Technical information supporting the 2018 inland waters: biosecurity (new incursions of invasive species) trend and condition report card

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Government of South Australia
Department for Environment and Water

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Summary

This document describes the indicators, data sources, analysis methods and results used to develop this report and the associated report card. The reliability of data sources for their use in this context are also described.

1 Introduction

This assessment addressed non-established plants and animals that are potential biosecurity risks in South Australia's inland waters. Invasive species include animals, plants, parasites or disease-causing organisms that become establish outside their natural range and become pests (IUCN 2000). Related report cards on established fish in inland waters and biosecurity and invasive species in marine and coastal environments can be found in the 2018 suite of enviornmental trend and condition report cards.

Invasive species have economic, environmental and social impacts, and can damage infrastructure needed for irrigation and human consumption and reduce access to waterways for recreational purposes. Invasive species also compete with and prey on our native plants and animals and cause damage to ecosystems by degrading water quality (Whiterod 2018). For example *Tamarix* ssp. can alter the water regime of riparian soils and affect stream flows (Tickner *et al.* 2001). Impacts extend to water supplies, fisheries, aquaculture, tourism, maritime industries, and important cultural areas.

Aquatic invasive species spread rapidly through catchments and across state boundaries. It is therefore important that incursions are prevented or eradicated before they can cause widespread environmental degradation, like the European carp. The prevention of new invasive species from becoming established is targeted towards public education, to change public perceptions about the dangers of releasing pond plants and fish into the wild.

Home aquaria and garden ponds are a ready source of new invasive species. Many ornamental fish are brought into Australia each year to stock home aquaria and garden ponds, and it is likely that some end up in waterways. While most would not survive, some have established feral populations. Across Australia, there has been an increase in the number of exotic freshwater ornamental fish species establishing wild populations. Of the 41 invasive fish species currently known to have established populations across Australia, up to 30 are now thought to have arrived in the country via the ornamental fish trade. This is a relatively large number of new species, and there is growing concern over the potential for one or more of these to create an expensive environmental problem.

2 Methods

2.1 Indicator

The number of new incursions was summed across regions. Records were considered separate incursions if they were geographically isolated from other records (for example records were not part of the same water body).

The species reported include those considered 'alert species' by Biosecurity SA (see Biosecurity SA Aquatic weeds factsheet and Aquatic pests factsheet). These are species that are not established in South Australia, or exist in isolated populations that have the potential to be eradicated.

Table 2.1. Key invasive species that are addressed in the report

Common name	Species name
Plants	
Alligator weed	*Alternanthera philoxeroides*
Giant arrowhead	*Sagittaria montevidensis*
Eurasian water milfoil	*Myriophyllum spicatum*
Horsetails	*Equisetum spp.*
Hydrocotyle	*Hydrocotyle ranunculoides*
Lagarosiphon	*Lagarosiphon major*
Leafy elodea	*Egeria densa*
Salvinia	*Salvinia adnata (syn. S. molesta)*
Senegal tea plant	*Gymnocoronis spilanthoides*
Water caltrop	*Trapa natans*
Water hyacinth	*Eichhorina crassipes*
Water soldier	*Stratiotes aloides*
Primrose willow	*Ludwigia peruviana*
Animals	
Alligator gar	*Atractosteus spatula*
Asian black-spined toad	*Duttaphrynus melanostictus*
Cane toad	*Rhinella marina*
Pearl cichlid	*Geophagus brasiliensis*
Red-eared slider	*Trachemys scripta elegans*
Red claw crayfish	*Cherax quadricarinatus*
Tilapia	*Oreochromis mossambicus*
Smooth newt	*Lissotriton vulgaris*
Snakehead	*Channidae ssp.*

2.2 Data sources

Records of non-established species were provided by Biosecurity SA (a division of Primary Industries and Regions, South Australia) and DEW regional staff. Incursions of invasive species are generally reported by the public or the aquaria trade. Some data come from site based surveys, however these tend to be in response to a reported detection.

2.3 Trend

Trend was not calculated in this assessment because it was expected that the change in the number of incursions would not represent actual change in the presence of non-established invasive species. For example, public education campaigns can lead to an increase in detections, but this increase does not indicate a trend in the number of new incursions.

Table 2.2. Definition of trend classes used

Trend	Description
Getting better	Over a scale relevant to tracking change in the indicator it is improving in status with good confidence
Stable	Over a scale relevant to tracking change in the indicator it is neither improving or declining in status
Getting worse	Over a scale relevant to tracking change in the indicator it is declining in status with good confidence
Unknown	Data are not available, or are not available at relevant temporal scales, to determine any trend in the status of this resource
Not applicable	This indicator of the natural resource does not lend itself to being classified into one of the above trend classes

2.4 Condition

Condition score is a single state-level statement of condition for 2017 that has been derived from the *Natural Resources Management Act 2004* and related to invasive inland water species (**Error! Reference source not found.**). It was assigned based on a number of inclusions in the assessment year (2017) and expert opinion by Biosecurity SA.

Condition scores were assigned to each region and then aggregated to state level. No further analysis of data was conducted as part of this assessment.

Table 2.3. Definition of condition classes used

Trend	Description	Threshold
Very good	Natural resources and our environmental, social and economic expectations of these (e.g. primary productivity) are not affected by invasive species.	-
Good	Natural resources and our environmental, social and economic expectations of these (e.g. primary productivity) are maginally affected by invasive species.	-
Fair	Natural resources and our environmental, social and economic expectations of these (e.g. primary productivity) are moderately affected by invasive species.	-
Poor	Natural resources and our environmental, social and economic expectations of these (e.g. primary productivity) are significantly affected by invasive species.	-
Unknown	Data are not available to determine the impact of invasive species on our natural resources	-
Not applicable	Invasive species impact does not lend itself to being classified into one of the above condition classes	-

2.5 Reliability

Information is scored for reliability based on the average of subjective scores (1 [worst] to 5 [best]) given for information currency, applicability and level of spatial representation. Definitions guiding the application of these scores are provided in Tables 2.4, 2.5 and 2.6, respectively.

Table 2.4. Guides for applying information currency

Currency score	Criteria
1	Most recent information >10 years old
2	Most recent information up to 10 years old
3	Most recent information up to 7 years old
4	Most recent information up to 5 years old
5	Most recent information up to 3 years old

Table 2.5. Guides for applying information applicability

Applicability score	Criteria
1	Data are based on expert opinion of the measure
2	All data based on indirect indicators of the measure
3	Most data based on indirect indicators of the measure
4	Most data based on direct indicators of the measure
5	All data based on direct indicators of the measure

Table 2.6. Guides for applying spatial representation of information (sampling design)

Spatial score	Criteria
1	From an area that represents less than 5% the spatial distribution of the asset within the region/state or spatial representation unknown
2	From an area that represents less than 25% the spatial distribution of the asset within the region/state
3	From an area that represents less than half the spatial distribution of the asset within the region/state
4	From across the whole region/state (or whole distribution of asset within the region/state) using a sampling design that is not stratified
5	From across the whole region/state (or whole distribution of asset within the region/state) using a stratified sampling design

3 Results

3.1 Reliability

The overall reliability score for this report card is 1, based on Table 3.1

Table 3.1 Information reliability scores for numbers of incursions of diseases and invasive species

Indicator	Currency	Applicability	Spatial	Reliability
Inland waters biosecurity data	5	1	1	
Overall				1

This assessment uses detections of key non-established species to inform incursions of inland waters biosecurity. Detections are generally reported by members of the public. Therefore, our ability to report trends in biosecurity and the impact of these species is poor.

Data partly inform assessments of condition and cannot be used to assess trends, despite having a high currency score. The overall reliability was therefore dropped to 1.

3.2 Trend

The introduction and spread of invasive species is regarded by many as a major threat to global freshwater biodiversity and hence ecological sustainability.

Across the state there are low numbers of reports of incursion of new invasive species. The available data do not allow trends in the number of new incursions of invasive species to be determined.

Each year there are a handful of reported prohibited species in garden ponds or aquariums – these are eradicated and prevented from entering waterways where they could established ongoing populations.

3.3 Condition

In 2017, there were five incursions of declared freshwater pest species across South Australia. This included stowaway cane toads that were eradicated, and salvinia, water hyacinth and gorsetails that were reported for sale or growing in garden ponds. No new incursions of aquatic plants were reported in the wild.

There was also a re-incursion of speckled livebearer in Willunga Creek catchment - this species was thought to have been eradicated after an earlier incursion.

The current condition of inland waters biosecurity is fair based on expert opinion of weed and vertebrate pest management staff in Biosecurity SA.

Table 3.2 Records of incursions of new invasive species in 2017 and 2016 (previous years records are unknown)

Common name	Species	Number of incursions in 2017	Number of incursions in 2016
Alligator weed	*Alternanthera philoxeroides*	0	1
Giant arrowhead	*Sagittaria montevidensis*	0	1
Eurasian water milfoil	*Myriophyllum spicatum*	0	0
Horsetails	*Equisetum spp.*	1	0
Hydrocotyle	*Hydrocotyle ranunculoides*	0	0
Lagarosiphon	*Lagarosiphon major*	0	0
Leafy elodea	*Egeria densa*	0	0
Salvinia	*Salvinia molesta*	1	1
Senegal tea plant	*Gymnocoronis spilanthoides*	0	0
Water caltrop	*Trapa natans*	0	0
Water hyacinth	*Eichhornia crassipes*	1	2
Water soldier	*Stratiotes aloides*	0	0
Primrose willow	*Ludwigia peruviana*	0	0
Red claw crayfish	*Cherax quadricarinatus*	0	0
Alligator gar	*Atractosteus spatula*	0	0
Asian black-spined toad	*Duttaphrynus melanostictus*	0	0
Cane toad	*Bufo marinus*	1	1
Pearl cichlid	*Geophagus brasiliensis*	0	0
Tilapia	*Oreochromis mossambicus*	0	0
Red-eared slider	*Trachemys scripta elegans*	0	1
Smooth newt	*Lissotriton vulgaris*	0	0
Snakehead	*Channidae ssp.*	0	0
Speckled livebearer	*Phalloceros caudimaculatus*	1	1
Total number of species incursions		5	8

South Australia is free of many exotic freshwater aquatic diseases and invasive species. South Australians have successfully prevented the introduction of many new invasive species, however with increased trade and waterways that cross state boundaries, the risk of incursions of new invasive species is ever present. Aquatic biosecurity is important to prevent the introduction and spread of new pest animals, plants and diseases, which can affect natural biodiversity, compete with other native plants and animals for food and habitat, modify and damage aquatic environments, foul industrial infrastructure and pose health risks.

Pest animals, plants and diseases can disperse beyond their natural range and become established naturally or by human activity, either deliberate or accidental. With increasing development, transport and trade the risk of new incursions is high. Some invasive species are not easily seen and may be hard to identify meaning that they are more likely to establish and spread. Changes in climate can also alter the distribution and abundance of pests and diseases, and the severity and frequency of incursions.

The primary focus of invasive species management is community education for prevention of human assisted dispersal. Once an invasive species is established in natural waterways, its removal is difficult. Management actions to contain new incursion include rapid response and removal or eradication. Invasive aquatic species are managed through environment and fisheries legislation and biosecurity policies.

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