GOVERNMENT OF WESTERN AUSTRALIA

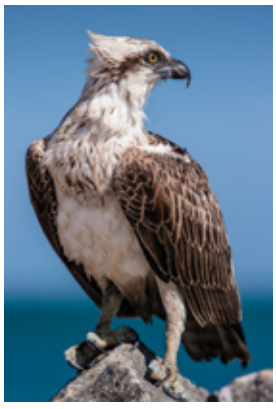
Department of **Biodiversity, Conservation and Attractions**

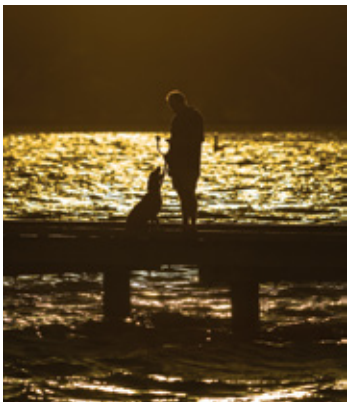
SWAN CANNING RIVERPARK

SWAN RIVER TRUST

SWAN CANNING RIVER PROTECTION STRATEGY

FIVE YEAR REVIEW





Darter on the Canning River.
Photo: Matt Kleczkowski

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Disclaimer

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Contents

Mantis shrimp tail Swan River.
Photo: Matt Kleczkowski

Swan Canning River Protection Strategy achievements

SCRPS Reporting

- 94% of the SCRPS's 68 management actions have either been completed or are on track to address the relevant action.
- 100% of the SCRPS's 33 priority actions were undertaken.
- 432 measures across 7 parameters were assessed to help reflect the ecological health of the Swan Canning river system. Of these, 312 (72.2%) met designated targets during the reporting period.

Water quality monitoring

- During 2020, short term water quality targets for nitrogen and phosphorus were met in 14 of the 15 catchments. 4 of these catchments met long term targets for nitrogen and 11 for phosphorus.
- 4 oxygenation plants operating on the lower Canning River and the upper Swan Estuary provided oxygen relief over a combined 14.5kms of the river system.
- DBCA's Rivers and Estuaries Science program undertook weekly water quality monitoring at 42 sites throughout the Swan Canning estuary and fortnightly nutrient samples were collected at 21 sites. Water quality and nutrients were monitored fortnightly at 33 sites within the Swan Canning catchment.
- DoH coordinated annual microbiological water sampling conducted by local government authorities within the Riverpark beaches.

Constructing wetlands and living streams

- The $3 million Eric Singleton Bird Sanctuary improved the quality of water flowing to the Swan River from the Bayswater Brook catchment.
- The $4 million Ellen Brook wetland removed nutrient loads from the Ellen Brook before entering the Swan River.
- The River Health Improvement Program used 11 demonstration sites and worked with 12 key stakeholders to develop wetlands, biofilters, living streams and soil amendments.

Supporting natural resource management/ community groups

- DBCA provided $3.13 million to sub regional groups to deliver catchment restoration and nutrient prevention projects throughout the Swan Canning catchment.
- DBCA and Alcoa Australia provided over $1.75 million to community groups to deliver 260 catchment restoration projects under the Swan Alcoa Landcare Program.
- The Community Rivercare Program contributed $900,000 to 26 community groups to deliver 34 catchment restoration projects.
- DBCA, Wheatbelt NRM and Perth NRM provided over $75,000 to assist 140 landholders in the Swan Avon region to implement on ground activities that improved soil health and water quality in the Swan-Avon River.

Protecting and restoring foreshores

- The Riverbank program funded 51 foreshore restoration projects with $5.6 million culminating in a total of $11 million including matched funding from local riverfront governments.
- The Riverpark foreshore asset management system was developed into Australia's most comprehensive river shoreline dataset.
- DPLH contributed $4.3 million to stabilise the Rivervale foreshore and rehabilitate a contaminated site on the Swan River floodplain in Bayswater.

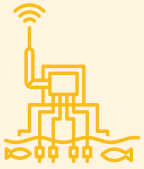
Trails and recreation

- The Riverpark Trails project constructed 8 interpretation nodes at Point Walter, Heathcote, Bicton, Adenia Park, John Tonkin Park, Kent St Weir, Brentwood and Matilda Bay. DBCA provided $601,000 towards the interpretation nodes construction.
- DBCA and DoT installed 10 new courtesy moorings. There are now 43 courtesy moorings available for free daily and overnight use by boating enthusiasts.
- DLGSC provided more than $3.31 million funding to state sporting and recreation organisations who used the Riverpark for all or some of their sport and recreation.

Working with traditional owners

- DBCA worked closely with the South West Aboriginal Land and Sea Council (SWALSC), traditional owners to create the Riverpark Trail interpretation nodes. 5 out of the 8 interpretation nodes were constructed by Aboriginal businesses, and 35 Aboriginal students obtained practical experience for their course and worked towards completion of their Certificate II in Civil Construction.

Research projects



- $325,504 was allocated to seagrass monitoring in the Swan Swan Canning Estuary.
- DPLH/WAPC provided $250,000 funding for a hydrological study and restoration of Ashfield Flats' floodplain.
- 4.5 million juvenile prawns were cultured and released into the Swan Canning estuary under a collaborative research project.
- DBCA and UWA developed eDNA monitoring of the Canning River to help detect the movement of native and feral fish.

Creating powerful river management tools

- The $450,000 Swan Canning Catchment Modelling project was coupled with detailed landuse mapping and a catchment and estuary model to provide climate, landuse, nutrient and estuary response projections to 2050.
- The Kent St Weir received major upgrades to enable more effective control of water levels in the Canning River and to improve flows to the Canning Estuary and fish passage.

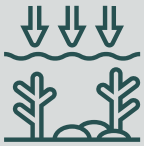
Citizen science

- DBCA contributed $300,000 over 5 years to the Dolphin Watch program to engage citizen scientists to help monitor dolphin activity, behaviours and the resident Riverpark dolphin population.
- The Reel It In fishing line bins project was expanded to 68 bins throughout the Riverpark that have collected 55 km of fishing line and 12,686 bait bags.
- Prawn Watch was a community education and engagement project supported by DBCA's River Guardians program.

Creating new habitat for native animals

- DBCA invested $250,000 over three years in the Nature Conservancy's Swan-Canning shellfish reef restoration project to help create new habitat for native fish and blue swimmer crabs.
- DBCA collaborated with the Fairy Tern Network and the City of Melville at the Point Walter Spit to improve breeding conditions for the threatened Fairy Tern. During 2020, 150 fairy tern breeding pairs utilised this location.

Reducing nutrients and contaminants



- The Phosphorus Awareness Program increased awareness of catchment nutrient issues amongst the community, local governments, and industry.
- The Light Industry Audit Program conducted over 1348 audit inspections with 733 businesses. The LIA Program reduced industry non-compliance from 73.4% to 12.5%.
- The Sediment Task Force reduced urban development sediment inputs from entering the Swan and Canning rivers and created important sediment regulations, education and research resources.

Incident response

- DBCA, DPIRD and DoH's incident response team responded to 2 Alexandrium algal blooms that affected large sections of the Swan Canning Estuary and delivered a public education campaign.
- A multi-agency incident management team responded to a Riverpark flood event in February 2017.
- Interagency response plans were developed for dolphin deaths or injuries, oil spills, algal blooms, wastewater spills and oiled wildlife.

Measuring visitor satisfaction

- The Annual Visitor Satisfaction Surveys revealed the average Riverpark visitor satisfaction across 23 Riverpark locations was 85.96% during 2016-2021. This was based on 1170 interview respondents.

Maintaining facilities

- DoT's Riverpark facilities funding of $1.195 million enabled the City of Melville to upgrade the Deepwater Point boat launching facility and the Point Walter boat launching facility.
- DoT undertook annual maintenance and modifications to priority Riverpark Aids to Navigation devices and jetties.

Improving urban drainage

- DWER and the Water Corporation created a new co-operative urban drainage partnership–Drainage for Liveability to help transform stormwater drains and basins into living streams and wetlands.

Improving policies and planning schemes

- 20 local riverfront governments worked with DBCA and the WAPC to improve planning schemes and policies that helped decrease nutrients and other contaminant inputs into the Swan and Canning rivers.
- The WAPC released the draft State Planning Policy 2.9: Planning for Water and the associated guidelines which will incorporate content from State Planning Policy 2.10: Swan Canning River System, with input from DBCA.

Improving environmental flows

- DBCA, DWER and Water Corporation investigated and managed environmental water provisions for major tributaries of the Swan and Canning rivers.

Addressing the needs of key river user groups

- DBCA and DoT continued to deliver the Swan Canning Riverpark Boating Management Strategy and Aquatic Use Management Framework.
- DoT completed consultation with 33 local governments on the LongTerm Cycle Network.

Managing riverfront development

- The City of Perth and Development WA delivered the major Elizabeth Quay and Matagarup Bridge developments.
- DBCA officers assessed and provided advice on 1105 development applications that were in, next to, or affecting the Swan and Canning rivers. The Trust provided advice to the Director General DBCA on 65 development applications in accordance with Part 5 of the SCRM Act.
- DBCA provided ongoing advice on river protection and foreshore enhancement matters for major projects including the Matagarup Pedestrian Bridge, METRONET, and DevelopmentWA projects at East Perth, Elizabeth Quay, Midland and Armadale (including Wungong).
- DBCA provided advice on the design development and construction phases of 5 major bridge crossings on the Swan and Helena Rivers.
- The Perth Water Buneenboro Locality Plan (PWBLP) was developed by DBCA with 7 other State agencies and local riverfront governments and was released in 2021.The Belmont Foreshore Precinct Plan was completed in 2018.

Supporting major Riverpark events

- DBCA continued to support a variety of major Riverpark community events.

Creating volunteering opportunities around the rivers

- The River Guardians program now has 2828 subscribers and offered volunteering and training opportunities via the Dolphin Watch project, Prawn Watch and the Reel It In fishing line bin project.
- DBCA's River Guardians program delivered 28 free RiverWise/Great Gardens sustainable gardening workshops to 2,036 attendees in priority nutrient suburbs.

Affecting behaviour change to benefit the rivers

- DBCA delivered 2 RiverWise Gardens behaviour change programs in priority nutrient suburbs including Southern River and Bullcreek. The programs engaged over 900 residents to reduce fertiliser and water use and save money.

Supporting tourism and commercial operators

- During the reporting period 224 tourism operator licences were approved on the Swan and Canning rivers and 35 leases granted within the River reserve.
- DBCA simplified the application process for commercial operators in the Swan Canning Development Control Area.

Supporting a water sensitive city

- DBCA continued to resource and support the New WAterways program and the Cooperative Research Centre for Water Sensitive Cities to invest in a water sensitive Perth.

Chair's Foreword

The iconic Swan Canning Riverpark is a fundamental part of Perth's environmental, economic, and social landscape. The rivers provide a backdrop to Perth residents' lives and like any significant place, the Riverpark is subject to protection and management under the guidance of its traditional owners and administered by State and Local Governments.

To ensure the continuing health and amenity of the rivers, all elements of government need to work co-operatively towards positive river management outcomes. The Swan River Trust (the Trust) serves as an independent community steward for the Swan Canning Riverpark and released the *Swan Canning River Protection Strategy* (SCRPS) in November 2015.

The SCRPS was developed by the Trust, as required by the *Swan and Canning Rivers Management Act 2006* (SCRM Act), to help coordinate the efforts of State government agencies, riverfront local governments, industry and the community with an interest in protecting the future of our rivers.

During 2015-2020 the Trust has delivered regular progress reports and a biennial report to help track the SCRPS's annual progress, key performance indicators and achievements in relation to the Strategy's 68 agreed river management actions.

This Five Year Review provides a comprehensive perspective on the Strategy since it was implemented in 2015. Notably, 100% of the SCRPS's priority actions were undertaken and 94% of the SCRPS's 68 management actions have either been completed or are on track to deliver the relevant river management initiatives.

The SCRPS also achieved 75% of its five year performance indicators and 72% of the Strategy's monitored ecosystem health data met the respective targets required for a healthy functioning ecosystem throughout the Swan and Canning rivers.

During 2021-2022, the review process engaged key partner agencies, natural resource management groups and other stakeholders to develop a series of recommendations. Based on the success of the SCRPS over its first five years, it is proposed that this feedback and advice will help inform a new and improved SCRPS that can coordinate the critical management of the Swan Canning Riverpark for the future.

I would like to thank all our partner agencies, local government, natural resource management groups, industry and the Perth community for their commitment to the river management actions outlined in the SCRPS.

Hamish R. Beck
Chair
Swan River Trust

Executive Summary

The SCRPS was released in November 2015 and heralded a new approach to bringing together a range of government organisations to clearly identify how agencies are working, both individually and collaboratively, to produce positive outcomes for the Swan and Canning rivers.

Under the SCRM Act, the Swan River Trust (the Trust) is required to produce a biennial report and a five year review to help monitor the progress of the SCRPS. The Trust has also produced two SCRPS progress reports in 2017 and 2019 to track the implementation of the SCRPS's Strategic Management Program.

This SCRPS Five Year review covers the period from July 2015 to December 2020. SCRPS partner agencies have provided short status reports on each project or task undertaken in support of the 68 agreed SCRPS river management actions. These agencies have also contributed to project case studies which highlight collaborations with other public sector organisations, the community, industry or research organisations.

Notably, 94% of the SCRPS's 68 management actions have either been completed or are on track to address the relevant action. Just four of the actions have experienced any minor or significant delays.

DBCA reviews and reports on the SCRPS implementation under a Monitoring, Evaluation and Reporting Framework. This framework ensures that the SCRPS 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 contribute data for progress reports, biennial reports and a SCRPS five year review. The 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.

Following the merger of many government departments in 2018, DBCA has worked with partner agencies to consolidate the operations of the SCRPS Advisory Group and has refined reporting frameworks to ensure that each agency clearly understands their agreed river management actions and responsibilities and proposed reporting timeframes.

During 2019 an SCRPS Advisory Group meeting was held to discuss machinery of government impacts on the core business of SCRPS partner agencies. A SCRPS Addendum publication was also produced in 2018 to update partner agency names and agreed river management actions for the SCRPS.

During 2020 DBCA individually met with state government partner agencies, natural resource management (NRM) groups and other key stakeholders to canvas feedback on the SCRPS format, process and reporting. This feedback has been captured in the "Recommendations" section of the SCRPS Five Year Review.

The SCRPS progress reports were produced in alternate years, when a biennial report is not required. Partner agencies were also invited to provide annual feedback on the operation and effectiveness of the Strategy via an SCRPS Advisory Group and the recent Five Year Review consultation process that engaged other key stakeholders.

Under the SCRM Act the Trust is required to monitor and report to the Minister for Environment on the following performance indicators detailed within the SCRPS:

- All priority actions listed in the SCRPS are undertaken within five years;
- 75% 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 Swan Canning Riverpark (Riverpark) facilities is 85% or higher. These performance indicators provide five-year targets that reflect the desired state of the Riverpark, as determined by community values.

SCRPS Five Year Review Recommendations

During 2020-2021 DBCA individually met with SCRPS State Government partner agencies, NRM groups and other key stakeholders to compile feedback on the SCRPS format, process and reporting.

Surveys, forums and workshops were also held with partner agencies, the Swan River Trust and senior staff from key subregional NRM groups. This feedback has been captured below as high level recommendations.

Developing a new SCRPS

1) The SCRPS should be updated and continue for another five years with annual reporting from DBCA and partner agencies on relevant agreed management actions and projects.
2) Revise SCRPS management actions and relevant projects for DBCA and partner agencies. Create new Collaborative Agreements for partner State government agencies and other key stakeholders.
3) Recalibrate catchment and estuarine water quality targets, particularly oxygenation targets.
4) Undertake an independent review of the original SCRPS and incorporate third party recommendations supported by the SCRPS Advisory Group.

Reporting, progress and achievements

1) The SCRPS should continue to produce a Biennial Report and Five Year Review but does not require annual progress reports.
2) Adopt new program/project based reporting for local government via the Swan Canning Riverpark Urban Forest program, Riverbank Funding, Riverpark Trail project, Plastic Free Riverpark program and Riverpark beaches monitoring program (DoH).
3) Improve KPI reporting and tables format/keys. Rationalise trend measure. Create new KPI – “Amount of river foreshore revegetated”.
4) Improve and expand reporting on a range of ecological indicators (e.g. Riverbank vegetation cover and connectivity) and measures of biodiversity value.
5) Introduce more social values-based reporting such as visitor satisfaction, recreational user group statistics and Plastic Free Riverpark project data.
6) Improve SCRPS partner agency reporting process and project progress spreadsheet format.
7) Identify and incorporate an economic metric for the Riverpark into the SCRPS reporting.

Partner agency and stakeholder engagement

1) SCRPS Advisory Group to meet annually and DBCA will hold one on one meetings with each key partner agency every year to help maximise agreed management actions, outcomes and opportunities.
2) Improve Aboriginal engagement and content on the new SCRPS, including Indigenous representation in the SCRPS advisory group.
3) Increase engagement with NRM groups and improve profile in the SCRPS.

Seahorse in the lower reaches of the Swan River. Photo: Matt Kleczkowski.

SCRPS Strategic Management Program

The SCRPS Strategic Management Program (SMP) lists river management actions that lead government agencies have identified as part of their core business.

These river management actions contribute to the ecological health and community benefit of the Swan and Canning rivers. The SMP contains 68 agreed river management actions and 33 priority actions. These priority actions were required to be undertaken within five years and form key performance indicators of the SCRPS. Achievement reporting agreements were developed and refined with the lead government agencies to help define individual activities to implement actions.

This *SCRPS Five Year Review* provides an update on the status of these agreed management actions and key performance indicators. The SCRPS Review highlights the work of the SCRPS partner agencies in implementing this important cross government agency initiative.

The actions within the SMP are structured around eight objectives. Based on the information provided by partner agencies, the status of these objectives within the reporting period is as follows:

Objective 1: Increase management coordination and collaboration between organisations with Riverpark responsibilities

The overall SCRPS implementation has been successful with the consolidation of the formal structures and agreements to support the implementation of the SCRPS. Partner agency feedback has been very positive with key stakeholders indicating that the SCRPS has increased co-ordination between State government agencies and other organisations with Riverpark roles.

Objective 2: Improve water quality and manage environmental flow

This is a substantial objective, containing four separate strategies and 14 actions. Water quality improvement in rivers is only achieved through consistent and long term activity in the catchment to reduce point and non-point source contributions of nutrients and other contaminants. Improving the condition of drains and tributaries via catchment restoration and constructed wetland projects in priority suburbs has helped ‘strip’ nutrients and contaminants out before they reach the rivers. DBCA, Department of Water and Environmental Regulation (DWER), Department of Primary Industries and Regional Development (DPIRD), local governments and sub regional natural resource management (NRM) groups have all worked in diverse areas including prescribing environmental water provisions for major tributaries of the Swan and Canning rivers to achieve these outcomes.

Objective 3: Ensure management decisions are based on appropriate knowledge

Objective three has four actions, focusing on various monitoring programs across water quality, non nutrient contaminants and ecological health. These programs allow progress tracking against long and short term sub catchment targets and help measure the effectiveness of management strategies for the river system.

DBCA worked with local and state government agency partners to respond to algal blooms and flood events and issue updates to key community stakeholders regarding public health, amenity or environmental impacts on the rivers.

DBCA and project partners developed, validated and implemented a suite of environmental health indicators to provide more information on the overall health of the Swan and Canning rivers.

Objective 4: Protect, manage and enhance biodiversity

This is the largest objective with five strategies and 14 actions. Implementation of the Riverbank program's engagement and extension initiatives and the subregional catchment restoration programs are progressing well.

The Riverbank program contributed over $5.6 million to 51 foreshore restoration projects in the Swan and Canning rivers. This funding was matched by foreshore land managers across the projects and represents over $11 million total investment in the health and amenity of the Riverpark.

Government agencies and partners conducted valuable research into Riverpark fish, prawns, dolphins, trees and shorebirds to help protect iconic species and their natural habitats.

Government agencies collaborated to reduce the adverse impacts of invasive plants and animals in the Riverpark.

Government agencies encouraged sustainable fishing practices and developed response plans for oil spills, dolphin entanglements, algal blooms, wastewater spills, and oiled wildlife.

Extensive effort was also undertaken to improve understanding of the Riverpark's ecosystem and threats through research.

Objective 5: Maintain and improve sense of place with the Riverpark

This objective focuses on improving community understanding and engagement with the Riverpark and solid progress was made in providing opportunities for people to engage with river information, interpretation and education opportunities focusing on culture and natural heritage.

The Riverpark Trail interpretation nodes have been a successful collaboration in supporting this objective with eight interpretation nodes already developed at iconic Swan Canning Riverpark locations. These nodes improve Riverpark facilities, amenity and cultural awareness at popular recreation sites.

Mobile river education displays were installed at key Perth venues such as the WA Museum and Scitech, riverside events and schools to help inform the public of significant Aboriginal stories and river culture facts.

Objective 6: Provide access and a safe environment for Riverpark users

This objective has four strategies and 13 actions that focus on safe access and use of facilities both on water and land, as well as continuing to improve the community's ability to access public lands adjoining the rivers.

A dinghy management program was initiated with local riverfront governments around the foreshores to implement dinghy management policy or storage systems. Funding from the Department of Transport's (DoT) Recreational Boating Facilities Scheme was also used to plan and design key public recreation facilities projects at a variety of iconic Riverpark destinations.

Ongoing foreshore stabilisation works continued with foreshore land managers and other agencies to protect Riverpark infrastructure and recreational amenity. DoT, Department of Local Government, Sport and Cultural Industries (DLGSC) and Main Roads Western Australia (MRWA) undertook work to improve public shared paths, cycle paths, boat ramps, moorings, jetties, navigation markers, toilets and lookouts along the Swan and Canning rivers.

Objective 7: Improve public knowledge and understanding of the Riverpark

There are five actions under this objective with significant progress being made in all areas. DBCA's River Guardians program continued to provide RiverWise training, volunteering opportunities and free presentations from scientific and behaviour change experts addressing key issues impacting our rivers. River Guardians now has 2828 subscribers.

The Dolphin Watch citizen science research project continued to be delivered in Perth. DBCA partnered with Curtin, Murdoch and Edith Cowan universities to train 651 new dolphin watchers.

The RiverWise Gardens behaviour change program also delivered education and home assessments to 912 riverfront residents in priority nutrient suburbs. The RiverWise sustainable gardening workshops delivered by Josh Byrne and Associates and Great Gardens delivered 28 free workshops that also educated 2036 residents across the Swan Canning catchment.

DBCA also produced mobile river education displays and activations for Scitech, WA Museum, Festival of Perth, Kings Park Festival, Canning River Festival and other key riverfront events.

The Swan Alcoa Landcare Program (SALP) – a 22 year commitment to an important community partnership by DBCA, Alcoa and Perth NRM continued to provide valuable funding for river restoration and conservation activities by local community groups.

The State Government's Community Rivercare Grants program has also been welcomed by community groups seeking multi-year funding to deliver catchment restoration projects that improve water quality, manage weeds, prevent erosion and install native plants to create vital habitat for native species dependent on waterways.

Objective 8: Improve the way we do business

There are four strategies and 11 actions supporting this objective covering external investment, statutory approvals processes, legislation and support frameworks. During the reporting period great progress was made on strategic land use planning initiatives, including completion of the *Perth Water Buneenboro Locality Plan (2021)*, update of the corporate policy suite (2016 & 2017), the *Belmont Foreshore Precinct Plan (2018)*, implementation of a competitive process for the establishment of seaplane operations in Perth Water (2020) and providing advice into the review of State Planning Policy (SPP) 2.10: Swan Canning river system, which is now being incorporated in draft SPP 2.9 - Planning for Water.

These initiatives support appropriate and responsible development in the Riverpark and will provide clearer guidance to proponents and commercial operators seeking licences and permits in the Riverpark. DBCA also streamlined its application processes, forms and assessment for commercial activities in the Riverpark.

Bannister Creek living stream. Photo: Mark Thornley

Measuring Success: Key Performance Indicators

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

This quantitative review indicates that three performance indicators specified in the SMP are being met and that 72.2% of monitored ecosystem health data meets respective targets required for a healthy functioning ecosystem which is slightly below the 75% target (Table 1).

Notably, 100% of the priority actions defined in the SCRPS were undertaken and 94% of the SCRPS's 68 management actions have either been completed or are on track to address the relevant action. Just four of the actions have experienced any minor or significant delays.

Table 1: Status of the Swan Canning River Protection Strategy's five-year performance indicators 2015-2020

	Achieved
1. All priority actions listed in the Strategy are undertaken within five years	✓
2. 75% 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% 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 shown in Table 2, with more detail on the items provided in the remainder of the report. **Note:** Progress on other important management actions is included in the summary tasks of each objective.

Consultation with lead agencies has determined that all priority actions listed within the Strategy were 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.

Catchment restoration planting at Brentwood. 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	Project	**Completed**
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	Project	**Completed**
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	**Completed**
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	**Completed**
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	**Completed**
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	**Completed**
18.2	Ensure all commercial operators in the Riverpark meet high standards through licensing	Ongoing	**Completed**
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% 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 projects across the Swan Canning catchment and estuary, and aspirational targets have been developed accordingly. Some of the datasets that underpin the targets have been collected 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:

Biophysical

- Catchment water quality (total Nitrogen; total Phosphorus);
- Estuary water quality (chlorophyll a; oxygen);
- Conditions in oxygenation zones.

Ecological

- Fish Community Index;
- Seagrass health.

As part of the SCRPS Biennial Report (2015-2017) a total of 148 parameters and associated targets were analysed to provide an indication of the ecological health of the Swan and Canning rivers and the associated catchment. Of these parameters, 114 met designated targets during the reporting period, providing an overall score of 77%.

A selection of parameters has since been collated to determine the proportion of data that meets relevant targets for the period July 2015 - June 2020. A total of 432 measures across seven parameters were assessed to provide an indication of the ecological health of the Swan Canning river system.

Of these measures, 312 (72.2%) met designated targets during the reporting period. The performance criteria set for a healthy functioning ecosystem in the Riverpark is 75% and therefore the monitored ecosystem health data fell slightly short of the five year target.

Many of the water quality targets used in this reporting were set in the mid 1990s when limited data on the variability of the river system was available and it is important these targets are reviewed in the near future to remain meaningful in the current climate.

Ecological indicators 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. The seagrass and fish community indicators applied here have been specifically developed for the SCRPS and any future indicators would also require a sound scientific basis.

Sunset colours at Bells Rapids in the upper Swan River. Photo: Dougal Topping.

Catchment Water Quality

Table 3: Catchment Water Quality Targets

Sub Catchment	Total Nitrogen					Sub Catchment Trend	Total Phosphorus					Sub Catchment Trend
	2016	2017	2018	2019	2020		2016	2017	2018	2019	2020	
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
○ Insufficient data

The Sub Catchment trend has been determined from water quality data collected over compliance periods from July 2015-June 2020.

*Stable: No significant change over time.

Sub Catchment trend
↗ Improving
→ Stable*
↘ Deteriorating
— Not assessed

Water quality targets for 15 tributaries of the Swan Canning river system were defined through the Swan Canning Cleanup Program (2001). Both short and long term targets for nutrients (Total Nitrogen – TN and Total Phosphorus – TP) were set in view of the long timeframes considered necessary to influence the concentration of nutrients in surface waters.

Target definition was based on a classification system developed for tributaries in 1994 and based on historic nutrient datasets. The water quality targets for the tributaries in the catchment were intentionally set high to ensure sound long term environmental outcomes for the estuarine receiving waters.

During 2020, short term targets for nitrogen and phosphorus were met in 14 of the 15 catchments. Four of these catchments are also meeting long term targets for nitrogen and 11 for phosphorus (Table 3). No significant trends were detected over the past five years and Ellen Brook was the only catchment not to meet any target.

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 long term management actions are required to improve water quality. Approaches being undertaken in the catchment are summarised on pages 23-28.

Estuary Water Quality Targets

Table 4: Estuary Water Quality Targets

Ecological Management Zone	Dissolved Oxygen					Biophysical trend	Chlorophyll-*a*					Biophysical trend
	2016	2017	2018	2019	2020		2016	2017	2018	2019	2020	
Canning Estuary	✗	✗	✗	✗	✗	→	✗	✗	✗	✗	✗	→
Lower Swan Canning	✓	✓	✓	✓	✓	→	✗	✗	✗	✗	✗	→
Middle Swan Estuary	✗	✗	✗	✗	✗	→	✗	✗	✗	✗	✗	→
Upper Swan Estuary	✗	✗	✗	✗	✗	→	✗	✗	✗	✗	✗	→

✓ Met three-year targets
✗ Did not meet three-year targets
Targets are based on three-yearly exceedance data.

The overall biophysical trend has been determined from data collected over a five year period from July 2015-June 2020.

*Stable: No significant change over time.

Biophysical trend
↗ Improving
→ Stable*
↘ Deteriorating
— Not assessed

The estuary water quality targets were set as part of the Swan Canning Cleanup program (2001) and are based on analyses of surface dissolved oxygen and chlorophyll-a data (January to May 1996-1998) in four different Ecological Management Zones (EMZs) of the waterway. These targets were intentionally set high to ensure long term environmental outcomes for Perth's rivers.

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. These targets range from 49.1% to 82.1% and only a small number of exceedances are permitted before these targets are not met.

Despite the majority of the targets not being achieved, in the past five years (July 2015-June 2020) the median surface saturation values were higher than 80% and median surface oxygen concentration was higher than 6mg/L in all zones. Dissolved oxygen concentrations above 4mg/L are considered to be supportive of species survival and ecological function.

Analyses of surface oxygen concentrations in each zone across the five-year dataset showed seasonal patterns and some interannual variability but no significant trend over the entire period.

Chlorophyll-a is used to determine the degree of algal activity occurring in zones of the Swan Canning estuary. The current targets for chlorophyll-a at the surface are also stringent, particularly in relation to the lower zone of the Swan Canning estuary.

The chlorophyll-a target for the Lower Swan Canning Estuary is set at 3µg/L and only a small number (3) of exceedances are permitted. In 2020 there were four exceedences compared with 10-45 in other zones. Although this section of the estuary failed to meet the targets, it is important to note that the median value in this zone during July 2015-June 2020 was less than 4µg/L.

Fish Community Index

Table 5: Fish Community Index

Ecological Management Zone	Canning Estuary	Lower Swan Canning Estuary	Middle Swan Estuary	Upper Swan Estuary
2016				
Shallow nearshore waters	●	●	●	●
Deeper offshore waters	●	●	●	●
2017				
Shallow nearshore waters	●	●	●	●
Deeper offshore waters	●	●	●	●
2018				
Shallow nearshore waters	●	●	●	●
Deeper offshore waters	●	●	●	●
2019				
Shallow nearshore waters	●	●	●	●
Deeper offshore waters	●	●	●	●
2020				
Shallow nearshore waters	●	●	●	●
Deeper offshore waters	●	●	●	●

● Met target in both seasons
● Met target in one season
● Did not meet target
Insufficient data for trend determination.

The Fish Community Index provides an indication of estuarine health based on the composition of the fish community in the Swan and Canning Estuary. Sampling events are conducted in summer and autumn each year. The target is achieved where fish communities score fair (C grade) or when the fish community score in an EMZ is better in one or more season (Table 5).

Over the past five years, targets for fish communities in the Lower Swan Canning Estuary and Upper Swan Estuary were met in both seasons on all but one occasion. Targets for the Middle Swan Estuary were met in both seasons 50% of the time with fish communities demonstrating resilience in that zone of the estuary.

In the Canning Estuary, fish communities in the deeper offshore waters did not meet targets in 2017 and 2019 and only met the target in one season in the intervening years. Factors influencing fish communities in this zone are being investigated.

A yellowtail trumpeter, part of the diverse Swan Canning fish community. Photo: Jennifer Eliott

Oxygenation zone conditions

Table 6: Oxygenation Zone Conditions

Oxygenation Zone	2016	2017	2018	2019	2020
Upper Swan Estuary	✓	✓	✓	✓	✓
Lower Canning River	✓	✓	✓	✓	✓

✓ Oxygenation target met
✗ Oxygenation target not met
The dissolved oxygen targets are based on cumulative annual threshold.
Insufficient data for trend determination.

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

Oxygen conditions are calculated as a percentage of dissolved oxygen data from the target zone that exceeds a minimum threshold. To meet the target, 80% of data should exceed 4 mg/L dissolved oxygen. The target was met over the five years of operations (Table 6).

Seagrass health

Table 7: Seagrass Health

Seagrass Health	
Sites	**2015-16**
Rocky Bay	✓
Dalkeith	✓
Lucky Bay	✓
Pelican Point	✓
Heathcote	✓
Canning Estuary	✓

✓ Seagrass target met
✗ Seagrass target not met

The health of seagrass communities has been shown to be a good biotic indicator of waterway condition. A range of seagrass performance metrics were used to produce an index of seagrass condition at six sites within the lower Swan Canning estuary and Canning estuary EMZs.

The 2015-16 full assessment at the commencement of this reporting cycle is reported here. Seagrass health was graded poor (<2), low (2-2.5), fair (>2.5-3), or good (>3) based on assessment of seagrass presence, percentage cover, productivity and reproduction.

For the SCRPS reporting the seagrass minimum performance target has been set at 2.25. All sites achieved or exceeded the target criteria, with the lowest seagrass performance scores (3.0) being recorded at the Lucky Bay and Canning estuary sites and the highest (3.75) at the Rocky Bay and Heathcote sites.

Understanding and measuring the SCRPS management actions and relevant projects

This report should be read in conjunction with the SCRPS. A traffic light approach has been developed to provide an easy visual reference to the status of each management action listed in the SCRPS SMP.

The status of each action is displayed in a pie chart. Each pie chart is divided into segments depending on how many activities (projects or tasks) have been identified for each agreed river management action. This provides a visual display of how the concurrent activities are tracking within the associated management action. Most actions only have one or two projects or activities linked to them, whilst some actions have up to 10. Some projects/activities may be relatively minor.

Priority actions are marked (P) in the SCRPS action reporting tables throughout this publication.

The classification is provided below:

	Completed	Activity is completed.
	Green (on track)	Activity is ongoing or on track to address action.
	Amber (at risk)	Activity undertaken is experiencing minor delays or is at risk of not addressing action. Attention required.
	Red (significant delay)	Activity is experiencing significant delays and is unlikely to address the action in the near future. Immediate review required.

Each lead agency has reviewed and reported on the status of the projects or tasks they are delivering in support of their SCRPS actions. As a result, each segment of the pie chart receives a colour depending upon the status of the relevant activity.

For example, in the below action, DBCA has five identified projects/activities that are delivering against the action. One project/activity is slightly delayed and therefore amber, while three are on track and one completed. Priority actions are indicated by '(P)'.

Example only

11.1 Investigate threats to ecosystem integrity and processes **(P)**	

Objective 1: Increase management coordination and collaboration between organisations with Riverpark responsibilities

1. Implement and review the Swan Canning River Protection Strategy

Action		Status	DBCA	Swan River Trust
1.1	Establish a SCRPS Advisory Group **(P)**		●	
1.2	Establish collaborative agreements between management organisations **(P)**		●	●
1.3	SCRPS progress, biennial and five-yearly reports are to be delivered to the Minister for Environment, partners and the community **(P)**		●	●

Implementation and review

DBCA established the SCRPS Advisory Group in May 2016 with representatives from each lead State government organisation, as well as the Water Corporation, Tourism WA and the Western Australian Local Government Association (WALGA). DBCA co-ordinates the SCRPS Advisory Group to support SCRPS implementation and reporting on the Strategy's achievements to the Trust and Minister for Environment.

Collaborative agreements were established between the Trust, DBCA and each of the key government agencies involved in the management of the Swan Canning river system. These agreements detail the activities undertaken by agencies in support of their agreed SCRPS actions.

Machinery of Government changes influenced revisions to these agency agreements and a monitoring, evaluation and reporting framework was developed and refined for the SCRPS progress, biennial and five-yearly SCRPS reporting as required by the SCRM Act.

DBCA and the Trust delivered a SCRPS publication reporting suite including two SCRPS progress reports (2017 and 2019), a Biennial Report (2018) and conducted one on one partner agency consultation to inform the SCRPS Five Year Review and recommendations produced during 2021.

Kayakers vista Canning River.
Photo: Laszlo Balazs

Objective 2: Improve water quality and manage environmental flows

2. Reduce nutrients, organic material and sediment entering the Swan and Canning rivers

Action		Status	DBCA	DWER	Local Govt
2.1	Identify the levels and sources of nutrients, organic material and sediment entering the Swan and Canning rivers **(P)**		●	●	
2.2	Develop and implement Swan Canning and local Water Quality Improvement Plans to achieve nutrient load reduction targets **(P)**		●		
2.3	Prescribe and apply intervention techniques to either trap nutrients, organic material and sediments in drains and tributaries, or to achieve source control of these contaminants				●
2.4	Improve management of fertiliser use to reduce nutrient loss from urban and rural land in the Swan Canning catchment **(P)**		●		
2.5	Implement actions arising from the Urban Water Drainage Partnership addressing strategic issues in the Swan Canning catchment		●	●	
2.6	Improve planning schemes and policies to achieve a net decrease in nutrient inputs from future land development				●

Water quality monitoring

DBCA undertook weekly water quality monitoring at 42 sites throughout the Swan Canning Estuary, with weekly phytoplankton and fortnightly nutrient samples collected at 21 of those sites. Water quality and nutrients were also monitored fortnightly at 33 sites within the Swan Canning catchment.

This monitoring provides information on physical water quality parameters, levels and sources of nutrients, organic material and sediments within the Swan Canning river system. It is used to identify priorities for river management and important initiatives, such as Water Quality Improvement Plans (WQIPs), development and validation of the Swan Canning Estuarine Response Model (SCERM) and the revision of the Swan Canning Water Quality Improvement Plan (SCWQIP).

Sub-catchments with local WQIPs include Bennett Brook, Bayswater Brook, Ellen Brook, Southern River, Mounts Bay, Bickley Brook, Canning Plain, Bannister Creek, Saint Leonards and Bull Creek.

DBCA reviewed the local WQIPs to assess progress against their prescribed actions. These reviews determined which WQIPs were and will be updated, based on the level of support from key stakeholders and the ongoing requirement for water quality improvement.

Additional water quality sampling was conducted in response to incidents such as algal blooms, fish kills and pollution spills.

Sediment Task Force

The Sediment Task Force (STF), funded through DBCA and co-ordinated by Perth NRM, continued to guide activities to reduce urban development sediment inputs from entering the Swan and Canning rivers.

STF is a multi agency and peak industry group with representatives from the Housing Industry Association (WA), Master Builders Association (WA) and Urban Development Institute of Australia (UDIA) (WA), DBCA, Department of Health (DoH), Main Roads WA, Water Corporation, WALGA, the Cities of Cockburn, Kwinana and Subiaco, and NRM groups South East Regional Centre for Urban Landcare (SERCUL) and Perth NRM.

Sediment task force Kwinana Freeway. Photo: DBCA

Over the past five years a series of case studies have identified that the City of Bayswater has facilitated co-operation from builders and developers while the Town of Cambridge is addressing sediment loss at its source. The City of Cockburn adopted a multi-faceted approach for sand drift and dust management while the City of Kalamunda developed a comprehensive regulatory framework to decrease sedimentation. The City of Subiaco remediated environmental degradation caused by sedimentation and the City of Swan introduced development design specifications work for subdivisions.

The STF also assisted to develop a variety of resources to raise awareness of sedimentation for education purposes and to encourage best practice erosion and sediment control on subdivision, roadworks and building sites.

These resources included the *Taking Action to Control Sediment* brochure, sediment content included in the MBA Smart Waste Program, HIA sediment management information sessions, creating two on-site sediment control compliance checklists, *Regulation for Effective Sediment Management Infosheet*, *Keeping Soil on Site information sheets*, providing five sediment control presentations and coordination of a local government workshop.

The task force also contributed to critical sediment research including sponsorship of The University of Western Australia (UWA)/Cooperative Research Centre for Water Sensitive Cities' (CRCWSC) research to quantify sediment export from an urban development site in Perth, Local Government Officer Survey Impacts of Urban Development and publication of *The Economic Cost of Erosion and Sediment Loss from Construction Sites* report.

The STF advocated for the prevention of erosion and sediment during urban development by developing a draft model Local Law for erosion and sediment control, contributed to legislative reviews and the inclusion of sediment management as a criterion for the MBA Building Industry Awards.

The STF member organisations reviewed policies, guidelines and internal processes to enhance sediment control protocol and management. These included Main Roads *Improved Erosion and Sediment Control During Construction Works* and *Regional Environmental Management Plan*; Water Corporation's *Rapid Response Processes and Guidelines* linked to *Erosion and Sediment Control Guidelines* and sediment management included in the *Drainage for Liveability Program*; UDIA's sedimentation information in *IPWEA LG Subdivision Engineering Guidelines* and the UDIA subdivision sediment and erosion plan to ensure lag times were not resulting in sedimentation.

Eric Singleton Bird Sanctuary wetland

A $3 million project to restore Eric Singleton Bird Sanctuary (ESBS) was undertaken by DBCA and the City of Bayswater during 2015.

Restoration works involved installation of a gross pollutant trap and sedimentation pond and creation of a constructed wetland. Over 170,000 native trees, rushes, sedges, shrubs and groundcovers were planted to help improve the quality of water flowing to the Swan River from the Bayswater Brook Catchment.

DBCA engaged UWA to conduct a hydrological and nutrient attenuation performance assessment in partnership with the CRCWSC and the City of Bayswater. The assessment was completed in 2020 and results demonstrated that during baseflow conditions the system reduced total nitrogen loads, examined the ESBS wetland's baseflow conditions from October 2017 to September 2019 and measured five storm events from June to August 2019.

During baseflow conditions the wetland's nutrient stripping construction was shown to reduce total nitrogen loads by 27%, total phosphorus loads by 45%, total suspended solid loads by 56%, and metal concentrations by 40-60%. The assesment report can be accessed here: watersensitivecities.org.au/content/eric-singleton-constructed-wetland-monitoring-and-assessment-for-optimal-stormwater-treatment-performance/

Eric Singleton nutrient striping wetland overview.
Photo: Mark Thornley

Intervention techniques

The River Health Improvement program (RHI) (previously known as the Drainage and Nutrient Intervention Program) works with land managers, statutory authorities and catchment management groups to refine approaches to water quality improvement throughout the Swan Canning River catchments.

The program includes 11 demonstration sites operated in partnership with 12 stakeholder groups. Interventions include constructed wetlands, biofilters, living streams, artificial oxygenation systems and soil amendments.

Ellen Brook Wetland

Established in 2014 the Ellen Brook wetland is a $4 million DBCA initiative implemented through State and Federal government funding that builds on years of research, initially undertaken by CSIRO then furthered by ChemCentre and the Swan River Trust via DBCA.

The constructed wetland is situated in the floodplain of Ellen Brook and is designed to remove nutrient loads from Ellen Brook (during winter and spring when the concentrations are highest) before the water reaches the Swan River.

Flow to the Ellen Brook wetland commenced in 2016 and between 2016 and 2020 the wetland treated over 950 megalitres of water and removed approximately 165 kilograms of Total Phosphorous and 550 kilograms of Total Nitrogen. The wetland provides the first large scale application of Iron Man Gypsum, a mineral sand mining by-product, as filtration media in a vertical flow wetland.

Planting of the wetland and surrounds with over 60,000 local native plants has created new habitat for native wildlife, improved site amenity and assisted nutrient removal from the site.

Water sampling at Ellen Brook wetland. Photo: DBCA

Site selection support tool for water quality improvement

Site selection and prioritisation process (SSPP) is a first step desktop evaluation of existing spatial datasets and water quality information to help guide investment in water quality improvement projects. This decision support tool is used to provide strategic advice to public land managers and guide DBCA's investment in works within the Swan Canning catchment. The tool is continually refined and updated as new information becomes available and is currently being updated to incorporate outputs from the Swan Canning Catchment Modelling project produced by UWA.

Ashfield Flats hydrological study

Ashfield Flats Reserve is a high conservation value asset located on the banks of the Swan River Estuary, the largest remaining river flat in the Perth metropolitan area. DBCA completed a hydrological study of the site with funding from the Department of Planning, Lands and Heritage (DPLH), the Australian Government's National Landcare Program, Regional Landcare Partnerships through Perth NRM and support from Water Corporation. The study's findings will be used to inform future management of the site.

Wetland readings at Ellen Brook. Photo: DBCA

Swan Canning Estuarine Response Model

In the period spanning 2011-2016, DBCA and project partners at UWA and DWER resourced the development of a spatially resolved coupled hydrodynamic-biogeochemical model – the Swan Canning Estuarine Response Model (SCERM).

Since that time, DBCA has continued to work with UWA to refine and further validate the model and create a prototype, real-time water quality system. A beta version, Swan Canning Estuary Virtual Observatory was developed to support management. The system used the validated 3D hydrodynamic-water quality model, driven by weather forcing from a nested weather forecasting model and coastal forcing from a local coastal ocean prediction system.

Real time flow and water quality data for the incoming rivers was used to generate a five day hindcast and water flows were used to enable a five day forecast of estuary physical and water quality conditions. The observatory proved valuable in predictions associated with flood events in 2017. The model was also used to explore the drivers of vegetation decline in the upper Swan.

In 2020 the SCERM model underwent an update as part of coupling it with the catchment modelling project, building additional drainage inputs and has continued to be validated. In addition, efforts to improve the parameterisation of controls on metabolism in the model framework have progressed and model outputs are being used to inform patterns in biota observed within the waterway.

Swan Canning Catchment Modelling project

Flows and nutrient loads from all of the Swan Canning catchments were modelled and coupled as part of the revision of the *Swan Canning Water Quality Improvement Plan* (2019).

This UWA/DBCA partnership involved a technical advisory group with representatives from Water Corporation, DPLH, DWER and DPIRD.

The $450,000 Swan Canning Catchment Modelling project involved detailed landuse mapping, the building, calibration and refinement of a catchment and estuary model, climate and landuse change projections to 2050 and the exploration of nutrient targets and estuary response relationships.

The model was used to generate datasets for comparison with spatial information on invertebrates, fish and dolphins and investigate hydrodynamic processes contributing to the spread of Phytophthora dieback in the upper Swan catchment.

The work has shown that a 7% reduction in total nitrogen loads and a 5% reduction in total phosphorus loads has occurred since the release of the SCWQIP in 2009.

A significant decrease in flows is expected under likely climate change scenarios with urban and industrial development also predicted to increase surface runoff and nutrient loads from the Swan Coastal Plain. The Avon, Ellen Brook and Southern River catchments are the largest contributors of nutrients to the rivers.

Swan Canning Estuarine Response Model graphic. Image courtesy of DWER

Fertiliser use

DBCA has funded the Phosphorus Awareness Project (PAP), delivered by the South East Regional Centre for Urban Landcare (SERCUL) since 2015.

The program targets fertiliser use and nutrient loss from urban and rural land within the Swan Canning catchment. It provides educational resources, presentations, and opportunities for getting involved in landcare for schools and at community events.

PAP increases awareness of catchment nutrient issues amongst the community, local governments, and industry, particularly in reducing nutrient inputs such as phosphorus from fertilisers.

During November 2015 – December 2020 PAP delivered:

- 83 displays to 33,437 people
- 1475 school presentations to 38,854 students from kindergarten to Year 12
- 159 school planting events – 19,726 plants, 6299 volunteers, 4964.5 volunteer hours
- 143 community presentations to 3059 people
- 13 YouTube Videos with 922 views
- Seven Annual Nutrient Reports (covering 2014-2020)
- Support to groups on 191 occasions with project resources
- Six annual canoeing events on the Canning River
- 116,608 PAP resources including *Fertilise Wise* brochures and *Grow Local* plant brochures
- 24 School's Catchment Education Newsletters

Phosphorus Awareness Program in action.
Photo: Courtesy of SERCUL

Urban Drainage Partnerships

The Urban Drainage Partnership began as collaboration between the Swan River Trust, Department of Water (now DWER), Water Corporation and WALGA to undertake activities to deliver on co-operative strategic drainage management. DWER and Water Corporation created a new cooperative urban drainage partnership – *Drainage for Liveability*. DBCA supports this partnership and is continuing its long-standing activities of identifying and delivering on urban drainage projects in conjunction with local governments.

Drainage for Liveability

Drainage for Liveability works with interested community groups, local authorities and industry to turn stormwater drains and basins in the Swan Canning catchments into living streams and wetlands. These projects help prevent nutrients entering the Swan and Canning rivers, control weeds, create native animal habitat and greener community spaces while providing significant environmental benefits. DBCA manages and contributes funding and in kind services to the following Drainage for Liveability projects: Wharf St Smart Park – Cannington, Mundaring Weir ecological linkage project – Mundaring, Russell St and Jacobsen Way living stream revegetation project – Bayswater and the Bennett Brook catchment revegetation project – Lockridge.

Planning schemes and policies

Twenty local government authorities manage lands within the Swan Canning Riverpark (Riverpark). These agencies continue to work with DBCA to improve planning schemes and policies that lead to a net decrease in nutrient and other contaminant inputs.

This is achieved by ensuring that local government schemes and policies are consistent with Better Urban Water Management, the Stormwater Management Manual for Western Australia, Decision Process for Stormwater Management in WA and DBCA's Policy 49 – Planning for Stormwater Management affecting the Swan Canning Development Control Area. DBCA provides advice to local government authorities to support consistent approaches in line with the WA Planning Commission (WAPC) and DBCA policies.

Drainage intervention structure at Ellen Brook wetland. Photo: DBCA

3. Reduce non-nutrient contaminants entering the Swan and Canning rivers

Action		Status	DWER	DBCA
3.1	Regulate and manage pollution from contaminated sites, prescribed premises and other commercial activities with the potential to cause pollution **(P)**		●	
3.2	Maintain inventory database of confirmed contaminated sites in the catchment, monitor appropriate remediation for sites and use the clean-up notice provisions of the Contaminated Sites Act as required		●	
3.3	Maintain an inventory of sources of pollution incidents		●	
3.4	Undertake action to address identified sources of pollution			●

Pollution regulation and management

DWER works with local government and other State government agencies in responding to serious pollution incidents and hazardous materials emergencies state-wide, with a 24/7 availability. DWER has the capacity to respond to incidents such as fuel tanker roll overs, chemical spills, chemical fires, illegal chemical dumping and hazardous materials truck crashes.

Contaminated sites

DWER continues to regulate new and existing sites along the Swan and Canning rivers that may represent a potential risk to human health or the environment. This is done in accordance with the requirements of the *Contaminated Sites Act 2003*. DWER also maintains the Contaminated Sites Database for Western Australia.

Optus Stadium from Claisebrook Cove.
Photo: Mark Thornley

Light industry audits

The Light Industry Program is a DWER program in partnership with six local governments This program aims to reduce light industry's contaminant input to the rivers in priority catchments.

The program began in July 2015 and during its first six months over 340 audits of 250 light industrial premises were conducted within the Swan Canning catchment. By 20 July 2017 the program had conducted 918 audits (includes both initial and follow-up audits) at 495 premises throughout the six participating local government areas.

The LIA Program was effective in reducing the level of non-compliance from 73.4% to 12.5% over the two years, thus significantly reducing discharges of pollutants to the Swan Canning catchment. By August 2019 the LIA program had conducted over 1348 inspections with 733 businesses compliant at initial inspection and 615 re-inspections then carried out.

The LIA program has been successful in identifying and rectifying practices at light industrial premises and has improved capabilities of participating local governments in light industry regulation. The program has also given DWER a clearer appreciation of the issues being faced by local governments in regulating industries.

The majority of business owners and operators were proactive in resolving issues identified at their premises once made aware of the risks to waterways. The remaining non-compliant businesses underwent follow up inspections and compliance.

Light Industry Audit DWER officers. Photo courtesy DWER

4. Undertake intervention works and/or programs to improve or maintain water quality

Action		Status	DBCA	DWER
4.1	Increase dissolved oxygen levels in the Swan and Canning rivers where required **(P)**		●	●
4.2	Investigate approaches to moderate and reduce the prevalence of algal blooms **(P)**		●	●
4.3	Adapt the use of oxygenation and other innovative technologies to manage future water quality issues as climate change science is updated		●	●

Oxygenation and innovation

DBCA, DWER and BOC Ltd worked together to operate and maintain four oxygenation plants on the Swan and Canning Rivers. These plants deliver oxygen to the river predominantly in the summer and autumn periods when seasonal conditions are more likely to create low dissolved oxygen levels within the river system.

Two plants on the Upper Swan River (Caversham and Guildford) supplement oxygen over a 10km section of tidal estuary and the two on the Canning River (Nicholson Road, Ferndale and Bacon Street, Wilson) help maintain oxygen levels over 4.5km of the Kent Street Weir-pool.

Management responsibility for the oxygenation plants was transferred to DBCA in July 2020. Prior to this the daily operation of the oxygenation plants was overseen by DWER under a Memorandum of Understanding with funding provided by DBCA.

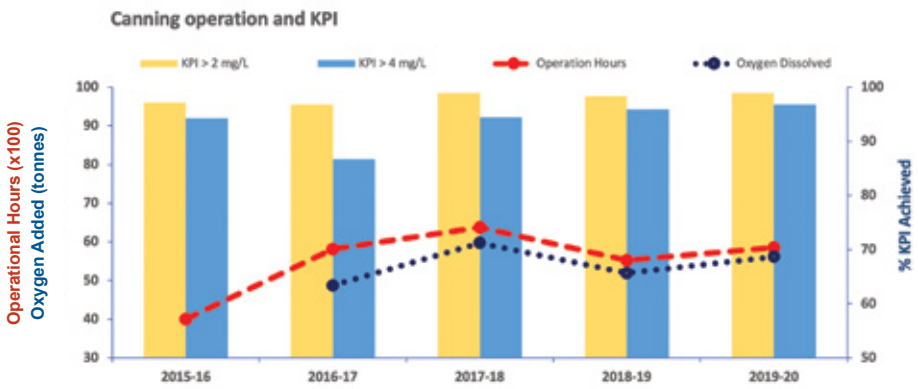
The operation of large infrastructure associated with oxygenation plants adjacent to the sensitive and dynamic riverine environment presents some major challenges such as fires, floods and pump failures. These challenges were successfully managed and have led to improved plant performance and efficiency, improved contractor and employee safety when on site, and successful transition of operational roles from DWER to DBCA.

The primary aim of the oxygenation systems was to maintain oxygen levels above critical ecological thresholds. Key performance indicators were measured weekly to monitor the effectiveness of the plants to maintain dissolved oxygen over the target areas. Seasonal KPIs were consistently within the ‘Good’ category (i.e. over 80% of measurements above 4mg/L).

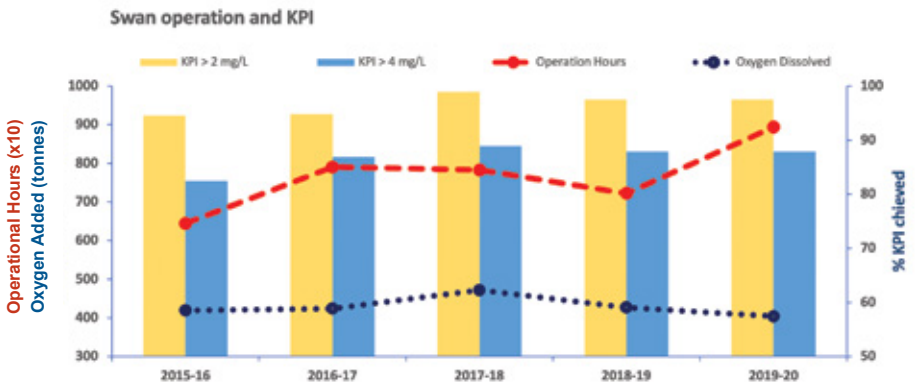
Several significant oxygenation plant infrastructure projects were delivered in the lower Canning River including redevelopment of the Bacon Street oxygenation plant with new dissolution technology and upgraded riverine distribution system; and decommissioning and removal of the Camsell Way oxygenation plant in 2016-17.

The Swan River oxygenation plants were also modified to improve plant performance and efficiency including new building and infrastructure to house the Caversham plant (2015-16), in-river pipework modifications at Guildford (2017) and Caversham (2020), oxygenation plant improvements at Guildford and Caversham including the installation of variable speed drives and removal of flow restrictions (2020).

Between 2015 and 2020 the oxygenation plants at Bacon Street and Nicholson Road (and Camsell Way between 2015 and 2017) operated a total of 4005-6369 hours and added 48.7 to 59.1 tonnes of oxygen to the 4.5 km of river upstream of the Kent Street Weir.



Between 2015 and 2020, the oxygenation plants at Guildford and Caversham operated a total of 6445-8937 hours and added 419 to 471 tonnes of oxygen to the Upper Swan estuary to provide habitat refuge and buffer against the significant water quality issues caused by low dissolved oxygen and high algal activity.



Caversham oxygenation plant Sparger being removed for maintenance. Photo: DBCA

5. Maintain or improve environmental flows to rivers

Action		Status	DBCA	DWER
5.1	Investigate, plan and manage environmental flows to the Swan and Canning rivers		●	●

Supporting environmental flows

Investigating habitat connectivity and environmental flow

DBCA and DWER work together to investigate and prescribe environmental water provisions for major tributaries of the Swan and Canning rivers.

Four tributaries are regulated by major water supply dams and flows downstream of them are prescribed through licensing by DWER under the *Rights in Water Irrigation Act 1914*. Allocation plans are produced to define abstraction limits and water available to sustain the environment. The implementation of water releases under these plans is managed by the Water Corporation.

Establishing allocation plans is a complex process involving consideration of scientific information, trade-offs, and consultation. DBCA is a stakeholder in DWER's allocation planning processes and also undertakes investigations to refine understanding of environmental water requirements and evaluate environmental water provisions.

The focus of effort to date has been on the middle Canning River and the lower Helena River. River flow in these systems is monitored to manage the timing and rates of water releases to maximise benefits of water supplements to the river.

Summer water releases maintain 1.5km of the lower Helena River, ensuring the high ecological value of the river pools is maintained and provides refuge for aquatic fauna. Evidence suggests these summer water releases are beneficial to aquatic communities through improving survival and recruitment rates.

DBCA in collaboration with Murdoch University investigated winter flows in the lower Helena River (2017 to 2019) to better understand habitat connectivity and fish movement. This work demonstrated that fish communities would benefit from water releases in winter and spring, especially if timed to coincide with life-stage movements such as spawning migrations upstream. Following a survey in the upper Canning River of the pearl cichlid, an existing weir in Kelmscott was modified to prevent the invasive fish from moving further upstream.

During 2015-2020 DBCA allocated $130,000 to help resource the environmental flows project.

DNA monitoring of fish

DBCA and UWA undertook a pilot project to develop DNA monitoring of the Canning River to detect the movement of native and feral fish. Ten sites were sampled looking at fish and crayfish while additionally trying to detect the presence of the pouched lamprey.

Freshwater marron and mussels benefit from timely water releases into river pools. Photos: DBCA.

Kent Street Weir Upgrade

The Kent Street Weir was constructed in the 1920s to maintain the upstream river as freshwater and was upgraded in 2018 to include automated gates and installation of a fishway.

The upgraded weir has been operating since late 2018 and was transferred as an asset from DWER to DBCA in 2020. The weir now permits safer and more effective control of water levels in the Canning River and flows to the Canning Estuary, and allows better management to reduce the impact of saltwater intrusion upstream of the weir.

The Kent Street weir was a significant obstacle to fish passage since its construction in the 1920s. The upgraded weir incorporates a vertical slot fishway to enable native fish and other river biota to move upstream of the weir to access food resources and habitat. Investigation of the fishway using trapping and acoustic monitoring of tagged fish has shown that fish are utilising the fishway to move past this barrier.

Kent Street Weir and fishway. Photo: DBCA

Objective 3: Ensure management decisions are based on appropriate knowledge

6. Coordinate a water quality and ecological health monitoring and evaluation program

Action		Status	DBCA	DWER
6.1	Undertake river and catchment-based water quality monitoring program to measure compliance against management targets **(P)**		●	●
6.2	Establish a program to monitor non-nutrient contaminants entering, and in, the river system **(P)**		●	
6.3	Monitor and report on the extent and severity of algal blooms and other events affecting water quality		●	●
6.4	Develop a suite of ecological health indicators to support reporting		●	●

Water quality monitoring

DBCA currently undertakes weekly water quality monitoring at 42 sites throughout the Swan Canning estuary with weekly phytoplankton and fortnightly nutrient samples collected at 21 of those sites. Water quality and nutrients were also monitored fortnightly at 33 sites throughout the Swan Canning catchment

A major review of environmental monitoring was finalised and, together with Machinery of Government changes, triggered significant shifts in operational delivery of water quality monitoring and improved approaches to data collection and reporting. The review also triggered a number of projects exploring new water quality monitoring technologies.

DBCA worked with CSIRO and Murdoch University to evaluate the potential of FlowCAM and multiwavelength fluorometer technology for plankton monitoring in the Swan Canning. FlowCAM technology was found to be unsuitable for local application in the desired manner.

Multiwavelength fluorometers are promising new technology for water quality monitoring and management and further assessment is required. The review will continue to provide a basis for further refinements of the monitoring program and a trigger for new initiatives over time.

Information on water quality is provided to the public through weekly reports and detailed annual reports available on the DBCA/Swan Canning Riverpark website. Results from the monitoring program have also been evaluated against key performance indicators in the *SCRPS Biennial Report 2018* and in this *SCRPS Five Year Review 2021*.

Water quality monitoring at a constructed nutrient stripping wetland. Photo: DBCA

Non-nutrient contaminants

Investigations into non-nutrient contaminants in the Swan Canning estuary and its catchment continued, with a focus on new and emerging contaminants in surface water and biota.

DBCA collected samples from 20 estuary sites and 32 catchment sites over a two year period. Samples were also collected from biota to determine the uptake of contaminants into these species to inform both the potential impact to biota and human health implications.

Catchment sources varied seasonally and spatially with the highest concentrations consistently associated with watercourses draining from Perth Airport and Pearce Airbase both of which have known Per-and Polyfluoroalkyl Substances (PFAS) legacy issues.

DoH then conducted a human health risk assessment in 2019 using DBCA data and determined that the concentrations of PFAS detected in black bream and blue swimmer crabs did not currently pose a human health risk.

Additionally, DBCA explored the potential for Ellen Brook constructed wetland to filter media to capture and store contaminants.

Algal blooms and other events affecting water quality

Phytoplankton are monitored routinely on a weekly basis at 21 sites in the Swan and Canning rivers. Both chlorophyll levels (as an indicator of phytoplankton activity) and phytoplankton composition is assessed. Information on phytoplankton activity within the estuary was provided weekly on the DBCA website. DBCA evaluates weekly monitoring results against guidelines in its Algal Bloom Response Protocol.

Where algal blooms reach pre-defined trigger levels in the rivers, a set of actions are put in place and, where appropriate, notifications are issued to community stakeholders and the public. These notifications include warnings on potential public health, amenity or environmental impacts arising from different types of algal blooms.

The Protocol is reviewed annually by a multi-agency panel (including representatives from DBCA, DWER and DoH) and updated based on new knowledge derived locally and elsewhere with respect to the impact of harmful algal blooms.

From late summer through to late autumn 2019 the Riverpark was impacted by an extensive bloom of dinoflagellate algae, known as *Alexandrium* spp. This alga produces Paralytic Shellfish Toxin (PST) which can accumulate in shellfish, crabs and other biota and may cause paralytic shellfish poisoning in people who eat contaminated seafood.

This event was a new phenomenon; the most intense of its kind recorded in natural waters in Western Australia. A second bloom occurred between December 2019 to May 2020. During both events DBCA, DPIRD and DoH collaborated as part of an incident response team to respond to the blooms that affected large sections of the Swan and Canning rivers.

Water quality and biotic sampling was conducted in response to the toxic *Alexandrium* bloom in the Swan estuary. Mussels, crabs and fish were tested for toxins and toxins were found in mussels and crab viscera. This led to the DoH issuing a health warning to advise the public to not consume fish, crabs or shellfish from the affected areas of the estuary for the duration of the blooms.

Response protocols were developed and have been applied since *Alexandrium* returned to the rivers in December 2020. Investigations of algal control approaches were undertaken and will be further examined through a collaborative research project with Murdoch University.

DBCA and DPIRD also co-ordinated a public education campaign on the *Alexandrium* algal bloom throughout 2020. The multi-channel education campaign included public signage at relevant Riverpark locations, videos, web page content, media articles and multi-lingual brochures to key stakeholders. The campaign was supported by local riverfront councils and Recfishwest and was welcomed by the recreational fishing sector.

DBCA also provides advice and co-ordinates responses to other types of river incidents and river management issues including dolphin deaths, fish kills, contaminants, pathogens, pollution and flood effects.

Alexandrium algal bloom Matilda Bay. Photo: Steve Schneider

Flood Response and Monitoring

In February 2017, heavy and widespread rainfall in the Avon catchment delivered unseasonal and unusually high flows into the Swan Canning Riverpark. This resulted in a minor flood warning being issued for the Swan River.

In addition to high water levels, the resultant water quality also became a concern as a result of pollutants from streets, gardens and farms that were flushed into the waterways from the catchment area.

An incident management team was established by DBCA in response to the flood event. This team was developed to manage associated risks and provide necessary communications to ensure the health and safety of the community and the environment. The team collaborated with representatives from DWER, UWA, DoT, DoH and the Bureau of Meteorology and local governments.

To aid the decision making process DWER provided valuable information on changing water levels, measured by telemetered stream gauging. This data was used in conjunction with the Swan Canning Estuarine Response model to enable effective prediction of timing and volumes of water throughout the flood event.

Water quality monitoring was also undertaken and, as a result, multiple alerts were issued to stakeholders over issues such as: waterborne bacteria, increased water levels, microalgae activity, recreational fishing, in-water hazards, foreshore safety and mosquitoes.

This collaboration between agency partners provided information effectively and promptly to the community. Targeted communication ensured that Riverpark users were able to make informed decisions over their own health and safety, whilst foreshore land managers were able to focus on the effective protection and conservation of the built and natural environment within the Riverpark.

Ecological health indicators – Seagrass

Measures of ecological health complement water quality monitoring and reporting and provide more information about the overall health of the Swan Canning Estuary. DBCA has been working with project partners to progress the development, validation and implementation of environmental health indicators.

Seagrasses are a highly valued component of estuarine ecosystems as they provide numerous ecosystem services. Seagrasses respond to changes in their physical and chemical environment and are recognised as being useful bioindicators of ecosystem health.

DBCA and DWER collaborated to progress development of a validated seagrass health index for the Swan Canning estuary (2011-2017), with DBCA continuing a modified monitoring program since 2018-19.

Seagrass sampling is conducted at six sites between December and March each year, with all metrics for the complete index measured once during each five year reporting period. A broadscale survey of seagrass distribution in the Riverpark was conducted in 2019 to produce a distribution map and this will be updated once every five years. A total of $325,504 (DWER and DBCA funding) was allocated to seagrass monitoring in the 2015-2020 reporting period.

DBCA also collaborated with CSIRO and UWA to address potential concerns with seagrass condition in the marine park at Alfred Cove identified by the seagrass health index. These investigations assessed ground water quality in the area that had been potential flux to the adjacent estuary, as well as broader sampling effort in the area of a wider range of stressors.

This work determined that while there were some complex localised impacts of nutrient and non-nutrient contaminants, as well as temperature and oxygen extremes resulting from limited water movement, that seagrass across the wider Alfred Cove part of Swan Estuary Marine Park was relatively healthy.

Seagrass performance was incorporated into the KPI reporting of the SCRPS in 2020. DBCA is continuing to monitor seagrass throughout the Swan Canning Estuary, to inform management decisions in response to new development proposals and to track the condition of seagrass meadows and estuarine health.

A light and temperature logger exposed with seagrass at extreme low tide. Photo: DBCA.

Ecological Indicators – Fish Community

Since 2012, an assessment of fish communities in the Swan Canning Estuary has been undertaken annually in collaboration with Murdoch University. The condition of fish communities is assessed using the Fish Condition Index (FCI). In 2020, it was assessed as fair to good overall, with deep offshore waters having the best score since 2015. These scores reflect good oxygenation of the waters over the sampling period.

A red wrasse faces off in the lower reaches of the Swan River. Photo: Matt Kleczkowski.

Shellfish reef restoration project

DBCA continued to invest $250,000 over three years (2019-20 to 2021-22) in the Nature Conservancy's Swan-Canning shellfish reef restoration project as part of a pilot trial. Pilot reefs were installed in shallow and deep zones between Applecross and Bicton in the Swan River to help create new habitat/food sources for native fish and blue swimmer crabs. These were seeded with mussels and monitored to inform the success of the pilot reefs. DBCA, DPIRD and Recfishwest provided specialist advice into a technical advisory group.

Dolphin Watch

DBCA also funds and runs the Dolphin Watch program in conjunction with Murdoch University and Edith Cowan University as a way of engaging citizen scientists to help monitor dolphin activity, behaviours and population within the Riverpark.

The community reporting is closely linked with the university-based dolphin research to help understand dolphin movement patterns and population dynamics and respond to entanglement incidents of these iconic inhabitants in the Swan and Canning rivers. For more information please visit: www.riverguardians.com/projects/dolphin-watch

Objective 4: Protect, manage and enhance biodiversity

7. Manage fish communities to maintain diversity and abundance

Action		Status	DPIRD/ Fisheries
7.1	Manage aquatic resources in the Swan Canning river system using a risk based management framework **(P)**		●
7.2	Protect and monitor the stock status of priority species in the Swan Canning river system according to risk **(P)**		●
7.3	Investigate fish re-stocking where appropriate		●
7.4	Involve recreational fishers and commercial tour operators with monitoring fish stocks		●
7.5	Promote responsible fishing behaviour (e.g. abiding by catch limits, protecting shoreline vegetation, using fishing platforms provided and using fishing line bins for unwanted tackle, bait packaging and other refuse)		●

The Swan Canning Estuary's blue swimmer crabs are among the largest in Western Australia. Photo: Matt Kleczkowski

Managing fish stocks

DPIRD uses a risk and evidence based approach to managing and monitoring aquatic resources. Fisheries research division believes the risk imposed to fish stocks by fishing in the Swan Canning Estuary is currently low.

Crabs are monitored via statutory catch and effort returns by the commercial fishers and reported annually in the Status Reports of the Fisheries and Aquatic Resources (SRFAR). Within the Riverpark there is currently one commercial operator targeting blue swimmer crabs. Recreational fishers also target this species throughout the year.

DPIRD in collaboration with DBCA and DoH monitored the impact of *Alexandrium* algal blooms on blue swimmer crab and fish stocks during 2019. Monitoring of PFAS levels in crabs and black bream was also conducted by DBCA, in collaboration with DPIRD and DoH, in 2018.

The status of fish stocks in the Swan Canning Estuary are also reported annually as part of the West Coast bioregion within the SRFAR. Results for species including cobbler, crabs and herring are aggregated within data collected across the entire West Coast Bioregion and statuses for the specific populations within the rivers are not available. The Swan Canning population of black bream is reported individually and is currently assessed as “adequate”. The SRFAR is available here: http://www.fish.wa.gov.au/About-Us/Publications/Pages/State-ofthe-Fisheries-report.aspx

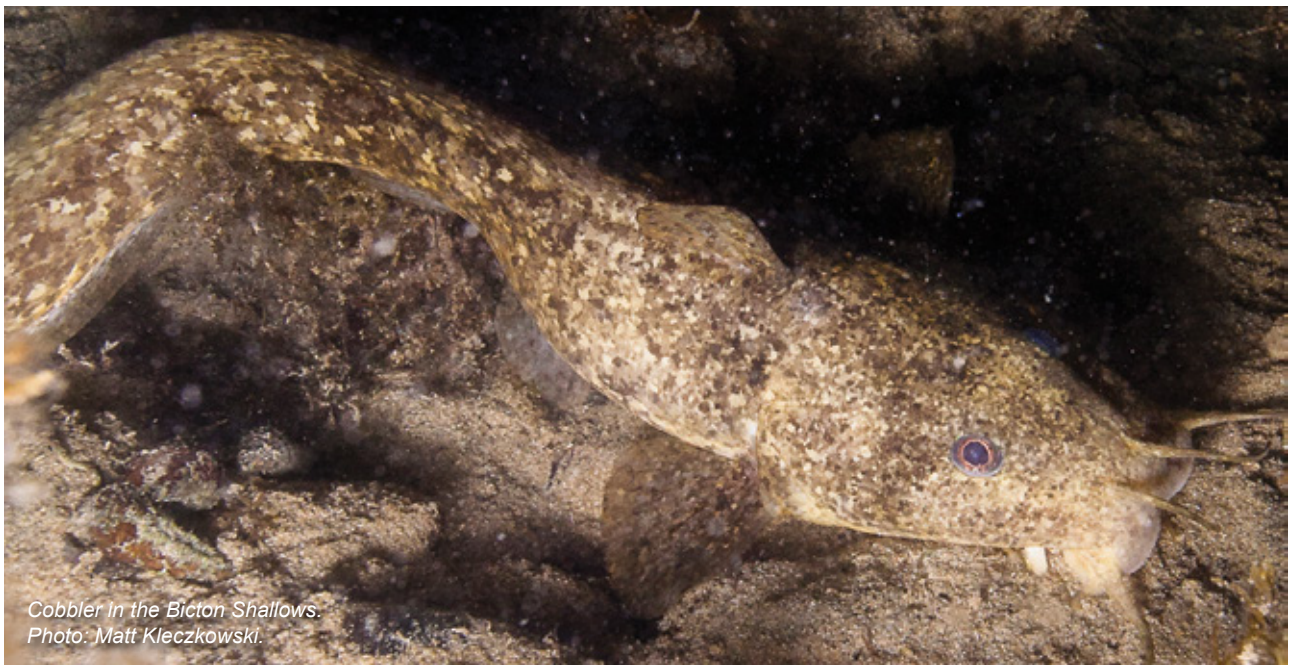
The Resource Assessment Framework (RAF) (2011) describes how DPIRD/Fisheries has selected indicators and what indicators are used in which location. Cobbler, black bream and herring are all identified for the Swan Canning Estuary as part of the West Coast estuarine suite. The RAF is currently being updated and refined.

Fishing restrictions can be implemented if protection of fish stocks is required. The overall sustainability of black bream, cobbler and Perth herring are all listed as being at moderate risk across the West Coast bioregion within the estuarine zones.

Bag and gear limits are also in place to restrict catches of black bream, prawns and crabs that can be taken within the Swan and Canning rivers. The RAF is available here: http://www.fish.wa.gov.au/Documents/occasional_publications/fop085.pdf

Fish restocking

DPIRD has a policy on Restocking and Stock Enhancement in Western Australia (http://www.fish.wa.gov.au/Documents/management_papers/fmp261.pdf) that it currently uses to assess all proposals.



Cobbler in the Bicton Shallows. Photo: Matt Kleczkowski.

Happy kids and a large Swan River Mulloway at the Swanfish Event. Photo: Recfishwest

Community Involvement

DPIRD/Fisheries manages and promotes the Research Angler Program (RAP). Data from this program is reported as part of the SRFAR. Typically 100 logbooks at any one time are being reported by RAP participants for the Swan and Canning rivers.

Fisheries' officers collect data from catch cards at a variety of recreational fishing events such as Swanfish to aid with monitoring fish stocks in the Swan and Canning rivers. DPIRD/Fisheries has community education officers who promote responsible fishing practices at events, schools and through communication material such as brochures, posters, websites and social media.

In addition, DPIRD officers with powers under the *Fish Resource Management Act 1994* undertake education and compliance as part of routine patrols as well as attending all large aquatic related events. DPIRD continues to provide information to promote responsible fishing behaviour through social media platforms and apps.

The DPIRD Recreational Fishing Guide contains the key information related to recreational fishing and is available on the Department's website at www.fish.wa.gov.au/documents/recreational_fishing/recreational_fishing_guide.pdf

Protecting river birds

DBCA, Birdlife WA and the Swan Estuaries Reserve Action Group initiated a collaborative partnership to improve the success of shorebirds nesting at key locations around the Riverpark. A pilot trial was established over the summer of 2016-17, using chick shelters that were built by Scotch College students as part of their community service program. These were placed on the Point Walter spit in advance of Red Capped Plover and Fairy Tern nesting season and monitored by Birdlife WA.

DBCA has since collaborated with the Fairy Tern Network and the City of Melville at the Point Walter Spit during 2018-2020 to improve conditions for successful breeding of the threatened Fairy Tern. This included temporary fencing, floating signage, improved substrate and educating the public to avoid the tip of the Point Walter sandspit from October to April each year. During 2020,150 fairy tern breeding pairs used the Point Walter site which is now recognised as an important natural breeding location.


A banded stilt forages for food. Photo: Matt Kleczkowski

8. Protect and rehabilitate foreshore

Action		Status	DBCA
8.1	Provide protection for riparian and/or aquatic vegetation **(P)**		●
8.2	Provide guidance on best management practices for shore stabilisation **(P)**		●

Protecting foreshores

DBCA provides funding towards riverbank rehabilitation and protection in conjunction with local government authorities and other foreshore land managers through two schemes – the Riverbank Grants program and the Proactive Funding Scheme.

These Riverbank programs assist with the development, coordination and management of foreshore projects as well as the provision of advice and support to facilitate best management practices among foreshore land managers.

During 2015-2020 the Riverbank program funded 51 projects with $5.6 million culminating in a total of $11 million including matched funding from riverfront local governments.

These projects include erosion control, revegetation, weed control, river wall construction, enhancing river access, widening vegetation corridors, creating native animal habitat and preparation of foreshore management plans.

The Riverbank datasets initiative (previously called the asset management system) collected data across four key shoreline themes: built shoreline assets, natural shorelines, riparian ecology and Riverpark reserve useability.

The Swan Canning Riverpark foreshore has been divided into 855 segments and data collected on all themes. This resulted in over 40,000 pieces of unique information canvassing all 340kms of the Swan, Canning, Southern and Helena rivers foreshore.

This data supports Riverpark wide shoreline prioritisation, funding decisions and assessment of the value of built shoreline assets. In January 2019 this data became available to all public shoreline managers, helping align partner priorities with DBCA river-wide priorities.

It is currently understood that the Riverbank datasets are the most comprehensive shoreline asset management dataset available in Australia. It also provides an opportunity for DBCA and public shoreline managers to move from asset based, reactive shoreline management to collaborative forward-looking shoreline planning activities.

Further, through the Riverbank Extension Plan, Riverbank has assessed foreshore land manager knowledge of restoration techniques, particularly bioengineering with encouraging results. This same exercise bore out the *Best Management Practices for Stabilisation on the Swan and Canning Rivers* publication as a popular, understood and utilised resource.

DBCA hosted a Swan estuary-based tour and a series of workshops for foreshore land manager officers, focusing on innovative applications of stabilisation techniques. These workshops were extremely popular and received very positive participant feedback.

Riverbank projects

Woodbridge Riverside Park

This Riverbank proactive project, co funded by the City of Swan, vastly improved the public amenity of the Woodbridge Riverside Park foreshore reserve whilst repairing a section of the Swan River foreshore previously prone to erosion.

Public access to the reserve was restricted until late summer 2018 due to a failing concrete/asbestos platform. Failed infrastructure was removed and replaced with a timber viewing platform, new beach access and terraced rock revetment.

The works complemented an adjacent nature playground and recreational facilities managed by the City of Swan, making this site an attractive tourist destination and recreational hub on the banks of the Swan River.

Total project costs exceeded $1 million with DBCA committing over $500,000 and the City of Swan contributing the remaining budget.

Apex Park

The foreshore adjacent to the Rowing WA (RWA) and Swan River Rowing Club buildings in Mount Pleasant, has been eroding in recent years. This includes a section of unallocated Crown land located between the Canning Bridge and the RWA building. Collectively this land is referred to as Apex Park.

To prevent further erosion at Apex Park and to protect the RWA building, the DBCA Riverbank program entered into a project with RWA, DPLH and DLGSC. Works on-ground commenced in March 2020 and were managed by DBCA Riverbank program staff.

A Civil Engineering company, under oversight from Marine Engineers, undertook the works. Demolition of the existing deteriorated timber wall and other erosion protection, a palm tree and the adjacent concrete slabs was undertaken.

The new riverwall construction works were complicated by dewatering requirements and limited space on the foreshore. However, works were undertaken rapidly and in line with all environmental conditions. Further works included placement of sand in beach compartments, construction of a rock headland to assist in retaining the adjacent beach compartments and landscaping and planting of native species to make the site highly useable and attractive while also providing continuous public access along the foreshore.

The project ran smoothly, on budget and was completed early with the Practical Completion Certificate delivered by the overseeing marine engineers on 19 June 2020. The approximate cost of the project was $600,000.

Woodbridge RiverWise Parkvista.
Photo: DBCA

Apex Park aerial perspective.
Photo: Courtesy Advanteering Civil Engineering

9. Reduce the adverse impacts of introduced plants and animals in the Riverpark

Action		Status	FLM	DPIRD	DPIRD/ Fisheries
9.1	Manage riparian and/or aquatic weeds		●		
9.2	Coordinate the management of declared plant species			●	
9.3	Where resources allow, investigate and map the extent of occurrence of feral fish and invasive species, and mitigate impacts by directing efforts into the early control of invasive species				●

Weed Management

Foreshore land managers are responsible for the onsite management of land adjoining the rivers, including weed control. They include the 20 local governments and various State agencies including DPLH, WAPC and DBCA. DPLH, on behalf of WAPC, continues to implement weed removal programs either on its own or in partnership with local government.

DBCA also has a program to remove exotic trees and revegetate the foreshores owned by WAPC with native species endemic to the area. DBCA conducted aquatic weed control of Taro on the Canning River between Nicolson Road and Roe Highway. SERCUL and a number of local governments have also conducted aquatic weed control of Amazon frogbit.

Amazon Frogbit

Limnobium laevigatum, commonly referred to as Amazon frogbit, is a floating aquatic plant that has been distributed for use in private ponds and aquariums, being promoted as an easy-to-maintain plant. However, when allowed to enter waterways Amazon frogbit is a highly invasive species with a rapid growth rate and high reproduction potential.

Amazon frogbit was initially discovered in Western Australian waterways in 2013 in Liege Street Wetlands (City of Canning). Since then multiple outbreaks have occurred around the Perth Metropolitan Area. Each infestation has been an isolated incident thought to be linked to residents inappropriately disposing of their aquarium or pond plants into the stormwater network or directly into the waterway.

Declared plant species

DPIRD supports the coordinated community control of widespread and established plant and animal species declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). DPIRD maintains and, where appropriate, replies to reports of declared plant and animal species. The community is now able to provide these reports through the *MyPestGuideReporter* app.

Invasive fish species

DPIRD manages a publicly available freshwater fish database which records all research reports and pest fish reports for freshwater systems. DPIRD prioritises prevention activities in biosecurity management. This includes promotion of the “Don’t dump that fish” message and early detection methods such as *Fisheries Pestwatch* app.

DPIRD also provides technical advice and best practice advice to local government authorities and community groups on pest fish management in wetlands and lakes throughout the metropolitan area.

DBCA determined the extent of pearl cichlid distribution in the Canning River and modified a weir to prevent fish passage. This iniiative helped protect upstream fish communities being impacted by this rapidly expanding invasive species.

Amazon Frogbit

The Amazon Frogbit Working Group established by SERCUL provided tools for identification, disseminated information and provided an officer to investigate possible infestations and confirm identification of suspected cases.

This included numerous potential infestations identified by State agencies including DPIRD, DBCA and Water Corporation. When infestations were confirmed SERCUL often planned and managed extirpation.

Through the Amazon Frogbit Working Group and lobbying of State Government Amazon Frogbit was in October 2018 declared a pest in the S22(2) No Control Category under the BAM Act.

Outbreaks were identified and controlled in the following areas – City of Cockburn, City of Swan, City of Canning, City of Armadale, City of Gosnells, City of Rockingham, City of Belmont and City of Bayswater. Each council was able to act quickly and effectively to control, manage and extirpate infestations as they were discovered with help from SERCUL.

Funding through a State NRM grant was used to write an 'Aquatic Weed Management Manual', including Amazon frogbit, which was launched at the WA Wetlands Conference in February 2020.

Federal funding received by SERCUL from the Swan Canning River Recovery Program Stage 2 (SCRRP2) through Perth NRM was used to develop an education campaign about Amazon frogbit. A brochure and poster were developed that were distributed widely including water garden nurseries and aquarium shops and Amazon frogbit display was produced for the 2019 Perth Garden Festival.

Training based on the Aquatic Weed Management Manual was delivered for weed management operators with 45 participants at four training sessions. Over 30 people selling Amazon frogbit on Facebook Marketplace and Gumtree were contacted and asked to take their adverts down with the majority of advertisements removed. Over 12 water garden and aquarium shops have been visited annually since 2019 with none of these stores now selling Amazon frogbit.

Hydrocotyle weed control continued with a project coordinated by SERCUL supported by SCRRP funding and Perth NRM. Weed control and rehabilitation projects were undertaken at Whiteman Park, Guildford and at Lot 216, Caversham, adjacent to Mandoon Estate.

A weed management strategy was also successfully implemented for DBCA managed lands within the Riverpark.

Little Rush Lake – Removing Amazon Frogbit.
Photo: Courtesy of SERCUL

10. Maintain environmental values of the Riverpark with the community

Action		Status	DBCA
10.1	Administer legislation to manage the Riverpark including the use of vessels and facilitate safe community use **(P)**		●
10.2	Maintain an incident response capability to ensure public safety and environment protection		●

Facilitating safe community use of the Riverpark

DoT is responsible for marine safety through legislation that controls licensing of boat skippers as well as provision and maintenance of navigation aids throughout the river and regulating aquatic use and activities on the river.

DoT is responsible for establishing speed limits and gazetted specific areas for higher risk aquatic activities such as jet skiing within the rivers. DBCA staff met with DoT on a quarterly basis to coordinate joint agency patrols and undertake compliance, particularly during peak recreational periods.

DBCA has several boats operating on the river to promote the safe and responsible use of the river for the community. DBCA and DoT continued to deliver the *Swan Canning Riverpark Boating Management Strategy and Aquatic Use Management Framework*. DoT produced the annual Swan Canning River Boating Guide from 2015-2020.

The departments work together on marine safety issues to ensure that different user groups and activities can equitably access the river in a safe and appropriate manner and to minimise conflicts between incompatible activities.

Incident response capabilities

DBCA has incident response protocols established with various organisations to respond to critical events as they arise within the Riverpark. These are reviewed on a regular basis. Response plans have been developed for dolphin deaths or injuries, oil spills, algal blooms, wastewater spills and oiled wildlife.

DBCA responded to hundreds of complaints in and around the Riverpark during 2015-2020. Foreshore vegetation protection signs were installed in the Riverpark. These signs are a successful tool to reduce vegetation damage from residents trying to improve their views and to help educate the public about the value of shoreline vegetation.

Windsurfers and kitesurfers on the Melville Beach foreshore.
Photo: Matt Kleczkowski

11. Improve understanding of Riverpark ecosystem through research

Action	Status	DBCA
11.1 Investigate threats to ecosystem integrity and processes		●
11.2 Improve understanding of the biophysical environment of the Riverpark		●

Investigating threats to ecosystem integrity

Cetacean Morbillivirus (CeMV) is known to be responsible for the deaths of three Riverpark dolphins in 2019 and believed to have contributed to the death of two others. DBCA has been working closely with Murdoch University to understand dolphin deaths and track incidents of this disease that has affected more than one species of cetacean along the Perth coastline.

DBCA worked with UWA to understand the causes of poor condition of seagrass in Alfred Cove within the Swan Estuary Marine Park reported by DWER following a five-year investigation of seagrasses in the estuary.

Key drivers of poor seagrass health along parts of the Attadale foreshore have been identified including high nutrient in-flows, heavy metals and low water movement. However, a cautious approach should be taken to extrapolating local scale results to broader areas as parts of the Attadale foreshore also had some of the healthiest seagrass recorded.

The outcomes of this project will influence management strategies for Alfred Cove within the Swan Estuary Marine Park and seagrass monitoring methods have been updated to avoid local impacts excessively skewing results.

DBCA worked with Murdoch University and UWA to understand the cause of decline of the flooded gum (*Eucalyptus rudis*) at Guildford and trial mitigation approaches. Remote sensing has been used to identify and map historic vegetation condition changes. Field survey and modelling was used to determine the extent to which hydrodynamic change may have contributed to vegetation decline.

The Swan Canning Estuarine Response model was linked with LiDAR results to provide a domain that extended into the riparian zone and enabled simulation of water levels, inundation and salinity. This enabled creation of local and regional habitat-salinity risk maps for 2008-2018 and a drier climate for 2050. Low lying, poorly drained areas between Bayswater and Guildford are at greatest risk of tree decline under hydrodynamic projections.

Tree surveys and evaluation for *Phytophthora* were conducted and with the assistance of community trials of the effectiveness of phosphite and nutrient injections were undertaken in an attempt to reduce dieback. None of the treatments were effective and did not result in significant health responses in the tree canopies, as determined by three health measures, over the 12 months of monitoring. Salinity intrusion into the Helena confluence area may be making flooded gums more susceptible to *Phytophthora* and rendering treatment ineffective. Flooded gum revegetation should be focussed in low to moderate risk areas.

Understanding the biophysical environment

DBCA collaborates with various research groups and agencies to investigate the biological and physical environment of the Swan and Canning rivers. Some key projects that have been delivered under the SCRPS include:

a) investigating habitat value of seagrass and macroalgae;

b) addressing the decline of the western school prawn;

c) estuarine response model and frameworks for reporting; and

d) tracking of priority estuarine fish species, with a particular focus on the oxygenation zone in the Upper Swan Estuary and the Canning Estuary up to Kent Street Weir.

Seagrass is recognised as an asset in the Riverpark playing an important role in stabilising sediment and maintaining oxygen levels at the sediment / water interface. It is also an important food source for the black swan.

Macroalgae are commonly found in the lower reaches of the Riverpark in late spring and summer, and in recent years, large amounts of macroalgae have accumulated in response to favourable growth conditions. The macroalgae is fast growing and is often considered a nuisance because it reduces light conditions to seagrass beds and can affect reproduction. DBCA supported a project at Edith Cowan University to investigate the biodiversity and ecological values of seagrass meadows and macroalgae accumulations in water and as accumulated wrack.

This work was important given regular community complaints to remove accumulated wrack from foreshores. The study found that the removal of localised seagrass or macroalgae wrack from nearshore and onshore areas was unlikely to directly impact fish and invertebrate assemblages. However, care should be taken not to disturb sediments beneath the wrack accumulations. Widespread removal of wrack was not recommended in recognition that both the macroalgae and seagrass wrack may contribute to important detrital food webs.

Algal bloom controls

Research into new and innovative approaches aimed at moderating and reducing algal bloom impacts has been undertaken and continues. Slurries of a locally sourced bentonite clay were applied at a range of application rates to *Alexandrium* suspension in a controlled laboratory trial. Results indicated that while clays are a potential viable control option, significant further effort needs to be undertaken to design a clay-additive matrix that is effective at significantly lower application rates (~0.2 mg/L) if costs and environmental impacts of treatment are to be kept to acceptable levels.

Western School Prawns restocking research

Between 2013 and 2016 4.5 million prawns were grown in aquaculture and released into the Swan Canning estuary. Research and restocking was undertaken collaboratively with Murdoch University and the Australian Centre for Applied Aquaculture Research and accompanied by a community education and engagement project, known as Prawn Watch, supported by the DBCA River Guardians Program.

The abundance of the western school prawn increased over the first three years of the study, driven by the hatchery releases of prawns, the persistence of marine-like salinities and favourable oxygen conditions in the estuary.

A wet autumn/winter season in 2016, combined with a series of low oxygen events in spring/early summer had negative influences on the population. In addition, a flood event (February 2017) caused widespread hypoxia during the breeding season of 2016-17. The spatial extent of this hypoxia impacted the primary habitat of the western school prawn.

DBCA continued to work with Murdoch University in 2017-18 to monitor the prawn populations in the Swan Canning estuary culminating in the following report: '*Changes in the abundance of the Western School Prawn during and after restocking program*'. Abundance in March 2018 was very low compared to pre-restocking levels.

The Western School Prawn restocking and monitoring project was a multi agency collaboration. Photo: Stewart Allen.

The Swan Canning Acoustic Array

The Swan Canning Acoustic Array (SCAA), which consists of 30 acoustic receivers deployed throughout the Swan Canning Estuary, provides valuable information on fish movements relative to water quality (e.g. dissolved oxygen concentrations) and in-river barriers and management initiatives such as the Kent St Weir fishway and the Swan Canning oxygenation program.

The SCAA has been in operation since 2016, with data downloads conducted quarterly. Since its deployment, 120 black bream have been acoustically tagged and their movements tracked. All data for the life of the deployed tags has now been collected and are currently being analysed.

Movement data has demonstrated that fish tended to avoid areas of low dissolved oxygen and the fishway at Kent Street Weir was successfully navigated by two tagged fish, providing passage between the Canning estuary and Lower Canning river. One of these fish made repeated passages through the fishway.

Side scan and imaging sonar were used to map the habitat complexity of the Middle and Upper Swan Estuary and determine how fish used different levels of habitat complexity in those zones. This investigation produced two reports and GIS layers of the scanned bathymetry, as well as an interpreted layer that categorised different levels of habitat complexity. It also indicated that acoustic technology could be a employed to determine fish abundance in complex habitats in which traditional netting methods could not be deployed.

Acoustic technology was also used to identify how fish utilised artificially oxygenated zones of the estuary and indicated clear movement in response to oxygen availability in the Upper Swan Estuary.

Black bream released with tag and tracking device in the Canning River. Photo: DBCA.

Objective 5: Maintain and improve sense of place with the Riverpark

12. Increase community understanding and engagement with natural and cultural heritage

Action	Status	DPLH/ Aboriginal Affairs	DBCA	Heritage Council
12.1 Assess, recognise and protect sites with a high level of cultural heritage significance **(P)**		●	●	●
12.2 Develop interpretive and educational opportunities incorporating the cultural resources of the area			●	
12.3 Provide publicly accessible information and maps detailing important cultural and natural sites and structures in the Riverpark			●	
12.4 Work with relevant Noongar groups to manage the Riverpark **(P)**			●	

Assessment, recognition and protection of sites

DBCA received formal exemption or consent from the Registrar of Aboriginal Sites DPLH, under regulations 7 and 10 of the Aboriginal Heritage Regulations 1974 to build the Matilda Bay interpretation node.

Interpretive and educational opportunities incorporating culture

DBCA is continuing to recognise and promote Aboriginal and other cultural heritage though the Riverpark Trails Project. Since 2015 eight new interpretation nodes have been constructed at Heathcote (Applecross, City of Melville), Point Walter (Bicton, City of Melville), Bicton Baths (Bicton, City of Melville), Brentwood (City of Melville), Bicentennial Adenia Park (Riverton, City of Canning), John Tonkin Reserve (East Fremantle, Town of East Fremantle), Matilda Bay (Nedlands, City of Nedlands) and Kent St Weir (Wilson, City of Canning).

DBCA has worked closely with the South West Aboriginal Land and Sea Council (SWALSC), traditional owners and a variety of local riverfront governments to create the nodes that include seating, Aboriginal artwork and information incorporated into structures as well as audio trail guides available via the Geotourist app.

The Marli Riverpark Interpretation Plan has identified 19 nodes across the Swan Canning Riverpark, with six additional nodes identified by the Noongar Advisory Panel, which gives a total of 25 nodes. More nodes are currently being planned for Deep Water Point, Banks Reserve, Garvey Park, South Perth foreshore and the Burswood foreshore in future years.

Further implementation of both the Marli Riverpark Interpretation Plan and the Riverpark Trails Masterplan are being planned. Trail guides are also being developed.

Publicly accessible information

DBCA has a range of information available to the community on exploring the Riverpark through the Explore Parks WA website. The link is provided below. The site provides maps as well as links to a range of information sources.

People can also access information on Aboriginal history, the social, political and environmental history of Perth Water, stories by the community and links to trail guides at https://parks.dpaw.wa.gov.au/park/swan-canning-riverpark. Trail guides for the Melville Water Riverpark Trail (a 16km urban trail along the river) from Fremantle to Canning Bridge and the Jenna Biddi Yorga trail (a 2km walk) from Point Walter to Blackwall Reach are provided via the GeoTourist app and the Trails WA website. The links are provided below.
http://trailswa.com.au/trails/jenna-biddi-yorga
http://trailswa.com.au/trails/melville-water-riverpark-trail#

Working with Whadjuk Noongar traditional owners

DBCA actively works with Whadjuk Noongar traditional owners to manage the Riverpark. As many projects are operationally delivered by partner organisations, DBCA actively encourages its project partners to maximise opportunities for Aboriginal involvement in projects and activities.

SWALSC endorsed the Whadjuk elders which DBCA engaged to obtain information and stories for the interpretation nodes projects.

DBCA engaged with Marie Taylor and Noel Morich for the City of Melville nodes, Doolann-Leisha Eatts at Kent St Weir and Trevor Walley at the Matilda Bay Reserve site. DBCA continues to engage with elders for future interpretation nodes.

DBCA worked closely with Whadjuk elders on a variety of key trail and interpretive projects, where oral recordings of the cultural values of the Riverpark are captured. The recordings are available on the Explore Parks WA website, as well as on the Geotourist app so Riverpark visitors can listen to the stories.

DBCA is the State government representative on the project steering committee for the UWA Clean Air and Urban Landscapes Hub's 'Reconstructing an understanding of Noongar knowledge for the Swan-Canning catchment – implications for land-use and water planning in Perth' research project. This is a Noongar-driven project that aims to determine a process for the collection, storage and culturally appropriate access of Noongar knowledge to guide land use and water planning in Perth.

Capturing the stories of traditional owner elders near Blackwall Reach. Photo: DBCA.

River Journeys interpretation nodes: Aboriginal trainees

CareyMC Pty Ltd is a majority Aboriginal owned and controlled Western Australian civil infrastructure contractor. DBCA has engaged with CareyMC to implement the River Journeys program on four of the eight completed interpretation nodes; Brentwood 'Living Stream' (2016), Bicentennial Adenia Park Sikh Heritage Trail (2018), Kent Street Weir Park (2020), and Matilda Bay Reserve (2020). CareyMC was successfully awarded these contracts through State Government procurement processes.

A subdivision of CareyMC, Carey Training, is a nationally accredited training provider which helps Indigenous students achieve skills in a wide range of construction disciplines, including carpentry, concreting, form work, plant operation, scaffolding and basic surveying.

As part of works for all four interpretation nodes constructed by CareyMC, Aboriginal students could complete practical components of their Certificate II in Civil Construction. In total, 35 Aboriginal students have gained valuable experience in civil construction with the interpretation node projects. Additionally, one of the students involved in the Kent Street Weir project was successful in gaining employment with CareyMC following completion of his Certificate II in Civil Construction with these works.

DBCA also contracted Meta Maya Construction Pty Ltd – a wholly Aboriginal owned Western Australian organisation to construct the John Tonkin Reserve Interpretation Node (2018).

In summary, five out of the eight interpretation nodes developed over the past five years have been constructed by Aboriginal businesses, and 35 young Aboriginal students could obtain their required practical experience for their course work towards completion of their Certificate II in Civil Construction.

Aboriginal trainees working on the Brentwood interpretation node. Photo: Ben Ansell

Objective 6: Provide access and a safe environment for Riverpark visitors

13. Maintain and improve safe access for Riverpark visitors

Action	Status	DBCA	DPLH	Local Govt	DoT	DoH
13.1 Promote public use and enjoyment of the Riverpark **(P)**		●				
13.2 Maintain and improve the level of safe public access to and along foreshore areas in the Riverpark **(P)**		●	●			
13.3 Improve access to public/courtesy moorings and short-stay pens		●			●	
13.4 Implement a rational management system for dinghy storage on foreshore areas				●		
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 **(P)**					●	
13.6 Coordinate primary contact water quality monitoring at popular swimming locations and report conditions to the community **(P)**						●
13.7 Develop a Shared Asset Management System to link funding/assets/damage to enable forecasting and prioritising of foreshore improvement works		●				
13.8 Implement works to stabilise the riverbank where valuable infrastructure or recreational amenity is threatened by erosion **(P)**		●			●	

Promotion

DBCA promotes events, activities, projects and other ways to enjoy the Riverpark through the River Guardians projects and social media. Internal and external events, activities and projects run by non-government organisations and community groups have been promoted through the River Guardians website, Facebook page and Instagram account.

Additional information on activities undertaken to support community enjoyment of the Riverpark and the River Guardians program can be found under Strategy 17 of this report.

During 2018-2020 DoT undertook 555 education and compliance patrols in the Swan Canning Riverpark. In addition DoT Maritime undertook 19 education activities within the Swan Canning Riverpark.

Riverpark access

DBCA develops and implements visitor risk management assessments and plans for areas of shared responsibility within the Riverpark to ensure safe public access and enjoyment. This includes inspections, assessments and the mitigation of hazards where necessary.

DBCA supports planning for future foreshore lands and improvement of existing public parks and reserves through strategic planning processes, including precinct planning and jointly developed foreshore master plans. These support ongoing community access to the rivers and improved amenity.

DPLH is continuing its program of land acquisitions to consolidate the Swan and Canning river foreshores and the provision of river management, public access and facilities. Land is acquired either by purchase or through the subdivision process by relevant development conditions. Land acquired is usually transferred to a land manager such as a local government to become part of the local parks and reserves system available for community use and access.

DPLH/WAPC provided $250,000 funding for a hydrological study of Ashfield Flats and restoration of this important floodplain in 2019. DPLH also spent $4.3 million to stabilise the Rivervale foreshore, removing weeds and revegetating the escarpment and completed the first stage of rehabilitation of a contaminated site (landfill) on the Swan River floodplain in Bayswater.

Courtesy mooring access

Since 2015, 10 new courtesy moorings have been installed. The Riverpark now has 43 courtesy moorings for free daily and over night use by boating enthusiasts. These short-stay moorings in different mooring areas allow recreational users to safely moor in different locations. Courtesy moorings are moved, as required.

The Swan Canning Boating Management Program developed with DoT allows for up to 50 courtesy moorings to be installed if required. DoT also conducts bi-annual inspections and annual maintenance of courtesy moorings to ensure that the Riverpark remains safe and accessible for the boating community.

The courtesy moorings have proved extremely popular with recreational boat owners in the Swan and Canning rivers. Photo: Mark Thornley

Dinghy management program

Dinghies on the Riverpark foreshores have been an issue for a long time impacting on public access, safety and the environment. Dinghies on foreshores restrict access to beaches and the waterline and people's ability to move through the Riverpark. Unmanaged dinghies create hazards and visual amenity problems and contribute to the erosion and destruction of foreshore vegetation.

DBCA has progressed well with its Dinghy Management Program of removing unattended vessels (mostly dinghies) from the Riverpark foreshores, where no formal storage facilities existed, and no permits were in place.

This was achieved through working closely with land managers and local riverfront governments through the development of formal storage facilities, or no dinghy storage being allowed – depending on the local government's policy. This improves public access and safety and reduces environmental impact to the Riverpark's vegetation and foreshores.

LGAs such as the City of Fremantle, Town of Mosman Park and the Shire of Peppermint Grove worked closely with DBCA to remove unattended vessels above the high water mark. During this period a total of 47 vessels were removed by DBCA, stored for up to six months, and if uncollected, working vessels were donated to charity, with the remaining unusable craft being taken to landfill.

DBCA spent $25,000 to undertake compliance management, collect, store, and dispose of unwanted vessels. Before vessel removal by DBCA, 77 boats were removed by the vessel owners themselves.

Dinghy storage system in Mosman Park.
Photo: Mark Thornley

Vessel use

DoT undertakes education and compliance of the *Western Australian Marine Act 1982* and Navigable Water Regulations 1957 through regular education programs and compliance patrols throughout the Riverpark.

A number of DBCA officers are cross authorised under DoT legislation. These officers received authorised officer training and actively and regularly participated in compliance monitoring and education functions on behalf of DoT.

Health monitoring

DoH coordinates and supports annual microbiological water sampling activities conducted by local government authorities within the Riverpark beaches. In addition to regular monitoring, biota sampling and testing activities were undertaken by DBCA, DPIRD and DoH in response to the *Alexandrium* algal bloom event in April-May 2019.

Asset management

Riverbank condition data has been finalised by updating the foreshore reserve useability data and re-analysis of riparian ecology data sets. The riverbank condition data documents type, extent, condition and value of the entire 330km of the Swan Canning natural and built shorelines, riparian ecology priorities and useability of public reserves. It enables analysis of shorelines via asset management systems, asset-threat-response models, and social impact assessment of facilities.

Riverbank funding decisions now benefit from up-to-date data collation, immediate priority identification and clear risk communication; all assisting in demonstrating value for money investment. Riverbank, in a collaborative project with Landgate has now made this data available to foreshore land managers via the State Land Information Platform (SLIP).

Infrastructure and amenity protection

DoT maintenance contractors attended all Aids to Navigation (AtoN) devices on the Swan Canning Riverpark as part of their annual scheduled maintenance. There were 24 outages. Replacement of 114 existing steel jettable beacons with 160 Ally jettable beacons commenced in line with DoT enhancement of AtoNs statewide.

DBCA maintained the Riverpark's amenity through its annual program of removing rubbish and dumped materials, reshaping eroded beaches, foreshore protection works and responding to incidents such as fish kills, algal blooms, injured wildlife, sewage spills and other pollution events.

Navigation Aids are constantly being maintained by the Department of Transport. Photo: Mark Thornley

Protecting infrastructure amenity

Riverbank Program

DBCA provides funding towards riverbank rehabilitation and protection in conjunction with foreshore land managers through two schemes – the Riverbank Grants program and the Proactive Funding Scheme.

During 2015-2020 DBCA's Riverbank Program funded 51 foreshore restoration projects along the Swan and Canning rivers with $5.6 million culminating in a total of $11 million including matched funding from local riverfront governments.

These projects include erosion control, revegetation, weed control, river wall construction, enhancing river access, widening vegetation corridors, creating native animal habitat and preparation of foreshore management plans.

The projects help protect, improve and manage shoreline areas of the Swan and Canning rivers and ensure that the Riverpark's shorelines are protected from erosion to help preserve on-shore infrastructure such as paths, parklands and roads.

Natural and built foreshore works also improve local amenity, support community access to the waterways and improve local habitat for biodiversity.

Cycle networks and shared paths

DoT completed consultation with 33 local governments on the Long Term Cycle Network project in September 2020. The project outlines an agreed, aspirational network across the Perth and Peel region. This includes identification of the aspirational network adjacent to rivers and lakes, as well as several aspirational crossings.

Initial development (feasibility study) work for a Public Shared Path (PSP) on the east side of the Kwinana Freeway was completed. A feasibility study and 2D for improvement to the PSP on the west side of the Kwinana Freeway from Cale St to Mt Henry was also completed. This has been identified by DoT for possible funding as part of PSP prioritisation 2022-2031.

MRWA undertook routine maintenance and inspection of the PSP network, which includes litter collection, lateral pruning, debris cleaning such as leaf and sand removal, flooding mitigation and edge repairs where required. A major defect identified under the PSP within the Smartways Project site was repaired and an additional section of PSP was resurfaced between Canning Highway and Narrows Bridge.

From 2020-21 onwards, MRWA committed to an annual allocation of $1 million towards ongoing maintenance of the PSP network. DoT has also allocated $1 million from the PSP Expansion Program budget to facilitate more intensive rehabilitation and widening works required along the PSP network. Individual local governments were responsible for the maintenance and upgrade of most Recreational Shared Paths (RSPs).

The City of Perth recently secured funding to upgrade the RSP between the Waterbank redevelopment area and Matagarup Bridge, as well as improvement works along the shared path adjacent to Riverside Drive.

Riverwall repairs on the South Perth foreshore. Photo: DBCA

14. Manage public use requirements to minimise conflicts

Action	Status	DBCA	DoT
14.1 Implement *Aquatic Use Review and Management Framework* for the Riverpark **(P)**		●	●

Managing public use

DoT undertook an *Aquatic Use Review of the upper reaches of the Swan Rive*r (upstream of Windan Bridge) and for Perth Water (Buneenboro). The Aquatic Use Reviews involved extensive community consultation and direct engagement with user groups such as clubs and associations. This followed the major A*quatic Use and Management Framework Review* jointly undertaken by the Trust and DoT in 2011.

The Aquatic Use Management Framework operational working group continues to consider additional minor amendments to speed limits, gazettals, and activities as needed to ensure the safety of users, the stability of the foreshores and infrastructure.

Several critical changes were made to use within Perth Water (Buneenboro) including changes to speed limits and some special use areas to ensure more equitable and safer sharing of the river between user groups. DoT also drafted amendments to regulations for Perth waters through to Windan bridge.

DoT completed a minor aquatic use review within Matilda Bay during 2018. Key stakeholders consulted included Rowing WA, Yachting WA, various clubs using Matilda Bay, commercial ferry operators, Recfishwest, the Boating Industry Association of WA and Boating Western Australia.

The general public were also provided on opportunity to comment, with 360 responses being submitted through an online survey. The major outcome of this review resulted in the implementation of an eight knot speed restriction in all waters of Matilda Bay for vessels over 10 metres.

Spectacular yachting regattas are a common sight on the Swan River.

15. Enhance the standard of Riverpark facilities

Action	Status	DoT	DBCA	Local Govt	Development WA
15.1 Improve quality of existing public facilities and infrastructure		●	●	●	
15.2 Establish a Swan Canning Riverpark Trails project including walking, cycling and kayaking trails			●		
15.3 Improve walking and cycle ways including the implementation of the Recreational Shared Path Network along the rivers as set out in the *Western Australian Bicycle Network Plan*		●			●

Improve quality of existing facilities and infrastructure

DoT receives submissions annually from facility managers seeking to access funding through the Recreational Boating Facilities Scheme. DoT administers the Recreational Boating Facilities Scheme (RBFS) with funding obtained primarily from boat registration fees.

Funding can be used for enhancing the safety of recreational facilities, maintaining a clean and healthy environment, improving access, and upgrading boating facilities including jetties, navigational aids, and courtesy moorings. DBCA is a member of the assessment panel supporting DoT in assessing applications for the RBFS.

In 2017 RBFS funding of $700,000 was allocated to the City of Melville to upgrade the popular Deepwater Point boat launching facility. A further $67,500 was allocated to the Town of Bassendean's Pickering Boat Ramp and jetty planning study. DBCA also received $15,000 for the planning and design of Sandy Beach Reserve Jetty in 2019-20.

Two projects were completed in the 2018-19 financial year for the City of Melville including the Deepwater Point boat launching facility upgrade and the Point Walter boat launching facility upgrade with grant funding totalling $1.195M. DoT also undertook annual maintenance and modifications to its infrastructure including Riverpark jetty deck replacements as a part of rolling program, Coode Street jetty repair work, Como jetty repair work, Mardalup – Claisebrook jetty refurbishment and the recently constructed Burswood jetty's regular monitoring and maintenance.

Regular ongoing monitoring and engineering inspections of Barrack Square Jetty 1 is now in place. DoT is currently negotiating with Old Perth Port, in conjunction with Development WA and DBCA, to redevelop jetty 1.

The popular Point Walter boat ramp.
Photo: Mark Thornley

Local government projects

Local governments are important contributors to Riverpark facilities. Over the past five years local governments have undertaken some major facility and infrastructure projects in the Riverpark, including:

- City of Perth and Development WA – Elizabeth Quay and Matagarup Bridge.
- The City of South Perth implemented Connect South encompassing the Mends Street Jetty foreshore, Mends Street, Harper Terrace and Windsor Park. This project focused on improving public amenity via place activation, wayfinding, access to transport and greater economic opportunity. Notable additions to the foreshore landscape included huge frill necked lizard and numbat sculptures.
- The City of Swan implemented the Woodbridge foreshore upgrade. The riverside area has been a favourite spot with locals for many years and is now complemented with foreshore protection, an overwater viewing platform, shaded picnic facilities and a perfect spot to launch a kayak or canoe for a paddle on the river.
- The City of Swan – boat ramp upgrade at Fish Market Reserve.
- City of Bayswater – Claughton Reserve Public Art Project and toilet upgrades.
- The City of Nedlands opened the popular Jo Wheatley All Abilities Play Space, a new purpose built park for all ages and abilities. Carefully built around and under existing trees, the park offers foreshore access, wheelchair access throughout, a sensory garden, adventure play equipment, toilet facilities and is fully fenced.
- Co-contributions for River Journeys interpretation nodes at John Tonkin (Town of East Fremantle) and Kent Street Weir (City of Canning).

This list is representative and does not include all works undertaken by the 20 local governments in their ongoing work in providing community facilities and services.

Family picnicing at Matilda Bay
Photo: Mark Thornley

River Journeys interpretation nodes

Implementation of the River Journeys program is continuing, with eight interpretation nodes constructed under the SCRPS at Point Walter, Heathcote, Bicton, Adenia Park, John Tonkin Park, Kent St Weir, Brentwood and Matilda Bay by November 2020.

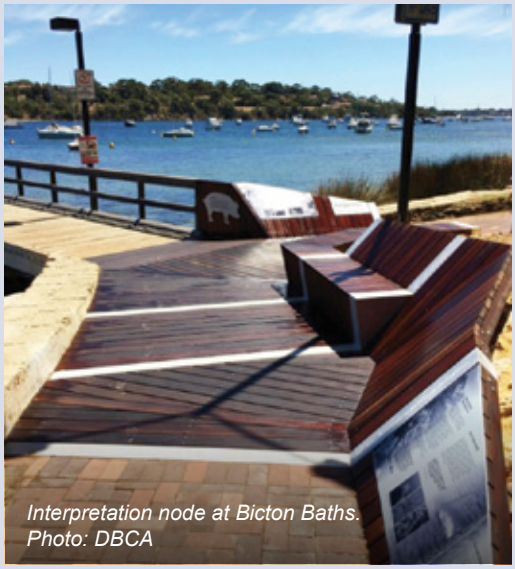
DBCA provided $601,000 towards the construction of eight nodes and about $60,000 in-kind contribution predominantly for project management, landscape architect design, and interpretation development. Co-funding is typically provided by local governments for each node with additional contributions being made by other State Government agencies, Lotterywest and corporate partners such as Woodside Energy.

This program forms part of a greater plan to connect sites across the whole Riverpark, an area of 72 square kilometres, with more interpretation facilities and trails. Planning is underway for new interpretation nodes at Banks Reserve in Vincent, Deep Water Point in Mount Pleasant, the South Perth foreshore, Burswood foreshore and Tonkin Gap site.

The River Journeys program supports the development of new or upgraded walking/cycling trails around the length of the Riverpark with interpretation nodes being placed at critical points. These nodes highlight Aboriginal, social and natural heritage features of the relevant river destination area.

Contemporary technology is providing a unique trails experience with users able to access audio recordings via the GeoTourist app at some locations. Riverpark visitors can also hear stories and explanations from Aboriginal elders about the local landscape and its significance.

Interpretation node at Point Heathcote Reserve
Photo: DBCA



Interpretation node at Bicton Baths.
Photo: DBCA

Improve walking and cycle ways including the Recreational Shared Path network

DoT has a variety of activities aimed at delivering improvements to shared paths including maintenance of existing networks and planning, scoping and constructing new networks.

The long term planning for the cycle network in line with the *Transport @ 3.5 million Perth and Peel Transport Plan* is ongoing. DoT is currently consulting with the 33 local government authorities involved to produce an agreed cycle network. This process was completed in June 2020 and identifies a number of river and lake crossings.

A review of lighting along the existing PSP from the Narrows Bridge to Mt Henry is also underway. Current planning has the first priority for works earmarked for the PSP section between the Narrows Bridge and Canning Bridge.

DevelopmentWA worked to integrate pedestrian and cycle paths in redevelopment areas into the existing networks in six major project areas including the Waterbank precinct, Elizabeth Quay, and Champion Lakes. Planning continued for Wungong, Midland and East Perth Power Station redevelopment areas to help connect foreshores and living streams with public open spaces and support public movement around the river foreshores.

Cyclists enjoying one of the Riverpark's many scenic shared paths.
Photo: Stewart Allen

16. Promote appropriate tourism activities

Action		Status	Local Govt
16.1	Support community events (e.g. Skyworks, river festivals, Swanfish) and tourism opportunities on the river foreshore **(P)**		●

Community events and tourism

Community events are held throughout the year within the Riverpark. Under the SCRPS, DBCA continued to support a variety of key community Riverpark events including the Matilda Bay Swim Thru, Perth Skyworks, the Canning River Festival, Kings Park Festival, Swanfish, the Algal Bloom yacht race, Avon Descent, Clean Up Australia Day, Reel It In Fishing Line Bin project clean up days, free RiverWise sustainable gardening workshops, Recfishwest sustainable fishing clinics and a variety of scuba dive club underwater clean ups in the Swan River.

These events are promoted and supported by DBCA's River Guardians program that provides free RiverWise sustainable gardening workshops and household assessments in priority nutrient suburbs. Local government and key stakeholder participation in the planning and coordination of these events is instrumental to their success.

DBCA hosted the Culture in the Parks event/s in 2015-2017 where traditional owners and Aboriginal tourism operators explored new opportunities for cultural tourism and activities in the Swan Canning Riverpark and other Western Australian national parks and marine parks.

DBCA also authorises commercial operators and activities in the Riverpark.

Visitor satisfaction across the Riverpark

A series of Visitor Satisfaction Surveys were undertaken to gain valuable information and data on community feedback and the perceptions of Riverpark users and visitors partly during school holiday periods. The average satisfaction across all 23 Riverpark locations where people were sampled was 85.96% during 2016-2021. This was based on 1170 interview respondents.

Average level of visitor satisfaction with their visit to Swan Canning Riverpark facilities 2016-2020.

Year	Target Satisfaction Level (%)	Actual Satisfaction Level (%)
2016-2017	80%	86.8%
2017-2018	95%	86.8%
2018-2019	90%	83.1%
2019-2020	85%	90.9%
2020-2021	85%	82.2%

Improved resources and application process for Swan Canning Riverpark commercial operators

DBCA facilitated the implementation of the Streamline WA virtual one-stop shop for tourism based operators in the Swan Canning Riverpark on the WA.gov website. A new commercial activity application form, maps and clear guidelines were developed to simplify the application process for commercial activities in the Swan Canning Development Control Area.

Objective 7: Improve public knowledge and understanding of the Riverpark

17. Facilitate opportunities for engagement with the Riverpark

Action	Status	DBCA	DLGSC	Sub regional NRM groups
17.1 Promote opportunities for community groups and individuals to be involved in on-ground conservation activities **(P)**		●		●
17.2 Facilitate opportunities for local community groups, agencies, educational institutions and volunteers to be involved in research, behavioural change and sustainable living programs/ projects		●		●
17.3 Support local environmental groups to source additional funding **(P)**		●		
17.4 Promote active and healthy lifestyles that encourage the use of the Riverpark			●	
17.5 Promote Riverpark identity through the media and major public and corporate events occurring in the Riverpark		●		

On-ground conservation opportunities

DBCA in partnership with Wheatbelt NRM assists landholders in implementing on ground activities that will improve soil health and contribute to improved water quality in the Swan-Avon river system.

DBCA has been supporting natural resource management (NRM) groups within the Swan Canning catchment for over 20 years, providing financial aid, technical support and advice as well as support to access various external funding sources. DBCA via Burswood Park Board provides remuneration for officers based in three sub regional groups – SERCUL, Ellen Brockman Integrated Catchment Group (EBICG), Eastern Region Catchment Management Program (ERCMP) and two part time officers in the cities of Swan and Bayswater. This funding enables the coordination of community projects that improve the water quality entering the river system.

Native plantings on the Milyu area of Swan Estuary Marine Park/Milyu Nature Reserve. Photo: Mark Thornley

Community Rivercare Program

The Community Rivercare Program was established in 2017. During 2018-2020 the program contributed $900,000 (three grant rounds of $300,000) to 26 community groups to deliver 34 projects. These initiatives helped address nutrient inflows and riverbank erosion, weed invasion and native fish and waterbird conservation.

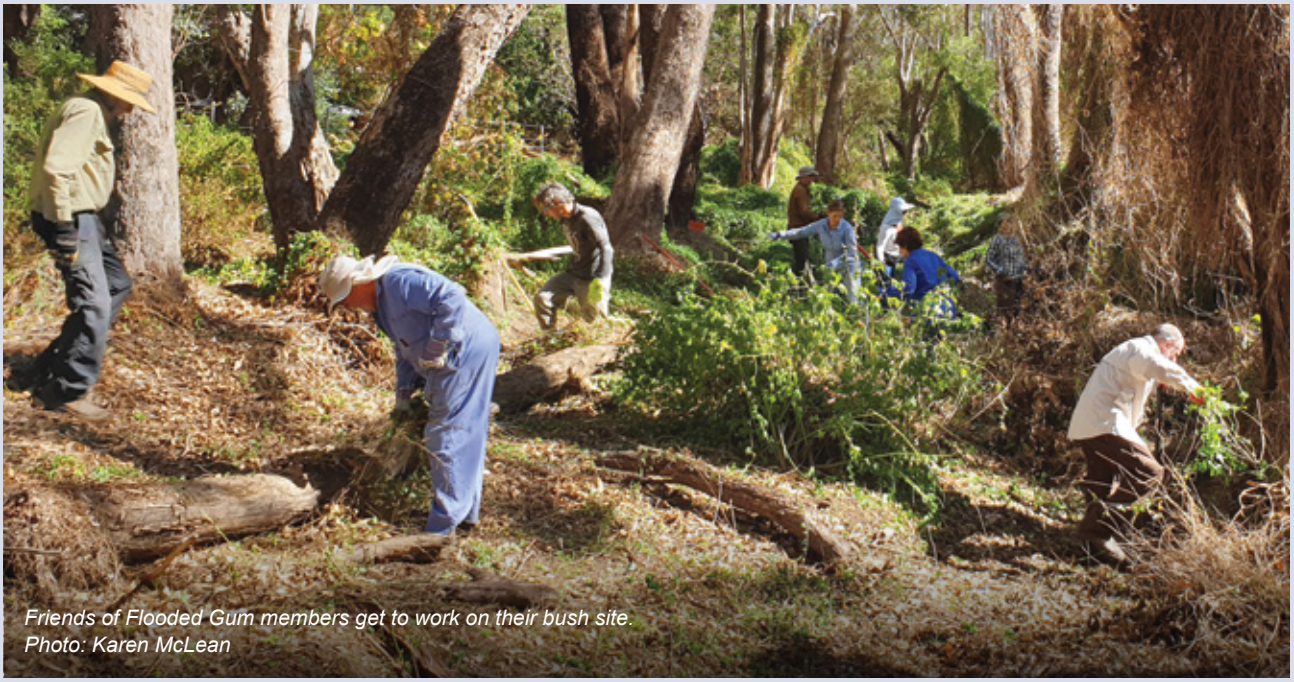
The grants program provides community volunteer groups with funding between $3,000-$150,000 to conserve the natural, cultural and social amenity of the rivers, tributaries and urban drains within the Swan Canning catchment.

The program funds activities such as habitat improvement for birds and other species dependant on waterways, foreshore revegetation and weed control, bank stabilisation to repair or prevent foreshore erosion and water quality improvement.

Recipient groups have local knowledge, experience and volunteer resources to complete restoration projects throughout the Swan Canning river system.

Friends of Jarrahdale Creek youngsters lend a hand.
Photo: Danielle Crichton

Friends of Bennett Brook volunteers conduct native plantings.
Photo: Melinda McAndrew



Friends of Flooded Gum members get to work on their bush site.
Photo: Karen McLean

Swan Alcoa Landcare Program

DBCA and the Burswood Park Board have had a long-term partnership with Alcoa and Perth NRM in delivering the Swan Alcoa Landcare Program (SALP). Since the inception of the program in 1998, with funding support from the Burswood Park Board and the Australian Government, DBCA has invested more than $4.825 million into the program.

DBCA has worked closely with Alcoa and Perth NRM to secure ongoing commitment and funding for this iconic and critical community program. Local community groups are integral in undertaking work to improve the ecological health and community benefit of their areas and often work in conjunction and with the support of local governments and DBCA.

Land management strategy

The land management strategy for the upper Canning River was delivered throughout various sections of the Canning River in Gosnells, Kenwick and Langford. This initiative helped identify unlawful structures and activity along the Canning River foreshore with a significant number of issues being identified including two dam structures that were assessed in relation to ecological function.

Facilitate opportunities for community involvement in research, education and behaviour change

River Guardians

The River Guardians program has been connecting the community with the rivers and the people and projects that protect them for over 12 years. Working with local partners and 'friends', the program is funded by DBCA and provides member benefits, including free RiverWise events and activities.

River Guardians provides opportunities for volunteering, training and education, as well as providing the latest river information and updates from experts. Volunteering opportunities such as planting, weeding, rubbish removal and fauna monitoring give the community opportunity to be involved in on-ground conservation activities to enhance and protect the rivers.

Several community engagement and education projects were delivered under the River Guardians banner to support behaviour change and citizen science for the Swan and Canning rivers.

The program now has 2828 subscribers and offered volunteering opportunities via the Dolphin Watch project, Prawn Watch and the *Reel It In* fishing line bin project. Volunteers can also participate in regular river clean ups and foreshore/catchment restoration planting days.

Citizen science

DBCA and the Trust continue to deliver two innovative citizen science programs: Dolphin Watch – supporting improved understanding of the Indo-pacific bottlenose dolphin sub population that visits the Riverpark on a daily basis; and the *Reel It In* Fishing Line Bin project.

The Dolphin Watch citizen science research project continues to be delivered in Perth and expanded to include dolphin populations in Mandurah and Broome during 2018. During 2015-2020 the Department trained and registered 651 new Dolphin Watch volunteers. There were over 8000 dolphin monitoring reports submitted, and volunteers contributed 2022 hours. Junior Dolphin Watch engaged with 150 students from five schools.

A third citizen science project, Prawn Watch effectively supported the western school prawn restocking project during 2013-2016.

Dolphin reflections
Photo: Matt Kleczkowski

Reel It In-Fishing line bin project

During 2015-2020 the *Reel It In* fishing line bins project was expanded significantly and there are now 68 dedicated bins at popular jetties, fishing platforms, traffic bridges and foreshores throughout the Riverpark. These bins have collected 55 km of fishing line and 12,686 bait bags since 2015 and are funded and supported by 11 local councils and 52 volunteers who have contributed over 1086 volunteer hours to help empty the bins.

Photo: Miranda Holker

Project partner Native Animal Rescue emptied the fishing line bins weekly and conducted annual audits on the bins. This helped DBCA provide data and updates on the bin locations to key stakeholders such as Recfishwest, Ozfish Unlimited and other members of the recreational fishing community.

The fishing line bins have helped significantly reduce fishing line and tackle waste on Riverpark foreshores and waterbird and dolphin entanglements in the Swan and Canning rivers.

Sustainable gardening workshops

Over the past five years DBCA's River Guardians program has delivered 28 free RiverWise/Great Gardens sustainable gardening workshops to 2,036 attendees in priority nutrient suburbs.

These fun, informative and interactive workshops are designed to teach Perth residents sustainable gardening practices that can save time, money and water.

The workshops educate residents about responsible fertiliser use and how reducing nutrients such as nitrogen and phosphorus from the garden can help improve the ecosystem health of the Swan Canning river system.


RiverWise gardening consult in priority nutrient suburb. Photo: Jennifer Eliott

RiverWise Gardens behaviour change programs

Since 2015 DBCA has also delivered two RiverWise Gardens behaviour change programs in priority nutrient suburbs. These targeted behaviour change programs deploy a personalised coaching approach for riverside residents combined with on-site garden consultations, feedback letters and referrals to a gardening workshop.

Southern River was selected for the 2017 *RiverWise* behaviour change project. This project engaged 397 households recruiting higher fertiliser users (30% of participants) into the garden consultation service, completing 117 garden consults, and achieved a 52% fertiliser reduction among this group. The overall participant group achieved a 28% reduction in fertiliser application, by weight, among participants.

In 2019 the Riverwise behaviour change project travelled to Bullcreek and engaged 412 households who agreed to more than 700 Riverwise actions. The program recruited higher fertiliser users (30% of participants) into the garden consultation service completing 97 garden assessments. A further 147 participants attended a special RiverWise gardening workshop delivered by ABC's Gardening Australia presenter Dr Josh Byrne.

River Guardians and Josh Byrne and Associates also partnered with Dawsons Nursery to deliver a pilot project aimed at educating and training Dawsons Nursery staff to provide RiverWise messaging and environmentally friendly products to customers at the point of sale. The workshops were well received with 95% staff attendance.

Mobile education displays

DBCA created mobile river education displays for Scitech and key Riverpark events and also helped develop a variety of permanent river education installations at the WA Museum to help deliver environmental, social and cultural education to the community and international/interstate visitors.

Funding key sub regional groups

During 2015-2020 DBCA provided over $3.13 million to sub regional groups to deliver catchment restoration and nutrient prevention projects throughout the Swan Canning catchment. These projects included weed control, invasive species control, native animal habitat creation and installing native plants at priority sites.

DBCA and Alcoa Australia also provided over $1.75 million to community groups to deliver 260 catchment restoration projects under the Swan Alcoa Landcare Program (SALP) during 2015-2020. Projects included weeding, fencing, native vegetation plantings, native animal habitat creation and converting drains into living streams.

During 2015-2019 DBCA , Wheatbelt NRM and Perth NRM assisted landholders in the Swan-Avon region to implement on ground activities that improved soil health and contributed to improved water quality in the Swan-Avon river system.

Between 2015-17, $75,000 was provided to develop a series of behaviour change workshops designed to increase understanding of soil testing and how that related to fertiliser application. There were 140 farming entities from broadacre farming, vegetable growers, orchardists, viticulture and horse pastures who were engaged in the program and as a result have applied improved nutrient management practices.

Further funding of $60,000 was approved for the program from 2017-19 that funded soil testing, 10 workshops, two field days, one conference and four community projects that installed over 20,000 native plants into local waterways.

Promoting active, healthy lifestyles

DLGSC provides support via the Organisational Sustainability Program to state sporting and recreation organisations such as Canoeing WA, Yachting WA, WA Water Ski, WA Power Boat, Rowing WA, Triathlon WA, and Outdoors WA.

In 2019-20, support (including $925,000 in funding) was provided to more than 12 state sporting associations and recreation organisations who use the Swan Canning Riverpark for all or some of their sport and recreation. Organisations that may utilise the river including Triathlon WA, Paddle WA and Masters' Swimming also received State Government COVID-19 support funding to ensure they could maintain operations following the introduction of COVID-19 restrictions.

DLGSC is also involved in the development and maintenance of sport and recreation facilities through the Community Sporting and Recreation Facility Fund.

During 2017 DLGSC allocated $700,000 to the City of Melville towards sporting facilities at Tompkins Park. Since 2017, DLGSC also approved funding requests for: a Preston Point Road North Sporting Facilities Masterplan in East Fremantle ($15,000); an upgrade to the female change rooms at Lilac Hill park ($350,000); a flood lighting upgrade to Gilbert Fraser Reserve ($86,667); a flood lighting upgrade to Tompkins Park ($86,667); improved female change facilities and members' amenities at Swan River Rowing Club ($60,000); and an upgrade to the floodlighting at Henry Jeffrey Oval ($29,179).

In 2018-19, DLGSC provided $1.06 million funding to more than 12 state sporting and recreation organisations who use the Riverpark for all or some of their sport and recreation. More than 100,000 people were recorded as association members or as participants in organised events.

Past funding has assisted with facility development in various Riverpark locations including Ascot Kayak Club, Swan Canoe Club at Mosman Beach and the WA Watersports Facility at Burswood. DLGSC also finances the State Sporting Infrastructure Fund.

DLGSC continues to improve sport and recreation facilities via investment in the maintenance of the Rowing WA headquarters. Funding was provided for the project management component of a foreshore stabilisation project following damage caused by winter storms to the riverwall and riverbank next to the Rowing WA headquarters.

DLGSC also continued to promote river-based activities at its Point Walter campsite. For the period July 2019 – September 2020, 2619 participants engaged in water-based activities at the Point Walter campsite (3928 physical activity hours). During 2018-19 over 3555 participants (5330 participation hours) engaged in water-based river recreation at the site.

NaturePlay WA co-ordinated the Muddy Hands Festival in October 2019 (reporting 6,500 plus participants) in conjunction with City of Canning.

DLGSC continues to support SCRPS action 17.4 via in kind support for the linkage of the International Commonwealth Walkway trails project to the Swan River at the Optus Stadium, Elizabeth Quay and Fremantle Port precincts.

Promoting the Swan Canning Riverpark identity

DBCA officers provide articles and various contributions for Landscope magazine (community engagement and citizen science projects), West Australian Newspaper (the Riverpark), Boating WA's magazine Flagship (fishing line bins), and Community Newspapers (vegetation protection, seaweed accumulation on foreshores).

DBCA officers also produced mobile river education displays and installations for Scitech, WA Museum, Festival of Perth and major riverside public events.

DBCA continued to support popular community riverfront events and activities including Swanfish, the Canning River Festival, kayak raft ups, Avon Descent, Perth Skyworks, Matilda Bay Swimthru and a variety of river foreshore and underwater dive club clean ups.

DBCA also hosts the River Guardians community program website, Facebook page and Instagram account to keep the friends of the Swan and Canning rivers involved and informed of local happenings.

Paddleboarding family at Point Walter
Photo: Matt Kleczkowski

Objective 8: Improve the way we do business

18. Support appropriate development and businesses through a planning and policy framework

Action		Status	DBCA
18.1	Identify nodes for developing appropriate commercial opportunities in the Riverpark **(P)**		●
18.2	Ensure all commercial operators in the Riverpark meet high standards through licensing **(P)**		●
18.3	Ensure River reserve leases are managed in line with policy to best practice standards **(P)**		●

Commercial opportunities

The Swan and Canning rivers are an iconic part of Perth and the city's lifestyle. Future commercial offerings should reflect what the Perth community values about the river. Recent public consultation strongly emphasised that the community favours a focus on Perth's unique cultural values and its environmental distinctiveness. This includes opportunities around Noongar cultural experiences, nature-based tourism and events and pop-up installations that showcase innovative or seasonal offerings.

DBCA is open to commercial opportunities that are sensitive to the Swan and Canning rivers and has worked with commercial operators to ensure businesses contribute to the community benefit and long term community use and enjoyment of the river without adversely affecting the ecological health and amenity of the river system.

The range of activities recently approved or operating on the rivers includes:

- Self-drive boat hire
- Floating event venue
- Charter vessels
- Permanent over water food and beverage outlets
- Permanent food and beverage outlets on foreshore
- Canoe/kayak hire and tours
- Ferries
- Kite and wind surfing lessons
- Stand up paddle board lessons and hire
- Bridge climbs/walks
- Jet boat operations
- Gondola taxi/tours

Commercial operators

DBCA is responsible for approving the operation of commercial activities within the Riverpark. DBCA balances the need to preserve, protect and manage the River as a public space on behalf of the community whilst supporting suitable commercial operations that contribute to the use and enjoyment of the river and enrich visitor experiences.

The variety and number of proposed commercial operations within the Riverpark continues to grow. From November 2015 to December 2020, 224 tourism operator licences were approved on the Swan and Canning rivers. An additional 107 commercial operators were approved to use the foreshore, primarily for pop-up food and beverage outlets.

DBCA granted a five year licence to Swan River Seaplanes to conduct commercial seaplane operations on Perth Water. This followed conclusion of the seaplane trial, an assessment of the community's views on the use of Perth Water for commercial seaplanes and a subsequent Expressions of Interest process. The operator is required to adhere to strict safety, environmental and amenity conditions.

DBCA has also been working with Tourism Western Australia within its case management framework and provided advice into the Matagarup bridge climb, zipline and access pod proposal.

Happy visitors at the new Matagarup bridge climb experience on Matagarup Bridge. Photo: courtesy Matagarup Zip + Climb

19. Engage effectively in the statutory decision making process

Action	Status	WAPC	DBCA	Local Govt	DevelopmentWA
19.1 Provide clear guidance consistent with SPP 2.10 to developers of land adjacent to the foreshore **(P)**		●	●		
19.2 Apply water sensitive urban design principles and other existing DBCA/Swan River Trust policies and guidelines		●		●	●
19.3 Continue to collaborate on the development of precinct and locality plans to support riverside development			●		

Providing guidance

DBCA and WAPC/DPLH continue to apply policies, such as State Planning Policy 2.10, and relevant planning instruments, such as structure plans, to their assessment of development applications and subdivisions in and adjoining the Swan Canning Development Control Area. These policies ensure consistent, critical advice and assessment is provided to proponents.

From November 2015 to December 2020, DBCA officers assessed and provided advice on 1105 development applications that were in, next to, or affecting the Swan and Canning rivers applying State and DBCA policy objectives. During 2015-2020 the Trust considered and provided advice to the Director General DBCA on 65 development applications in accordance with Part 5 of Section 84 of the SCRM Act.

DBCA provided advice on 209 subdivision applications, 46 proposals to the Metropolitan Development Authority, 10 proposals associated with Metronet, 60 proposed structure plans and five proposals that were considered by the State Development Assessment Unit established as part of the State's economic recovery from COVID-19. Additional advice was provided by DBCA on other projects including amendments to local and regional planning schemes, proposed structure plans and proposed amendments to State Planning Policies.

DBCA also assisted in consideration of review and advice on significant development projects in cooperation with the Office of the Government Architect and the referral of development projects to the State Design Review Panel.

DBCA provided ongoing advice on river protection and foreshore enhancement matters for major projects of State significance on and around the Swan and Canning rivers, including the Matagarup Pedestrian Bridge, METRONET, and DevelopmentWA projects at East Perth, Elizabeth Quay, Midland and Armadale (including Wungong).

Advice was also provided on major redevelopments at the Belmont Racecourse precinct and within the Canning Bridge Activity Centre. DBCA provided comments on the Local Government Guidelines for Subdivisional Development (DPLH and the Institute of Public Works Engineering Australasia) that are undergoing a review.

DBCA continued to provide advice on the design development and construction phases of five major bridge crossing on the Swan and Helena Rivers to ensure the rivers are protected.

Main Roads WA is undertaking the construction of the projects including the duplication of the Redcliffe Bridge between Ascot and Bayswater as part of the Tonkin Gap project, Fremantle Traffic Bridge replacement and construction of a new railway bridge in Fremantle, Causeway pedestrian and cyclist bridge (connecting Victoria Park's foreshore with Heirisson Island and the Peth CBD), Lloyd St Bridge in Hazelmere/Midland and the Roe Highway Bridge duplication in Helena Valley/Bellevue.

DBCA's statutory assessments team worked closely with MRWA and the respective bridge project Alliances to ensure the best possible design, public access, heritage and environmental management outcomes.

Apply water sensitive urban design and other policies

Water sensitive urban design (WSUD) is an approach for minimising the impact of urbanisation on the natural water cycle and supports integrated water cycle management. For the rivers, WSUD is a critical element in urban planning to maintain and enhance water quality, manage groundwater and surface water interactions and achieve enhanced environmental and community amenity outcomes in urban developments.

DBCA provided assessment support and advice on WSUD application on development applications referred from local governments in 2018-19. WAPC and DBCA also support the application of WSUD through the framework and principles contained in Better Urban Water Management (WAPC, 2008).

DBCA continued to resource and support the New WAter Ways program and the CRCWSC, and influence and advocate for the implementation of a water sensitive Perth through membership of the Water Sensitive Transition Network (WSTN). The Vision and Transition Strategy for a Water Sensitive Greater Perth was released by CRCWCS and WSTN and the associated implementation plan was completed by WSTN.

DBCA attended and provided support and information for numerous Water Sensitive Cities index benchmarking and visioning workshops for local governments. These workshops identify the current status of a local government area on its journey to a water sensitive city and identify areas to develop actions to transition to water sensitive cities.

DevelopmentWA is a supporter of WSUD approaches and has worked to incorporate environmental integrity as part of its redevelopment objectives, as well as incorporating WSUD and other sustainability aspects into redevelopment scheme principles, development policies and design guidelines.

Proposals are assessed for their compliance with these requirements to achieve improved environmental, sustainability and community outcomes. Where possible the WAPC endeavours to address legacy drainage infrastructure that is the source of nutrients entering the river system.

Collaborate on locality plans

Several locality plans and master plans are being developed throughout the Riverpark. Locality plans were developed for Perth Water (Buneenboro) and Belmont. Most recently, the *Perth Water Buneenboro Locality Plan* (PWBLP) was developed in collaboration with seven other State agencies and local governments and was completed in 2020 before being released in 2021.

The PWBLP is an initiative of the Perth Water Vision Group which comprises eight government agencies, each with a strong interface and active role in Perth Water's management. The Locality Plan establishes a vision for Perth Water Buneenboro and provides development policy, direction and actions to achieve the vision.

The Locality Plan focuses on respecting the cultural and environmental value of Perth Water, and addresses key development considerations such as tourism and recreation opportunities, commercial use and transport improvements around and across the river.

The plan will guide future improvement and development of Perth Water, its foreshores and abutting private development interface. The Belmont Foreshore Precinct Plan was also completed in 2018.

The Riverpark's yacht clubs are constantly evolving.
Photo: Geoffrey Byfield

20. Continually improve the statutory approval process

Action	Status	DBCA	DPLH/Aboriginal Affairs	Local Govt	DevelopmentWA
20.1 Review regulations and legislation to improve efficiency of the statutory assessment process **(P)**		●			
20.2 Support implementation of Aboriginal Heritage Protocol to obtain A*boriginal Heritage Act 1972* approvals for conservation works in the Riverpark		●	●		
20.3 Monitor approvals and enforce compliance with development		●		●	●

Legislation and policy

A key objective of the *Swan and Canning Rivers Management Act 2006* is to provide for the management of activities that affect the ecological and community benefits and amenity of the Riverpark.

DBCA worked with DPLH to review State Planning Policy 2.10: Swan-Canning River System and State Planning Policy 2.9: Water Resources and associated guidelines to ensure that activities, land use and development maintain and enhance the health, amenity and landscape values of the rivers, including recreational and scenic values.

To support the State Planning Policy review, DBCA began preparing a locality policy that will have key principles to direct and inform development, supported by a series of intended outcomes for each locality that are to be demonstrated as part of any proposal within or affecting the Swan Canning Development Control Area.

DBCA updated its guidelines 'Scientific Studies: Applying Regulation 16C' and 'Variation or Extension of Approval: Applying Section 84' to increase efficiencies and provide further clarity to proponents. DBCA provided comments on the Draft Precinct Design State Planning Policy and Guidelines (WAPC and DPLH) to improve incorporation of water sensitive urban design approaches and to improve protection of the Swan Canning river systems.

Elizabeth Quay bridge.
Photo: Dennis Wat

Implementation of Aboriginal Heritage approvals

DBCA has not initiated any projects requiring heritage approval and continues to advise partner organisations when projects should seek approval. DBCA is resourcing and supporting, through membership on the project steering committee, a UWA/clean air and urban landscapes hub project on *Reconstructing an understanding of Noongar knowledge for the Swan Canning catchment – implications for land-use and water planning in Perth.* DBCA is committed to recognising and preserving Aboriginal heritage in all areas of the State.

Compliance

DBCA continues to monitor works around the Riverpark and aims to assist other approvals authorities with advice on compliance with their conditions. There is an increasing trend to obtain detailed information through conditions of development approval, for example dewatering management plans.

DBCA continues to work closely with other approval authorities to ensure that the objectives of State and DBCA policies are being achieved. DevelopmentWA has continued to work with developers on major projects including Elizabeth Quay, East Perth Power Station, Waterbank, Midland and Wungong Urban Water Project to achieve agreed WSUD and environmentally sustainable outcomes. Approved developments at Elizabeth Quay must demonstrate Australian Best Practice 5 Star Green Star design and dewatering management plans.

City drone vista.
Photo Tom Proudfoot

21. Identify and attract new sources of investment to achieve greater management outcomes

Action	Status	DBCA
21.1 Develop mechanisms for attracting private sector financial support for conservation and community projects through corporate partnering		●
21.2 Investigate opportunities to diversify and increase investment in the Riverpark		●

Attracting private sector support and new investment

DBCA coordinates grant applications and promotes key river management and restoration projects to Federal government, State government, local government, private enterprise, philanthropists and foundations to help secure external income streams to support Riverpark objectives.

DBCA is actively supporting the WA Parks Foundation that is working to secure private and corporate funding to implement major environmental projects within the Riverpark. DBCA was successful in obtaining grant funding from Woodside to develop one interpretation node for the Riverpark Trails project.

The Trust, DBCA and the Burswood Park Board have enjoyed a long term partnership with Perth NRM and Alcoa for the Swan Alcoa Landcare Program. Since the partnership began in 1998, with funding support from the Burswood Park Board, Crown Perth and the Australian Government, the Trust and DBCA have invested more than $4.25 million into the catchment restoration program.

DBCA has worked closely with Perth NRM and Alcoa to secure ongoing commitment and funding for this iconic and critical community program that has leveraged a further $8 million of matched funding for on-ground catchment restoration projects since its inception.

In December 2019 DBCA successfully attracted $22,000 in funding support from DPIRD/Recfishwest to expand the *Reel It In* Fishing Line Bin project throughout the Riverpark.

River reserve leases

The SCRM Act makes provision for the Minister for Environment or CEO of DBCA to grant a lease of land that is part of the River reserve. During 2015-2020 there were 35 leases in place within the River reserve. These leases are currently managed by DoT which is responsible for the *Marine and Harbours Act 1981*, as an agent of DBCA. These River reserve leases are mainly with yacht clubs, marinas, restaurants, hotels and for jetties.

DBCA issues leases for development activities where permanent or semi-permanent structures are placed on or in the River reserve. Examples of developments requiring River reserve leases include jetties, marinas, over-water restaurants, and boat sheds. DBCA actively works with lease holders on environmental management of their facilities including the use of environmental management systems to ensure that nutrients, sediments, contaminants and rubbish are prevented from entering the river system.

The revenue derived from these leases is credited to DoT and contributes to the maintenance, replacement and management of the public jetties in the Swan and Canning rivers. DBCA as the landlord and lessor has active oversight, monitoring, commercial input and other engagement with the lessees on a continual basis to ensure appropriate management of the lease conditions. This includes environmental management systems to ensure pollutants at lease sites, such as yacht clubs, are dealt with adequately and environmental mitigation measures are put in place.

Pelicans on the Swan River.
Photo: Matt Kleczkowski.

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

SWAN CANNING RIVERPARK

SWAN RIVER TRUST

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