Threatened Species Assessment

Platydoris galbana
Sea slug

Taxonomy

Platydoris galbana Burn, 1958

The original description of the species from Victoria (Burn, 1958) refers to the species as 'Platydoris galbana Burn 1958', however Rudman (2003) refers to it as 'Platydoris galbanus Burn 1958' on the 'Sea Slug Forum', where he tentatively identified the new individual from a photograph taken during an intertidal survey by Benkendorff (1999) in Ballambi NSW. Burn (2006) considered both names to be referring to the same species, and the Atlas of Living Australia (ALA) has *Platydoris galbanus* listed as a synonym for *Platydoris galbana*. The names are often used interchangeably between in the literature (see: O'Hara and Barmby, 2000; O'Hara, 1995).

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1991).

Categorised as Vulnerable in the 2009 Advisory list of threatened invertebrate fauna in Victoria (DSE 2009).

Proposed conservation status

Endangered in Victoria

Criterion B1ab(ii,iii,v)+2ab(ii,iii,v)

Species Information

Description and Life History

Platydoris galbana belongs to a genus of dorid nudibranches, commonly referred to as sea slugs, which are marine gastropods that lack a shell. Nudibranchs are almost entirely restricted to salt water and occur in seas throughout the world. Nudibranchs are benthic animals that are found to occur from the shallow intertidal zone to great depths in the ocean. They most commonly inhabit warm tropical reefs; however they are also distributed throughout temperate regions. There are at least 20 valid species of the genus distributed throughout temperate regions in the Atlantic, Eastern Pacific and Indo-Pacific (Dorgan et al., 2002). *P. galbana* is clearly distinguishable from other species within the genus by its external colouration, which is predominantly yellow (Dorgan et al., 2002). Species within this genus are known to be cryptic, typically inactive during the day and come out at night to search for food sources (Ruppert et al. 2004 cited in Invertebrates of the Coral Sea, 2019). *Platydoris* spp. are often found to co-occur with sponges as they are a preferred source of food (Megina et al., 2001).

Species belonging to the order Nudibranchia are simultaneous hermaphrodites, in that both the male and female sex organs are functional at the same time. Eggs are typically deposited onto a substratum, where they will develop over time and hatch into planktonic veliger larvae, then continue to grow as adults (Ruppert et al. 2004 cited in Invertebrates of the Coral Sea, 2019). *P. galbana* has been observed to produce egg masses in gelatenous ribbons underneath boulders in the intertidal zone (Benkendorff, 1999; Przeslawski et al., 2005); however the number of eggs is unknown. Information available for other species within the family (namely *P. scabra, Anisodoris lentiginosa* and *Jorunna funebris*) suggests that the number of eggs and the timing of developmental stages varies greatly (Millen, 1981; Kasamesiri et al., 2012). *P. scabra* has been shown to produce up to 1.5 million eggs at a time (Soliman, 1978), similarly, *A. lentiginosa* has been shown to produce maximum number of eggs as high as 135, 0000 (Millen, 1981). Such data suggest that *P. galbana* also produce a large number of eggs. However no studies have confirmed this.

There are no specific data available for *P. galbana* in relation to age at sexual maturity and reproductive rates. However many heterobranch sea slugs experience very short life cycles, and can respond quickly to perturbations in the environment (Nimbs and Smith, 2016), with the potential to be used as indicator species to detect environment change (Goddard et al., 2016). Information available for other species within the family Discodorididae suggests that the embryonic period may take between 6 days to 1.5 months (from oviposition to hatching) and veligers may remain in the planktonic stage for 4 days to 1.5 months (see: Wolf and Kassamesiri et al., 2012; Millen, 1981). Studies for species within the order Nudibranchia (e.g. *Janolus fuscus*) suggest a generation length of approximately 105 days (Wolf and Young, 2012). However, *J. fuscus* is a subaunnual species from a different type locality and it has not been determined if *P. gilbana* follows a annual, sub-annual or biennial life cycle (Wolf and Young, 2012). As such, further research is required into the life history and reproductive biology of *P. galbana* is required.

Generation Length

The generation length of *Platydoris galbana* is inferred to be 105 days, inferred from studies conducted on other species (namely *J. fuscus*) within the order Nudibranchia (Wolf and Young, 2012).

Distribution

For 40 years *P. galbana* was considered to be a short range endemic, restricted to Victoria, until it was reported from Wollongong, NSW in 1998 (Nimbs 2017). It is known to occur in San Remo (reef flat) in Western Port Bay (O'Hara and Barmby, 2000), and also off of Delray and Woodside beach in south-east Victoria (O'Hara, 1995). Records also exist for Bass Point, Wollongong NSW; Port Stephens, NSW; Sydney, NSW and Bellambi, NSW (see Burn, 2015; Nimbs and Smith 2016, Przeslawski and Davis, 2007; Przselawski et al., 2005).

Habitat

The taxon occurs in Intertidal to shallow subtidal, rocky reefs at a depth of 0-30 m (Burn, 2006; Nimbs, 2016). The type locality in which it was originally recorded (San Remo reef flat) exhibits a combination of unique physical attributes that have not been documented anywhere else in Victoria. The San Remo Marine Community has a northerly orientation and experiences low wave energy. A fast-flowing channel is adjacent to the community, which facilitates nutrient availability. Furthermore, the rocky intertidal and boulder field is composed of weathered vesicular basalt which is usually subject to erosion by tides and is not often found in intertidal zones (O'Hara 1995).

Threats

Threats encountered by this taxon are based on those listed in O'Hara (2002) as being specific to vulnerable marine habitats in which this species is found: namely embayments and the intertidal/subtidal shallow zone. The San Remo Marine Community was listed under the FFG Act as it is highly prone to future threats which are likely to result in extinctions (O'Hara, 1995). Threats specific to the San Remo Marine community include impacts associated with development, damage from boating, recreational activities, changed currents, inflows and nutrient sedimentation loads, pollution and dredging. Climate change is also considered a significant risk.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(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

Evidence:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

There is no evidence to indicate whether the taxon has suffered significant past decline in population size or any other demographic parameter. However it is possible that an ongoing habitat decline may be occurring, due to the operating threats.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (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: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 74 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been amended to match the AoO.

It is suspected to have two locations, and has a continuing decline in (i), (ii), (iii) and (v) above. The habitat, and therefore the numbers and the area of occupancy are likely to continue to decline as a result of development, damage from boating, recreational activities, changed currents, inflows and nutrient sedimentation loads, pollution and dredging. As global warming could affect Victoria's marine environment in several ways, it is likely to result in a continuing decline in the quality of habitat.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 20 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, it has locations and has a continuing decline in (i), (ii), (iii) and (v) above.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C as Data Deficient

There is insufficient evidence to determine the number of mature individuals. Whilst there have been extensive surveys of the San Remo reef flats and the taxon has been recently found off the 90 Mile Beach, other targeted surveys for the taxon along the coastline have not been undertaken. Benthic marine surveys within Western Port are numerous (Melbourne Water 2011), but records for this taxon are only for the San Remo site.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	< 50	< 250	< 1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO < 20 km2 or number of locations ≤ 5

Evidence:

Eligible under Criterion D2 as Vulnerable

The taxon has a restricted distribution (i.e. AoO is 74) and has only one location, such that this restriction makes the taxon capable of becoming CR or EX within one or two generations in response to the identified threats.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

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