hughes and Stewart 2020], however the size composition of fish in recreational and tagging datasets also indicates that the recreational fishery has been based largely on juveniles since at least the mid-1970s [Gillanders et al. 2001, Steffe et al. 1996, Steffe and Murphy

2011]. This long-term stability of the narrow size distributions seen in landings suggest that the stock is not fully mixed across its range [Green et al. 2020] and the ongoing source of recruits (mature spawning fish) are therefore not fully vulnerable to the NSW fishery, thus providing continuing stable recruitment which aids the sustainability of the fishery. Numerous examples of long-distance movements of Yellowtail Kingfish have been recorded in this region, between Australia, New Zealand and Lord Howe Island [Gillanders et al. 2001, Holdsworth et al. 2016] as well as within Australia (between NSW and SA, and between NSW and Queensland [NSW Gamefish Tagging Program unpublished data, Gillanders et al. 2001]). Consistent with these recorded movements, it has also been suggested that much of the spawning stock may be distributed offshore where it is not vulnerable to the NSW fishery [Smith 1987, Gillanders et al. 1999, Gillanders et al. 2001, Patterson and Swearer 2008]. Indeed, gravid female fish are routinely captured during the austral summer spawning season around Lord Howe Island [Patterson and Swearer 2008], but are relatively rare in NSW coastal waters during the same period [Gillanders et al. 1999] where the majority of the NSW fishery occurs. The temporal stability of the narrow size frequency distributions, which are used to derive estimates of mortality (from catch-curve analyses) and subsequent spawning stock biomass estimates (from SPR analyses), are therefore likely to consistently indicate high mortality and low exploitable biomass through time. Analyses based on these size distributions are therefore unlikely to accurately represent the ongoing status of the stock. The stability of this long-term pattern does, however, indicate ongoing stable recruitment into the fishery, and in particular provides no evidence of predicted recruitment failure suggested by long term trends in SPR modelling.

The above evidence indicates that the biomass of this part of the stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Stock assessment modelling (CMSY+ BSM) estimated that fishing mortality (F) was higher than that predicted to drive biomass below $B_{0.2}$ ($F > F_{0.2}$) between the early 1980s and the early 2000s under all scenarios; however has declined to sustainable levels ($F < F_{0.2}$) in the most probable scenarios since the early 2000s [Hughes and Stewart 2020]. Most probable scenarios estimated that F has been declining relative to $F_{0.2}$ since 2009. Current harvest (all sectors) is below estimated MSY. Catch curve analyses estimate current F to be similar to natural mortality for the past decade [Hughes and Stewart 2020].

The above evidence indicates that the current level of fishing mortality is unlikely to cause this part of the stock to become recruitment impaired.

The weight-of-evidence approach used here to assess stock status reveals considerable uncertainty due largely to the lack of data on size composition from historical landings, the recreational harvest (particularly from SA), and the population dynamics of the stock. Movement patterns and connectivity of Yellowtail Kingfish in south-eastern Australia are poorly understood, resulting in large uncertainty as to how representative the Yellowtail Kingfish population in NSW is of the entire biological stock. Further work into examining the population dynamics of the stock in the region, and particularly investigating the distribution and movements of the spawning stock, as well as the source of juveniles, is suggested to address this uncertainty.

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

Western Australia

In Western Australia (WA), Yellowtail Kingfish makes up a very minor component of commercial and recreational catches. Commercially, catches of Yellowtail Kingfish have been less than 2 t for any of the fishery sectors and total commercial catches for all fisheries have been less than 4 t annually since 1999. The 2019 commercial catch was 4.1 t. Boat-based recreational catches of Yellowtail Kingfish have averaged 7 t per year since 2011-12 (7.1 t +/- se 1.7 t in 2017-18) [Ryan et al. 2019]. Shore-based catches are unknown. The WA

charter catch for the species was <0.5 t. Yellowtail Kingfish are not targeted to any great extent by any sector and there is no evidence that catches have fluctuated greatly through time as a result of fishing.

In WA, all species of fish are allocated to a suite for monitoring and assessment purposes. Yellowtail Kingfish are part of the large pelagic resource in WA, which uses Spanish Mackerel, Grey Mackerel and Samsonfish as indicator species [Department of Fisheries Western Australia 2011]. As the status of each of these indicator stocks is sustainable, then this implies that the Yellowtail Kingfish stock is also sustainable.

In addition, WA uses a weight of evidence approach for all assessments. In the case of Yellowtail Kingfish the lines of evidence included: low catch, wide catch distribution, low effort levels, low vulnerability (Productivity Susceptibility Assessment) and stock reduction analyses (Catch-MSY) [Froese et al. 2016], with forward projections which indicate an increasing trend in biomass under current management arrangements. The current risk level for the Yellowtail Kingfish stock was estimated to be "Medium" [DPIRD 2020]. The current status of the Yellowtail Kingfish stock in WA is "Acceptable-Sustainable", with no new management required.

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

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

BIOLOGY

Yellowtail Kingfish biology [Stewart et al. 2001, Stewart and Hughes 2008]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Yellowtail Kingfish	20+ years, 1900 mm FL	5–10 years, 800–1250 mm FL

DISTRIBUTION



Distribution of reported commercial catch of Yellowtail Kingfish

TABLES

Fishing methods							
	Commonwealth	New South Wales	Queensland	South Australia	Tasmania	Victoria	Western Australia
Charter							
Hook and Line		✓	✓			✓	
Rod and reel							✓
Spearfishing						✓	
Commercial							
Danish Seine	✓						
Demersal Gillnet	✓						
Demersal Longline	✓						
Dropline	✓	✓					✓
Gillnet							✓
Hand Line, Hand Reel or Powered Reels							✓
Handline (mechanised)	✓						
Hook and Line		✓				✓	
Line			✓				✓
Net			✓			✓	
Otter Trawl	✓						
Pelagic Longline	✓						
Trolling		✓					✓
Unspecified					✓		
Various		✓					
Recreational							
Hook and Line		✓	✓		✓	✓	
Rod and reel							✓
Spearfishing		✓	✓			✓	✓

Management Methods							
	Commonwealth	New South Wales	Queensland	South Australia	Tasmania	Victoria	Western Australia
Charter							
Bag limits		✓	✓			✓	

STATUS OF AUSTRALIAN FISH STOCKS REPORT
Yellowtail Kingfish (2020)

Gear restrictions		✓	✓			✓	
Licence		✓					✓
Limited entry							✓
Passenger restrictions							✓
Possession limit		✓	✓			✓	
Size limit		✓	✓			✓	✓
Spatial closures		✓	✓			✓	✓
Commercial							
Gear restrictions						✓	
Licence						✓	
Limited entry	✓	✓	✓	✓		✓	✓
Size limit		✓	✓		✓		✓
Spatial closures		✓	✓			✓	✓
Trip limits					✓		
Vessel restrictions		✓	✓				✓
Recreational							
Bag and possession limits					✓		
Bag limits		✓	✓	✓		✓	✓
Boat limits				✓			
Gear restrictions		✓	✓			✓	
Licence		✓				✓	✓
Possession limit		✓	✓			✓	✓
Size limit		✓	✓	✓	✓	✓	✓
Spatial closures		✓	✓			✓	✓

Catch	Commonwealth	New South Wales	Queensland	South Australia	Tasmania	Victoria	Western Australia
Charter						Unknown	<0.5 t
Commercial	8.7592 t	75.6233 t	4.9729 t	1.82116 t		0 t	2.88912 t
Indigenous		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Recreational		41,241 (± 16,450) individuals (129 t) in 2017–18	9 t in 2013–14	199 t in 2013–14 [Giri and Hall 2015]	1,000 individuals in 2017-18 [Lyle et al. 2019]	Unknown	7 t (2017/18)

[Murphy et al.
2020]

Commonwealth – Recreational The Commonwealth Government does not manage recreational fishing. Recreational fishing in Commonwealth waters is managed by the states or territory immediately adjacent to those waters, under their management regulations.

Commonwealth – Indigenous The Commonwealth Government does not manage non-commercial Indigenous fishing (with the exception of the Torres Strait). In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the states or territory immediately adjacent to those waters. In the Torres Strait both commercial and non-commercial Indigenous fishing is managed by the Torres Strait Protected Zone Joint Authority (PZJA) through the Australian Fisheries Management Authority (Commonwealth), Department of Agriculture Fisheries and Forestry (Queensland) and the Torres Strait Regional Authority. The PZJA also manages non-Indigenous commercial fishing in the Torres Strait.

Western Australia – Recreational (Catch) Statewide survey of boat-based recreational fishing in Western Australia 2017/18 [Ryan et al. 2019]. Shore-based catch (if any) largely unknown.

Western Australia – Recreational (Management methods) Boat-based recreational fishing licence required.

Western Australia – Charter (Catch) The charter catch is an estimate based on numbers of fish caught multiplied by an average weight.

Queensland – Indigenous (management methods) for more information see <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

New South Wales – Recreational (Catch) Murphy et al. [2020]

New South Wales – Indigenous (management methods) <https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing>

Victoria – Indigenous (Management Methods) A person who identifies as Aboriginal or Torres Strait Islander is exempt from the need to obtain a Victorian recreational fishing licence, provided they comply with all other rules that apply to recreational fishers, including rules on equipment, catch limits, size limits and restricted areas. Traditional (non-commercial) fishing activities that are carried out by members of a traditional owner group entity under an agreement pursuant to Victoria's *Traditional Owner Settlement Act 2010* are also exempt from the need to hold a recreational fishing licence, subject to any conditions outlined in the agreement. Native title holders are also exempt from the need to obtain a recreational fishing licence under the provisions of the Commonwealth's *Native Title Act 1993*.

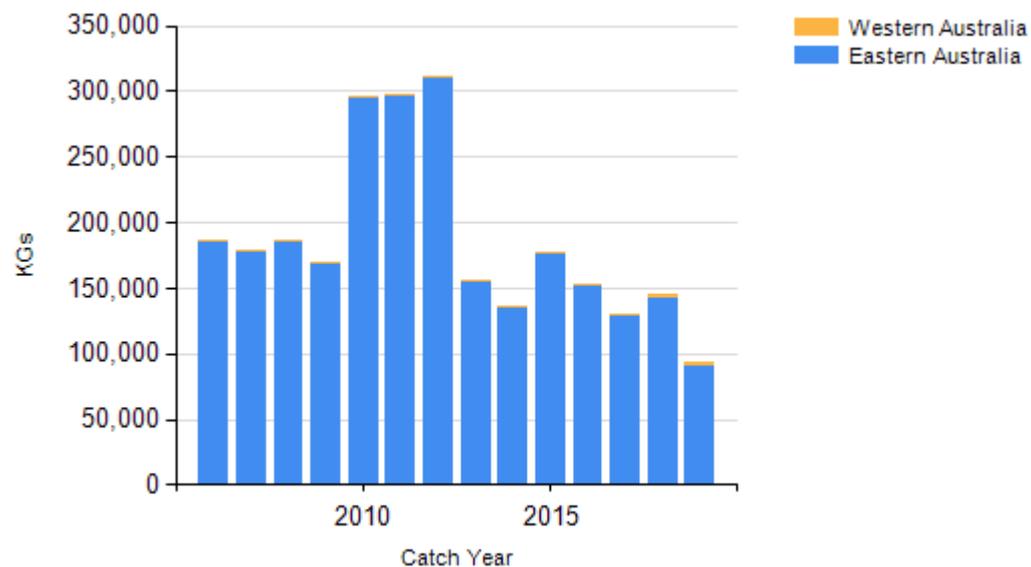
Tasmania – Commercial (catch) (a) Catches reported for the Tasmanian Scalefish Fishery are for the period 1 July to 30 June the following year. The most recent assessment available is for 2018/19; (b) A combined trip limit of 250 kg (with snapper and striped trumpeter) is in place for commercial scalefish licence and rock lobster licence holders.

Tasmania – Indigenous (Management methods) In Tasmania, Indigenous persons engaged in traditional fishing activities in marine waters are exempt from holding recreational fishing licences, but must comply with all other fisheries rules as if they were licensed. For details, see the policy document "Recognition of Aboriginal Fishing Activities" (<https://dipwe.tas.gov.au/Documents/Policy%20for%20Aboriginal%20tags%20and%20alloting%20an%20UIC.pdf>).

Tasmania – Recreational (management methods) The species is subject to a minimum size limit of 450 mm total length. A bag limit of five fish and a possession limit of ten fish is in place for recreational fishers.

CATCH CHART

STATUS OF AUSTRALIAN FISH STOCKS REPORT
Yellowtail Kingfish (2020)



Commercial catch of Yellowtail Kingfish - note confidential catch not shown

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STATUS OF AUSTRALIAN FISH STOCKS REPORT
Yellowtail Kingfish (2020)

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