



Department of Biodiversity,
Conservation and Attractions



SWAN CANNING
RIVERPARK



Swan Canning River Protection Strategy

BIENNIAL REPORT 2018



Foreword

The *Swan Canning River Protection Strategy* (the Strategy) was released by the Swan River Trust (the Trust) in 2015. An addendum publication to the Strategy has since been developed to reflect the significant State Government agency restructures that occurred as a result of Machinery of Government changes in Western Australia on 1 July 2017.

The Department of Biodiversity, Conservation and Attractions conducts an annual review of the Strategy's Strategic Management Program, with assistance from the agencies and organisations involved in managing the Riverpark.

The *Swan Canning River Protection Strategy Biennial Report* (Biennial Report) provides the information necessary to prepare progress reports, biennial reports and a five-yearly review of the Strategy to the Minister for Environment, partners and the community. The Strategy is updated if necessary through the five-yearly review process.

This Biennial Report incorporates the Riverpark's ecological, community benefit and amenity measures, reflecting the broad management focus of Riverpark managers and the legislative requirements of the *Swan and Canning Rivers Management Act 2006*.

The Biennial Report provides the first detailed status update on the Strategy since it was implemented in 2015. I would like to thank all of our partner agencies, industry and the Perth community for their commitment to the agreed river management actions outlined in the Strategy.



A handwritten signature in black ink, appearing to read 'Hamish Beck'.

Hamish Beck
Chairman
Swan River Trust

Introduction

The Department of Biodiversity, Conservation and Attractions (DBCA) reviews and reports on the Swan Canning River Protection Strategy's (the Strategy) implementation under a Monitoring, Evaluation and Reporting Framework. This framework ensures that the Strategy is adaptive to reflect new information, undergoes continuous development and improvement, and provides results that are measured and clearly communicated to all necessary stakeholders.

Partner organisations involved in managing the Riverpark are required to collect and provide data for progress reports, biennial reports and a five yearly review of the Strategy. The Swan River Trust then reports to the Minister for Environment on the partner agencies' progress in implementing the agreed projects and river management actions outlined in the Strategy's Strategic Management Program. The progress reports are produced in alternate years, when a biennial report is not required. Partner agencies are also invited to provide feedback on the operation and effectiveness of the Strategy.

Under the *Swan and Canning Rivers Management Act 2006* the Swan River Trust is required to monitor and report to the Minister for Environment on the following performance indicators detailed within the Strategy:

- All priority actions listed in the Strategy are undertaken within five years;
- 75 per cent of monitored ecosystem health data meets respective targets required for a healthy functioning ecosystem;
- The wider Perth community is actively involved with Riverpark management and participation rates are increasing; and
- The average level of visitor satisfaction with their visit to the Riverpark facilities is 85 per cent or higher.

These performance indicators provide five-year targets that reflect the desired state of the Riverpark, as determined by community values.



Photo: Mark Thornley

Measuring Success: Key Performance Indicators

The performance indicators specified in the Strategy's Strategic Management Program (SMP) were developed with input from various Riverpark stakeholders to provide a multi-faceted measure of the Strategy's success. The Strategy has been reviewed against these four indicators to provide a quantitative assessment of the operation and effectiveness of its first two years of operation.

This quantitative review indicates that all four performance indicators specified in the SMP are being met (Table 1).

Table 1: 2018 status of the Swan Canning River Protection Strategy's five-year performance indicators

	Status
1. All priority actions listed in the Strategy are undertaken within five years	✓
2. 75 per cent of monitored ecosystem health data meets respective targets required for a healthy functioning ecosystem	✓
3. The wider Perth community is actively involved with Riverpark management and participation rates are increasing	✓
4. The average level of visitor satisfaction with their visit to the Riverpark facilities is 85 per cent or higher	✓

1. All priority actions listed in the Strategy are undertaken within five years

The Strategy contains 33 priority actions to be undertaken within five years. Many of these actions are ongoing responsibilities for the respective lead partner agencies, where the intent is for these actions to be continued on an ongoing basis rather than being completed and closed out. Therefore, the term 'undertaken' is indicated by a status of "in progress" or "completed" for finite projects and "in progress" for activities of an ongoing nature. The status of these priority actions is detailed in Table 2.

Consultation with lead agencies has determined that all priority actions listed within the Strategy have been undertaken within the first two years of implementation. This positive result reflects the effort, commitment and coordination of multiple government agencies and organisations in support of the Strategy and its objectives.



Photo: Mark Thornley

Table 2: Priority Actions defined in the Swan Canning River Protection Strategy

Priority Action	Action Type	Status
1.1 Establish a Swan Canning River Protection Strategy Advisory Group	Project	Completed
1.2 Establish collaborative agreements between management organisations	Project	Completed
1.3 Biennial and five-yearly reports to be delivered to the Minister, partners and the community	Ongoing	In progress
2.1 Identify the levels and sources of nutrients, organic material and sediment entering the Swan and Canning rivers	Ongoing	In progress
2.2 Develop and implement Swan Canning and local water quality improvement plans to achieve nutrient load reduction targets	Ongoing	In progress
2.4 Improve management of fertiliser use to reduce nutrient loss from urban and rural land in the Swan Canning catchment	Ongoing	In progress
3.1 Regulate and manage pollution from contaminated sites, prescribed premises and other commercial activities with the potential to cause pollution	Ongoing	In progress
4.1 Increase dissolved oxygen levels in the Swan and Canning rivers where required	Ongoing	In progress
4.2 Investigate approaches to moderate and reduce the prevalence of algal blooms	Ongoing	In progress
6.1 Undertake river and catchment-based water quality monitoring program to measure compliance against management targets	Ongoing	In progress
6.2 Establish a program to monitor non-nutrient contaminants entering, and in, the river system	Project	In progress
7.1 Manage aquatic resources in the Swan Canning River system using a risk-based management framework	Ongoing	In progress
7.2 Protect and monitor the stock status of priority species in the Swan Canning river system according to risk	Ongoing	In progress
8.1 Provide protection for riparian and/or aquatic vegetation	Ongoing	In progress
8.2 Provide guidance on best management practices for shore stabilisation	Ongoing	In progress
10.1 Administer legislation to manage the Riverpark including the use of vessels and facilitate safe community use	Ongoing	In progress
12.1 Assess, recognise and protect sites with a high level of cultural heritage significance	Ongoing	In progress
12.4 Work with relevant Noongar groups to manage the Riverpark	Ongoing	In progress
13.1 Promote public use and enjoyment of the Riverpark	Ongoing	In progress
13.2 Maintain and improve the level of safe public access to and along foreshore areas in the Riverpark	Ongoing	In progress
13.5 Facilitate safe use of vessels on waterways – maintain navigation aids in the Swan and Canning rivers to facilitate safe passage through the navigation channels	Ongoing	In progress
13.6 Coordinate primary contact water quality monitoring at popular swimming locations and report conditions to the community	Ongoing	In progress
13.8 Implement works to stabilise the riverbank where valuable infrastructure or recreational amenity is threatened by erosion	Ongoing	In progress
14.1 Implement Aquatic Use Review and Management Framework for the Riverpark	Ongoing	In progress
15.2 Establish a Swan Canning Riverpark Trail project including walking, cycling and kayaking trails	Project	Completed
16.1 Support community events (e.g. Skyworks, Swanfish and Blessing of the Rivers) and tourism opportunities on the river foreshore	Ongoing	In progress
17.1 Promote opportunities for community groups and individuals to be involved in on-ground conservation activities	Ongoing	In progress
17.3 Support local environmental groups to source additional funding	Ongoing	In progress
18.1 Identify nodes for developing appropriate commercial opportunities in the Riverpark	Project	In progress
18.2 Ensure all commercial operators in the Riverpark meet high standards through licensing	Ongoing	In progress
18.3 Ensure river reserve leases are managed in line with policy to best practice standards	Ongoing	In progress
19.1 Provide clear guidance consistent with SPP 2.10 to developers of land adjacent to the foreshore	Ongoing	In progress
20.1 Review regulations and legislation to improve efficiency of the statutory assessment process	Ongoing	In progress
% undertaken:		100.0

2. 75 per cent of monitored ecosystem health data meets respective targets required for a healthy functioning ecosystem

There are many different ecological health factors that must be considered to provide a true representation of the overall state of the Swan and Canning rivers. Ecosystem health is currently assessed through biophysical conditions and specific ecological indicators.

Data is collected through a variety of monitoring programs across the Swan Canning catchment and aspirational targets have been developed accordingly. Some of these ecosystem health and water quality monitoring programs have been in place for over 30 years, while others have commenced in recent years.

For the SCRPS reporting, the health of the Riverpark ecosystem is assessed against performance targets measuring the following indicators:

- catchment water quality;
- estuary water quality;
- conditions in oxygenation zones; and
- fish community index.

These indicators are based on existing monitoring programs, however new monitoring programs may be implemented in the future and subsequent targets incorporated into outcomes for this performance indicator.

A selection of parameters has been collated to determine the proportion of data that meets relevant internal or external targets. A total of 148 parameters and associated targets have been analysed to provide an indication on the ecological health of the Swan and Canning rivers and the associated catchment area. Of these parameters, 114 met designated targets during the reporting period, providing an overall score of 77 per cent. The performance target for this indicator is 75 per cent, therefore the monitored ecosystem health data meets the requirements for a healthy functioning ecosystem in the Riverpark.

An increased suite of ecosystem health data is currently being reviewed for consideration in future reporting. Existing targets for water quality in the catchment and estuary were developed in 1998 and 2001, respectively, as part of the Swan Canning Cleanup Program. These targets will also be reviewed in 2019/2020.

Ecological indicators (or biotic indicators) have been found to provide additional and complementary information on the resilience and health of an ecosystem, as they are based on the response of organisms to a combination of various physical, chemical and biological conditions. It is envisaged that these types of targets, together with existing biophysical and chemical parameters, will be able to provide a more thorough indication of the Swan and Canning rivers' ecosystem health into the future.

Other environmental factors such as high rainfall events like the 2017 flood must also be considered in the interpretation of the results outlined in these tables.

Catchment Water Quality

Water quality targets for the Swan Canning Estuary have been intentionally set high to ensure sound long-term environmental outcomes for Perth's rivers.

During 2017 short term targets for nitrogen and phosphorus were met in 14 of the 15 catchments. Eight of these catchments are also meeting long term targets for nitrogen and 12 for phosphorus (Table 3).

Ellen Brook remains the largest contributor of nutrients to the Swan Canning river system. Much of the Ellen Brook catchment has been cleared for agriculture and peri-urban development and it contains soils that have a poor nutrient holding capacity. These factors, combined with the seasonal flow of the catchment, make it very difficult to address nutrient issues in the short term. The Ellen Brook catchment is a priority for water quality improvement and will continue to require a variety of long-term management actions to improve water quality.

Measures being undertaken in the catchment to improve water quality include:

- education programs to inform better land management practices;
- construction of wetlands;
- fencing and revegetation of stream lines;
- soil testing to inform appropriate fertiliser application;
- trialling appropriate soil amendments to reduce nutrient loss; and
- reviewing of major development proposals likely to affect water quality.

Table 3: Catchment Water Quality Targets (2016-2017)

Sub Catchment	Total Nitrogen		Sub Catchment trajectory	Total Phosphorus		Sub Catchment trajectory
	2016	2017		2016	2017	
Avon River	●	●	→	●	●	↗
Bannister Creek	●	●	↗	●	●	↗
Bayswater Brook	●	●	↗	●	●	↗
Bennett Brook	●	●	→	●	●	↗
Bickley Brook	●	●	→	●	●	↗
Blackadder Creek	●	●	↗	●	●	→
Canning River	●	●	↗	●	●	↗
Ellen Brook	●	●	→	●	●	→
Helena River	●	●	→	●	●	↗
Jane Brook	●	●	→	●	●	→
Mills Street Main Drain	●	●	↗	●	●	↗
South Belmont Main Drain	●	●	↗	●	●	↗
Southern River	●	●	→	●	●	↗
Susannah Brook	●	●	↗	●	●	↗
Yule Brook	●	●	↗	●	●	→

- Met short and long-term targets
- Met short but not long-term targets
- Did not meet targets

Sub Catchment trajectory

- ↗ Improving
- Stable*
- ↘ Deteriorating
- Not Assessed

The Sub Catchment trajectory has been determined from annual compliance data collected over a 30 year period from 1987 – 2017.

*Stable: No significant change in exceedances detected over time.

Estuary Water Quality Targets

The estuary water quality targets are based on dissolved oxygen and chlorophyll-a data collected over a three year period from within the Riverpark. These targets have been intentionally set high to ensure sound long term environmental outcomes for Perth's rivers.

The indicators in Table 4 represent the water quality monitoring undertaken throughout 2015, 2016 and 2017. In 2017 a significant flood event resulted in high flows and widespread hypoxia, which impacted water quality monitoring data during this period.

Oxygen is required by the majority of organisms for respiration, therefore targets are in place for dissolved oxygen at the surface of the water column in four of the Ecological Management Zones (EMZs) of the Swan Canning Estuary. These targets range from 75.1 per cent to 82.1 per cent and only a small number of exceedances are permitted over a three-year period before these targets are not met.

Despite the targets not being achieved in each EMZ, dissolved oxygen concentrations at the surface of the water column were above 4mg/L in 96 per cent of samples and above 6mg/L in more than 80 per cent of samples collected from the Lower Swan Canning Estuary and the Middle and Upper Swan Estuary.

Dissolved oxygen concentrations above 4mg/L are considered to be supportive of species survival and ecological function. Oxygen conditions in these three zones of the Swan Canning Estuary are therefore still considered to be highly favourable for aquatic organisms. In the Canning Estuary, surface oxygen concentrations were generally lower (averaging 4.8mg/L) and above 6mg/L in only 17 per cent of samples. These conditions are less favourable and may provide some insight into the lower condition scores for fish communities seen in the Canning Estuary over recent years.

Chlorophyll-a is used to determine the degree of algal activity occurring in sections of the Swan Canning Estuary. The current targets for chlorophyll-a at the surface are also stringent, particularly in relation to the lower section of the Swan Estuary. The chlorophyll-a target for the lower Swan Estuary is set at 3µg/L and only a small number of exceedances are permitted. Although this section of the Swan Estuary failed to meet the target, it is important to note that 3µg/L is considered to have a low likelihood of producing algal blooms.

A value of 10µg/L is used in microalgal reporting to indicate the presence of a potential bloom event. For the lower estuary, over the three years of compliance monitoring, chlorophyll-a was below 10µg/L in 89 per cent of samples. However, the mid and upper reaches of the Swan Estuary exhibited more bloom events, exceeding 10µg/L in 55 per cent and 69 per cent of samples, respectively. This is consistent with the locations in which the algal blooms have historically occurred and where management is being targeted. The Canning Estuary, which also exhibits frequent blooms, exceeded 10µg/L in 55 per cent of samples.

Table 4: Estuary Water Quality Targets (2015-2017)

Ecological Management Zone	Dissolved Oxygen	Biophysical trajectory	Chlorophyll-a	Biophysical trajectory
Canning Estuary	✘	→	✘	→
Lower Swan Canning	✓	→	✘	↘
Middle Swan Estuary	✘	→	✘	→
Upper Swan Estuary	✘	↗	✘	→

✓ Met three-year targets
 ✘ Not yet met three-year target
 Targets are based on three-yearly exceedance data.

Biophysical trajectory
 ↗ Improving
 → Stable*
 ↘ Deteriorating
 — Not Assessed

The overall biophysical trajectory has been determined from annual compliance data collected over an 11 year period from 2007 – 2017.

*Stable: No significant change in exceedances detected over time.

Fish Community Index

The Fish Community Index provides an indication of estuarine health based on fish communities within the Swan and Canning Estuary. Sampling events are conducted in summer and autumn each year. The performance of the 2016 and 2017 Fish Community Index results against respective targets is detailed in Table 5.

Targets were met in all the Swan Canning Riverpark's shallow nearshore waters in 2017 but a significant flood event in the Swan Canning catchment in early 2017 caused widespread hypoxia through large parts of the waterway into autumn. This contributed to a decrease in Fish Community Index scores from 2016 to 2017, particularly in deeper waters.

Table 5: Fish Community Index (2016-2017)

Ecological Management Zone	Shallow Nearshore Waters			Deeper Offshore Waters		
	2016	2017	Index trajectory	2016	2017	Index trajectory
Canning Estuary	●	●	—	●	●	—
Lower Swan Canning Estuary	●	●	—	●	●	—
Middle Swan Estuary	●	●	—	●	●	—
Upper Swan Estuary	●	●	—	●	●	—

- | | |
|-------------------------------------|-------------------------|
| ● Both sampling events met target | Index trajectory |
| ● One sampling event met target | ↗ Improving |
| ● Neither sampling event met target | → Stable* |
| | ↘ Deteriorating |
| | — Not Assessed |

The Fish Community Index trajectory was not assessed as there was insufficient data (<10 years) for determination.

*Stable: No significant change in exceedances detected over time.



Photo: Jennifer Elliott

Oxygenation Zone Conditions

The four oxygenation plants operating on the Lower Canning River and Upper Swan Estuary provide oxygen relief over a combined 14.5kms of the river system known to be regularly impacted by poor water quality. Intervention through this process provides refuge for organisms during periods of oxygen stress.

The dissolved oxygen targets developed to assess the effectiveness of this program require at least 90 per cent and 80 per cent of oxygenation values to exceed 4mg/L and 2 mg/L, respectively. These targets were met in 2016 and 2017 (Table 6).

Table 6: Oxygenation Zone Conditions (2016-2017)

Oxygenation Zone	2016	2017	Oxygenation Zone trajectory
Upper Swan Estuary	✓	✓	—
Lower Canning River	✓	✓	—

<ul style="list-style-type: none"> ✓ Oxygenation target met ✗ Oxygenation target not met <p>The dissolved oxygen targets are based on cumulative annual threshold.</p>	<p>Oxygenation Zone trajectory</p> <ul style="list-style-type: none"> ↗ Improving → Stable* ↘ Deteriorating — Not Assessed
<p>The Oxygenation Zone trajectory was not assessed as there was insufficient data (<10 years) for determination.</p> <p>*Stable: No significant change in exceedances detected over time.</p>	

3. The wider Perth community is actively involved with Riverpark management and participation rates are increasing

The geographical extent of managing the Riverpark extends far beyond the immediate Swan Canning Riverpark and up into the greater catchment and sub-catchment regions. The wider Perth community is actively involved with Riverpark management through participation in various events, volunteer organisations and promotions. These include:

- River Guardians
- Dolphin Watch
- River Rangers
- Clean Up Australia Day
- Swan Alcoa Landcare Program
- Tree planting days
- SwanFish
- The use of sustainable fishing practices, i.e. fishing line bins
- Responsible boating and speed limits

To determine whether participation rates are increasing, several key parameters will be used and compared in each biennial review. These parameters represent various Riverpark management activities being undertaken by the community. Community membership of volunteer programs includes River Guardians members and active Dolphin Watch contributors. Total volunteer hours in Riverpark-related activities and events has been determined through River Guardians events, tree planting days and community participation in the Dolphin Watch program. The Biennial Report is the first of these reviews and will form a baseline comparison for future Strategy reporting. The key parameters to be used to indicate participation rates are detailed in Table 7.

Table 7: Key parameters for monitoring participation rates of the wider Perth community in Riverpark management

Key Parameter	1 Jan 2016 – 31 Dec 2017
Community membership of volunteer programs (e.g. River Guardians, Dolphin Watch) – Total number of members	3373 community members
Community participation in Riverpark related activities and events – Total volunteer hours	6015 hours

4. The average level of visitor satisfaction with their visit to the Riverpark facilities is 85 per cent or higher

DBCA undertakes a Visitor Satisfaction Survey for the Swan Canning Riverpark every two years. This survey collects, collates and analyses information from Riverpark users, identifying:

- visitor satisfaction levels with the Riverpark and its facilities;
- recreational usage patterns; and
- suggestions for improvements.

The average visitor satisfaction level is determined by asking respondents to rate their overall satisfaction with their visit to the Riverpark, from “totally dissatisfied” to “very satisfied”. This is measured on a scale of 1 to 5, with 1 being “totally dissatisfied” (0 per cent) and 5 being “very satisfied” (100 per cent). In order to determine the average level of visitor satisfaction as a percentage, the mean value of all responses to this question is determined, then divided by 5 and multiplied by 100 per cent.

The most recent visitor satisfaction survey was conducted through *Yardstick* in 2017, with 242 responses received for the survey question on overall satisfaction. These responses had a mean of 4.34 out of a possible 5. This provides an average satisfaction level of 86.8 per cent, which meets the Strategy’s five-year target of 85 per cent or higher (Table 8).

Table 8: Overall level of visitor satisfaction with their visit to Swan Canning Riverpark facilities in 2017

Rating	Satisfaction Level (%)	Target Satisfaction Level (%)	Actual Satisfaction Level (%)
5 – Very satisfied	100%		
4 – Satisfied	75%		
3 – Neither satisfied nor dissatisfied	50%	>85%	86.8%
2 – Dissatisfied	25%		
1 – Totally dissatisfied	0%		

Operation and Effectiveness

The performance of the Strategy has been monitored since its implementation in late 2015 through progress reporting, advisory group meetings, correspondence with stakeholders, and now the biennial review of the Strategy's five-year performance indicators. Overall, feedback has been positive, reflecting on successful collaboration and improvements in efficiency that have been achieved.

The first Progress Report was released in 2017, detailing various activities and projects that have been supported following the commencement of the Strategy. Advisory group meetings have been conducted on an annual basis and have been well attended. Participants have been engaged and open in discussions, which has provided valuable insights into the challenges and issues faced by various agencies and organisations. This increased awareness of operational and organisational functions has improved cross-agency communication, support and project planning, and increased efficiency in project execution.

This Swan Canning River Protection Strategy Biennial Report assesses the Strategy's five-year performance indicators and shows positive steps are being taken in achieving its four main outcomes – better coordination, a healthy river ecosystem, improving community engagement and enjoyment, and better management.

Improvements in collaborative management and community benefit have become evident, and the overall ecosystem health of the rivers is meeting the specified benchmark. Ecological performance indicators may experience some lag (up to 20 years) before they are able to provide an accurate reflection of the river management changes implemented under the Strategy. Therefore, ecosystem health will require a much longer timeframe to achieve measurable and indicative results.

The Swan River Trust, DBCA and the Strategy's partner organisations have committed to providing continued support for the Strategy and its objectives, despite some of these key agencies undergoing significant organisational change throughout the past 12 months. This steadfast commitment reflects the strong alignment with the shared values of the Swan Canning Riverpark demonstrated by the leadership teams, advisory group nominees and supporting officers within and between these organisations.



Photo: Megan Lewis

Conclusion

Historically we have changed the natural river system; in the waterway itself, on the coastal plain for industry and suburban development and in the broader landscape where the Wheatbelt was cleared to feed our growing population. These changes add to the complex web of ecological pressures that impact our rivers and increase their vulnerability to oxygen depletion, nutrient enrichment and other biodiversity threats.

River system management is challenging; it involves uncertainty and rapid changes. Understanding and addressing the issues goes beyond the capacity of any one organisation. It requires adaptive management, working across organisational boundaries and applying innovative, comprehensive solutions.

The level of involvement, support and ongoing commitment to the Strategy by partner organisations to date has been very positive. The Strategy has provided a co-ordinated management mechanism for various agencies and organisations with differing operational priorities to work together in support of the shared vision – “A healthy river for all, to be enjoyed and shared, now and in the future”.

This first Biennial Report of the operation and effectiveness of the Strategy and its implementation is already showing strong indications of its success. Measurable improvements are emerging and have been demonstrated in many of the Strategy’s performance indicator achievements and the priority actions summary.

Our partner organisations are undertaking effective, ongoing river management interventions and the Strategy will continue to drive further improvements across State and local government, industry and the Perth community.



Photo: Matt Kleczkowski



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RIVERPARK**



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