

Listing Advice

Seriolella brama

blue warehou

Taxonomy

Following taxonomic revision, the name of this species is now conventionally accepted as *Seriolella brama* (Günther, 1860). The species was previously known as *Neptomenus brama* Günther 1860.

Conservation status

The Committee judges that the blue warehou has been demonstrated to have met sufficient elements of Criterion 1(A2) to make it eligible for listing as **critically endangered**.

The Committee also considers that the species meets the requirements of section 179 of the EPBC Act to be eligible for listing as **conservation dependent**.

The highest category for which the species is eligible to be listed is **critically endangered**.

The Committee recommends that the species be listed in the **conservation dependent** category.

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows the assessment of information contained within a nomination by the Committee to list the blue warehou.

Description

The blue warehou belongs to the family Centrolophidae, the species of which are commonly referred to in Australian waters as the trevallas, as opposed to trevally species (family Carangidae). The blue warehou is a medium-sized, deep-bodied fish, reaching a maximum total length of 90 cm and a maximum weight of 7 kg (Bruce et al., 1998; Gomon, 2008; Stobutzki et al., 2011). This species is steely blue to greenish blue in colour, and slightly paler below, with the operculum (the bony flap covering the gills) and lower jaw somewhat metallic to pinkish. There is a large, very dark blotch located above the base of each pectoral fin. The body is thick, the snout is blunt and the eyes are medium-sized. The pectoral fin in adults is distinctly sickle-shaped and long, often reaching to or beyond the origin of the anal fin (Gomon, 2008). The caudal peduncle (narrow area between the tail and main body) possesses a small but distinct lateral keel on each side, but without scutes which are characteristic of the similar looking silver trevally (*Pseudocaranx dentex*) (Hutchins and Swainston, 1999; Gomon, 2008).

The larval body is moderately elongate, and the head becomes relatively large and teeth develop with age (Bruce et al., 1998). Larvae are moderately pigmented, increasing as development progresses (Bruce et al., 1998). The pectoral fin is less curved in juveniles (Gomon, 2008).

Distribution

Globally, the blue warehou is confined to Australian and New Zealand waters (Kaschner et al., 2010). Within the Australian Exclusive Economic Zone, the species occurs predominantly in coastal shelf, upper continental slope and seamount waters offshore from New South Wales, Tasmania, Victoria and South Australia (Bruce et al., 1998; Gomon, 2008). The known distribution extends into waters off south eastern Western Australia, and there is one possibly unauthenticated data point in waters near Perth (Atlas of Living Australia, 2013). The species

occurs at depths between 3 and 550 m (Bray and Gomon, 2011), although it is more abundant in waters shallower than 200 m (Gavrilov and Markina, 1979).

Talman et al. (2004) found significant differences in genetics, body morphology and otolith shape and microchemistry between blue warehou sampled to the east and west of Bass Strait. A genetic study by Robinson et al. (2008) was less conclusive on this distinction between stocks. However, known phenotypic data, such as spawning behaviour, larval distribution and differences in size/age compositions (Bruce et al., 2002) support the notion that there are two separated populations of blue warehou, and this evidence has led to the species being managed by the Australian Fisheries Management Agency as two stocks (see AFMA, 2014):

- an eastern stock, extending offshore from southern New South Wales southwards to south eastern Tasmania, and
- a western stock, extending offshore from western Tasmania northwards to western Victoria.

Stock assessments of the two stocks assume that the unfished biomass of eastern stock was considerably higher than the western stock (Punt, 2009). There is evidence of restricted gene flow between these stocks (Robinson et al., 2008), and each stock appears to have a different pattern of recruitment, although the reasons for the recruitment variability are unknown (Bruce et al., 2002).

At the time of the Committee's assessment, the blue warehou is not listed under any Australian, state or territory government legislation.

Relevant Biology/Ecology

Longevity, age-at-maturity, fecundity, generation length

The 2012 stock assessment for the Southern and Eastern Scalefish and Shark Fishery (the most recent stock assessment report available) considers the maximum age for blue warehou to be 25 years. The stock assessment also lists length-at-maturity (sexual maturity) for the species as 33.4 cm, however does not list age-at-maturity (Klaer, 2013). The stock assessment uses the von Bertalanffy growth equation for its calculations (Klaer, 2013). Therefore using the inverse von Bertalanffy growth equation (see below), age-at-maturity can be calculated.

The von Bertalanffy growth equation is defined as:

$$L_{(t)} = L_{\infty} * (1 - \exp(-K * (t - t_0)))$$

Therefore, the inverse von Bertalanffy growth equation is:

$$t_{(L)} = t_0 - 1/K * \ln(1 - L/L_{\infty})$$

Parameters are (in order of first use): $L_{(t)}$ = length-at-age; L_{∞} = length-at-maximum age (maximum length); K = growth parameter (how fast growth is to maximum length); t = age; t_0 = age-at-zero length; $t_{(L)}$ = age-at-length; L = age (Source: Sparre and Venema, 1998).

Using the inverse von Bertalanffy growth equation with the parameters provided in the 2012 stock assessment (Klaer, 2013), the estimated age-at-maturity for blue warehou is ~2 years. Therefore, based on the age information used in the most recent stock assessment (longevity = 25 years, age-at-maturity = ~2 years), and using the accepted generation length formula (longevity + age-at-maturity)/2, the Committee estimates generation length to be approximately 13.5 years.

It should be noted that the Committee's accepted generation length formula differs from what is referred to in the *Commonwealth Fisheries Harvest Strategy Policy* as 'mean generation time'. 'Mean generation time' is defined as the average age of a reproductively mature animal in an unexploited population (DAFF, 2007). In addition, the International Union for Conservation of Nature uses a different definition for 'generation length', that being – "the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore

reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once.” (IUCN, 2012).

Blue warehou are fast growing in early life, with individuals reaching around 25 cm in their first year (DPIPWE, 2013a). The species is considered to have a high fecundity, with the annual fecundity of females increasing exponentially with length. Females spawn around three batches of eggs each year. The main spawning period in the eastern stock occurs between May and August each year, while in the western stock it occurs later, between June and October each year (Knuckey and Sivakumaran, 2001). Spawning occurs over a wide range of areas off southern Australia, including offshore from southern New South Wales and eastern Victoria for the eastern stock, and western Tasmania and western Victoria for the western stock (Knuckey and Sivakumaran, 2001; Bruce et al., 2002). Post spawning, larvae disperse widely during the winter and spring months within shelf and slope waters, being recorded from waters offshore from Kangaroo Island off South Australia, around the western and eastern coastlines of Tasmania up to an area offshore from the Victoria/New South Wales border (Bruce et al., 1998; Bruce et al., 2001).

Diet, habitat and movement

The blue warehou is an opportunistic predator of pelagic invertebrates. One study offshore from the New South Wales and Victorian coastlines reported pyrosomes (free-floating colonial tunicates) as the predominant prey item for the species (Bulman et al., 2001). Another study of mature individuals on the New Zealand Plateau reported that the diet at any one site varied with depth and the distribution and abundance of prey species (Gavrilov and Markina, 1979). Feeding intensity decreases prior to spawning (Gavrilov and Markina, 1979). The diets of immature stages are unknown; however, the occurrence of juveniles in coastal bays and estuaries, suggests that their diet is different to adults (Bruce et al., 2002).

The blue warehou is a migratory species. A study in waters off New Zealand has shown that the species undertakes major seasonal migrations in order to feed and spawn, and in response to changes in water temperature. The species shows preference for relatively warmer waters of between 10 and 15°C when compared with other trevallas (Gavrilov and Markina, 1979). Larval blue warehou have been observed from the surface to depths of 100 m, with the highest abundances found in the upper 50 m (Bruce et al., 2001). Older larvae and small juveniles are commonly found under drifting jellyfish or larger inanimate objects (Bruce et al., 1998), with larger juveniles congregating in bays and estuaries, and once individuals have attained lengths greater than 30 cm in length, they are most abundant in the continental slope waters further offshore (Gavrilov and Markina, 1979; Bruce et al., 2002).

A study offshore from eastern Tasmania on blue warehou found evidence of diurnal movements in the water column, with individuals moving upwards, away from the seabed on the approach of sunset, before dispersing through the water column at night (Boyes, 1983). The reverse occurs at sunrise, when the fish move downwards, lasting approximately one hour, before forming schools which become fully formed at between 10 and 30 m above the seabed. This study also found that these schools ranged in biomass from between 0.5 t to more than 6 t (Boyes, 1983). Changes in abundance and distribution from year to year may represent the real dynamics of a spatially and temporally patchy stock distribution or availability (AFMA, 2014).

National fisheries context

Commonwealth managed fisheries

The blue warehou is taken in commercial fisheries working in southern Australian waters. Historically, the species was taken as a byproduct species principally by gillnet fishers (often referred to as part of the ‘non-trawl’ category) in Commonwealth managed fishing operations in southern Australian waters (AFMA, 2014). Demersal trawlers had also taken this species, both as periodic targeted catch and as incidental byproduct catch when targeting other species. Gillnet operations tended to catch larger blue warehou than the demersal trawl operations (AFMA, 2014).

Currently, the blue warehou is caught as incidental byproduct in the Southern and Eastern Scalefish and Shark Fishery, which is managed by the Commonwealth statutory authority – the Australian Fisheries Management Authority. The Southern and Eastern Scalefish and Shark Fishery is a multisector, multigear and multispecies fishery, encompassing almost the entire southern half of the Australian Fishing Zone (Woodhams and Vieira, 2012).

There are two principal sectors within the Southern and Eastern Scalefish and Shark Fishery that have the potential to interact with blue warehou:

- Commonwealth Trawl Sector – located offshore from coastline between Sydney in New South Wales, around Tasmania to Cape Jervis in South Australia (near Adelaide). The main gear types used are otter trawl and Danish-seine methods, with some midwater trawling. Pair trawling is also permitted.
- Gillnet, Hook and Trap Sector – located offshore from the coastline between Fraser Island in Queensland, around Tasmania including Bass Strait, to the South Australian-Western Australian border. The main gear types are scalefish and shark hook, gillnets and fish traps. Scalefish hook includes the use of automatic demersal longlines and droplines. Historically, the primary method that was used to catch blue warehou in this sector was gillnets.

Approximately 90 per cent of the blue warehou catch from the recent fishing seasons (2011/12 and 2012/13) was taken by trawling (Penney et al., 2013a).

Tasmanian managed fisheries

The blue warehou occurs seasonally in Tasmanian inshore waters, where the availability is thought to be influenced by prevailing oceanographic conditions and availability of prey (Hartmann and Lyle, 2011; André et al., 2014). The species is commercially targeted as part of the Tasmanian Scalefish Fishery, which is a multi-species and multi-gear fishery with many types and sizes of fishing vessels (DPIPWE, 2013b). However, in recent years the blue warehou has not been considered a key component of the commercial catch in the Tasmanian Scalefish Fishery as fishers have invested in specialising their fishing operations towards targeting banded morwong (*Cheilodactylus spectabilis*) and wrasse (family Labridae) for the live fish trade into Australian restaurants, and specialising in targeting calamari (DPIPWE, pers. comm., 2013). The most recently published fishery status report for the 2010 to 2012 fishing seasons states that almost all catches of the species are by fishers using graball nets, with a range of other gear methods, including gillnet and seine nets registering relatively small amounts of catch (André et al., 2014). Demersal trawling has been prohibited in Tasmanian state waters since 2001 (DPIPWE, 2013b). Most commercial catches of blue warehou are taken offshore from the east coast, in particularly the south east coast, of Tasmania, hence harvesting the eastern stock. However, there is also a small catch of the species offshore from between Stanley and Burnie, on the western section of the north coast of Tasmania (André et al., 2014).

In 1998, a Memorandum of Understanding (MOU) was signed between the Commonwealth and Tasmanian governments to cover catches from Tasmanian waters. Under this MOU, there was provision for a maximum Tasmanian blue warehou commercial catch limit of 318 t per annum (Hartmann and Lyle, 2011; André et al., 2014). This figure was set based on the highest historical total catch from Tasmanian waters prior to the signing of Offshore Constitutional Settlement agreements between the Commonwealth and Tasmanian governments in 1996. The Tasmanian Scalefish Fishery had a major restructure in 1998, with the introduction of the *Fisheries (Scalefish) Rules 1998*, and average annual catches decreased as the fishery underwent structural reform and fishers diversified into targeting other species such as banded morwong and wrasse (DPIPWE, pers. comm., 2013).

Recreational fishers also target the blue warehou using mainly gillnets, and to a lesser extent using line fishing (about 10 per cent) (Lyle et al., 2009). Targeted recreational fishing surveys for Tasmanian waters have estimated total recreational catch of the species annually at between 7 – 36 t (Lyle et al., 2009; DPIPWE, pers. comm., 2013). One of these surveys undertaken between December 2007 and November 2008 reported that approximately 31 per cent of the recreational catch of blue warehou was targeted catch, and only about one per cent was

discarded. The average weight of each fish caught during this survey was estimated at 800 g (Lyle et al., 2009).

Other state/territory managed fisheries

The blue warehou is only very rarely caught by recreational fishers in New South Wales (DPI, pers. comm., 2012). The species is not included in either of the most recent publicly available *Status of Fisheries Resources in NSW 2011–12* (NSW DPI, 2014), or the *South Australian Marine Scalefish Fishery – Stock Status Report 2012/13* (Fowler et al., 2013), and so the status of the species in terms of commercial catch methods in either jurisdiction is unknown at present. The species forms only a very small component of the commercial catch in Victorian waters (DEPI, 2012). While a combined maximum bag limit of 20 is in place for recreational fishers in Victorian waters for blue and silver warehou (*Seriolella* spp.) (DEPI, 2014), the total annual catch by recreational fishers is not publicly reported.

Threats

Overfishing

In the global database *Fishbase*, the blue warehou is classified as ‘of high catchability’, that is, high vulnerability to fishing (Froese and Kesner-Reyes, 2011).

The main identified threat to blue warehou in Australian waters is high levels of fishing pressure, which occurred historically between the late-1980s until the early-2000s, and have resulted in the species currently being classified in the Australian Bureau of Agricultural and Resource Economics and Sciences’ *Fishery Status Reports 2012* and Institute for Marine and Antarctic Studies’ *Tasmanian Scalefish Fishery Assessment 2010/12* as ‘overfished’ (Penney et al., 2013a; André et al., 2014). Historical fishing of the species has caused the reduction in the Australian stocks of the species to the low levels observed today.

Historically, the trawled catches of blue warehou came mainly from outer-shelf and upper-slope waters offshore from southern New South Wales, eastern Bass Strait and western Victoria. The significant gillnet catches were caught from shallower, shelf waters in eastern Bass Strait and around inshore Tasmanian waters (Smith, 1994).

Ongoing fishing mortality is classified as ‘uncertain’, since it is not known whether the current levels of catch of blue warehou are low enough to facilitate rebuilding of stocks (Penney et al., 2013a). Given the ‘uncertain’ status of fishing mortality, the current level of ongoing fishing pressure remains a potential threat.

Commonwealth waters

In the early to mid-1990s, the blue warehou was an extremely important component of the non-trawl sector of the South East Fishery, principally in gillnet catches. At the same time, the demersal trawl sector also took this species as both a periodic targeted catch and an incidental byproduct catch when targeting other species in the south and east of the area now covered by the Southern and Eastern Scalefish and Shark Fishery (Knuckey and Sivakumaran, 1999; AFMA, 2014). In 2003, the South East Fishery and a number of other fisheries were amalgamated under one common set of management arrangements to establish the Southern and Eastern Scalefish and Shark Fishery (Penney et al., 2013b).

Catch records from Commonwealth waters prior to 1992 usually did not distinguish between blue warehou and the closely related silver, or spotted, warehou (*Seriolella punctata*), so catch totals of the two species were grouped together (Knuckey and Sivakumaran, 2001; AFMA pers. comm., 2012). Catches of both species increased dramatically during the 1980s, and total landed catches of blue warehou across southern and eastern Australia peaked in 1991 at approximately 2500 t (estimated from the grouped blue warehou and spotted warehou total catch), which was roughly divided equally between trawl and non-trawl methods (AFMA, 2008; AFMA, 2014). In recent years, trawl fishing in the Southern and Eastern Scalefish and Shark Fishery has accounted for over 90 per cent of retained commercial catch (Haddon, 2013; Penney et al., 2013a).

By 2008 (the year before the unavoidable incidental bycatch total allowable catch limit was introduced – see below), catch had declined to 157 t, most of which was caught by the trawl sector (Morison et al., 2009; Haddon, 2013). Both total catch and catch rates (catch per unit effort) declined substantially prior to the introduction of the reduced catch limit in 2009, especially in years during the mid-1990s (Stobutzki et al., 2010), accompanied by a significant reduction in the mean catch-at-age in some sectors of the fishery (Knuckey and Sivakumaran, 2001). Standardised catch per unit effort rates have been below limit reference points (20 per cent of their unfished levels) for the eastern stock since 1998, and mostly below for the western stock since 1995 (Stobutzki et al., 2010).

Since 2001, the biomass of blue warehou stock or stocks has been consistently classified as 'overfished' in fishery status reports, except in 2007 where it was classified as uncertain (Woodhams and Vieira, 2013). While fishing mortality has been classified as 'subject to overfishing' in only three seasons (2004, 2009, 2010) since 2004 (when classifications on fishing mortality commenced), it remains uncertain whether ongoing catch of blue warehou is low enough to facilitate recovery (Woodhams and Vieira, 2013; Penney et al., 2013a).

The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* was first implemented in 2008 in response to the 2008 stock assessment indicating that both the eastern and western stocks remained below biomass limit reference points (B_{LIM}) of 20 per cent of their unfished biomass level (AFMA, 2008). Under the rebuilding strategy, targeting of the species in the Southern and Eastern Scalefish and Shark Fishery is not allowed and an unavoidable incidental bycatch total allowable catch limit is reviewed annually. Although there has been an overall decline in targeting of the species since 2008, the 2011 fishery status report identified concerns that targeting was likely to be still occurring (Ward et al., 2012), however the 2012 fishery status report concludes that there is evidence of a significant reduction in targeting given that landed catch (49 t) was well below the unavoidable incidental bycatch total allowable catch limit (118 t). The revised version of the stock rebuilding strategy was released in April 2012 (AFMA, 2012), and a more comprehensively reviewed strategy (AFMA, 2014) is scheduled for implementation in late-2014. The draft of this 2014 revised strategy notes that assessments in 2013 "indicated that both the eastern and western stocks of Blue Warehou remained below 20% of their unfished spawning biomass and required rebuilding" (AFMA, 2014).

Historically, most of the catch has been from the eastern stock (which is now considered the more depleted of the two), but since 1999 catches have been higher of the western stock. The unavoidable incidental bycatch total allowable catch limit is split between the stocks, with the catch limit of 118 t being split into 27 t in the east and 91 t in the west (Penney et al., 2013a).

The rate of discarding (any unwanted catch returned to the sea) has varied considerably over the last decade, from 10 per cent of the annual catch in 2007, to 58 per cent in 2008 (Stobutzki et al., 2011; Ward et al., 2012). Discards have also been greatly reduced in recent years and have ranged between 15 and 40 t in years for which data are available between 2009 and 2011 (Haddon, 2013; Penney et al., 2013a).

Tasmanian waters

In Tasmanian waters, the most recent published stock assessment (for the 2009/10 fishing season) classified the blue warehou stock accessed by Tasmanian fishers as 'overfished' and classified the availability of the species in Tasmanian waters as low (Hartmann and Lyle, 2011). The stock assessment goes on to state that the recent depressed catches in Tasmanian waters are almost certainly linked to reduced biomass, the result of overfishing by Commonwealth and state fisheries during the 1990s (Hartmann and Lyle, 2011). However, it is noted in the stock assessment that the availability of blue warehou in Tasmanian inshore waters is influenced by a range of environmental factors (such as oceanographic conditions and availability of prey), leading to marked inter-annual variability in abundance and hence catches taken from Tasmanian waters (Hartmann and Lyle, 2011; André et al., 2014).

Since the early 2000s, the blue warehou has been rarely targeted by commercial fishers in Tasmanian waters and the total annual commercial catch has been less than 50 t since 2000/01 in all years except 2001/02 (66 t) (Hartmann and Lyle, 2011, DPIPWE, pers. comm., 2013).

The total commercial catch in recent seasons (11 t for 2010/11 and 4 t for 2011/12) remains considerably lower than catches reported during the 1990s, which averaged at around 200 t annually and peaked at 318 t in 1991/92 (Hartmann and Lyle, 2011; DPIPWE, pers. comm., 2013; Andre et al., 2014).

Since 2000, the estimated recreational harvest of blue warehou in Tasmanian waters has been surveyed three times, and has ranged from 7 t for 2007/08, 15 t for 2000/01 (Hartmann and Lyle, 2011) and 36 t for 2009/10 (DPIPWE, pers. comm., 2013). These catch estimates are substantially lower than a recreational catch estimate in 1997 of nearly 120 t (Lyle, 2000). However, there is some possibility that the earlier data may be misleading as some catch of the similar silver, or spotted, warehou (*S. punctata*) may have been incorrectly identified as blue warehou in surveys of recreational fishers (commonly referred to as 'creel surveys') (DPIPWE, pers. comm., 2013).

Targeted and bycatch in managed waters of other states and territories

Reported commercial catches of blue warehou in Victorian waters totalled only 4 t between the years 2006 and 2011 (DEPI, 2012). The recreational bag of the species in Victoria limit is currently 20, with no size limits (DEPI, 2012).

How judged by the Committee in relation to the EPBC Act Criteria and Regulations

Note: When considering thresholds for assessing commercially harvested marine fish, the Committee refers to the *Commonwealth Fisheries Harvest Strategy Policy* (DAFF, 2007). This policy allows that declines of up to 60 per cent (from pre-fishing biomass levels) are acceptable for commercially harvested fish species where depletion is a managed outcome. Variations in the extent of acceptable decline depend on the biology of the individual species. The Committee is informed, but not bound, by a series of biological reference trigger points (commonly referred to as B_{LIM} and B_{TARG}) provided in the policy for management intervention for species that decline below 60 per cent of their pre-fishing biomass. These interventions include listing assessments.

Criterion 1: Reduction in numbers (based on any of A1 – A4)

- A1. An observed, estimated, inferred or suspected population size reduction, very severe $\geq 90\%$, severe $\geq 70\%$ or substantial $\geq 50\%$, over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
- (a) direct observation
 - (b) an index of abundance appropriate to the taxon
 - (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - (d) actual or potential levels of exploitation
 - (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.
- A2. An observed, estimated, inferred or suspected population size reduction, very severe $\geq 80\%$, severe $\geq 50\%$ or substantial $\geq 30\%$, over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.
- A3. A population size reduction, very severe $\geq 80\%$, severe $\geq 50\%$ or substantial $\geq 30\%$, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

A4. An observed, estimated, inferred, projected or suspected population size reduction, very severe $\geq 80\%$, severe $\geq 50\%$ or substantial $\geq 30\%$, over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

Evidence

Abundance over the three generation period

As mentioned above, the Committee estimates the generation length for blue warehou to be approximately 13.5 years. Therefore for the use in consideration of Criterion 1, the Committee accepts the estimate of three generation lengths as approximately 40 years. The relevant period for consideration of past declines is from approximately 1974, although the key period for this assessment commences in the late 1980s when the fishery reached its maximum take and catch per unit effort levels.

The main source of information for blue warehou stocks is derived from catch records from the Commonwealth managed Southern and Eastern Scalefish and Shark Fishery and state fisheries (Tasmania) (see Figure 1 below). The annual total retained catch of blue warehou rose to an estimated 2500 t in 1991 before declining to the levels recorded today (Haddon, 2013; Penney et al., 2013a). Of the 2500 t caught in 1991, approximately 1300 t was caught by demersal trawling operations. Catch by gillnet operations had actually peaked a year earlier, in 1990, at approximately 1700 t (AFMA, 2008). From that peak in catch, standardised catch per unit effort declined precipitously (Figures 2 and 3), and by 2008, the retained catch had declined to 194 t (Commonwealth and state) (Haddon, 2013).

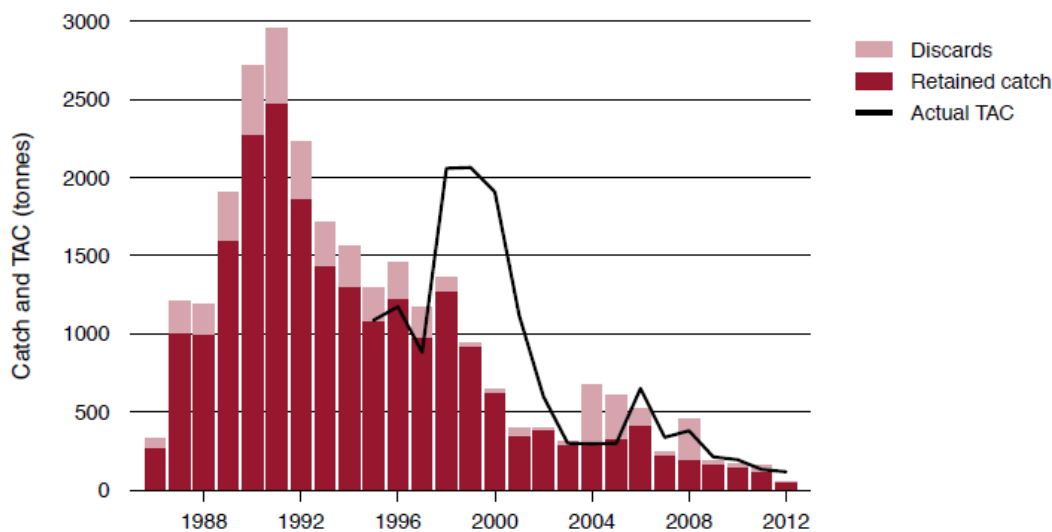


Figure 1: Total blue warehou annual catches (Commonwealth and state) and fishing season Total Allowable Catches (TACs), from 1986 to 2012, showing retained and discarded catches (source: Haddon, 2012, cited in Penney et al., 2013a).

The Committee notes that after 2008 standardised catch per unit effort data are not considered to be a good indicator of stock status. The reason for this is that the the *Blue Warehou* (*Seriolella brama*) *Stock Rebuilding Strategy* was implemented in December 2008 in response to the observed decline (AFMA, 2008). A key feature of the rebuilding strategy has been to reframe the annual total allowable catch limit for blue warehou, which had already been greatly reduced in 2003, to provide an annual unavoidable incidental bycatch total allowable catch limit which reflects the catch of blue warehou that fishers cannot avoid when targeting other species. In 2009 the unavoidable incidental bycatch total allowable catch limit was implemented following the introduction of the rebuilding strategy. As a consequence of these lowered catch limits for blue warehou, fishers have increasingly avoided catching blue warehou such that “effort” cannot be appropriately estimated and therefore catch per unit effort is not able to be effectively determined.

Nevertheless, the decline occurred prior to the introduction of the unavoidable incidental bycatch total allowable catch limits and standardised catch per unit effort data was considered sufficient for stock estimation purposes until the last fully comprehensive (Tier 1) quantitative assessment of blue warehou stocks, which was updated in 2008 (Punt, 2009). The avoidance behaviour of fishers since the introduction of the unavoidable incidental bycatch total allowable catch limit presents a problem in assessing future recovery of the stock, but is not an impediment to assessing the decline for the purposes of Criterion 1.

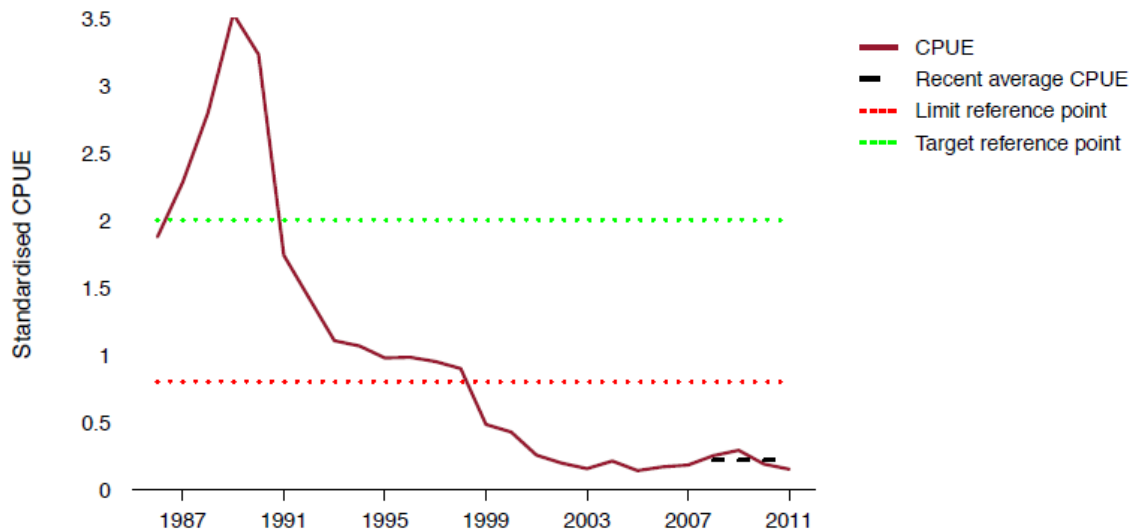


Figure 2: Standardised catch per unit effort (CPUE) for the eastern stock of blue warehou from 1986 to 2011 (Haddon, 2012, cited in Penney et al., 2013a)

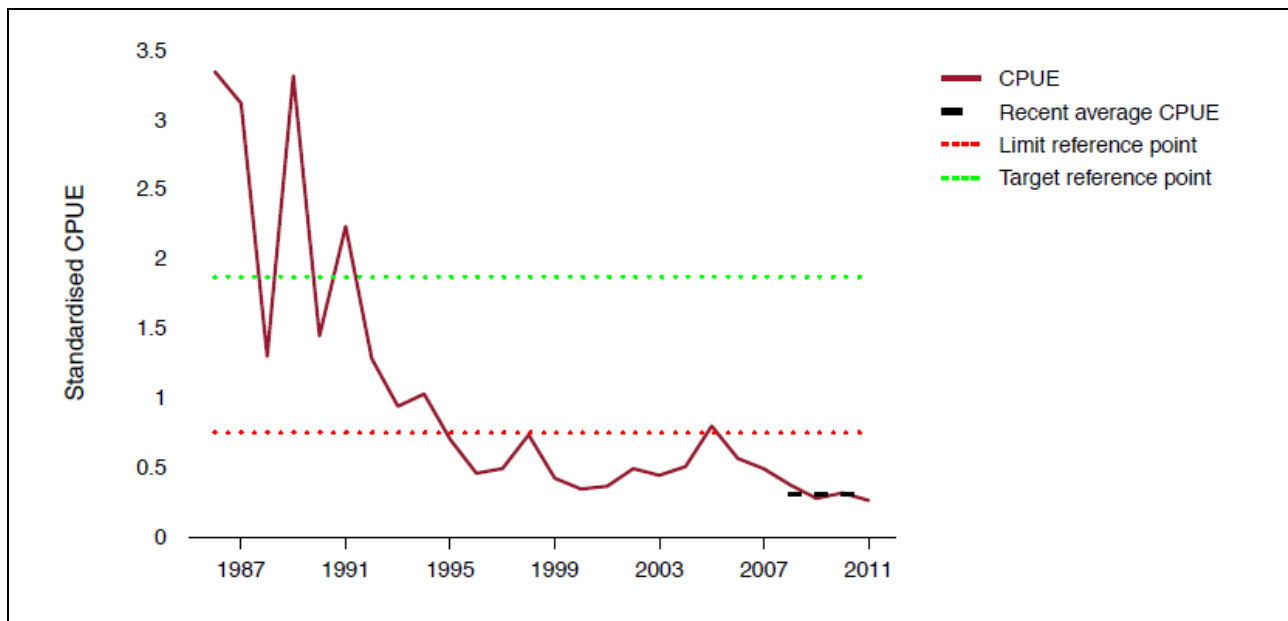


Figure 3: Standardised catch per unit effort (CPUE) for the western stock of blue warehou from 1986 to 2011 (Haddon, 2012, cited in Penney et al., 2013a)

The standardised catch per unit effort data series for the east and west stocks of blue warehou show very severe declines from the early 1990s (see Figures 2 and 3 above). Levels of standardised catch per unit effort have been determined to be below limit reference points (defined as a depletion level of 20 per cent of the unfished biomass) for the eastern stock since 1998, and mostly below for the western stock since 1995, suggesting that the biomasses of both stocks are below 20 per cent of their unfished levels (Penney et al., 2013a; AFMA, 2014).

The Committee notes that the estimate of unfished standardised catch per unit effort is approximately one third of the highest levels recorded (Haddon, 2013). That is, the decline is not estimated against the peak standardised catch per unit value but against a much lower reference value and thus estimates of decline are inherently somewhat conservative.

For the eastern stock, in the four years before the introduction of the unavoidable incidental bycatch total allowable catch limit (i.e. 2005–08), standardised catch per unit effort averaged 0.19 units (Haddon, 2013), equivalent to approximately 5 per cent of the unfished biomass. For the western stock, in the four years before the introduction of the unavoidable incidental bycatch total allowable catch limit (i.e. 2005–08), standardised catch per unit effort averaged 0.56 units (Haddon, 2013), equivalent to approximately 14 per cent of the unfished biomass. Given that the eastern stock is considered to have had a higher unfished biomass than the western stock (Punt, 2009), when catch information is combined, average standardised catch per unit effort data suggest that the combined blue warehou stock level in the four years before the introduction of the unavoidable incidental bycatch total allowable catch limit (i.e. 2005–08) averaged at a level of approximately 7 per cent of the unfished level (Haddon, 2013). These numbers indicate the decline in the abundance of blue warehou has been at least 80 per cent to 2008, exceeding the thresholds for critically endangered listing.

The Committee concludes that, given that the use of standardised catch per unit effort data only became problematic after 2008 when the unavoidable incidental bycatch total allowable catch limit was introduced and that most of the decline, if not all, occurred in years well before 2008, there is sufficient evidence to conclude that the population of blue warehou has undergone an observed reduction of at least 80 per cent, within the last three generations (i.e. in the past 40 years) which is considered to be a very severe reduction in numbers. In addition, the Committee notes that there has been no evidence of recovery, or further decline, in blue warehou stocks. While the *Commonwealth Fisheries Harvest Strategy Policy* (DAFF, 2007) suggest decline of up to 60 per cent is acceptable where this is a managed decline, estimates of both populations indicate these stocks have declined significantly beyond a level appropriate as a managed outcome. The Committee notes both the high vulnerability of the species to fishing as well as its high potential for rebuilding, but also notes the lack of any evidence for recovery to date.

Ongoing threat

This criterion allows that where the causes of the reduction are known, understood and ceased that a higher threshold may be applied in determining the appropriate category for listing. In this context, it must be determined whether fishing has ceased under the current management regime.

Since 2001, the biomass of blue warehou stock or stocks has been consistently classified as 'overfished' in fishery status reports, except in 2007 where it was classified as uncertain (Woodhams and Vieira, 2013). While fishing mortality has been classified as 'subject to overfishing' in only three years (2004, 2009, 2010) since 2004 (when classifications on fishing mortality commenced), it still remains uncertain as to whether ongoing catch of blue warehou is low enough to facilitate recovery (Woodhams and Vieira, 2013; Penney et al., 2013a). While targeting of the species is considered to be reduced in recent years, there is a level of ongoing bycatch (Penney et al., 2013a), and it remains uncertain what impact this level of catch is having on stocks. As noted above, the unavoidable incidental bycatch total allowable catch limit has been set at 133 t and 118 t in the past two (2011/12 and 2012/13) seasons, and recorded catches have been 99 t and 49 t respectively (Penney et al., 2013a). While landed catches, and possibly discarding, have declined, it is unknown what the maximum level of catch is which would allow recovery of the species to the limit reference point by the given timeframe as stipulated in the rebuilding strategy (Penney et al., 2013a). In recent fishing seasons, recommended biological catch for the species has been set at zero (Haddon, 2011; Haddon, 2012; Haddon, 2013). The primary rationale behind the setting of a total allowable catch for blue warehou is not the rebuilding objective under the rebuilding strategy, but is rather intended to allow for what is considered unavoidable incidental catch while targeting other species (Penney et al., 2013a). While this is the case, and in the absence of clear evidence of recovery, the Committee considers that the threat of fishing to the species has not completely ceased and has applied the lower thresholds for assessment under this criterion (A2).

Conclusion

The Committee concludes that the species' population size has undergone an observed population reduction of at least 80 per cent. This classifies as a very severe reduction in numbers, making the species eligible for listing in the critically endangered category under Criterion 1(A2) of a decline of at least 80 per cent. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 1 to make it **eligible** for listing as **critically endangered**.

Criterion 2:

Geographic distribution (based on either of B1 or B2)

B1. Extent of occurrence estimated to be very restricted <100 km², restricted <5000 km² or limited < 20 000 km²

B2. Area of occupancy estimated to be very restricted <10 km², restricted <500 km² or limited <2000 km²

AND

Geographic distribution is precarious for the survival of the species, (based on at least two of a–c)

- a. Severely fragmented or known to exist at a limited location.
- b. Continuing decline, observed, inferred or projected, in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) area, extent and/or quality of habitat
 - (iv) number of locations or subpopulations
 - (v) number of mature individuals.
- c. Extreme fluctuations in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals

Evidence

Geographic distribution

Within Australian waters, the blue warehou occurs predominantly in waters offshore from New South Wales, Tasmania, Victoria and South Australia. There is also one unauthenticated recording from waters offshore from Perth (Atlas of Living Australia, 2013). The species occurs in shelf and upper slope, near-shore waters, at depths between 3 and 550 m, although it is more abundant at depths down to 200 m (Gavrillov and Markina, 1979; Bruce et al., 1998; Gomon, 2008; Bray and Gomon, 2011).

As discussed above, based on the current information available there are two stocks of blue warehou in Australia: an eastern stock, from southern New South Wales to south eastern Tasmania; and a western stock, from western Tasmania to western Victoria (Bruce et al., 2002; Talman et al., 2004).

The Committee accepts the Department of the Environment's estimate for the blue warehou's total extent of occurrence as exceeding 1 000 000 km² based on an Albers projection (DotE, 2013). The total area of occupancy of blue warehou, if the distribution is considered to be from the NSW–Qld border southwards around Tasmania to the Eyre Peninsula, is estimated to be approximately 360 000 km² (DotE, 2013). Both extent of occurrence and area of occupancy are well above the indicative threshold for limited distribution.

The geographic distribution is not considered by the Committee to be limited because the extent of occurrence is estimated to be greater than the lowest threshold value (20 000 km²) and the area of occupancy is greater than the lowest threshold value (2000 km²) for eligibility under this criterion.

Precariousness – fragmentation [Criterion 2a]

While there are two stocks of blue warehou, which are genetically and morphologically different from each other, there is no information indicating that there is severe fragmentation occurring within stocks.

Precariousness – decline [Criterion 2b]

There is no reliable information available as to whether there has been any substantial recorded decline in the extent of occurrence of blue warehou. While the species is estimated to have undergone very severe population decline, this decline is not known to have altered the original range of the species.

Precariousness – extreme fluctuations [Criterion 2c]

While the blue warehou is a naturally a highly mobile and migratory species that travels in schools and has a patchy distribution and abundance (Hartmann and Lyle, 2011), there is no indication of fluctuation in the extent of occurrence or area of occupancy for blue warehou, and there is a lack of evidence of extreme fluctuation in number of locations or subpopulations, or number of mature individuals.

The Committee notes that there is currently no evidence to suggest that the geographic distribution of blue warehou is limited nor is it precarious for the survival of the species. The Committee further notes that the geographic distribution of the species is well above the indicative thresholds for extent of occurrence and area of occupancy to be eligible for listing. Therefore, as the species has not been demonstrated to have met the required elements of Criterion 2, it is **not eligible** for listing in any category under this criterion.

Criterion 3: The estimated total number of mature individuals is very low <250, low <2500 or limited <10 000; **and** either of (A) or (B) is true

- (A) evidence suggests that the number will continue to decline at a rate very high (25% in 3 years or 1 generation (up to 100 years), whichever is longer), high (20% in 5 years or 2 generations (up to 100 years), whichever is longer); or substantial (10% in 10 years or 3 generations (up to 100 years), whichever is longer); or
- (B) the number is likely to continue to decline and its geographic distribution is precarious for its survival (based on at least two of a – c):
- a. Severely fragmented or known to exist at a limited location.
 - b. Continuing decline, observed, inferred or projected, in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) area, extent and/or quality of habitat
 - (iv) number of locations or subpopulations
 - (v) number of mature individuals.
 - c. Extreme fluctuations in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals

Evidence

Not applicable – Blue warehou is a small teleost fish capable of forming large schools and while there are insufficient data available to accurately determine the total number of mature individuals; the total population of mature individuals in Australian waters is likely much greater than the indicative threshold for a 'limited number' (10 000 individuals). Knowing that individuals can attain a weight of 7 kg (Stobutzki et al., 2011), if an assumption is made that the average weight of fish caught in the Southern and Eastern Scalefish and Shark Fishery is 3.5 kg, and given that 99 t and 49 t was caught in the 2011/12 and 2012/13 fishing seasons respectively, it would indicate that approximately 28 000 and 14 000 individuals were caught in each of these seasons. At 3.5 kg, the 'limited number' of 10 000 individuals would weigh 35 t, and it is highly likely that there is more than a biomass of 35 t of mature individuals remaining

in Australian waters. Therefore, it can be reasonably expected that the total number of mature individuals remaining in Australian waters would be higher than the thresholds to classify as very low, low or limited.

The geographic distribution is not precarious for its survival and there is no current information available that indicates that the distributional range of the blue warehou has declined. Continued decline in numbers could still be occurring, as it is unclear whether the current level of removals will facilitate rebuilding of the species, (Penney et al., 2013a). However, as the total number of mature individuals is not considered to be very low, low or limited the species has not been demonstrated to have met the required elements of Criterion 3, it is **not eligible** for listing in any category under this criterion.

Criterion 4: Estimated total number of mature individuals:

- (a) Extremely low < 50
- (b) Very low < 250
- (c) Low < 1000

Evidence

Not applicable – While there are insufficient data available to accurately determine the total number of mature individuals of blue warehou, given that the species is a small teleost fish capable of forming large schools, the total population of mature individuals in Australian waters is likely much greater than the indicative threshold for a low number (1000 individuals). Therefore, as the total number of mature individuals is not considered to be extremely low, very low or low, the species has not been demonstrated to have met the required elements of Criterion 4, it is **not eligible** for listing in any category under this criterion.

Criterion 5: Probability of extinction in the wild based on quantitative analysis is at least:

- (a) 50% in the immediate future, 10 years or three generations (whichever is longer); or
- (b) 20% in the near future, 20 year or five generations (whichever is longer); or
- (c) 10% in the medium-term future, within 100 years.

Evidence

Not applicable – There are insufficient data available to estimate a probability of extinction of blue warehou in the wild over a relevant timeframe. Therefore, as the species has not been demonstrated to have met the required elements of Criterion 5, it is **not eligible** for listing in any category under this criterion.

How judged by the Committee in relation to the conservation dependent listing criteria of the EPBC Act and Regulations

To be eligible for listing as conservation dependent a species must, at the time, satisfy the statement at paragraph 179(6)(a) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or satisfy all four of the subparagraphs of paragraph 179(6)(b).

The Committee judges that the species is **eligible** for listing as **conservation dependent** under the EPBC Act. The assessment against the criteria is as follows:

At the time of the Committee's assessment, a review of the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* was being undertaken by the Australian Fisheries Management Authority. The Australian Fisheries Management Authority has informed the Department of the Environment that it anticipates that the reviewed stock rebuilding strategy will be implemented by late 2014. The advice of the Committee contained herein is predicated on the assumption that the reviewed strategy will be implemented, without significant alteration, prior to the Minister for the Environment's listing decision under the EPBC Act being made.

Paragraph 179(6)(a): the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered.

Evidence

Not applicable – The Committee considers that blue warehou is already eligible for listing in the critically endangered category. Therefore, the Committee does not consider the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* to constitute a conservation program, the cessation of which would result in the blue warehou becoming vulnerable, endangered or critically endangered because the species has already been found eligible for listing as critically endangered. The species has, therefore, not been demonstrated to have met the required element of paragraph 179(6)(a) of the EPBC Act.

Paragraph 179(6)(b): the following subparagraphs are satisfied:

- (i) the species is a species of fish;**
- (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;**

The species is a species of fish:

The blue warehou (*Seriolella brama*) is a species of *bony fish* for the purposes of the definition of **fish** under subsection 179(7) of the EPBC Act, therefore satisfies subparagraph 179(6)(b)(i).

The fish species is the focus of a plan of management:

The Committee considers that a stock rebuilding strategy developed in accordance with the requirements of the *Commonwealth Fisheries Harvest Strategy Policy* (DAFF, 2007) can be described as a scheme of action for managing the rebuilding of particular fish stocks to a specified level within a particular timeframe and is therefore considered to be a 'plan of management'. The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* provides a plan of management for rebuilding the two known stocks of the species within Australian waters (AFMA, 2014). The Committee considers this to be a plan of management for a fish for the purposes of assessment under paragraph 179(6)(b) of the EPBC Act.

There are currently no plans of management describing action for managing the rebuilding of these stocks by state jurisdictions. The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (AFMA, 2014) is therefore the only plan that can be considered for assessment under paragraph 179(6)(b) of the EPBC Act.

Plan of management provides for management actions:

The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* has been developed under the *Commonwealth Fisheries Harvest Strategy Policy*. This harvest strategy policy requires defined targets for rebuilding stock that fall below the stock's biomass reference point¹ (B_{LIM}) and timelines to achieve this. A stock rebuilding strategy under the harvest strategy policy must include, but is not limited to, a clear specification of:

- objectives
- rebuilding targets and timeframes
- performance criteria against the objectives
- actions to achieve the objectives, and
- key threats to the recovery and strategies to counter these.

The Committee requires these components to be within a plan of management for a conservation dependent species and, in addition:

- strategies for rigorous evaluation of the effectiveness of the plan against its objectives, with a clear description of the monitoring and review process and its associated timelines, and
- a research plan where this is considered necessary.

The Committee has evaluated the potential effectiveness of the plan of management for each of the above components.

Objectives

The Committee expects that the plan of management will establish the goal which actions in the plan are intended to accomplish. The actions contribute to the achievement of the specified objectives, and these actions should be measurable, defined, operational and specific.

The objectives of the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* are:

- “to rebuild blue warehou (east and west) stocks in the area of the Southern and Eastern Scalefish and Shark Fishery to or above the default limit reference biomass level (B_{LIM}) of 20 per cent of the unfished spawning biomass within a biologically reasonable time frame; being one mean generation time plus 10 years (approximately 16 years). That is, to reach or exceed B_{LIM} by no later than 2024.
- Having reached B_{LIM} , rebuild blue warehou (east and west) stocks in the area of the Southern and Eastern Scalefish and Shark Fishery to the default maximum sustainable yield biomass level of 40 per cent of the unfished spawning biomass (B_{MSY}) using the harvest control rules outlined in the *Southern and Eastern Scalefish and Shark Fishery Harvest Strategy Framework*.
- Once B_{MSY} is reached, pursue the biomass level which aims to maximise net economic returns, currently 48 per cent of unfished spawning biomass (B_{MEY}).” (Source: p. 4 – 5, AFMA, 2014)

It should be noted that the ‘mean generation time’ is defined in the harvest strategy policy as the average age of a reproductively mature animal in an unexploited population, which is different to the Committee’s definition for ‘generation length’ (see above).

Rebuilding targets and timeframes

The Committee considers that rebuilding (recovery) targets are an essential requirement in a plan of management to ensure that the actions identified and implemented through the rebuilding strategy will be achieved and that the actions of the plan of management can be monitored and evaluated for performance. The *Commonwealth Fisheries Harvest Strategy Policy* establishes that rebuilding strategies will define targets for rebuilding as part of its objectives.

¹ The biomass limit reference point is the point beyond which the risk to the stock is regarded as unacceptably high
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The Australian Fisheries Management Authority has used the proxies provided in the *Commonwealth Fisheries Harvest Strategy Policy* as biomass target² and limit reference points in the *Blue Warehouse (Seriolella brama) Stock Rebuilding Strategy*. Once the initial target reference point (referred to in the rebuilding strategy as the default maximum sustainable yield) is reached, the final target reference point, (referred to as the default maximum economic yield biomass (B_{MEY})), will be pursued (AFMA, 2014). Thus, the rebuilding targets identified in the rebuilding strategy are:

B_{LIM} :	B_{20} (20 per cent of the original unfished biomass)
$B_{TARG/MSY}$:	B_{40} (40 per cent of the original unfished biomass)
B_{MEY} :	currently B_{48} (48 per cent of the original unfished biomass)

The Committee considers that timeframes associated with rebuilding targets are an essential requirement in the plan of management to ensure that the actions identified and implemented through the rebuilding strategy will be achieved, can be monitored and evaluated for performance.

The Australian Fisheries Management Authority has used the typical recovery time defined in the *Commonwealth Fisheries Harvest Strategy Policy* as the mean generation time plus 10 years in the *Blue Warehouse (Seriolella brama) Stock Rebuilding Strategy*. Hence, the recovery timeframe, has been specified in the rebuilding strategy to be 16 years (AFMA, 2014).

Recovery timeframe to B_{20} for blue warehouse = approximately 16 years (by or before 2024)
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Performance criteria against the objectives

The *Blue Warehouse (Seriolella brama) Stock Rebuilding Strategy* lists under 'Monitoring and Evaluation' a number of monitoring procedures and methods by which the success of rebuilding objectives will be reviewed, including:

- an annual review of catch and biological information
- the Integrated Scientific Monitoring Program involving collection of independent and verifiable information on fishing operations, catch and discards using observers covering approximately 3 per cent of the trawl effort
- fishery independent surveys to provide more accurate indicators of abundance than catch and effort data from commercial fisher logbooks
- industry data collection of length measurements for the species to be incorporated into future assessments
- annual reports to the Department of the Environment on stock status and performance against the objectives of the rebuilding strategy, and
- a review of the rebuilding strategy in five years from implementation (Source: pp. 9 – 12, AFMA, 2014)

The rebuilding strategy aims to improve monitoring, by including: monitoring of discards, including blue warehouse, through the observer program to more accurately estimate discard rates across the fishery; fishery independent surveys and improved data collection, and; continual assessment of whether there is any targeting of the species occurring in the fishery (AFMA, 2014).

The Shelf Resource Assessment Group (ShelfRAG) will annually review the rebuilding strategy as 'the main tool for monitoring performance' against its objectives. The performance criteria are broadly specified as being if there are 'changes in stock status or the ongoing monitoring by ShelfRAG', it may result in amendments to management arrangements (Source: p. 2, AFMA, 2014). The rebuilding strategy identifies that these possible future management

² The biomass target reference point is the point at which it is desired that stock levels be at or above, and usually equates to maximum sustainable yield (B_{MSY}) (DAFF, 2007).

arrangements may include: management of eastern and western stocks under separate total allowable catch limits; trigger and move on provisions for large catches, and; spatial and temporal closures in areas of high abundance or spawning grounds (Source: pp. 8, AFMA, 2014).

Actions to achieve the objectives

The *Blue Warehouse (Seriolella brama) Stock Rebuilding Strategy* now applies to both the trawl and non-trawl operators within the Southern and Eastern Scalefish and Shark Fishery. Under the section 'Management actions to achieve the objectives', arrangements identified to rebuild stock levels are:

- no targeting and an incidental catch limit
- limited entry
- gear requirements
- fishery closures, and
- triggers for eastern and western stocks (Source: pp. 6 – 8, AFMA, 2014)

Following the implementation of the *Blue Warehouse (Seriolella brama) Stock Rebuilding Strategy* in 2008, eastern and western stocks to date have shown little sign of recovery (AFMA, 2012). As a consequence the rebuilding strategy was revised in 2012 to implement further actions. For example, the 2008 rebuilding strategy applied to trawl methods only, whereas from 2012 the rebuilding strategy applies to both trawl and non-trawl operators in an effort to manage all sources of mortality within the Southern and Eastern Scalefish and Shark Fishery. In addition, a number of the catch trigger limits were lowered in 2012 and implemented from the 2012/13 fishing season onward (AFMA, 2012).

The management measures specified within the current revised 2014 *Blue Warehouse (Seriolella brama) Stock Rebuilding Strategy* directly relating to blue warehouse, include:

- *no targeting and an incidental catch limit*, mirroring what is specified in the *Commonwealth Fisheries Harvest Strategy Policy*, the rebuilding strategy prohibits targeted fishing of blue warehouse and sets an incidental total allowable catch limit after consideration of factors including the ability of stocks to rebuild to B_{LIM} by 2024 and previous non-targeted catch based on reported landings and discards. The current incidental total allowable catch limit is set at 118 tonnes.
- *triggers for eastern and western stocks*, to monitor catches against individual triggers for the eastern and western stocks during the season. Catch triggers and reporting requirements, including catch triggers for trips where 250 kg or more of the species are caught are detailed at Appendix B of the rebuilding strategy (Source: pp. 6 – 8 and Appendix B, AFMA, 2014).

Current management measures highlighted within the revised rebuilding strategy as fishery-wide measures, which may also serve benefit to blue warehouse stocks include:

- *limited entry* controlled under the *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003* means that fishing effort is limited to and into the future by the number of fishing concessions that currently exist. New operators may only access the fishery by purchasing an existing concession.
- *gear requirements* which restrict operators to use larger than the specified minimum mesh sizes for trawl and non-trawl as to reduce the mortality of juvenile fish of all species, controlled under a legislative direction for minimum gear requirements for the Southern and Eastern Scalefish and Shark Fishery.
- *fishery closures* which, while not specifically implemented for the protection of the species, overlap with the distribution of blue warehouse and provide some protection to stocks. (Source: p. 7 – 8, AFMA, 2014)

Key threats to recovery and strategies to counter these

The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* acknowledges under 'Key Threats' the significant impact that fishing has had on blue warehou stocks, although it notes that the degree of impact is difficult to estimate due to spatial and temporal patchiness of the species and significant uncertainties in the stock assessment models which rely on catch per unit effort trends in the fishery (AFMA, 2014).

The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* identifies the importance of ensuring 'that incidental catch of the species is kept to a minimum'. This is currently being achieved by implementing an incidental total allowable catch to cover the catch of the species while targeting other species. This catch limit is reviewed annually, and in the years since 2008 has been reduced from 365 t in the 2008/09 fishing season to being set at 118 t for the 2012/13, 2013/14 and 2014/15 fishing seasons (AFMA, 2012; AFMA, 2014).

The Committee considers that key threats to recovery and appropriate strategies to potentially counter these are identified in the rebuilding strategy.

Strategies for rigorous evaluation of the effectiveness of the plan against its objectives, with a clear description of the monitoring and review process and its associated timelines

As discussed above, the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy*, under 'Monitoring and Evaluation', outlines the Australian Fisheries Management Authority's strategy for evaluation, including annual reviews of catch limits and biological information and a complete review of the rebuilding strategy in five years (AFMA, 2014).

A research plan where this is considered necessary

The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* lists 'to improve knowledge of stock status, including improved data collection and monitoring that will inform future management responses' as a key aim (AFMA, 2014).

The Committee considers that the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) satisfies subparagraph 179(6)(b)(ii) of the EPBC Act.

The Committee considers the plan of management, including its objectives, rebuilding targets and timeframes, performance criteria, actions, identification of key threats, strategies and research plan to be potentially sufficient to halt population decline, and support the rebuild (recovery) of the species over the longer term. Therefore, the species has been demonstrated to have met the relevant elements of subparagraph 179(6)(b)(ii) of the EPBC Act.

Subparagraph 179(6)(b)(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory

To be 'in force under law', the plan of management (rebuilding strategy) must provide for, or give some, legal effect to the plan.

The *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) is applicable only within the Southern and Eastern Scalefish and Shark Fishery. The fishery has a management plan, the *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003*, made under section 17 of the *Fisheries Management Act 1991*. Management of this fishery uses output controls including annual total allowable catch limits for a range of quota species, including blue warehou. These are given legal effect by being registered within a legislative instrument annually. Another legislated management measure listed within the rebuilding strategy as contributing to its objectives is gear restrictions.

Stock rebuilding strategies are not determined by legislative instrument as a 'plan of management' under section 17 of the *Fisheries Management Act 1991*, unlike fishery-wide management plans such as the *Southern and Eastern Scalefish and Shark Fishery*

Management Plan 2003. Fishery management plans do not expressly mention 'stock rebuilding strategies' and make no express provision for matters contained in a stock rebuilding strategy to be applied, adopted or incorporated.

To meet subparagraph 179(6)(b)(iii), all of the actions that are necessary to stop the decline of, and support the recovery of blue warehou stocks, so that its chances of long term survival in nature are maximised, need to be legislated.

The incidental total allowable catch limits, limited entry concessions, gear restrictions and fishery closures listed as management actions in the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* are all legislated. Therefore, the Committee considers that the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* meets the relevant elements of subparagraph 179(6)(b)(iii).

The Committee considers that the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) satisfies subparagraph 179(6)(b)(iii) of the EPBC Act.

The Committee considers that all management actions that are necessary to stop the decline of, and support the recovery of blue warehou stocks, so that its chances of long term survival in nature are maximised, are legislated and therefore the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) meets subparagraph 179(6)(b)(iii).

Subparagraph 179(6)(b)(iv) cessation of the plan of management would adversely affect the conservation status of the species

The cessation of the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) would adversely affect the conservation status of blue warehou. Cessation of the management plan would mean that actions providing for the halt of decline and rebuilding of the stocks of the species would cease and this would result in the species being eligible for listing in the critically endangered category under Criterion 1. Cessation of the plan would allow actions otherwise prevented under the plan to resume, and the species would no longer be protected from key threats, thereby affecting the species' conservation status.

The Committee accepts that, without the rebuilding strategy, further declines in population from its current low level are likely because if incidental total allowable catch limits were removed, the current stock levels are likely not to be able to tolerate increased fishing pressure.

The Committee considers that the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) will provide management actions necessary to stop the decline of, and support the recovery of, blue warehou so that its chances of long term survival in nature are maximised, and that without implementation of this plan the conservation status of the species would be adversely affected. Therefore, the species has been demonstrated to have met the relevant elements of subparagraph 179(6)(b)(iv) of the EPBC Act.

Conclusion

Conservation status

Seriolella brama (blue warehou) was nominated for inclusion in the list of threatened species referred to in section 178 of the EPBC Act.

The Committee considers that the decline of blue warehou throughout its entire Australian distribution is very severe, being at least 80 per cent, and the extent that threats from fishing have ceased impacting the species is currently unclear. Therefore, the Committee considers that the species has been demonstrated to have met sufficient elements of Criterion 1(A2) to make it **eligible** for listing as **critically endangered**.

The Committee has evaluated the *Blue Warehou (Seriolella brama) Stock Rebuilding Strategy* (plan of management) for the species, and considers that it could be effective in halting further decline and supporting recovery of blue warehou in order to maximise its chance of survival in nature, and the management actions identified within the rebuilding strategy are legally effective. Therefore, the Committee judges that blue warehou has been demonstrated to have met the requirements of paragraph 179(6)(b) of the EPBC Act and is **eligible** for listing as **conservation dependent**.

The highest category for which blue warehou is **eligible** to be listed is **critically endangered**.

In considering its recommendation, the Committee has also considered paragraph 186(2) of the EPBC Act – ‘the effect that including the native species in that category could have on the survival of the species’. The Committee has considered the effect of listing in either the critically endangered and conservation dependent categories could have on the survival of blue warehou and has decided that the conservation dependent category is likely to provide the best outcome for the species because:

- actions for the species’ protection and recovery will be implemented immediately under law.
- the actions will remain in place while the species remains listed as conservation dependent.
- monitoring is required to meet specified rebuild targets, albeit over a long timeframe.

While the blue warehou is eligible for both the critically endangered and conservation dependent categories, in light of the considerations of subsection 186(2), the Committee **recommends listing in the conservation dependent category** subject to the actions identified above by the Committee being implemented under law.

Public Consultation

Notice of the proposed amendment was made available for public comment for at least 30 business days between August and November 2012. Any comments received that are relevant to the survival of the species have been considered by the Committee.

Recommendation

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the **conservation dependent** category:

Seriolella brama

Threatened Species Scientific Committee

3 September 2014

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