Section 5 supporting information

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APPENDIX 1

Freshwater fishes recorded from different Drainage Divisions in South Australia.

[x = recorded, ? unconfirmed records, * SA endemic, blue = diadromous, green = euryhaline]

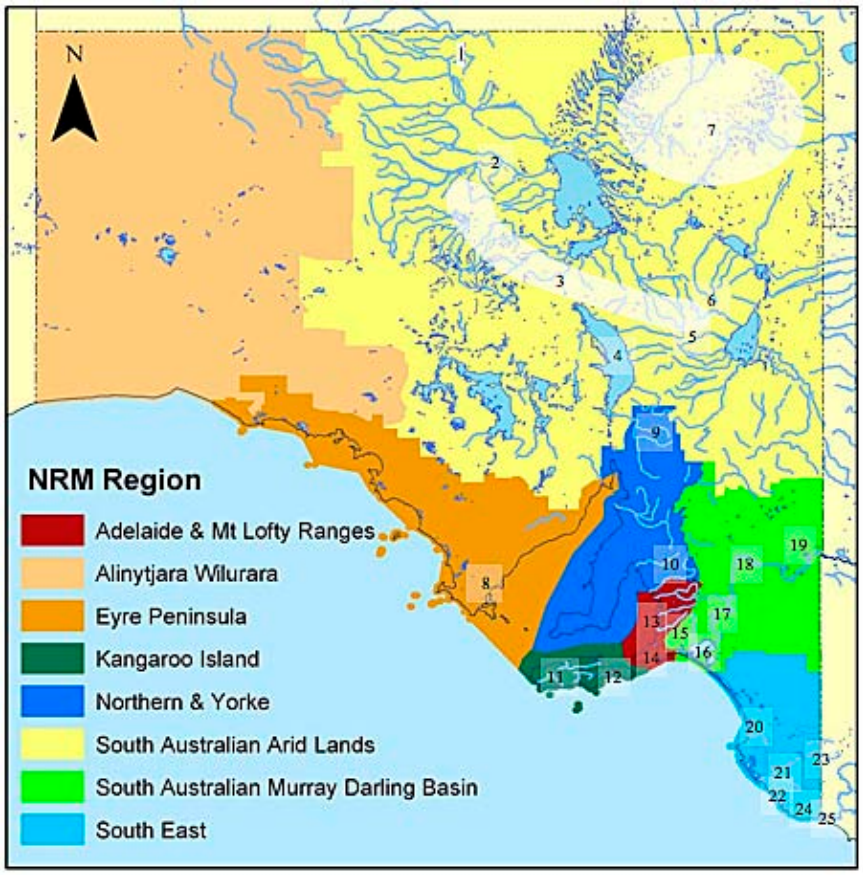
Family	Taxon	Common name	SEC	MD	SAG	LE	WP
Geotriidae	*Geotria australis*	Pouched Lamprey	x	x	x		
Mordaciidae	*Mordacia mordax*	Shortheaded Lamprey	x	x	x		
Anguillidae	*Anguilla australis australis*	Shortfinned Eel	x	x	x		
Plotosidae	*Neosiluroides cooperensis*	Cooper Catfish				x	
	Neosilurus gloveri	Dalhousie Catfish				x	
	Neosilurus hyrtlii	Hyrtl's Catfish				x	
	Porochilus argenteus	Silver Catfish				x	
	Tandanus tandanus	Freshwater Catfish		x			
Clupeidae	*Nematalosa erebi*	Bony Herring		x	?	x	
Retropinnidae	*Prototroctes maraena*	Australian Grayling	x				
	Retropinna semoni	Smelt	x	x		x	
Galaxiidae	*Galaxias brevipinnis*	Climbing Galaxias	x	x	x		
	Galaxias maculatus	Common Galaxias	x	x	x		
	Galaxias olidus	Mountain Galaxias	x	x	x		
	Galaxias rostratus	Flathead Galaxias		x			
	Galaxias truttaceus	Spotted Galaxias	x				
	Galaxiella pusilla	Dwarf Galaxias	x				
	Neochanna cleaveri	Australian Mudfish	x				
Melanotaeniidae	*Melanotaenia fluviatilis*	Murray Rainbowfish	?	x			
	Melanotaenia splendida tatei	Desert Rainbowfish				x	
Atherinidae	*Atherinosoma microstoma*	Smallmouthed Hardyhead	x	x	x		x
	Craterocephalus dalhousiensis	Dalhousie Hardyhead				*	
	Craterocephalus eyresii	Lake Eyre Hardyhead			*	*	?
	Craterocephalus fluviatilis	Murray Hardyhead		x			
	Craterocephalus gloveri	Glover's Hardyhead				*	
	Craterocephalus stercusmuscarum fulvus	Unspecked Hardyhead		x			
	Craterocephalus stercusmuscarum stercusmuscarum	Flyspecked Hardyhead				x	
Ambassidae	*Ambassis agassizii*	Agassiz's Glassfish		x			
	Ambassis sp.	Northwest Glassfish				x	
Percichthyidae	*Gadopsis marmoratus*	River Blackfish	x	x	x		

Appendix 1 continued....

Family	Taxon	Common name	SEC	MD	SAG	LE	WP
	Maccullochella macquariensis	Trout Cod		x			
	Maccullochella peelii peelii	Murray Cod		x			
	Macquaria ambigua ambigua	Murray-Darling Golden Perch		x			
	Macquaria australasica	Macquarie Perch		x			
	Macquaria colonorum	Estuary Perch	x	x			
	Macquaria sp.	Lake Eyre Golden Perch				x	
	Nannoperca australis	Southern Pygmy Perch	x	x	x		
	Nannoperca obscura	Yarra Pygmy Perch	x	x			
	Nannoperca variegata	Variegated Pygmy Perch	x				
Terapontidae	*Amniataba percoides*	Banded Grunter				x	
	Bidyanus bidyanus	Silver Perch		x			
	Bidyanus welchi	Welch's Grunter				x	
	Leiopotherapon unicolor	Spangled Grunter		x	?	x	?
	Scortum barcoo	Barcoo Grunter				x	
Pseudaphritidae	*Pseudaphritis urvillii*	Congolli	x	x	x		x
Eleotridae	*Hypseleotris klunzingeri*	Western Carp Gudgeon		x		x	
Eleotridae	*Hypseleotris klunzingeri*	Western Carp Gudgeon		x		x	
	Hypseleotris sp. 1	Midgley's Carp Gudgeon		x		x	
	Hypseleotris sp. 3	Murray Darling Carp Gudgeon		x	x		
	Hypseleotris spp.	Hybrid forms (e.g. Lake's Carp Gudgeon)	x		x		
	Mogurnda adspersa	Southern Purple-spotted Gudgeon		x	x		
	Mogurnda clivicola	Flinders Ranges Purple-spotted Gudgeon		x			
	Mogurnda thermophila	Dalhousie Purple-spotted Gudgeon			*		
	Philypnodon grandiceps	Flathead Gudgeon	x	x	x		
	Philypnodon macrostomus	Dwarf Flathead Gudgeon		x	x		
Gobiidae	*Chlamydogobius eremius*	Desert Goby				*	
	Chlamydogobius gloveri	Dalhousie Goby				*	
	Pseudogobius olorum	Western Bluespot Goby	x	x	x		x
	Tasmanogobius lasti	Lagoon Goby	x	x	x		
Totals		58	21	35	17	23	3

APPENDIX 2

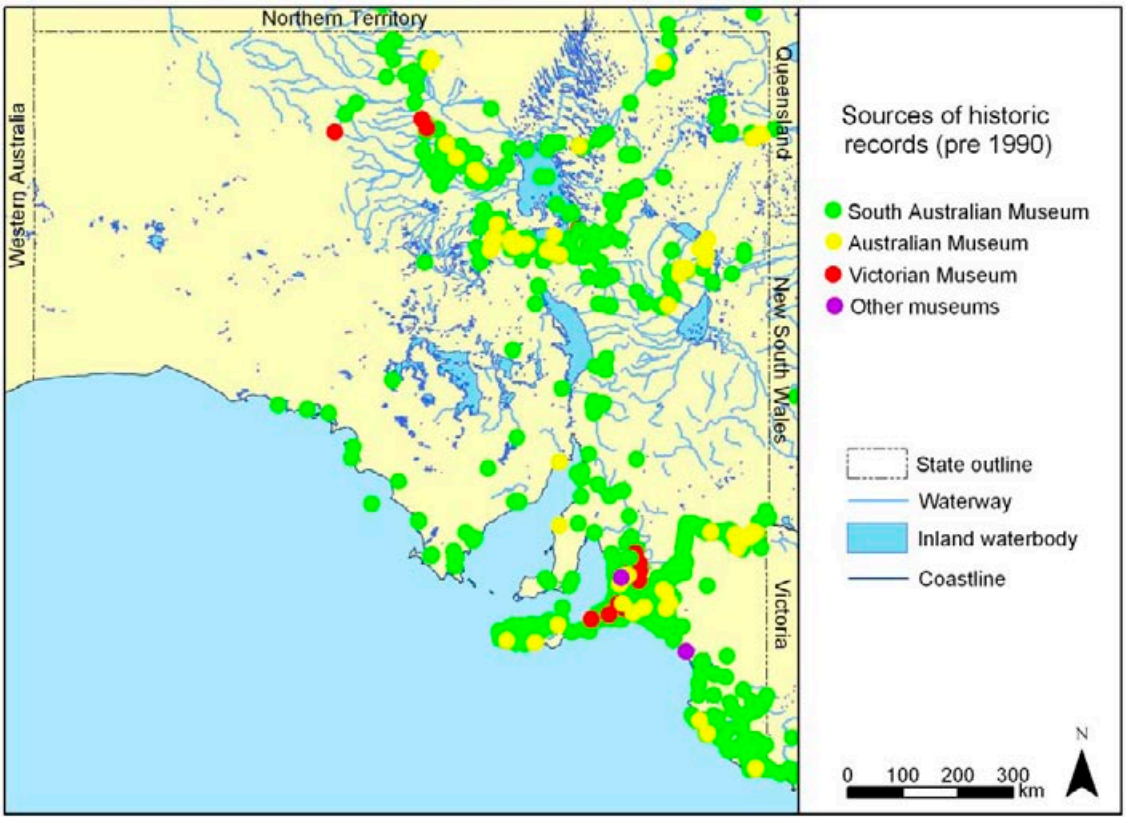
Management jurisdictions and important fish habitats in South Australia



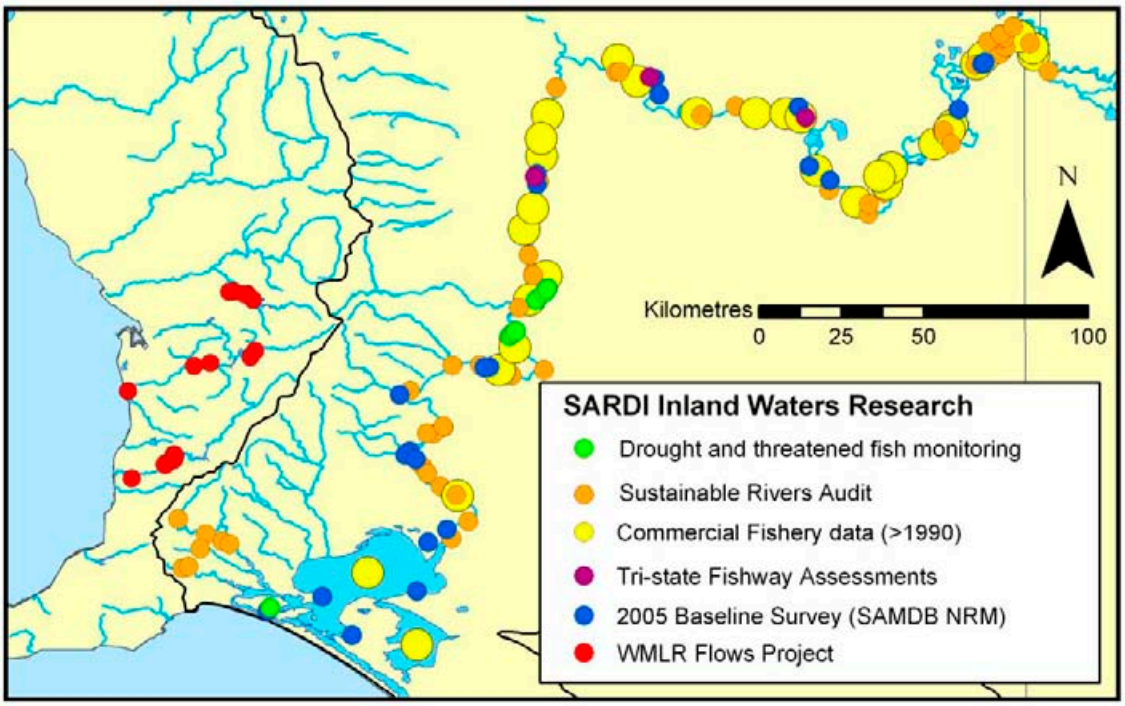
South Australian Arid Lands		Adelaide & Mt Lofty Ranges	
1	Dalhousie Springs	13	Streams (Gawler to Hindmarsh catchments)
2	Neales River	14	Southern Fleurieu Swamps
3	GAB mound springs	**South Australian MDB**	
4	Lake Torrens and fringing springs	15	Eastern Mount Lofty Ranges (Currency, to Marne catchments)
5	Balcanoona Creek	16	Lakes Alexandrina and Albert & the Coorong
6	MacDonnell Creek	17	River Murray wetlands (Blanchetown-Wellington)
7	Coopers Ck, Coongie Lakes and Warburton River	18	River Murray channel
Eyre Peninsula		19	Chowilla region, Berri and Disher Ck wetlands
8	Tod River	**South East**	
Northern and Yorke		20	West Avenue watercourse (Henry Creek)
9	Willochera Creek	21	Mt Burr swamps
10	Broughton River	22	Lake Bonney area & Millicent drains
Kangaroo Island		23	Mosquito Creek and Bool Lagoon
11	Western streams (Middle, Western, Rocky, Stunsail, Harriet)	24	Lower SE rising springs (Ewens, Stratmans, Piccaninnie)
12	Willson River	25	Glenelg River (SA)

APPENDIX 3

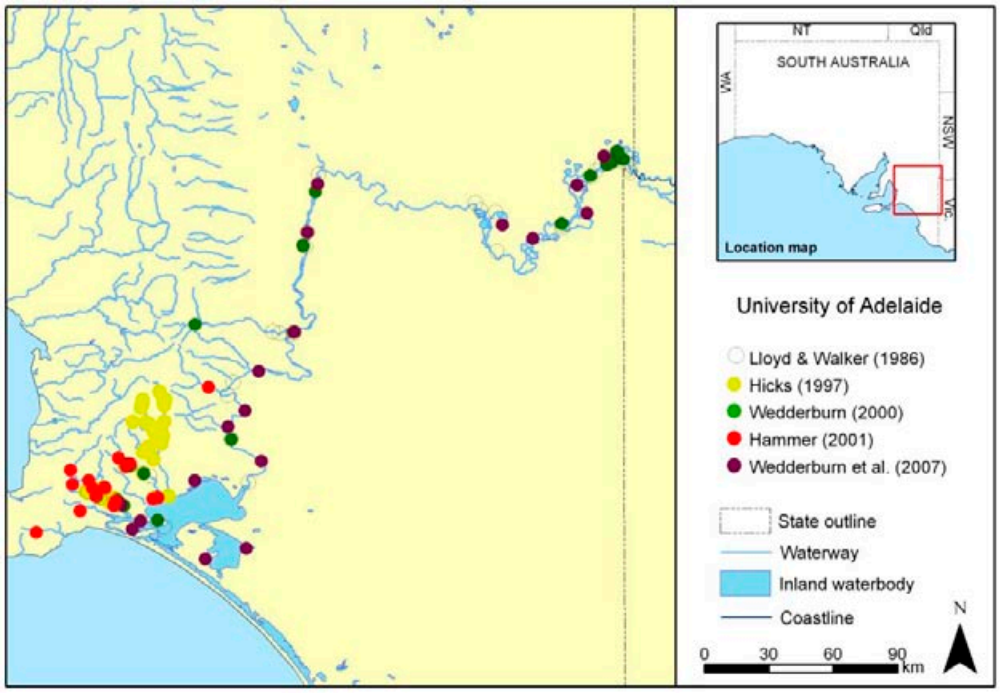
Management jurisdictions and important fish habitats in South Australia



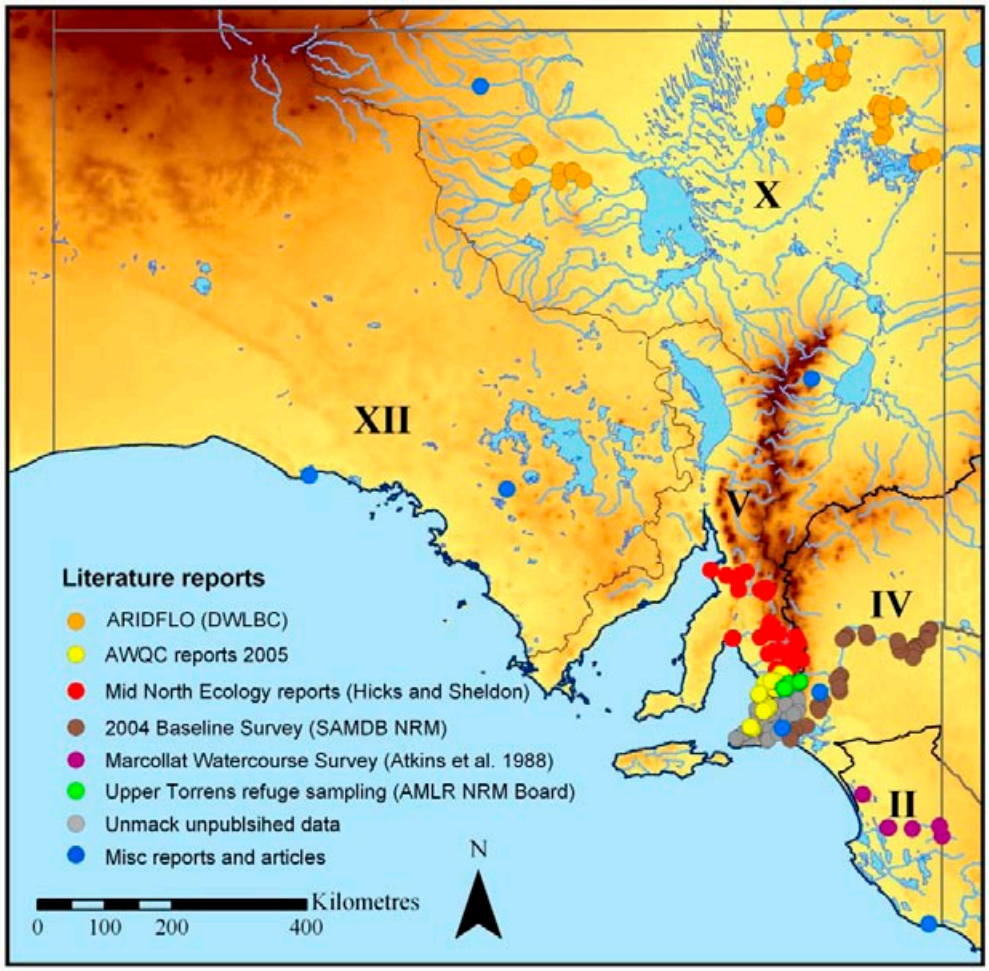
Museum records



Available SARDI Aquatic Sciences Research records 2001-2006



University of Adelaide studies



Miscellaneous research records for South Australia

APPENDIX 4

Conservation criteria used to asses the Status of Taxa in South Australia[38]

IMPORTANT NOTE: It is imperative that, when assessing species schedules for South Australia, the following considerations are made:

When assessing the status of taxa in SA, populations' external to this state must largely be ignored as the focus is on conserving taxa within this state.

Taxa may be classed as 'Rare' in South Australia if they meet one of the following critera (a. to d.) and do not meet the 'IUCN' criteria for 'Critically Endangered', 'Endangered' or 'Vulnerable'.

The definitions for the majority of terms used in the 'Rare' criteria are consistent with 'IUCN' definitions.

It is intended that the 'Rare' category for South Australia includes taxa that are in decline (but do not meet IUCN criteria) as well taxa that naturally have a limited presence (in terms of range or numbers etc) in this state.

Proposed ratings for taxa should be clearly justified by annotating with the assigned criteria.

It is highly recommended that, before commencing any assessment, all the information accompanying the 'IUCN' criteria be read (refer to website : http://www.redlist.org/info/categories_criteria.html)

Species that are considered 'Extinct' or 'Critically Endangered' using the IUCN criteria are currently listed as 'Endangered' on the SA schedules.

IUCN 2001 Criteria[6] used for Critically Endangered, Endangered and Vulnerable. Rare category developed for South Australia by the 'Threatened Species Schedule Subcommittee' in February 2002. IUCN criteria (2001) also applies for Extinct (EX): no reasonable doubt that the last individual has died, following exhaustive surveys, and Extinct in the Wild (EW): taxon is known to survive in captivity or as naturalised population(s) outside of historic range.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥90% 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.
2. An observed, estimated, inferred or suspected population size reduction of ≥80% 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.
3. A population size reduction of ≥80%, 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.
4. An observed, estimated, inferred, projected or suspected population size reduction of ≥80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years), where the time period includes 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.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km^2, and estimates indicating at least two of a-c:
    - a. Severely fragmented or known to exist at only a single 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.

2. Area of occupancy estimated to be less than 10 km^2, and estimates indicating at least two of a-c:

    a. Severely fragmented or known to exist at only a single 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.

C. Population size estimated to number fewer than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

    (a) Population structure in the form of one of the following:

        (i) no subpopulation estimated to contain more than 50 mature individuals, OR

        (ii) at least 90% of mature individuals in one subpopulation.

    (b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥70% 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.
2. An observed, estimated, inferred or suspected population size reduction of ≥50% 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.
3. A population size reduction of ≥50%, 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.
4. An observed, estimated, inferred, projected or suspected population size reduction of ≥50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years), where the time period includes 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.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km^2, and estimates indicating at least two of a-c:
    - a. Severely fragmented or known to exist at no more than five locations.
    - 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.

2. Area of occupancy estimated to be less than 500 km^2, and estimates indicating at least two of a-c:

    a. Severely fragmented or known to exist at no more than five locations.

    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.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

    (a) Population structure in the form of one of the following:

        (i) no subpopulation estimated to contain more than 250 mature individuals, OR

        (ii) at least 95% of mature individuals in one subpopulation.

    (b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥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.
2. An observed, estimated, inferred or suspected population size reduction of ≥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.
3. A population size reduction of ≥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.
4. An observed, estimated, inferred, projected or suspected population size reduction of ≥30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years), where the time period includes 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.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a-c:
    - a. Severely fragmented or known to exist at no more than 10 locations.
    - 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.

2. Area of occupancy estimated to be less than 2000 km^2, and estimates indicating at least two of a-c:

    a. Severely fragmented or known to exist at no more than 10 locations.

    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.

C. Population size estimated to number fewer than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

    (a) Population structure in the form of one of the following:

    (i) no subpopulation estimated to contain more than 1000 mature individuals, OR

    (ii) all mature individuals are in one subpopulation.

    (b) Extreme fluctuations in number of mature individuals.

D. Population very small or restricted in the form of either of the following:

1. Population size estimated to number fewer than 1000 mature individuals.
2. Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

RARE (RA)

Criteria:

a. Reduced area of occupancy and/or extent of occurrence: Taxa that have disappeared from >50% of their former area of occupancy and/or extent of occurrence and it is observed, estimated, inferred or suspected that further decline is continuing.

b. Declined in abundance: Taxa that have experienced a significant decline in abundance in >50% of their former area of occupancy and/or extent of occurrence and it is observed, estimated, inferred or suspected that further decline is continuing.

c. Small populations: Taxa where it is observed, estimated, inferred or suspected that the total population size numbers <3000 mature individuals and specifying any of the following.

(i) Resident population

(ii) Regular visitors to the state (eg. migratory taxa)

(iii) Irregular visitors to the state (eg. in response to episodic rainfall events)

(iv) Taxa that are experiencing range extensions into SA, with data for other areas showing that they are increasing in range and abundance.

d. Restricted extent of occurrence or area of occupancy: Taxa with either i) or ii)

(i) extent of occurrence <20,000 km^2

(ii) area of occupancy <2,000 km^2 that is highly fragmented

ACTION PLAN FOR SOUTH AUSTRALIAN

FRESHWATER FISHES

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