Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee (the Committee) on Amendment to the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

1. Name

Orectolobus maculatus

This species is commonly known as spotted wobbegong. 'Wobbegong' is reputed to be an Indigenous name meaning 'shaggy beard', referring to the fleshy tassels found around the head and mouth. Spotted wobbegong are in the Family Orectolobidae.

2. Reason for Conservation Assessment by the Committee

This advice follows assessment of information provided by a public nomination to list the spotted wobbegong. The nominator suggested listing in the **vulnerable** category of the list.

The Committee provides the following assessment of the appropriateness of the species' inclusion in the EPBC Act list of threatened species.

This is the Committee's first consideration of the species under the EPBC Act.

3. Summary of Conclusion

The Committee judges that the species has not been demonstrated to have met the relevant elements of any Criteria, and is therefore **not eligible** for listing in any category under the EPBC Act.

4. Taxonomy

The species is conventionally accepted as *Orectolobus maculatus* (Bonnaterre, 1788).

5. Description

Wobbegong are small to large, bottom-dwelling sharks. They have flattened heads and bodies and large mouths with very sharp, dagger-like teeth. Their mouths are surrounded by characteristic tassels or lobes. They have two spineless dorsal fins of moderate height. There are 11 species of wobbegong, and 10 of those species are found in Australia. Several cryptic species have recently been detected and described (e.g. Huveneers, 2006; Last et al., 2006; Corrigan et al., 2008; Last and Chidlow, 2008). All wobbegong species have ornate colour patterns. Spotted wobbegong are a pale yellowish-brown or greenish-brown on their upper surface. This is overlain with numerous white circles made up of small spots, as well as some dark blotches. They have four dark saddles in front of the dorsal fins (Last and Stevens, 2009). Along with the gulf wobbegong (*O. halei*), spotted wobbegong are the largest species of wobbegong.

6. National Context

Spotted wobbegong occur along the southern two-thirds of the Australian coastline. On the east coast spotted wobbegong have been recorded from the Swain Reefs in Queensland through to at least Port Phillip Bay in Victoria, albeit with an apparent disjunct distribution in the Bass Strait. The species is also recorded in small numbers from South Australia (St Vincent's Gulf) and in moderate numbers from Western Australia (as far north as Exmouth) (Huveneers et al., 2009a; Last and Stevens, 2009). In Western Australia in past decades the species was likely frequently confused with the dwarf spotted wobbegong (*O. parvimaculatus*), a similar species only formally described in 2008 (Last and Chidlow, 2008). Reports of this species from Tasmania are probably invalid (Huveneers et al., 2009a; Last and Stevens, 2009). Reports of this species from the South China Sea and Japan are

now thought to involve species other than spotted wobbegong (Huveneers et al., 2009a; Last and Stevens, 2009). The spotted wobbegong is therefore considered to be a species endemic to temperate and sub-tropical Australian waters (Compagno, 2001; Huveneers et al., 2009a; Last and Stevens, 2009).

The International Union for the Conservation of Nature (IUCN) lists the species as vulnerable in NSW and near threatened nationally (Cavanagh et al., 2003; Huveneers et al., 2009a).

Spotted wobbegong are currently not listed as threatened under the EPBC Act or under any state legislation. Spotted wobbegong are subject to fishing regulations in some states:

- In NSW, since 2007, recreational fishers have a bag limit of zero while commercial fishers are restricted to a bag limit of six wobbegong per day and a minimum size limit of 130 cm.
- In Victoria, a recreational catch limit of one shark per person (including wobbegong species) applies; there are no commercial restrictions but also no commercial targeting of the species.
- In Western Australia, a recreational catch limit of two sharks per person (including wobbegong species) applies and commercial shark fishing is restricted.
- In Queensland, a recreational bag and possession limit of one shark per person (including wobbegong species), and a maximum size limit of 1.5 m, applies.

There are no commercial or recreational fishing restrictions on wobbegong species in South Australia.

7. Relevant Biology/Ecology

Spotted wobbegong have been recorded to a depth of at least 218 metres (Kyne et al., 2005) but appear to be largely an inshore species. Adult wobbegong of all species are usually found resting on the sea floor in and around areas of rocky reef, boulders and sand, and in some areas, coral reef (Compagno, 2001). They have a preference for topographically complex rocky habitats and can be quite cryptic, resting under rocks and boulders, although spotted wobbegong are more likely to sit on sand patches than other species (Huveneers et al., 2009b). Juvenile spotted wobbegong are occasionally found in estuaries and over sea-grass beds (Huveneers et al., 2009a; Last and Stevens, 2009). Newborn and small juvenile wobbegong of all species are rarely seen and are suspected to be highly cryptic, hiding in rock crevices and similar places (Huveneers et al., 2009b).

A study using recreational divers recorded many more spotted wobbegong in northern NSW than southern NSW (Huveneers et al., 2009b). This may be a result of habitat preferences (complex rock habitat predominates in northern NSW, as opposed to boulder habitat in southern NSW); preferences for warmer water temperatures; or depletion of spotted wobbegong in southern NSW due to heavy targeted fishing. Potential for localised depletion of spotted wobbegongs is possible as individuals of other wobbegong species (*O. ornatus*, *O. halei*) have been recorded residing in specific sites for up to 20 months (Huveneers et al., 2009b). However, another study recorded no pregnant spotted wobbegong in central and southern NSW (Huveneers et al., 2007b), indicating this northern bias may be partly biological in nature.

The diet of spotted wobbegong is primarily based on bony fish, but also includes small quantities of cephalopods (i.e. various octopus species, cuttlefish) and chondrichthyans (i.e. other sharks) (Huveneers et al., 2007a). The fish species taken are mostly demersal species typical of inshore marine habitats such as snapper (*Pagrus auratus*), pike eel (*Muraenesox bagio*) and sweep (*Scorpis* spp.). However, two pelagic fish species are also taken, yellowtail scad (*Trachurus novaezelandiae*) and slimy mackerel

(*Scomber australasicus*), with the latter making a significant contribution to the diet (Huveneers et al., 2007a).

Age and growth in wobbegong species remains uncertain. Shark species are aged by examining the growth bands deposited in their vertebrae, which are generally deposited at a rate of one band per year. Several studies have found that wild and captive wobbegong (*O. ornatus, O. maculatus, O. halei, O. hutchinsi*) do not put down growth bands in a predictable annual manner and have vertebral banding that are difficult to interpret (Tanaka, 1990; Chidlow et al., 2007; Huveneers, 2007). One study did find however that the growth rates of captive wobbegong supported the assumption of one growth band per year in wild specimens (*O. hutchinsi*) (Chidlow et al., 2007). A maximum age of 26 years was recorded from several wobbegong species studied in NSW (*O. ornatus, O. maculatus, O. halei*) (Huveneers, 2007) while a maximum age of 32 years of age was recorded for *O. hutchinsi* in Western Australia (Chidlow et al., 2007).

Spotted wobbegong have been reliably recorded to at least 170 cm in length, but there are reports of specimens up to 300 cm in length (Huveneers et al., 2009a; Last and Stevens, 2009). Using data from over 100 specimens and a von Bertalanffy growth model, Huveneers (2007) calculated a theoretical mean maximum size (growth asymptote) of ~176 cm for spotted wobbegong. However such calculated maximum sizes are dependent upon data from limited sampled specimens, and it is likely that some spotted wobbegong individuals can exceed this size.

Huveneers (2007) concluded that spotted wobbegong reached sexual maturity at ~125 cm in length. He estimated this to be at eight years of age using whole vertebrae, or at 14 years of age using thin-sliced vertebrae sections. Consequently, generation length is tentatively estimated as either 17 years ([26+8]/2) or 20 years ([26+14]/2) respectively.

Huveneers et al. (2007b) estimated an L_{50}[1] of ~112 cm for female wobbegong based on ovary condition, and an L_{50} of ~128 cm for male wobbegong based on clasper[2] calcification.

Wobbegong species employ a form of reproduction known as aplacental viviparity, where fertilised eggs (i.e. developing embryos) are retained in the mother shark's uterus during development but are not nourished by a placenta, instead deriving their nutrition solely from their yolk sacs (Last and Stevens, 2009; Huveneers et al., 2011).

Spotted wobbegong have a triennial (3 year) reproductive cycle. Ovarian follicles[3] in female wobbegong do not grow for the first 12 months after parturition (birth) of the previous litter. In the next 10–11 months the follicles develop rapidly, with ovulation occurring in November. Mating (and fertilisation of ova) is suspected to occur in December–January. Parturition of pups occurs the following September–October after a gestation period of 10–12 months, with litters averaging 21 pups. New-born pups average 23 cm in size (Huveneers et al., 2007b).

Huveneers et al. (2007b) report that no pregnant spotted wobbegong, or female spotted wobbegong in advanced reproductive condition, have been recorded in central or southern NSW, either by researchers or by commercial fishermen operating in these regions for more than 15 years. However, they are regularly recorded in northern NSW. Huveneers et al. (2007b) propose several explanations for this: (1) female wobbegong may stop feeding during mating periods, reducing their capture on baited lines; (2) female wobbegong may migrate to warmer northern waters to increase rates of follicular and embryonic development;

[1] The length at which approximately 50% of individuals in a population have reached sexual maturity, as estimated from sampled specimens.
[2] Claspers are modifications to the pelvic fins of male sharks, which are used to transfer sperm to female sharks and achieve internal fertilisation.
[3] A follicle is a small cavity in the ovary in which an ovum, surrounded by its encasing cells, is held. If developed to maturity and released, this ovum becomes an ova, or in other words, a viable egg awaiting fertilisation. Ovaries contain a large number of follicles.

(3) female wobbegong may move to locations where targeted fishing does not occur (e.g. estuaries or offshore locations) (Huveneers et al., 2007b).

8. Description of Threats

Overfishing

Overfishing is the main threat to spotted wobbegong. Commercial fishing is the main concern, however past and present recreational fishing take may also be significant. The National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) reported that 5,174 wobbegong (species not identified/separated) were caught and kept by recreational fishers in southern Australian states during the survey time period (May 2000–April 2001), comprising 1,944 from NSW, 999 from Queensland, 252 from South Australia, and 1,978 from Western Australia.

Spotted wobbegong are biologically vulnerable to fishing pressure, given their late age at sexual maturity and low reproductive output. Evidence of medium-term site fidelity in other closely related species (e.g. Carraro and Gladstone, 2006) suggests there is potential for localised depletion as well.

QLD

Fisheries Queensland state that between July 2008 and July 2011 less than five wobbegong individuals per year (species not identified/separated) were reported in logbooks for commercial net and line fisheries (Fisheries Queensland, 2011). (Before 2008, wobbegong catch was often recorded simply as 'shark'.) Similarly, Fisheries Queensland state that observers have recorded spotted wobbegong on trawl fishery operations, however less than five spotted wobbegong individuals have been recorded per year over the last two financial years (2009/2010, 2010/2011), with all encountered individuals released alive (Fisheries Queensland, 2011).

A recent study from December 2004 to October 2007 captured 58 spotted wobbegong for dissection (via bycatch from commercial gill nets, and sampling utilising set line, drop line, gill net, seine net, and hand net), and tagged and released a further 68 spotted wobbegong (via sampling using hand nets), in Moreton Bay alone (Stead, unpubl. data, 2012). These data suggest that there are significant numbers of spotted wobbegong in southern Queensland, and that the incidental capture rate by Queensland commercial fishermen is likely to be higher than reported.

The National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) reported that 999 wobbegong (species not identified/separated) were kept by recreational fishers in Queensland in 2000/2001.

NSW

In NSW, commercial fishing targeting wobbegong with baited cross-lines commenced in 1990/1991 in that state's Ocean Trap and Line Fishery. Total catches of wobbegong species subsequently declined by a large amount between 1990/1991 (~150 tonnes) and 1999/2000 (~70 tonnes) (Huveneers, 2007; Huveneers et al., 2007b; Huveneers et al., 2009a), estimated at >60% decline by Cavanagh et al. (2003) and ~55% decline by IUCN (Huveneers et al., 2009a). However, interpreting this decline in total catch is complicated by the facts that: effort was recorded only as number of days fished; wobbegong species were not separated in catch records (but see next paragraph); and effort has varied — the number of fishers landing wobbegong declined from about 520 in 1990/1991 to 250 in 2003/2004[4] (Huveneers, 2007; Huveneers et al., 2007b; Huveneers et al., 2009a). Therefore, catch rate and catch-per-unit-effort (CPUE), which offer more accurate insights into likely stock trends, cannot be calculated. Nevertheless, this strong decline in total catches in NSW led the IUCN

[4] NSW trend data on number of fishers between 2003–2004 and implementation of restrictions on wobbegong take in 2007 is not available.

to consider them vulnerable in New South Wales, and near threatened nationally (Cavanagh et al., 2003; Huveneers et al., 2009a). Recreational divers reported notable declines in wobbegong numbers during this period (Huveneers, 2007). No specific restrictions were put on wobbegong harvest in NSW until 2007 (see National Context).

The proportion of the NSW wobbegong population that spotted wobbegong comprise, and the proportion of NSW commercial wobbegong catches that spotted wobbegong comprise, is roughly indicated by two studies. A study by Huveneers et al. (2009) used recreational scuba divers to sight, identify and record wobbegongs in NSW. Between July 2003 and January 2005, 402 wobbegongs were sighted and positively identified, and of those, 229 individuals or 60% were identified as spotted wobbegongs. Huveneers et al. (2007c) examined the catch composition of commercial NSW wobbegong catches. Between June 2003 and May 2006, Huveneers et al. (2007c) recorded 904 wobbegongs caught by commercial fishers in NSW, and spotted wobbegongs (*O. maculatus*) comprised 185 individuals or 20% of this catch. (Gear selectivity and fine scale variations in habitat use are possible reasons for the differing 'encounter rate' for spotted wobbegong between the two studies.) Using this figure of 20%, a minimum of 30 tonnes of spotted wobbegong were estimated to have been caught when wobbegong were first targeted (1990/1991) in the NSW Ocean Trap and Line Fishery.

Since July 2007 however, recreational fishers can no longer take wobbegong, while commercial fishers are restricted to a bag limit of six wobbegong per day (any species) and a minimum size limit of 130 cm. Use of wire traces is also banned. NSW Fisheries suggests that this has effectively stopped the commercial targeting of wobbegong in NSW, resulting in a drop in the total catch of wobbegong species to about 20 tonnes (Rowling et al., 2010; cited in Huveneers, 2011).

The National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) reported that 1,944 wobbegong (species not identified/separated) were kept by recreational fishers in NSW in 2000/2001.

Victoria

In Victoria, there has been no targeted commercial fishing for spotted wobbegong. The available commercial catch/effort data suggest that there is a very small amount of wobbegong by-catch in the ocean fishery. Total reported landings vary between 5–150 kilograms per year during 2000 to 2010 (VIC DPI, 2011). There is some targeting by recreational spearfishers (VIC DPI, 2011), which is a concern given the role recreational spearfishing has played in depleting other large vulnerable inshore marine species (Nevill, 2006; Lloret et al., 2008; Godoy et al., 2010). Anecdotal reports from experienced abalone divers operating between Lakes Entrance and Mallacoota indicate that sightings of spotted wobbegong have become less frequent over the last 20 years (VIC DPI, 2011).

South Australia

In South Australia, wobbegong species are caught in relatively small numbers. In state managed fisheries, commercial catches of wobbegong species are small (about 0.5–2.5 tonnes) with the highest yearly catch being 3.1 tonnes in 1987/88. The proportion of spotted wobbegong in these reported catches is not known (SA DENR, 2011). In Commonwealth managed fisheries, wobbegong species are taken as bycatch within the Southern and Eastern Scalefish and Shark Fishery, mainly in the Great Australian Bight Trawl Fishery sector (AMFA, 2011). Retained wobbegong bycatch from this fishery between 2004 and 2010 ranged from 5.98 tonnes to 12.36 tonnes. The proportion of spotted wobbegong in these reported catches is also not known (AFMA, 2011). It is suggested by AFMA that spatial closures including minimum depth restrictions and gear restrictions keep catches in other sectors of the Southern and Eastern Scalefish and Shark Fishery at very low levels (AFMA, 2011).

Wobbegong species are sometimes caught in lobster pots (SA DENR, 2011).

The National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) reported that 252 wobbegong (species not identified/separated) were kept by recreational fishers in South Australia in 2000/2001. From the limited data on recreational catch there has been a 38% decline in total number of wobbegong caught recreationally in South Australia, from 661 in 2000/01 to 251 in 2007/8. Additionally the release rate appeared to decline significantly from 89.6% to 15.95% (Jones, 2009; cited in SA DENR, 2011). There is some unconfirmed evidence (from recreational fishing reports) of relatively high numbers of benthic sharks being taken by recreational fishers in the more accessible coastal waters in parts of South Australia. Examples of locations in SA where wobbegong are taken by recreational fishers include southern Fleurieu Peninsula and southern Yorke Peninsula (Baker, 2004; cited in SA DENR, 2011).

Western Australia

In Western Australia, wobbegong species are not separated by commercial fishers in catch reporting. However, between November 2000 and June 2007, WA Fisheries researchers recorded 1,013 wobbegong sharks in total catches (including discards) of commercial shark boats operating in the South Coast Demersal Gillnet and Demersal Longline Managed Fishery and the West Coast Demersal Gillnet and Demersal Longline Interim Managed Fishery. Of these 1,013 wobbegong, 2.1% were identified as spotted wobbegong (WA Fisheries, 2011).

The majority of reported Western Australian wobbegong catch has come from the South Coast Demersal Gillnet and Demersal Longline Managed Fishery and the West Coast Demersal Gillnet and Demersal Longline Interim Managed Fishery. These fisheries have reportedly taken between 30 and 70 tonnes per year from 1990 to 2010, without any clear increasing or decreasing trend in catches. In general, only larger wobbegong greater than 120 cm are retained by fishers. Research monitoring estimating the species-composition by weight of wobbegong larger than 120 cm has concluded that spotted wobbegong make up approximately 9% of the retained wobbegong catch (WA Fisheries, 2011).

The trend in catch-per-unit-effort (CPUE) of wobbegong (per kilometre-gillnet-day) by commercial gillnet fishers on the south and west coasts has shown slight catch increases through the 1990s before becoming erratic between 2003–2008. This is suggested to be due to new fisheries regulations and catches previously being attributed to the wrong technique (WA Fisheries, 2011). Post-2008 CPUE show a slight decline but little can be concluded from this.

WA fishery management arrangements were strengthened between 2006 and 2008. These measures included the commercial protection (i.e. no retention) of all sharks in fisheries other than the target-shark gillnet and long line fisheries, the northern shark fisheries, the marine aquarium fish fishery and three northern fisheries in which shark catches have been assessed as a low sustainability risk. Additionally, the use of wire trace and large hooks was prohibited in all but three WA-managed fisheries between 2006 and 2008. It is suggested by WA Fisheries these measures should prevent the retention of wobbegong by commercial fishers operating outside the demersal gillnet and long line fisheries (WA Fisheries, 2011).

Recent management measures include a closed season for demersal recreational fishing and a closed area for commercial fishing, including gillnet and long line, between 31 and 33 degrees south. It is suggested by WA Fisheries that catches of wobbegong species in the near future are expected to be substantially less than in recent decades, e.g. the commercial catch may continue at around 40–50 tonnes per year and the recreational catch at around 200 animals per year (WA Fisheries, 2011). WA Fisheries (2011) estimate this would equate to a commercial catch of approximately four tones of spotted wobbegong, and a recreational take of four individuals of spotted wobbegong, per year in Western Australian waters.

Small wobbegong occasionally enter lobster pots and are unable to escape. The number of wobbegong retained by rock lobster fishers has always been very low and is now expected to be zero due to the commercial protection of sharks in most state fisheries. The probability of discarded wobbegong surviving is very high (Braccini et aI., 2011; cited in WA Fisheries, 2011).

A 12 month survey carried out by WA Fisheries during 1996–1997 reports that an estimated 1,000 individual wobbegong were caught and retained by recreational fishers, with a further 590 caught and released. Species-specific data are not reported (Sumner and Williamson, 1999; cited in WA DEC, 2011).

The National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) reported that 1,978 wobbegong (species not identified/separated) were kept by recreational fishers in WA in 2000/2001.

Gut-hooking

A general threat to wobbegong species is the rate of gut-hooking that occurs when they are caught on conventional 'J' [shaped] hooks. Huveneers et al. (2007a) recorded an extremely high gut hooking rate of approximately 80% in wobbegong species caught on 'J' hooks. Therefore, commercial and recreational line fishing interactions may result in significant mortality of wobbegong sharks, even if individuals are released, reducing the effectiveness of bag limits and minimum sizes.

The use of circle hooks, which are designed to consistently hook fish (and sharks) in the corner of the mouth, generally alleviates this problem. However informal trials have revealed similar rates of gut hooking wobbegong with both 'J' hooks and circle hooks (Huveneers, pers. comm., 2012).

9. Public Consultation

The nomination was made available for public exhibition and comment for 30 business days. No comments were received.

10. How judged by the Committee in relation to the criteria of the EPBC Act and Regulations

The Committee judges that the species is **not eligible** for listing in any category under the EPBC Act. The assessment against the criteria is as follows:

Criterion 1: It has undergone, is suspected to have undergone or is likely to undergo in the immediate future a very severe, severe or substantial reduction in numbers

The Committee infers a reduction potentially exceeding 55% in total commercial catch of wobbegong species in NSW, between 1990/1991 and 1999/2000, to be a substantial decline in NSW stocks of spotted wobbegong, notwithstanding poor recording and variation in commercial fisher numbers and effort (Huveneers, 2007; Huveneers et al., 2007b; Huveneers et al., 2007c; Huveneers et al., 2009a). This trend is supported by anecdotal reports from commercial fishers of heavy declines of wobbegong species in some areas, particularly in areas south of Sydney (Huveneers, 2007), and of exploitation leading to the removal of most individuals in some wobbegong populations around Sydney (Lee, pers. comm., 2012). The Committee also notes that the NSW decline is based on data up to 2000, but that effective restrictions on the NSW fishery were not imposed until 2007 (Rowling et al., 2010; cited in Huveneers, 2011).

In addition to this inferred substantial decline of spotted wobbegong in NSW, the Committee notes possible declines of spotted wobbegong in Victoria and South Australia (Baker, 2004

cited in SA DENR, 2011; VIC DPI, 2011) and commercial fishing pressure in WA (WA Fisheries, 2011).

However, catch data from southern Queensland (Stead, unpubl. data, 2012) and from WA (WA Fisheries, 2011) suggest significant numbers of spotted wobbegong exist in these states, and there is no evidence to date of substantial declines in these states. Therefore, while spotted wobbegong is inferred as having declined substantially in NSW, over the whole of the species' distribution (i.e. national extent) the decline has not been sufficient to meet the indicative thresholds for substantial, severe or very severe decline. Thus the species has not met the relevant elements of Criterion 1 and is **not eligible** for listing in any category under this Criterion.

Criterion 2: Its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited

The spotted wobbegong has been subject to the threat of commercial overfishing in NSW and possibly recreational overfishing in other states (Huveneers, 2007; Huveneers et al., 2007b; Huveneers et al., 2007c; Huveneers et al., 2009a; SA DENR 2011; VIC DPI, 2011). Concerns remain about the high rate of gut-hooking of wobbegong species, including spotted wobbegong, on 'J' hooks (Huveneers et al., 2007a). The Committee notes that the species' largely inshore distribution and occurrence along the heavily-settled and heavily-fished eastern Australian coastline (Huveneers et al., 2009a; Huveneers et al., 2009b; Last and Stevens, 2009) contributes to encounters between the species and commercial and recreational fishers. However, the Committee does not consider the overall threat profile faced by spotted wobbegong to be a primary result of its geographic distribution, and thus concludes that the species' geographic distribution is not precarious for its survival.

The spotted wobbegong has an extensive distribution throughout the southern Australian coastline, mostly in inshore waters but also in waters up to 218 metres in depth (Huveneers et al., 2009a; Last and Stevens, 2009). The Committee does not consider this distribution to be very restricted, restricted or limited.

In summary, the Committee does not consider that the species' geographic distribution is precarious for its survival nor very restricted, restricted or limited. 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 limited to a particular degree; and either

(a) evidence suggests that the number will continue to decline at a particular rate; or

(b) the number is likely to continue to decline and its geographic distribution is precarious for its survival

The Committee has concluded that spotted wobbegong have undergone a suspected substantial decline in NSW (Cavanagh et al., 2003; Huveneers, 2007; Huveneers et al., 2007b; Huveneers et al., 2007c; Huveneers et al., 2009a) and possible declines in Victoria and South Australia (Baker, 2004 cited in SA DENR 2011; VIC DPI, 2011). However, no population estimates are available, and as the spotted wobbegong has an extensive distribution throughout the southern Australian coastline (Huveneers et al., 2009a; Last and Stevens, 2009), the Committee is uncertain as to whether the species' overall numbers are below the relevant threshold of 10,000 mature individuals.

Recreational catches and anecdotal reports suggest spotted wobbegong may have declined in South Australia and Victoria to some degree (Baker, 2004 cited SA DENR 2011; VIC DPI, 2011). Total catch and catch-per-unit-effort data from Western Australia, where spotted wobbegong are a minor component of wobbegong catch, are inconclusive (WA Fisheries,

2011). The NSW fishery agency suggests that decline of spotted wobbegong has effectively halted due to reform of commercial fishing regulations in 2006 and 2007, which have limited commercial take and removed the incentive to target wobbegong species (Rowling et al., 2010; cited in Huveneers, 2011). Consequently, the Committee cannot reach a conclusion on the likelihood of future declines in the species.

The Committee has concluded that the spotted wobbegong's geographic distribution is not precarious for its survival.

In summary, the Committee is unable to conclude whether the total number of mature individuals is limited, or the likelihood of future decline in the species. The Committee has concluded the species' geographic distribution is not precarious for its survival. Therefore, as 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: The estimated total number of mature individuals is extremely low, very low or low

No population estimates are available for spotted wobbegong. However, as the spotted wobbegong has an extensive distribution throughout the southern Australian coastline (Huveneers et al., 2009a; Last and Stevens, 2009), the Committee considers it is highly unlikely that the species is below the highest relevant threshold for this criterion of 1,000 mature individuals (= low). Therefore, the Committee does not consider that the estimated total number of mature individuals of the species is extremely low, very low or low. The species has not been demonstrated to have met any required element of Criterion 4, and is **not eligible** for listing in any category under this Criterion.

Criterion 5: Probability of extinction in the wild that is at least

(a) 50% in the immediate future; or

(b) 20% in the near future; or

(c) 10% in the medium-term future

Data are unavailable to estimate the probability of extinction of the species 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.

11. The species' eligibility as conservation dependent.

Criterion 6a: 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.

The species is not the focus of a specific conservation program. Therefore, as the species has not been demonstrated to have met the required element of Criterion 6a, it is **not eligible** for listing in conservation dependent under this Criterion.

Criterion 6b:

i) the species is a fish

ii) and is the focus of a plan (or plans) 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 spotted wobbegong is a fish, but it is not the focus of a plan of management.

The Committee has identified components that it expects to be in a management plan to meet the requirements of Section 197(6)(b)(ii). These are:

- The rationale to limit reference points if identified for the species
- A clear statement of the objectives to be achieved, including rebuilding targets and timeframes that recognise the objectives of the EPBC Act. This will include an estimation of the duration of the recovery process
- Specified actions required to achieve the objectives
- Identification of the key threats to the recovery of the species and strategies to counter these threats, including detailed mitigation strategies for the incidental take of the species
- Specification of all significant related environmental impacts (positive and negative) that will arise from the implementation of the plan, including consideration of all relevant marine plans
- Performance criteria and 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.

While fishing regulations such as bag limits apply to sharks and rays in Queensland, New South Wales, Victoria, and Western Australia, the Committee does not consider that this 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 spotted wobbegong therefore does not satisfy subparagraph 6bi or 6bii of Section 179 of the EPBC Act and therefore is **not eligible** for listing as conservation dependent under this criterion.

iii) the plan of management is in force under a law of the Commonwealth or of a state or territory

While fishing regulations such as bag limits apply to sharks and rays in Queensland, New South Wales, Victoria, and Western Australia there is no plan of management for spotted wobbegong. The spotted wobbegong does not satisfy subparagraph 6bi or 6bii and therefore also cannot satisfy 6biii of Section 179 of the EPBC Act. It is **not eligible** for listing as conservation dependent under this criterion.

iv) cessation of the plan of management would adversely affect the conservation status of the species

While fishing regulations such as bag limits apply to sharks and rays in Queensland, New South Wales, Victoria, and Western Australia, and cessation of these regulations would be likely to adversely affect the conservation status of the species, the Committee does not consider that these regulations constitute ‘management plans’ for the purposes of section 179(6)(b) of the EPBC Act.

There is no plan of management for spotted wobbegong. The spotted wobbegong does not satisfy subparagraphs of Section 179 of the EPBC Act and therefore is not eligible for listing as conservation dependent under this criterion. Therefore, as the species has not been

demonstrated to have met the required elements of Criterion 6b, it is **not eligible** for listing in conservation dependent under this criterion.

Therefore, as the species has not been demonstrated to have met the required elements of either Criterion 6a or 6b, it is **not eligible** for listing in the conservation dependent category.

12. Conclusion

Conservation Status

Orectolobus maculatus (spotted wobbegong) was nominated for inclusion in the list of threatened species referred to in section 178 of the EPBC Act. The nominator suggested listing in the vulnerable category of the list.

The Committee infers a reduction potentially exceeding 55% in total commercial catch of wobbegong species in NSW, between 1990/1991 and 1999/2000, to be a substantial decline in NSW stocks of spotted wobbegong (Huveneers, 2007; Huveneers et al., 2007b; Huveneers et al., 2007c; Huveneers et al., 2009a). The Committee notes possible declines of spotted wobbegong in Victoria and South Australia (Baker, 2004; cited in SA DENR, 2011, VIC DPI, 2011). However, catch data from southern Queensland (Stead, unpubl. data, 2012) and from WA (WA Fisheries, 2011) suggest significant numbers of spotted wobbegong exist in these states, and there is no evidence to date of substantial declines in these states. Therefore, while spotted wobbegong is inferred as having declined substantially in NSW, over the whole of the species' distribution (i.e. national extent) the decline has not been sufficient to meet the indicative thresholds for substantial, severe or very severe decline.

The Committee further judges that the species' geographic distribution is not precarious for its survival or very restricted, restricted or limited; that numbers of individuals are not known but are unlikely to be limited or low; and that the possibility of further decline is not known but notes that a major source of decline (targeted commercial fishing in NSW) has now effectively ceased (Rowling et al., 2010; cited in Huveneers, 2011).

13. Recommendations

The Committee recommends that *Orectolobus maculatus* is **not eligible** for inclusion in the list of threatened species referred to in section 178 of the EPBC Act.

Threatened Species Scientific Committee
6 March 2013

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