

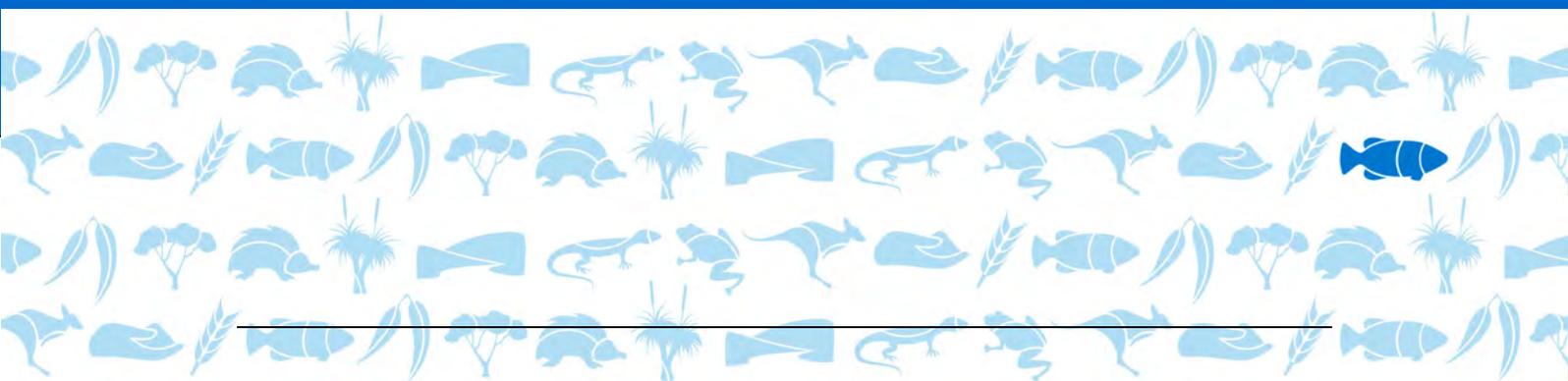
Richness of 'At Risk' Species near Wetlands and KEAs along the River Murray in SA

FINAL
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Government of South Australia

Department of Environment
and Natural Resources





Richness of 'At Risk' Species near Wetlands and KEAs

This series of maps displays the number (or richness) of 'at-risk' species in proximity to wetlands and within Key Environmental Assets (KEAs) described in the [Assessing vulnerability of fauna climate change SA River Murray Final June11.pdf](#) report. Spatial data and research literature can be found in the Floodplain Information Package (FIP) 2012. Limitations from that report have been reproduced below:

The methodology and data used in this project is detailed in the report [AssessingFaunaCC_GISMethodsFeb2011.pdf](#).

Conclusions, Limitations and Future Work

Thirty-seven vertebrate fauna species (eleven fish, two frogs, nine reptiles, eleven birds and four mammals) were identified through the risk assessment process as most 'at-risk' or most vulnerable under climate change in the South Australian Murray Darling Basin (from Wellington to SA-Vic Border). These are listed in Table below. Although many aspects of each species' ecology, physiology, genetics and resilience influenced the assessments, the vulnerability of *all* species was driven principally by two main factors. Firstly, the forecast decrease in flood frequency, duration and extent along the River Murray resulting in a significant reduction in area and quality of foraging and breeding habitat (in particular floodplain and flowing habitat). Secondly, an increase in overall salinity levels coupled with a decrease in wetland, floodplain and river productivity and subsequent decline in diversity and abundance of flora and fauna that make up the food resources and habitat structure for all 'at-risk' vertebrate species.

| CLASS | Common Name | Scientific name |
|--------------|--|------------------------------------|
| AMPHIBIA | southern bell frog | <i>Litoria raniformis</i> |
| AMPHIBIA | long-thumbed frog | <i>Limnodynastes fletcheri</i> |
| AVES | white-bellied sea-eagle | <i>Haliaeetus leucogaster</i> |
| AVES | yellow-billed spoonbill | <i>Platalea flavipes</i> |
| AVES | Australasian bittern | <i>Botaurus poiciloptilus</i> |
| AVES | Baillon's crake | <i>Porzana pusilla</i> |
| AVES | spotless crake | <i>Porzana tabuensis</i> |
| AVES | musk duck | <i>Biziura lobata</i> |
| AVES | regent parrot | <i>Polytelis anthopeplus</i> |
| AVES | Australian spotted crake | <i>Porzana fluminea</i> |
| AVES | black-fronted dotterel | <i>Eseyornis melanops</i> |
| AVES | nankeen night-heron | <i>Nycticorax caledonicus</i> |
| AVES | blue-billed duck | <i>Oxyura australis</i> |
| MAMMALIA | common brushtail possum | <i>Trichosurus vulpecula</i> |
| MAMMALIA | Giles' planigale (paucident planigale) | <i>Planigale gilesi</i> |
| MAMMALIA | southern myotis | <i>Myotis macropus</i> |
| MAMMALIA | eastern water rat | <i>Hydromys chrysogaster</i> |
| OSTEICHTHYES | freshwater catfish | <i>Tandanus tandanus</i> |
| OSTEICHTHYES | Murray cod | <i>Maccullochella peelii</i> |
| OSTEICHTHYES | purple-spotted gudgeon | <i>Mogurnda adspersa</i> |
| OSTEICHTHYES | Murray hardyhead | <i>Craterocephalus fluviatilis</i> |
| OSTEICHTHYES | short-headed lamprey | <i>Mordacia mordax</i> |
| OSTEICHTHYES | estuary perch | <i>Maquaria colonorum</i> |
| OSTEICHTHYES | golden perch | <i>Macquaria ambigua ambigua</i> |
| OSTEICHTHYES | silver perch | <i>Bidyanus bidyanus</i> |
| OSTEICHTHYES | common galaxis | <i>Galaxias maculatus</i> |
| OSTEICHTHYES | dwarf flathead gudgeon | <i>Philypnodon macrostomus</i> |
| OSTEICHTHYES | crimson-spotted rainbow fish | <i>Melanotaenia fluviatilis</i> |
| REPTILIA | broad-shelled turtle | <i>Chelodina expansa</i> |
| REPTILIA | common long-necked turtle | <i>Chelodina longicollis</i> |
| REPTILIA | Murray short-necked turtle | <i>Emydura macquarii</i> |
| REPTILIA | carpet python | <i>Morelia spilota</i> |
| REPTILIA | eastern tiger snake | <i>Notechis scutatus</i> |
| REPTILIA | red-bellied black snake | <i>Pseudechis porphyriacus</i> |
| REPTILIA | eastern water skink | <i>Eulamprus quoyii</i> |
| REPTILIA | lace monitor | <i>Varanus varius</i> |
| REPTILIA | southern water skink | <i>Eulamprus tympanum</i> |

Fauna species identified as most 'at-risk' of vulnerability to Climate Change.

From a wetland management perspective, the main goal of this project was to prioritise wetlands for management based on the diversity of these 'at-risk' species present in certain areas. It is presumed that these priority wetlands possess habitat attributes that are required or desirable to these species and should be managed appropriately so they can be maintained through changing climatic conditions. A species was identified as 'present' at a location if it had a record within the BDBSA and proximity statistics were performed at both the wetland and KEA scale. It is recommended that management decisions are made at the broader KEA scale, allowing for buffering where survey effort misrepresents actual usage of wetlands and to increase data capture such as where a species may regularly move around at a smaller neighbourhood scale. It is recommended that KEA areas are prioritised for management as per the list in Table 24, and those considered highest priority, with records of 10 or more 'at-risk' species, are presented here.

| Key Environmental Asset (KEA) |
|--------------------------------------|
| Riverland Ramsar |
| Gurra Floodplain |
| Katarapko Floodplain |
| Loch Luna and Wachtels Lagoon |
| Pompoota/Paiwalla/Sunnyside |
| Morgan East & Morgan CP |
| Martins Bend |
| Mobilong Swamp incl. Rocky Gully |
| Hart Lagoon |
| Reedy Creek Mannum |
| Spectacle Lakes / Beldora Complex |
| Loveday Swamps and Mussel Lagoons |
| Nigra/Schillers |
| Moorundie Complex |
| Mypolonga/Toora Levee/Jury Swamp |
| Paringa Paddock |
| Riverglades |

Funding and resources, in particular access to environmental water, will be the limiting factors that determine how many of the priority KEAs can be managed. Within KEAs where there are several individual wetland units, prioritisation for management should occur as per the individual wetland priority ranking (Table 23) or 'cluster' management e.g. alternate environmental watering as resources become available.

Project limitations and recommendations for future work:

- The risk assessment process used to identify vulnerable species is reliant on the extent, applicability and interpretation of species research and availability of local population information. For many species, research is limited. The expert consultation process for each taxonomic group to review the final assessments improved robustness of the process and confidence in the results. However, to increase robustness of the assessment method, weighting of individual criteria could be considered. Each criterion currently has an equal weighting in its contribution to the final vulnerability rating, but in reality the influence of each criterion on the vulnerability of a species to climate change is likely to be highly variable.
- Due to project time limitations only the presence of vulnerable vertebrate fauna was used to identify priority wetlands for management. This needs to be taken into consideration when using this data to make management decisions, e.g. the presence of potentially vulnerable vegetation species and communities and invertebrate fauna should also be acknowledged.

- Data used to calculate the proximity statistics was restricted to that available within the Biodiversity Database of South Australia (BDBSA) (plus some additional fish data sources). The BDBSA is considered the most comprehensive data source in South Australia but does not include all known fauna survey data (e.g. SA MDB NRM board and DFW data). It is unknown to what extent the addition of this data would change the priority listing of wetlands for management but management decisions should be made with this knowledge, and it is recommended that future work includes the downloading of all known data to the BDBSA and the re-calculation of proximity statistics.
- The importance of a wetland to a particular species may be ascertained by the frequency of occurrence or abundance of that species at a site. In this study, presence or absence of a species was inferred by the occurrence of any record between 1990 & 2010 and this limitation should be acknowledged when using the proximity analyses to determine priority wetlands for management.
- When management decisions are based on the known distribution of vulnerable species all efforts should be made to ensure distribution and abundance records are accurate. A correlation is expected between survey effort and the number of 'at-risk' species recorded at a wetland site. A twenty year data capture period (1990-2010) was thought adequate for this project however during this period only one major flood occurred in 1993. This may have been the only opportunity over this 20 year period to capture records of many species reliant on flooding and to determine the value of habitat within the study region to these species, at a point in time when their numbers were highest and detection rate greatest. In between floods their presence is likely to be highly localised or they may migrate out of the study region and not be detected during limited survey events. The extent of survey effort during the 1993 flood event is unknown. Baseline surveys were undertaken in 2003-07 at many wetlands within the SA MDB floodplain. This was during a period of low River Murray levels and consequently a low diversity and abundance of most fauna species was reported. It is highly recommended that during the 2010-11 flood event, in particular during the spring/summer period of 2011-12, there is increased survey effort of fauna populations from all taxonomic groups to more accurately inform the future management of wetlands under predicted climate change scenarios.

NOTE: wetland monitoring data collated by DENR from ex NRM Board and ex DEH staff is being collated and entered into BDBSA via the Riverine recovery Project.

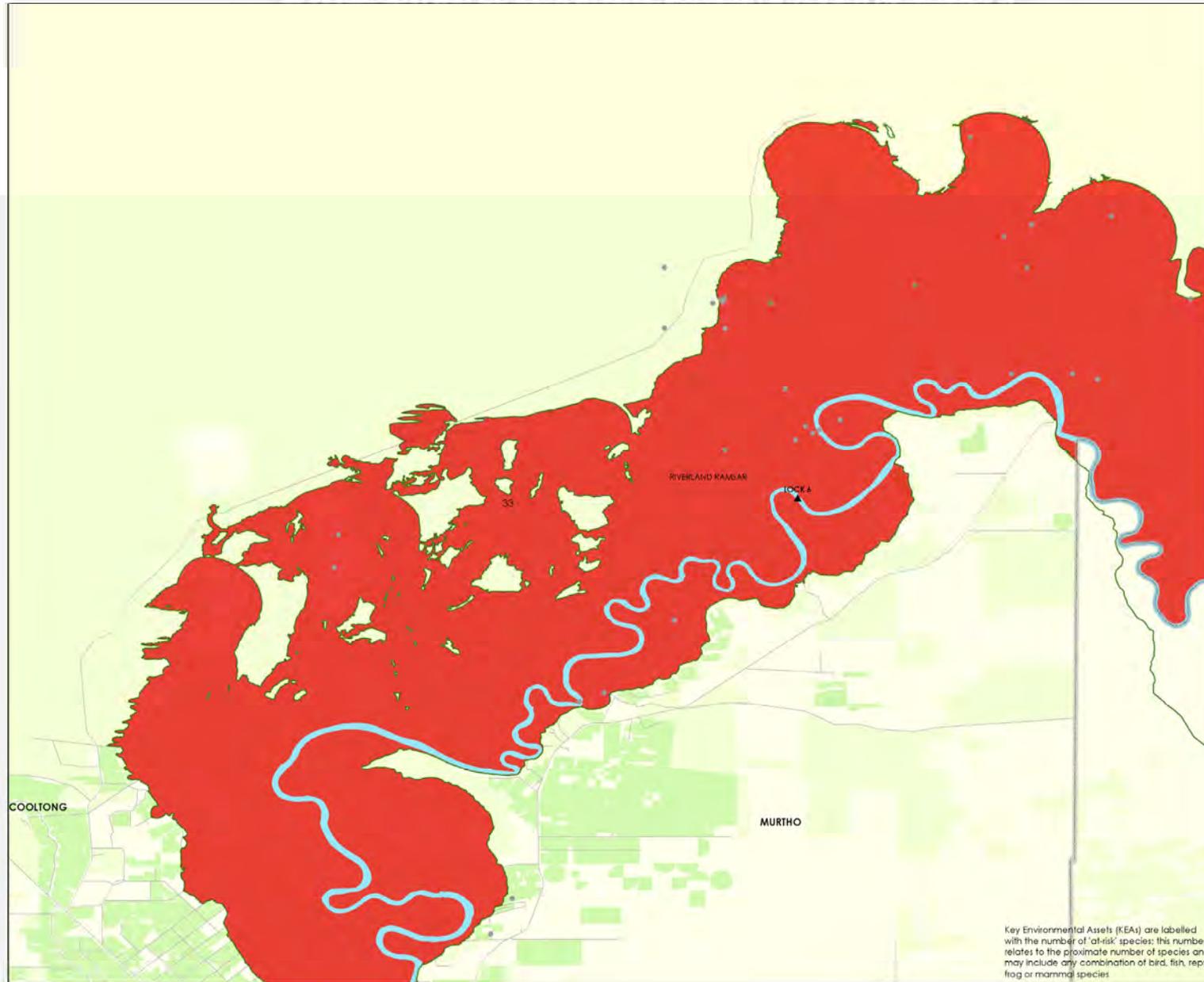
| AUS_WETNR | Name | SAAE Classification | Number of Taxa Groups | Number of 'At-Risk' Species |
|-----------|----------------------------------|-------------------------------------|-----------------------|-----------------------------|
| S0001997 | RIVER MURRAY | Permanent Reach | 5 | 31 |
| S0001486 | ROCKY GULLY | Saline Swamp | 4 | 13 |
| S0002461 | PAIWALLA WETLAND | Temporary Wetland - Terminal Branch | 3 | 12 |
| S0000425 | SALT CREEK AND GURRA GURRA LAKES | Permanent Lake - Throughflow | 5 | 11 |
| S0000821 | CAUSEWAY LAGOON | Permanent Lake - Terminal Branch | 4 | 11 |
| S0001973 | PILBY LAGOON | Permanent Swamp - Throughflow | 4 | 11 |
| S0000466 | LAKE MERRETI | Permanent Lake - Terminal Branch | 4 | 10 |
| S0000711 | LOCH LUNA AND NOCKBURRA CREEK | Permanent Lake - Throughflow | 5 | 10 |
| S0000938 | MUSSEL LAGOON | Permanent Lake - Terminal Branch | 3 | 10 |
| S0001618 | WERTA WERT | Temporary Wetland - Terminal Branch | 4 | 10 |
| S0001626 | LAKE LITRA | Temporary Wetland - Terminal Branch | 4 | 10 |
| S0001718 | MORGAN CONSERVATION PARK | Permanent Lake - Throughflow | 5 | 10 |
| S0002460 | PAIWALLA WETLAND | Temporary Wetland - Terminal Branch | 2 | 10 |
| S0000928 | BELDORA WETLANDS | Permanent Swamp - Throughflow | 4 | 9 |
| S0000970 | MORGAN CONSERVATION PARK | Permanent Lake - Throughflow | 4 | 9 |
| S0002020 | LITTLE DUCK LAGOON | Permanent Swamp - Terminal Branch | 5 | 9 |
| S0016022 | RIVERGLADES | Permanent Swamp - Throughflow | 4 | 9 |
| S0000034 | NGAK INDAU INLET | Ephemeral Reach | 4 | 8 |
| S0000047 | MOBILONG SWAMP | Permanent Reach | 3 | 8 |
| S0000098 | SLANEY WEIR BILLABONG | Temporary Wetland - Throughflow | 4 | 8 |
| S0000174 | SWANPORT WETLAND | Permanent Swamp - Throughflow | 3 | 8 |
| S0000933 | YATCO LAGOON | Permanent Lake - Throughflow | 5 | 8 |
| S0001617 | PILBY CREEK | Ephemeral Reach | 4 | 8 |
| S0001672 | HART LAGOON | Permanent Lake - Terminal Branch | 4 | 8 |

Table 23 Wetlands occurring within respective search radii of 8 or more 'at-risk' species from any taxonomic group.

| KEA Asset Name | KEA ID | Number of Taxa Groups | Number of 'At-Risk' Species |
|---|--------|-----------------------|-----------------------------|
| Riverland Ramsar | 1 | 5 | 25 |
| Gurra Floodplain | 10 | 5 | 18 |
| Katarapko Floodplain | 17 | 5 | 17 |
| Loch Luna and Wachtels Lagoon | 23 | 5 | 16 |
| Pompoota/Paiwalla/Sunnyside | 95 | 3 | 15 |
| Morgan East & Morgan CP | 54 | 5 | 14 |
| Martins Bend | 11 | 4 | 13 |
| Mobilong Swamp incl. Rocky Gully | 97 | 4 | 13 |
| Hart Lagoon | 37 | 4 | 12 |
| Reedy Creek Mannum | 91 | 5 | 12 |
| Spectacle Lakes / Beldora Complex | 21 | 5 | 12 |
| Loveday Swamps and Mussel Lagoons | 22 | 4 | 11 |
| Nigra/Schillers | 41 | 5 | 11 |
| Moorundie Complex | 25 | 5 | 10 |
| Mypolonga/Toora Levee/Jury Swamp | 66 | 3 | 10 |
| Paringa Paddock | 96 | 5 | 10 |
| Riverglades | 4 | 5 | 10 |
| Boggy Flat | 98 | 4 | 9 |
| Devon Downs Complex | 43 | 3 | 9 |
| Murrundi | 73 | 3 | 9 |
| Paisley Creek/Edsons Flat | 106 | 4 | 9 |
| Swanport Wetland | 65 | 3 | 9 |
| Yatco Lagoon | 101 | 5 | 9 |
| Banrock Ramsar Complex (inc Wigley Reach) | 19 | 3 | 8 |
| Brenda Park / Morphetts Flat Complex | 55 | 5 | 8 |
| Coolcha Lagoon | 85 | 4 | 8 |
| Disher Creek | 6 | 4 | 8 |
| Overland Corner | 26 | 4 | 8 |
| Pike-Mundic | 8 | 5 | 8 |
| Rilli Lagoons | 14 | 4 | 8 |

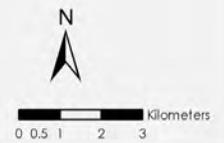
Table 24 KEAs within respective search radii of 8 or more 'at-risk' species

Climate Change Risk Analysis Project
Map 1. Border to Cooltong Post 1990 Distribution - Species Richness of 'At-Risk' Species Near KEAs



No. 'At-Risk' Species

- 1 - 6
- 7 - 12
- 13 - 18
- 19 - 24
- 25 - 30
- 31 - 36
- River Murray
- Study Area
- Native Vegetation (>10ha)
- Irrigated Crops (>10ha)
- Roads (>20m wide)
- State Border
- Lock
- Pre-1990 'At-Risk' Species Record



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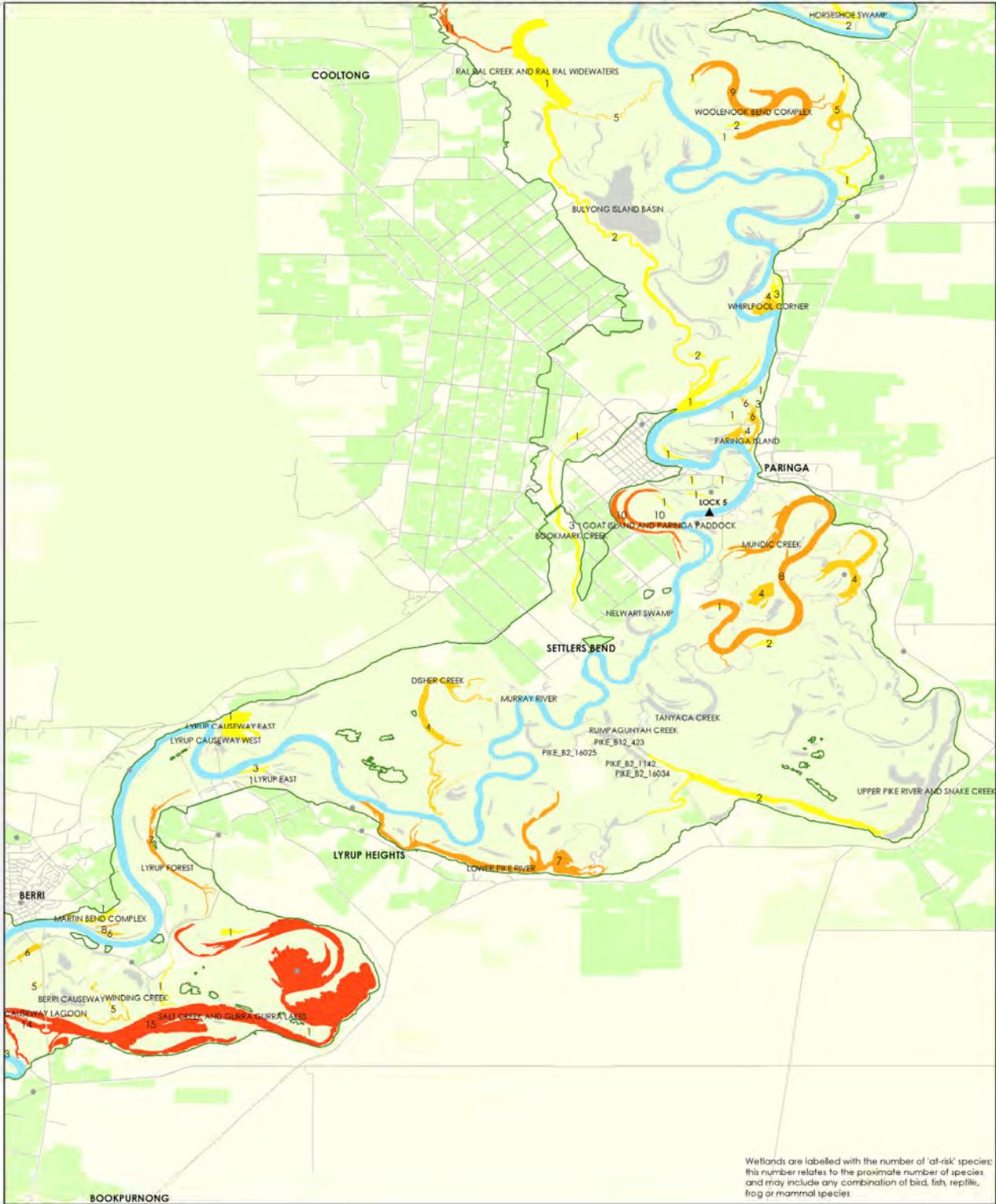
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Projection Lambert Conformal Conic
Datum Geocentric Datum of Australia, 1994

Key Environmental Assets (KEAs) are labelled with the number of 'at-risk' species; this number relates to the proximate number of species and may include only combination of bird, fish, reptile, frog or mammal species.

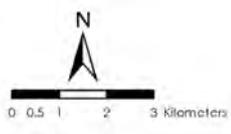
Climate Change Risk Analysis Project

Map 2. Cooltong to Berri Post 1990 Distribution - Species Richness of 'At-Risk' Species Near Wetlands



Wetlands are labelled with the number of 'at-risk' species; this number relates to the proximate number of species and may include any combination of bird, fish, reptile, frog or mammal species

- No. 'At-Risk' Species**
- 1 - 3
 - 4 - 6
 - 7 - 9
 - 10 - 12
 - 13 - 15
 - 16 - 18
 - None Recorded
- Legend:**
- Study Area/Floodplain
 - River Murray
 - Native Vegetation (>10ha)
 - Irrigated Crops (>10ha)
 - Roads (>20m wide)
 - Pre-1990 'At-Risk' Species Record
 - Lock



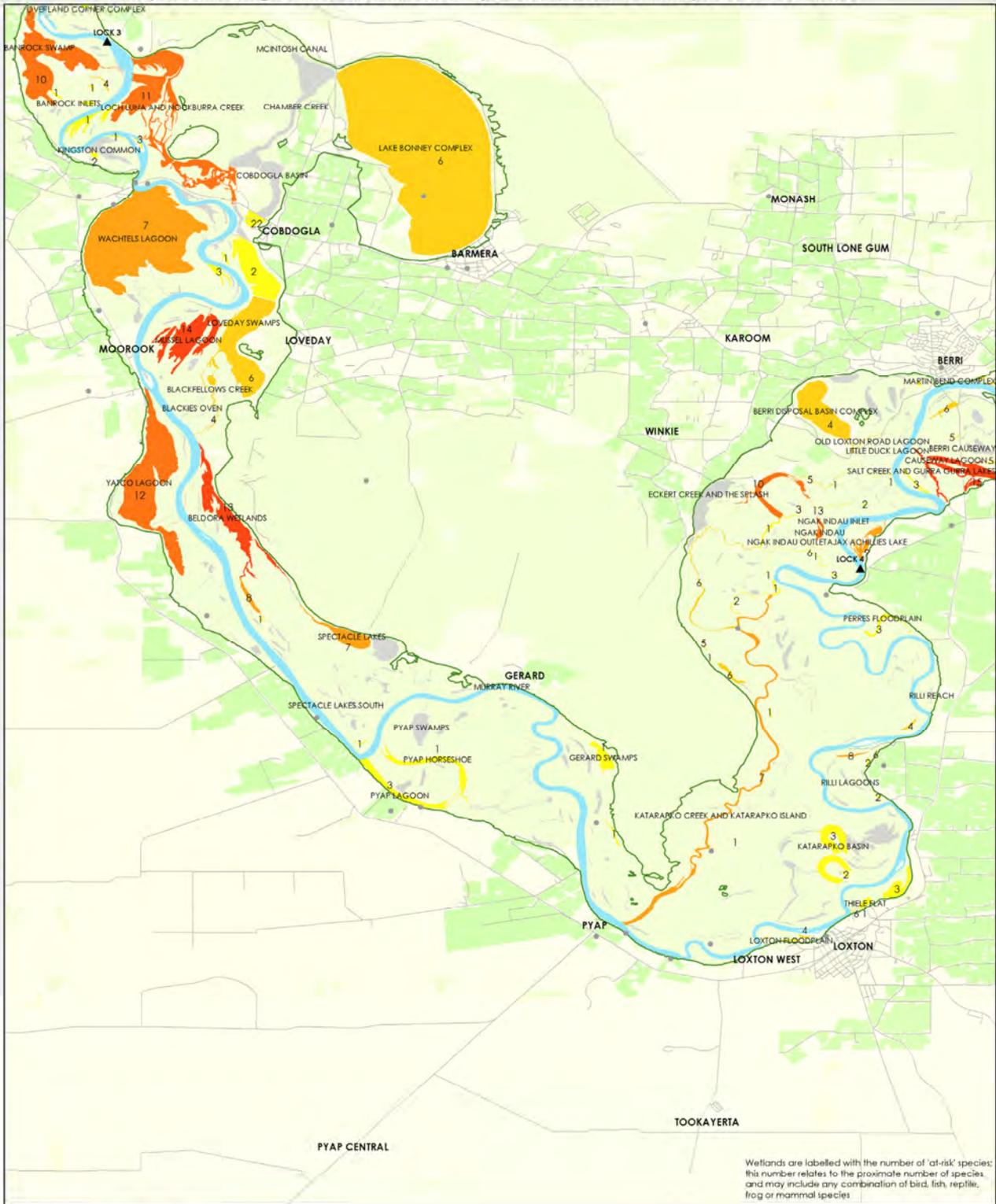
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Climate Change Risk Analysis Project

Map 3. Berri to Kingston Post 1990 Distribution - Species Richness of 'At-Risk' Species Near Wetlands



Wetlands are labelled with the number of 'at-risk' species; this number relates to the proximate number of species, and may include any combination of bird, fish, reptile, frog or mammal species

- No. 'At-Risk' Species**
- 1 - 3
 - 4 - 6
 - 7 - 9
 - 10 - 12
 - 13 - 15
 - 16 - 18
 - None Recorded
- Legend:**
- Study Area/Floodplain
 - River Murray
 - Native Vegetation (>10ha)
 - Irrigated Crops (>10ha)
 - Roads (>20m wide)
 - Pre-1990 'At-Risk' Species Record
 - Lock



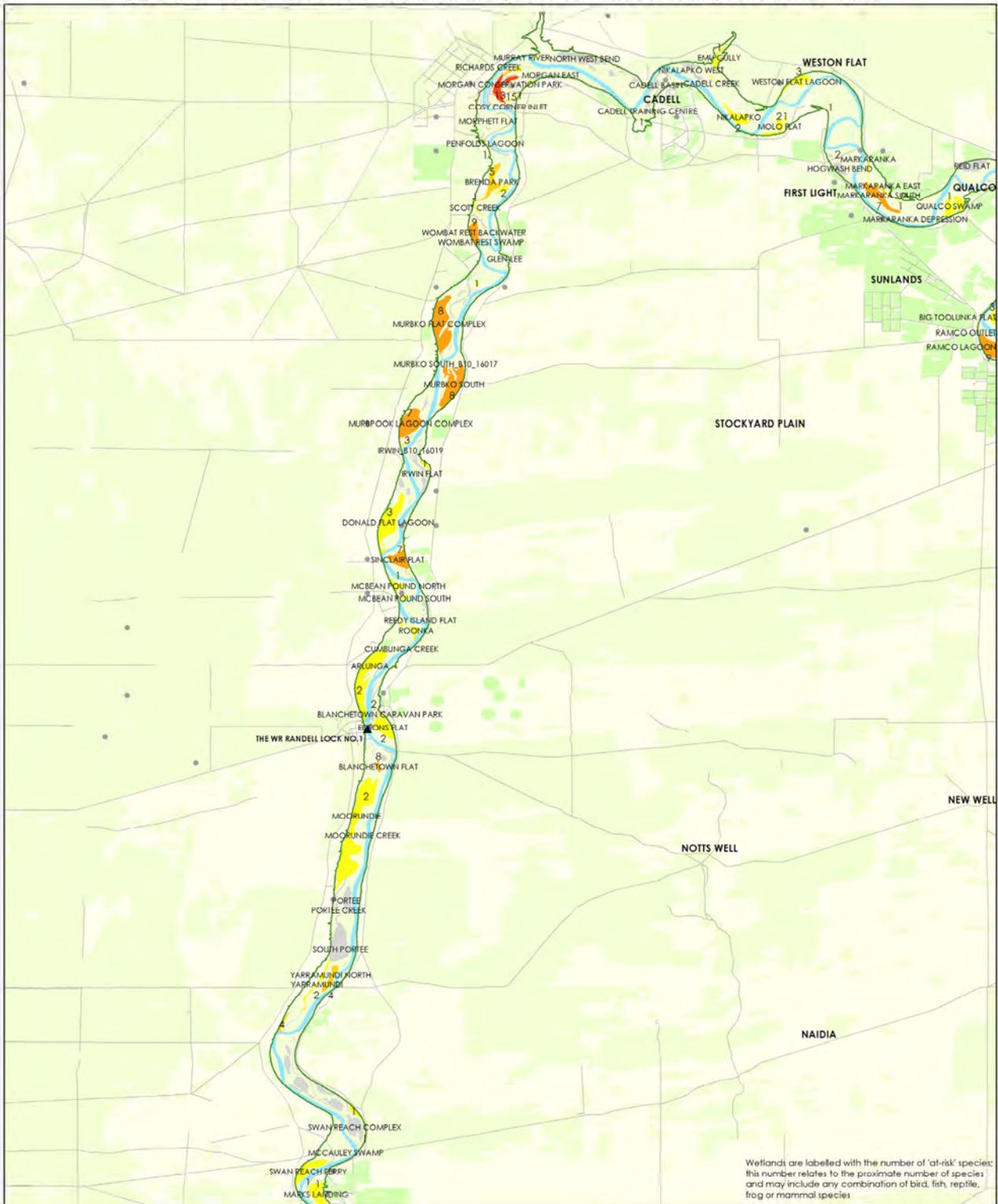
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Climate Change Risk Analysis Project

Map 5. Cadell to Swan Reach Post 1990 Distribution - Species Richness of 'At-Risk' Species Near Wetlands



Wetlands are labelled with the number of 'at-risk' species; this number relates to the approximate number of species and may include any combination of bird, fish, reptile, frog or mammal species

No. 'At-Risk' Species

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12
- 13 - 15
- 16 - 18
- None Recorded

Legend:

- Study Area/Floodplain
- River Murray
- Native Vegetation (>10ha)
- Irrigated Crops (>10ha)
- Roads (>20m wide)
- Pre-1990 'At-Risk' Species Record
- Lock

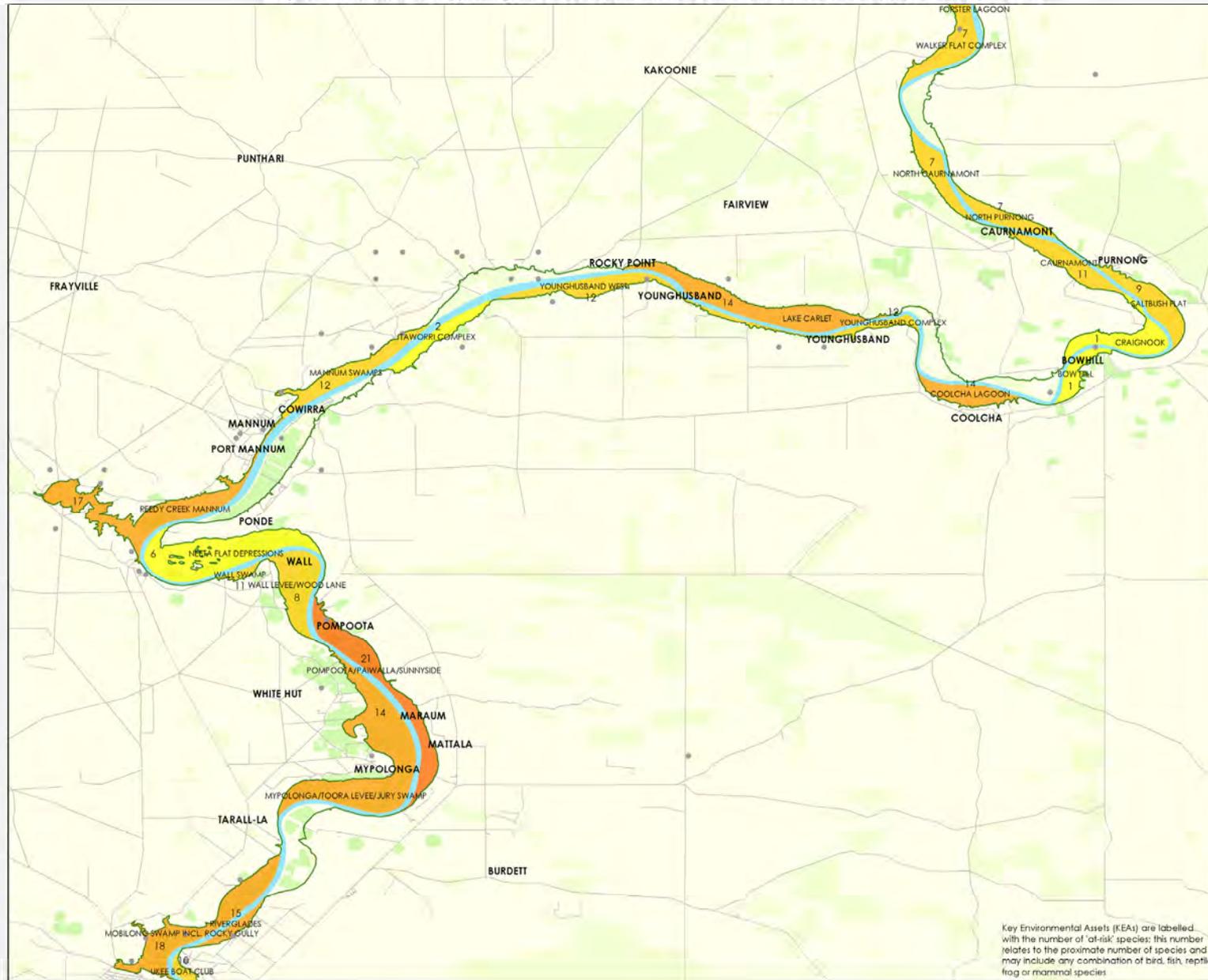


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Climate Change Risk Analysis Project
 Map 7. Caurnamont to Mypolonga Past 1990 Distribution - Species Richness of 'At-Risk' Species Near KEAs



No. 'At-Risk' Species

- 1 - 6
- 7 - 12
- 13 - 18
- 19 - 24
- 25 - 30
- 31 - 36

River Murray

Study Area

Native Vegetation (>10ha)

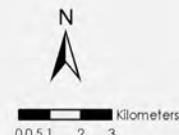
Irrigated Crops (>10ha)

Roads (>20m wide)

State Border

Lock

Pre-1990 'At-Risk' Species Record



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