LAKE TOWERRINNING

Management Plan 2025

Shire of West Arthur

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Acknowledgement of Country

The Shire of West Arthur respectfully acknowledges that the land upon which we work and live, is the traditional land of the Wilman Noongar people. We recognise their cultural heritage, beliefs and continuing relationship with the land. We honour Elders past, present and emerging and we support the principles of a reconciled Australia for all its people.

Photo credits throughout the report: Caroline Telfer, Astrid Volzke and Kerryn Chia

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1.0 INTRODUCTION

1.1 Location

Lake Towerrinning is located 32km south of Darkan Figure 1 within the Shire of West Arthur in the Towerrinning Nature Reserve (24917). It is approximately 180ha of permanent brackish water (Cale et al., 2004) which is vested in the Conservation Commission of Western Australia and is managed by the Department of Biodiversity, Conservation and Attractions (DBCA). However, because of the significance of the Lake as a recreational facility, the Shire of West Arthur has for many years leased part of the reserve and used the water as a gazetted ski area. Public facilities have been provided by the Shire on land owned by the Shire adjacent to the Lake, for use by the community and tourists who visit this area.

Figure 1: Location of Lake Towerrinning

The Lake Towerrinning catchment covers an area of approximately 15,700ha (Raper and van Wyk, 2009) which includes the Capercup Nature Reserve. The Lake sits at the bottom of the catchment and discharges into the Arthur River (Figure 2). Water coming into the Lake comes in through an inlet swamp on the north western side and is released to the Arthur River through an Outlet swamp located to the south of the main water body of the Lake.

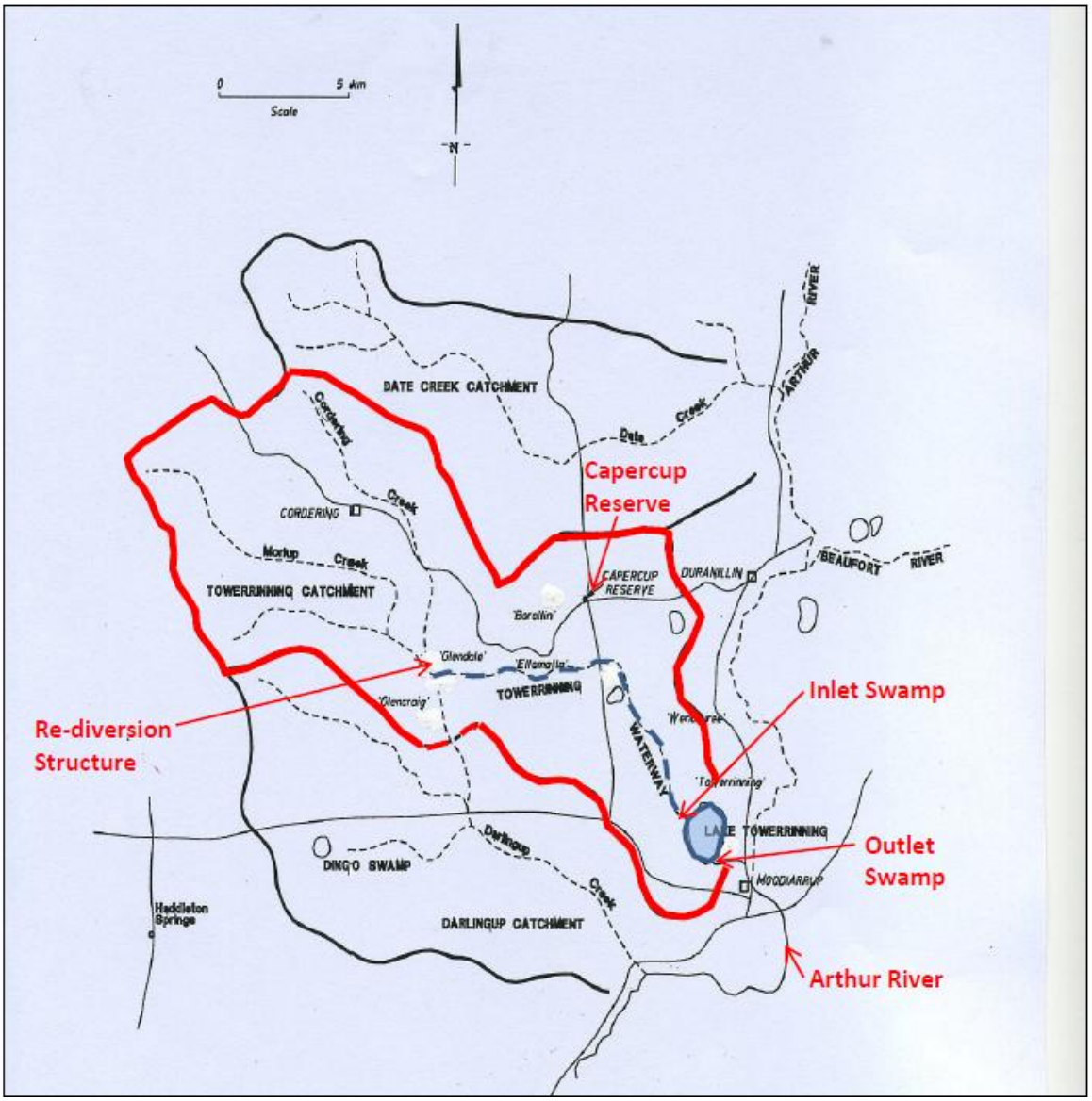


Figure 2: Lake Towerrinning catchment (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012b).

1.2 History of Lake Management

Lake Towerrinning was originally discovered by Captain Bannister on 5th January 1832 and he described it as a "rushy lagoon" (Lake Towerrinning Landcare Group, 1994). Extensive land clearing for agriculture in the 1950s and 60s resulted in an increase in salinity of the lake until the lake was receiving around 6500 tonnes of salt in 1993. In 1986 the lake was described as polluted by phosphorus and organic nitrogen, dirty and experiencing severe blue green algae blooms (Lake Towerrinning Landcare Group, 1994). Today around 90% of the Lake catchment is cleared and an obvious decline in the water quality was observed from 1973 onwards (Froend and McComb, 1991). From 1979-1981 lake levels were very

low with the Lake completely drying out on occasions. Flooding caused by cyclonic activity during the summer months of 1982 resulted in the lake refilling and the lake has not dried out again since that time.

1.2.1 Local Management

Lake Towerrinning Catchment Landcare Group formed in 1989 to improve water quality in Lake Towerrinning by diverting fresher water into the Lake from the catchment area (George et al., 1995). Water originally flowed through the Cordering and Morlup creeks into Lake Towerrinning, however in the 1950s the erosion of a firebreak resulted in water from these creeks being diverted into Darlingup Creek and away from the Lake (Lake Towerrinning Landcare Group, 1994).

The Landcare group, together with the Department of Agriculture (now Department of Primary Industries and Regional Development) designed and constructed the Lake re-diversion at the confluence of the Cordering and Morlup Creeks in 1993 to re-divert water to the Lake. The re-diversion structure allows saltier water to bypass the lake and fresher water to be redirected through a 12km waterway into the Lake. The incorporation of gates at the outlet of the Lake controls lake levels and enables flushing of the Lake to be controlled manually. Since that time water quality has remained below 2500mS/m based on van Wyk and Raper 2008 (Raper and van Wyk, 2009). Even in 2015 (a well below average rainfall year), Lake salinity was still below 2500mS/m at 2300mS/m in December 2015.

Prior to the lease being renewed in 1999, the Shire of West Arthur, at the (formerly) Department of Conservation and Land Management's (CALM) request, organised a public meeting in August 1998 at Moodiarrup. The meeting discussed issues concerning the Lake and formed a management plan for the future direction of Lake Towerrinning. The need for management had arisen because of the pressures that were being put on the Lake by skiers, sailboats, commercial businesses and other recreational users of the Lake. The management plan would have a dual purpose in that it would ensure that CALM's (now DBCA's) interest of conservation in this reserve would be secured and it would give the Shire Council some direction in terms of what facilities and measures are required to satisfy all interested parties.

A committee was assembled to develop the Management Plan based on the issues raised at the public meeting and the first management plan was developed. This management plan has been reviewed a number of times over the years and this current review was undertaken in July 2025 after consultation with relevant stakeholders.

It is expected that after each update, and following public approval of the Plan, the Council will adopt the Plan as the official Management Plan for Lake Towerrinning. By doing this Council will have satisfied DBCA's requirements and can implement any directions that are listed in the Plan.

1.2.2 Living Lakes Project

In addition to the management plan, the Department of Regional Development (DRD) identified Lake Towerrinning as wetland worthy of inclusion in the Living Lakes Project in 2011. The aim of the Living Lakes Project was to identify three existing lake systems in the Wheatbelt that would be suitable for investing government funds for enhancement in order to create permanent and accessible water bodies (JDA Consultant Hydrologists, 2011). This project resulted in detailed environmental surveys being undertaken including flora, fauna (Bamford Consulting, 2012), Aboriginal heritage, soils and landforms.

Following the surveys a feasibility study was undertaken to identify engineering Enhancement Options that would "future proof" the Lake (JDA Consultant Hydrologists, 2012). This report contains comprehensive details on water quality within Lake Towerrinning. The engineering enhancement options outlined in this report were:

- Increase the capacity of the re-diversion structure through the addition of an extra culvert which would result in more rapid filling of the Lake during early winter, greater flushing of salt from the Lake and a longer period of high Lake levels (ET1).
- A drain from Capercup Nature Reserve to the Lake in order to manage salinity within the reserve (ET2).
- Dredging of the Lake to create an island (ET3)
- Groundwater replenishment to increase water flow into the Lake (ET4)
- Rehabilitation of the re-diversion structure to reshape the 12km drain and the possible upgrade of the culverts under the roads that cross the drain (ET5).
- Refine outlet from outlet swamp to the Arthur River which involved and excavated drain to connect the outlet swamp more efficiently to the Arthur River (ET6).
- Modified outlet structure from the Lake to the outlet swamp to allow higher Lake water levels to be maintained (ET7).

Of these options the rehabilitation of the re-diversion structure through reshaping of the 12km of drains and increasing water flow beneath the roads (ET5) was considered to be the option that met the project objectives of increasing the Lake hydro-period and improving

water quality. The estimated cost of construction for this option was $137,000[1] and ongoing maintenance was $13,770.

The Capercup Nature reserve drain (ET2), whilst not meeting the Living Lakes project objectives was noted as an opportunity to prevent further degradation of Capercup Nature Reserve. It was estimated that this would cost $24,300[1] to construct and annual maintenance would be in the order of $2,430.

Neither option (ET5 or ET2) was pursued due to lack of funding from the State Government.

Finally, a land use concept plan was developed by DRD for each of the lakes included in the Living Lakes Project including Lake Towerrinning (EPCAD Pty Ltd, 2016) with the aim of enhancing visitor experiences. Opportunities for enhancement identified in this report included:

- improved signage at the entrance of the Lake;
- reconstruction of the boat ramp to enable improved public access to the Lake;
- improvements to connectivity (in terms of revegetation) between the carpark and Lakeside Camping;
- installation of viewing towers;
- installation of a walking trail;
- development of land based recreation (e.g. BMX and mountain biking track);
- promotion of the Moodiarrup Sporting Complex to Lake visitors; and
- development of corporate-retreat facilities or lifestyle villas.

At the time of the completion of the Living Lakes Project, there was no funding available for development of any of the concepts developed by DRD. Note that these options were developed by DRD and are not necessarily reflective of the opinions and ideas of the local community or the Shire of West Arthur.

1.2.3 Recent Upgrades

The Shire of West Arthur has recently invested funds from the Federal Local Roads and Community Infrastructure Program into upgrades to Lake infrastructure in 2021,2022 and 2023.

A major upgrade of the jetties was undertaken in 2021 as part of this funding program after assessment by a structural engineer resulted in them being closed to the public due to

[1] This estimate was made in 2012.

potential danger of collapse. The refurbishment involved the removal of the decking which was rebuilt on the existing piles.

The boat ramp reconstruction was undertaken in April 2022 to improve access when water levels are low and to prevent damage to vehicles and boats. It is anticipated that the newly installed cement extension to the boat ramp will resolve the issue of “blow out” occurring at the end of the ramp.

Additional funds have been used to upgrade the public facilities on the upper level of the lake. Installation of new shade structures to replace trees that were dying as a result of watering with salt water from the lake were installed in 2022. New furniture has also been installed including a wheelchair accessible table.

The playground has also been refurbished and is now more in keeping with its surrounds. It features nature based play items including a carved long neck tortoise and a recycled boat with a wake board for imaginative play based around the water skiing theme.

Dead trees in the picnic area have also been removed. Stump grinding will be required to complete the removal of these trees which were beginning to cause a hazard due to limbs dropping.

The construction of an all-abilities access boardwalk was completed in January 2023. The ramp now provides wheelchair users with access to the lake beach and BBQ areas. The ramp finishes at the first shade shelter along the beach, having begun at the boat ramp.

Additional improvements are anticipated in the second half of 2025, with funding being sought to transform the changeroom facilities into an interpretive centre and undercover picnic area.

1.3 Legislation and relevant documents

Management of Lake Towerrinning needs to be undertaken in accordance with various Federal and state legislation including the following:

- *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) (Commonwealth)
- *Native Title Act* 1993 (Commonwealth)
- *Aboriginal Cultural Heritage Act 2021* (State)
- *Bushfires Act* 1954 (State)
- *Biosecurity and Agriculture Management Act* 2007 (State)
- *Conservation and Land Management Act* 1984 (State)
- *Biodiversity Conservation Act 2016*
- *Emergency Management Act* 2005 (State)
- *Fire and Emergency Services Act* 1998 (State)
- *Heritage Act 2008* (State)
- *Land Administration Act* 1997 (State)
- *Planning and Development (Local Planning Scheme) Regulations* 2015.

In addition, other documents, guidelines and policies relevant to management of Lake Towerrinning include:

- Australia and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) Guidelines for Recreation Water Quality: Primary Contact
- Wetlands Conservation Policy of Western Australia 1997
- Wetlands Policy of the Commonwealth Government of Australia 1997
- National Health and Medical Research Council (NHMRC) 2008, Guidelines for Managing Risks in Recreational Water
- Department of Biodiversity, Conservation and Attraction lease document signed by the Shire of West Arthur in 2009
- Bushfire Risk Management Planning – Guidelines for preparing a Bushfire Risk Management Plan (2015)

- Shire of West Arthur Bush Fire Risk Management Plan 2017
- Shire of West Arthur Local Emergency Management Arrangement (EMA) 2016
- Shire of West Arthur Community Strategic Plan 2021-2031

2.0 PHYSICAL ENVIRONMENT

2.1 Climate

Lake Towerrinning is located in an area with a Mediterranean climate (hot dry summers and wet winters). Rainfall at Duranillin (the closest rainfall station to the Lake) has decreased in recent years. An average of 561mm was recorded pre-1975 and this has reduced by 14% to 484mm post 1975 (Raper and van Wyk, 2009). More notably the winter rainfall (May-October) has fallen by 18%.

Climate change is expected to result in increases to average temperatures in all seasons and less rainfall in winter and spring months in the South west of Western Australia (https://www.agric.wa.gov.au/climate-change/climate-projections-western-australia accessed November 2019) which may impact on water inflow into Lake Towerrinning.

2.2 Soils and Landscape

The Lake catchment landscape is characterised by gently undulating rises, low hills, narrow incised valleys and broad flats. Soils are largely duplex sandy gravels within the Darkan System (gently undulating to rolling rises and low hills, and narrow alluvial plains of the Blackwood, Arthur and Hillman Rivers) (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012a).

There has been some work done to identify issues associated with increasing salinity in the catchment and the Lake (Raper and van Wyk, 2009). In 2009, salinity was estimated to cover 12% of the Lake Towerrinning catchment area and was estimated to rise to 20-25% by 2028 if no further action was taken. At the time local land holders agreed to contain salinity to 15% of the catchment by 2028.

2.3 Hydrology

Lake depth varies with seasonal rainfall and as part of the Living Lakes Project a number of measurements were made and average depth was recorded as 2.55m in February 2012. The water temperature in February averaged 24.9°C and was fully mixed throughout the water column.

Water quality in Lake Towerrinning has been highly variable over the years. Prior to the construction of the re-diversion structure, salinity levels ranged from <2000-10,000 mS/m. Since the construction of the re-diversion salinity levels within the lake have stabilised and range from <1,000-2,500 mS/m even in low rainfall years such as 2015 (Figure 3, data collected by Lakeside Camping). Water salinity in the outlet swamps is higher with average salinity in the outlet swamp approaching sea water (JDA Consultant Hydrologists, 2012).

Detailed water quality analysis of the Lake was undertaken as part of the Living Lakes Project (JDA Consultant Hydrologists, 2012), and only Selenium (Se) was identified as being elevated above guidelines and it was recommended that sampling be undertaken during winter months to determine levels of Se.

Algal levels were also identified as exceeding guidelines however no toxigenic cyanobacteria species were identified.

The owner of the Caravan Park has indicated in the past that the smell emanating from the decomposition of sediment and restriction of water flow through the swamps is an issue. An investigation was undertaken by the then Landcare Officer at the Shire of West Arthur in 2008 (Shire of West Arthur, 2008a). There has been no resolution to this issue to date.

3.0 NATURAL ENVIRONMENT

3.1 Vegetation and Flora

Lake Towerrinning is located within the Beaufort Vegetation System which is dominated by marri (*Corymbia calophylla*) and wandoo (*Eucalyptus wandoo*) on undulating country and swamp yate (*E. occidentalis*) on clay valley floors (Beard, 1981). Large areas of land around Lake Towerrinning have been cleared in the past for agricultural purposes. The vegetation remaining around the Lake was mapped as part of the Living Lakes Project and ten major vegetation formations were identified (Figure 4) (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012a).

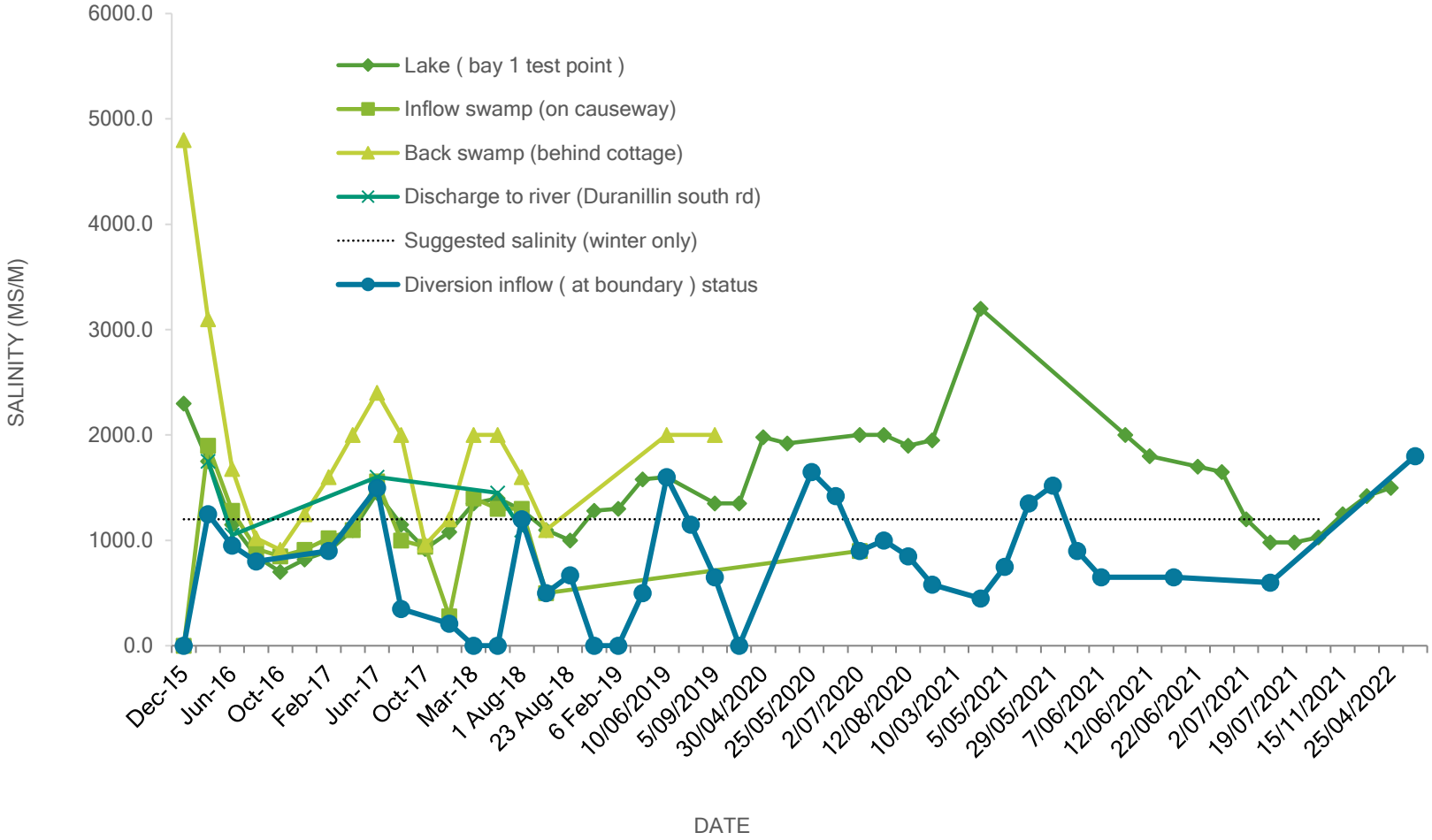


Figure 3: Salinity measures at Lake towerrinning from December 2015.

These vegetation associations consist of:

- woodlands around the main water body of the Lake of either flooded gums (*E. rudis*), rock sheoak (*Allocasuarina huegeliana*), mixed flooded gum/wandoo (*E. wandoo*), acorn banksia (*B. prionotes*), or freshwater paper bark (*Melaleuca rhaphiophylla*) with two small pockets of marri (*C. calophylla*) woodland.
- woodlands around the back swamps of saltwater paperbark (*M. cuticularis*), saltwater sheoak (*Casuarina obesa*), freshwater paperbark (*M. rhaphiophylla*), acron banksia (*B. prionotes*), or flood gum (*E. rudis*); and
- freshwater paper bark (*M. rhaphiophylla*), rock sheoak (*A. huegeliana*), samphires (*Tecticornia* spp.), flooded gum (*E. rudis*), wandoo (*E. wandoo*) around the rediversion drain entering the Lake.

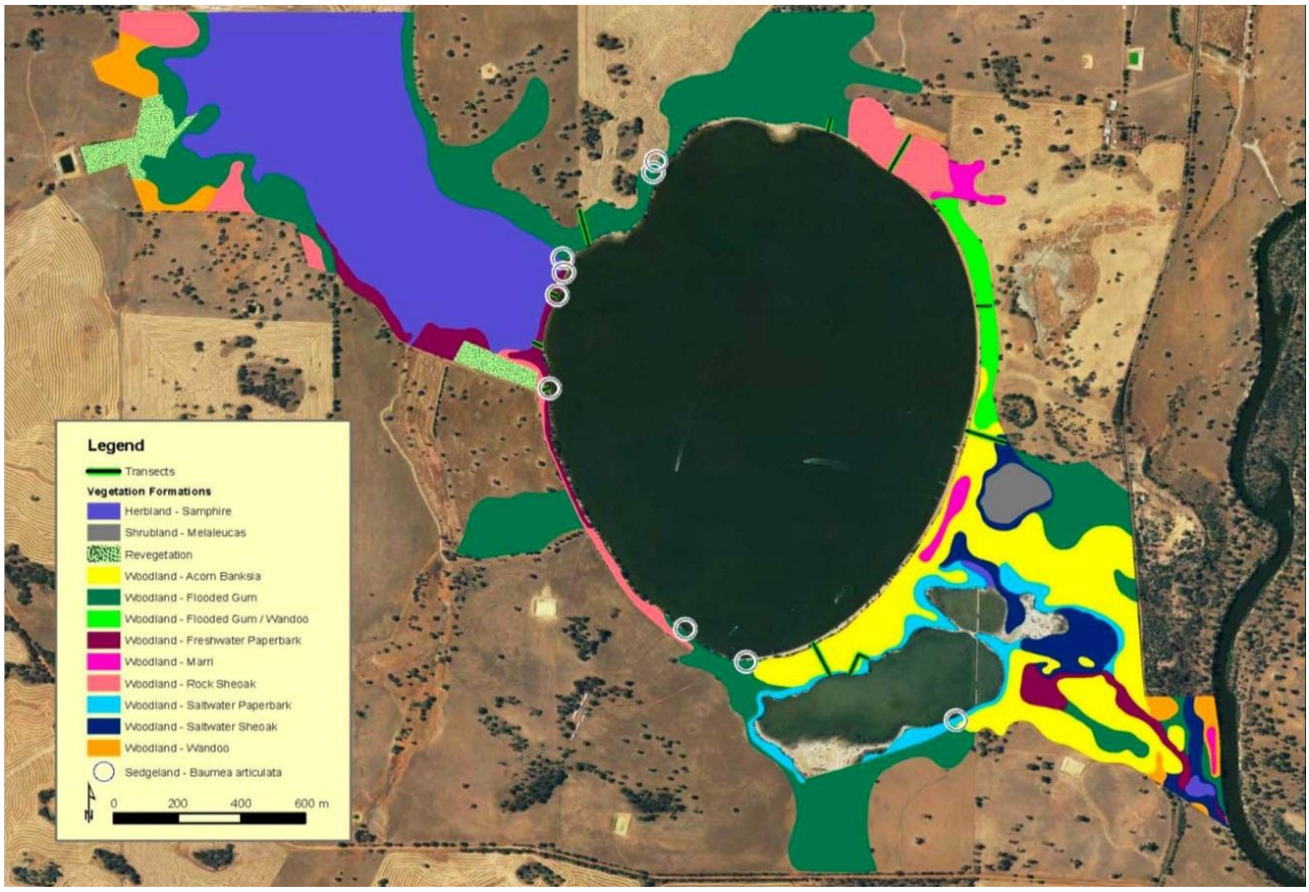


Figure 4: Vegetation associations around Lake Towerrinning (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012a)

None of the vegetation associations mapped around Lake Towerrinning are considered to be Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC). Some of these communities may however be susceptible to dieback, in particular the *Banksia* communities.

A total of 50 species was recorded in the immediate vicinity of Lake Towerrinning during the flora surveys undertaken for the Living Lakes Project (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012b) and these are listed in Appendix 1. There are no known Declared Rare Flora (DRF) Threatened or Priority species that occur around the Lake.

In 2017, the Shire of West Arthur applied for a Community Action Grant through the State Natural Resource Management Program to undertake some work on the dune system around the public area of the lake and to install some pathways to ensure the lake vegetation is protected. The paths were constructed in 2018, fencing installed in the boat ramp car park area and over 900 seedlings planted on the dunes. Whilst survival of seedlings has not been high, those plants that have survived will increase vegetation cover on the dunes and the pathways will encourage people to stick to certain areas rather than making their own way through the dune systems.

3.2 Weeds

A number of introduced species were identified as occurring at Lake Towerrinning (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012b). *Asparagus asparagoides* (bridal creeper) was identified as occurring in the native vegetation adjacent to the fence line near private land at the northern end of the boat ramp car park (pers. obs.). It is also located near the rock steps at boat ramp and is prevalent in the ephemeral swamps on the north eastern side of the lake. Bridal creeper is listed as a Declared Pest in the *Biosecurity and Agriculture Management Act 2007* and is listed in the control category "C3 – Management" (i.e. organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism).

Wild turnip is also known to be present at Lake Towerrinning and is considered to be a weed of agricultural crops (Shire of West Arthur, pers. obs.).

Ruppia megacarp is a native submerged aquatic plant that occurs in Lake Towerrinning. On occasions it has become quite dense and become a problem for recreational users of the Lake. High levels of nutrients and lower water levels (increased light availability ensure perfect growing conditions for weeds. Such conditions were evident in 2015 when rainfall and runoff was particularly low.

Lupins were also observed on the banks – if left unchecked these can become a serious weed also.

3.3 Dieback

Phytophthora dieback refers to the introduced plant disease caused by *Phytophthora cinnamomi.* Phytophthora dieback spends its entire life in the soil and in plant tissue and causes root rot in susceptible plants, thereby limiting or stopping the uptake of water and nutrients. The pathogen

is able to survive within plant roots during the dry soil conditions commonly experienced during the summer months. *Banksia prinoites* (a species that occurs around Lake Towerrinning is highly susceptible to dieback. There have been no surveys undertaken to determine if dieback is present at Lake Towerrinning.

3.4 Fauna

A complete fauna survey has never been undertaken at Lake Towerrinning however a list of 252 species that could potentially occur at the Lake has been compiled by Bamford Consulting (specialist fauna consultants) as part of the Living Lakes Project. One fish species, 14 frog species, 43 reptile species, 171 bird species and 23 mammal species could potentially occur in or around Lake Towerrinning (Bamford Consulting, 2012). Of these species, a total of 14 are listed as significant (either Threatened or Priority Fauna) and are considered to be wetland dependant or reliant on fringing vegetation of wetlands (Appendix 2). All 14 of these species are considered to be resident or regular visitors to Lake Towerrinning.

Lake Towerrinning provides regionally significant habitat for birds by (Bamford Consulting, 2012):

- being part of an Important Bird Area (IBA) identified by Birdlife Australia because is supports more than 1% of the global population of the Blue billed Duck (*Oxyura australis)*;
- providing significant habitat for diving waterbirds in the form of extensive areas of deep water;
- supporting regionally significant numbers of waterfowl (in the top 15 of 1017 wetlands in the south western Australia)
- providing a breeding ground for 14 different bird species.

In August 2019, the Shire of West Arthur was approached by Recfish West regarding the potential for introducing a native fish species into the lake environment for the purposes of recreational fishing. After initial discussions Recfish West decided not to pursue this option.

4.0 SOCIAL ENVIRONMENT

4.1 Aboriginal Heritage

All of Lake Towerrinning including the inlet and outlet swamps is a registered Aboriginal Site (ID 964). This site is listed as a Ceremonial and Mythological site. The Lake was used as a meeting place, for camping, a hunting place and water source (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012b).

Department of Indigenous Affairs (now Department of Planning Lands and Heritage) advised that (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012a); *Lake Towerrinning is a place*

where traditional Aboriginal ceremony was practised and is associated with a sacred narrative. The site is described as 'winnaitch' (dangerous) due to events which occurred during the Dreaming at this place. It is also known as a place where corroborees used to be practised. As such it has previously been determined to be a place to which section 5(b) of the Aboriginal Heritage Act 1972 (AHA) applies. DIA is unaware of any Aboriginal heritage surveys which have been undertaken over the area of the Lake and there may be currently unrecorded Aboriginal heritage values which relate to the area of the Lake and its immediate surrounds.

Lake Towerrinning is located within the Gnaala Karla Booja Native Title claim area. As part of the Living Lakes Project, the consultants met with Gnaala Karla Booja Working Group and Named Applicants. The working group expressed a strong interest in including interpretative signage and for the cultural heritage of the Lake to be acknowledged (JDA Consultant Hydrologists, 2012).

There is evidence of a connection between the Aboriginal people and the Lake. There have been reports of finding camp sites, hunting grounds and burial sites. Last recorded evidence of aboriginal settlement was in 1938 where temporary camps were set up to hunt for local bush food (Shire of West Arthur, 2008b).

4.2 European heritage

The clearing of agriculture lands saw water tables rise resulting in an increase in surface area run-off. Low lying areas became increasingly inundated with water, forming an almost permanent freshwater Lake. Local residents came to increasingly enjoy the opportunity for recreation in the area. The decline in the lake health in the 1960s resulted in the death of many of the reeds and rushes on the Lake's edge. The locals proceeded to remove more of the reeds and rushes to construct a boat ramp in the area (Pers. comm. B. Smith nee Whitaker). This decline in Lake health resulted in the idea for a re-diversion Project which was finally implemented by the Lake Towerrinning Catchment Group (formed by local landholders with technical support from the then named Department of Agriculture and Water Authority) in 1993. The group's approach and positive impact was the subject of a State Landcare Award in 1993 and a National Landcare Award in 1994. The Lake is now used for by the local community and others for swimming, water skiing, picnicking, camping bird watching and community events, and other recreational pursuits.

The future of tourism at the lake is set to include Astrotoursim with the inclusion of Darkan and the Shire of West Arthur as part of the Astrotowns WA network (https://astrotourismwa.com.au/darkan/). Lake Towerrinning has been identified as an astrophotography hotspot and will be promoted through the Astrotoursim program.

4.3 Infrastructure

A privately owned and operated caravan park, located on the southern side of the Lake, commenced operation in 1992. Other facilities at the Lake are owned and maintained by the Shire of West Arthur and include:

- a picnic area with barbeques, shade shelters, picnic tables, a playground and public amenities (toilets, shower and change rooms) located in a terraced recreation area on the top eastern wall of the Lake,
- two wooden jetties built around 1964-65 by Civil Defence (Pers. comm. B. Smith) and refurbished in 2021,
- permanent shade structures erected on the beach area in 2009;
- sealed car parking area near BBQ area and gravel car park near boat ramp area;
- a boat ramp on the eastern side of the Lake;
- two pathways through the dunes at the boat ramp end of the jetty installed in 2018; and
- An all accessible board walk erected on the beach area in 2023.

In addition, the Shire of West purchased two gates that were installed at the outlet of the lake to replace the original board structure that was installed as part of the re-diversion project. The gates were purchased as part of the Community Action Grant and were installed by Lakeside camping in 2018. The gates allow the water levels to be maintain manually without the need for someone to enter the water.

DBCA have advised that any further developments should be submitted for its approval to ensure there are no negative impacts on the nature reserve or nature conservation values (Land Assessment Pty Ltd and Woodgis Environmental Consultants, 2012b).

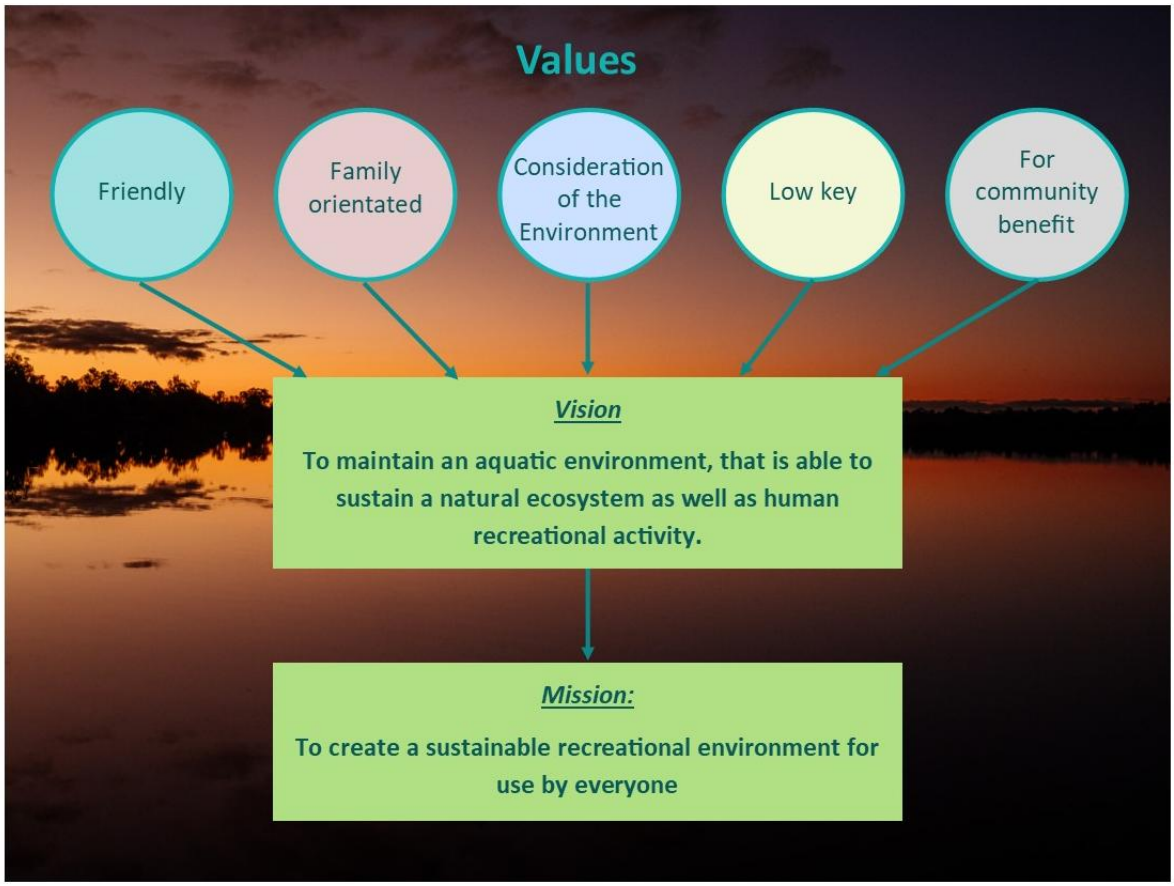
5.0 STRATEGIC MANAGEMENT PLAN

The development of a Management Plan has resulted in better management and decision making, identification of priorities, future planning and funding arrangements across a range of issues that have arisen at Lake Towerrinning over the past 15 years.

The Plan was originally developed by identifying the issues at Lake Towerrinning through an extensive consultation process involving Council, community organisations, government departments, and local public meetings.

The Plan is reviewed regularly with input from relevant stakeholders and following the review there will be the opportunity for community input into the proposed management strategy.

In order to develop management goals, objectives and strategies a clear vision is required to ensure that these goals, objectives and strategies are aiming to create the environment that is expected by the local community. The vision, mission and values of the original committee established to manage Lake Towerrinning are listed below.



The following definitions are provided to clarify the terms used in this plan.

Goal: Is the overall aim of that component of the plan

Objective: The outcomes that are to be achieved by the implementation of the plan

Strategies: Means/methods by which the objective can be achieved

How: Specific directives or tasks to be carried out to achieve the Objective

When: Timing for these tasks or directives to be undertaken

Who: The relevant person or authority required to undertake the tasks.

GOAL ONE: Conservation of the Lake Towerrinning environment

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
To conserve the natural vegetation and flora found within the Lake Towerrinning Nature Reserve.	Management of human movement through terraced areas on the eastern side of the Lake to prevent damage to natural vegetation.	• Maintain pathways from terraced BBQ area through the vegetation on the lake banks to the swim area. • Maintain the pathways from the boat parking area to local ski area.	Ongoing	Shire
	Continued education of the public on minimising disturbance to Lake vegetation.	• Maintain signage encouraging movement of foot traffic on pathways rather than through vegetation. • Install interpretative signage about the important flora and fauna found at the Lake in the proposed interpretive shelter.	Ongoing	Shire
	Prevent the introduction or spread of dieback through the native vegetation surrounding the Lake.	• Ensuring all machinery, equipment and footwear that will be entering areas of natural vegetation. around the Lake is clean (through washing down and removal of all mud and soil. • Avoiding soil movement during wet periods. • Use of certified dieback free construction materials (such as soil, mulch or plant material).	Ongoing	Shire
	Re-vegetation of Lake banks to stabilise banks, reduce weed invasions and ensure an aesthetically pleasing environment.	• Implement weed control on the banks of the Lake. • Revegetate areas of the lake banks with low growing species, once all landscaping is complete.	Ongoing	Shire

Goal one cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
To conserve the natural vegetation and flora found within the Lake Towerrinning Nature Reserve (cont'd)	Prevent the introduction of weeds and minimise the spread of current weeds.	• Remove and spray bridal creeper in on the terraces, near boat ramp and on eastern banks of the Shire managed area. • Monitor Lake banks for weed invasions and control weeds as soon as noticed. • Ensure that all construction materials such as mulch or plant material is weed free. • Maintain the vegetation on the bank areas with natural vegetation to minimise weed invasion.	• Immediate • Ongoing	Shire/ Landcare officer
	Prevent the continued death of mature trees on the lake banks and in the BBQ area	• Remove dead trees from terraced areas and grind out old stumps. • Continue monitoring trees around the terraced area of the lake and continue investigating potential causes of death. • Plant new trees in the area if required to ensure a succession plan for trees that are dying.	Ongoing	Shire
	Maintain a boat prohibited area (conservation area) to protect wildlife and some shoreline habitats.	• Maintain buoys that define the ski area within the Lake. • Maintain signage at the boat ramp and at the camping ground identifying the ski area and rules and regulations associated with boating and skiing. • Ensure all visitors to the camping area are aware that skiing is restricted in the area for conservation of fauna.	Ongoing	• DoT • DoT • Lakeside camping

Goal one cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO

To conserve fauna and fauna habitats found within the Lake Towerrinning Nature Reserve	Management of the Lake environment to ensure that habitats important for threatened fauna species that are resident or regularly present at Lake Towerrinning are maintained. The important habitat characteristics are salinity, shallows, open water, bare shoreline and fresh water sedges and seeps.	• Monitor salinity within the Lake to ensure that fringing vegetation is protected. • Monitor and maintain water levels (through the re-diversion structure) to ensure shallows and deep open water remains available for water birds. • Open the gates at the Lake outlet to ensure that Lake water level and quality is maintained through regular flushing. • In the event of fauna death, the resultant animal will be disposed of appropriately (in accordance with Lease Schedule Item 8, Section 4.2).	• Quarterly • Regularly in summer particularly in low rainfall years • When levels reach the base level of the original Lake outlet (generally following winter rainfall) • As required	• Lakeside camping • Shire • Lakeside camping in consultation with other land owners. • Shire

Goal one cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO

To ensure that the Lake environment is protected from fire.	Prevent visitors from lighting fires	• Maintain signage advising that there are no fires allowed in the public area of Lake Towerrinning. • Regular slashing of grasses and work on a grass eradication program on the public reserve through control burning procedures. • Regular assessment of fire fuel loads within the reserve, and implementation of appropriate control measures in accordance with relevant management policies and guidelines. • Maintain records of fire locations and intensity to assist with tracking changes within the reserve over time. • Notify DBCA in the event of a fire as per lease requirements. • Include procedures to be carried out in the event of a dangerous or uncontrolled fire and/or significant environmental impacts as per lease requirements in the Shire Bush Fire Management Plan.	• Ongoing • Ongoing • Ongoing • Ongoing • As required • Annually	• Shire • Shire • Community Emergency Services Manager • Shire • Shire • Shire

GOAL TWO: Maintain a high quality of facilities at Lake Towerrinning

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
To maintain the present infrastructure at a level that is considered to be of a high standard.	Maintain jetties which are considered to be an iconic structure within the Shire.	• Inspect jetties at the commencement of the summer season for any immediate repairs.	• At commencement of the summer season each year	Shire
	Monitor and maintain boat ramp to ensure it remains safe for use.	• High pressure clean algae off the boat ramp to reduce the risks associated with slips and trips for users. Make this a high priority during low rainfall years. • Monitor the new installation of the boat ramp extension for effectiveness.	• On request or on an as required basis particularly during low rainfall years • Throughout the summer	Shire
	Maintain ablution facilities (including pressure pump), BBQ's, car park, playground, shade structures, all-accessible board walk, signage and new interpretative centre (old change rooms).	• Inspect and maintain facilities on a regular basis and in particular before major events held at the Lake such as the Australia Day breakfast. • Weekly refuse removal with more service in peak season (October – March). • Repair any broken playground equipment. • Consolidate and update the signage in the picnic area and interpretative centre including QR codes and a welcome sign. • Install a rail along the edge of the retaining wall to prevent falls off the ledge. • Repair pathways and curbing in the public car park area. • Install garden beds to reduce lawn area and improve aesthetics.	• Ongoing but more frequently during summer months • As soon as noticed • Within the next 2-3 years.	Shire

Goal two cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
Maintain infrastructure cont'd	Management of lawn area to ensure adequate grass coverage	• Continue watering and maintenance programme as currently implement. • Remove tree stumps. • Consider planting salt tolerant plant species in garden beds along the terraced area to minimise lawn requirements.	• Ongoing • As soon as possible • When funding is available	Shire
	Provide an attractive entrance to the Lake	• Ensure trees are trimmed and weeds slashed at the entrance of the Lake on the Darkan South Road. • Investigate the potential for an entrance statement for the lake to make the entrance more visible.	• At the commencement of the summer season. • Next 2-3 years	Shire
	Provide report to DBCA regarding state of current facilities.	Prepare a report outlining the following points to comply with Lease conditions: • State and repair of any man-made structures at or within the lease area (including boat ramp and jetties). • Maintenance and repairs undertaken by the Shire. • The condition of the leased premises in respect to known hazards and safety situations. • Water quality and suitability for human contact and aquatic activity.	Annually as required by lease arrangements (i.e. seven days after the end of the lease year that is by the 7th of October).	Shire

Goal two cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
Continue to develop facilities at the Lake for the use of the general public.	Provide access to all areas of the lake for everyone within the community (including those with limited abilities).	• Investigate an all-access pathway from the top terrace to both the swimming and ski area. • Investigate the possibility of upgrading current all-access pathways from the ablutions to the top terrace and also the possibility of all access at the playground end of the terrace.	When funding is available	Shire
	Provide shade structures on the Shoreline for users of the Lake.	Investigate funding opportunities for construction of additional shade shelters and BBQ facilities at the boat ramp. Suggestions have included a retaining wall and elevated platform for proposed BBQ facilities.	When funding is available	Shire

GOAL THREE: Maintain watercraft regulation and safety on the waters of Lake Towerrinning

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
To ensure boat and user safety at Lake Towerrinning through the regulation of boat movements on the Lake.	Implement boat usage plan: • Ski in anticlockwise direction only. • Skiing permitted between sunrise and sunset only. • Skiing prohibited within 30m of shoreline except within designated take-off and landing areas. • Take-off and landing is restricted to the two designated areas only. • Motorised Personal Water Craft (i.e. jet skis) are not permitted unless towing a skier. • In case of an emergency or incident dial 000 or contact the Shire on 9736 2222.	• Include Boat usage plan and map on Shire Website. • Provide information on the Shire website that includes the Boat usage plan and other important information for visitors. Include a QR code on any signage at the Lake that links to the Shire website and the Boat usage plan. • Distribute boat usage plan to campers and other users of Lake Towerrinning. • Direct complaints to the DoT using Marine Safety Form on the Departments website: http://www.transport.wa.gov.au/mediaFiles/marine/MAC_F_MarineSafetyComplaint.pdf	• Ongoing • As soon as possible	Shire/Lakeside camping

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
Boat and user safety cont'd	Implement a safety education program to ensure all users are aware of safety issues at Lake Towerrinning.	• Update information and map on Shire website including the Boat Usage Plan as outlined above. • Remind local boat users via Shire Facebook page at the beginning of the summer season of boating safety. • Information to be distributed to all campers regarding boat safety including boat usage plan.	Ongoing but ensuring that the information is prominently available during summer months	Shire/ Lakeside camping
	Ban on water craft when water levels are extremely low as per DoT recommendations of 1.6m depth.	• Measure water levels particularly during the summer months and during seasons of low rainfall. • Use signage at boat ramp and on the beach to close the Lake if required. • Communicate issues including closure of the Lake via the Shire website and Facebook page ensuring that public comments cannot be made on any posts if required.	When required	DoT/Shire

GOAL FOUR: Maintain water quality and levels of Lake Towerrinning

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
Maintain the water levels to ensure that fauna habitats are protected, to prevent aquatic weed build up within the water body of the Lake and ensure that the Lake can continue to be used for recreational purposes.	Monitor the Cordering Creek re-diversion dam and associated re-diversion channels to ensure integrity of structures.	• A visual inspection to be undertaken on a regular basis by the landowner. • Should issues be identified, the landowner is required to contact the Shire for further inspections.	Following heavy rainfall events or on a regular basis (3 monthly)	Landowner/ Shire
	Maintain and repair Cordering creek re-diversion dam and drainage system so that it effectively drains fresh water into Lake Towerrinning.	• Clean sediment or silt out of the re-diversion dam structure during summer months. • Inspect the drainage channel from the re-diversion to the lake to ensure that it is clear of all debris and that water is able to flow to the lake. • Inspect drainage channel culverts on all public roads to ensure they are free from vegetation and water is able to flow freely through the channel.	• Prior to the next wet season • Annually prior to the onset of winter runoff and with landowner permission • Annually prior to the onset of winter runoff	Shire
	Investigate means of ensuring Shire has access to the re-diversion system in order to future-proof Lake Towerrinning.	• Investigate possibility of creating an access easement to allow Shire to maintain rediversion structure. • Investigate possibility of a formal agreement with current land owners.	As soon as possible	Shire

Goal four cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
Maintain water levels cont'd	Investigate means to improve water flow into the Lake.	• Investigate the possibility of installing a second culvert in the re-diversion dam and upgrading the W-drain to increase water flow to the lake as per recommendations from the JDA Living Lakes Project. • Investigate the potential to drain water from Capercup Nature Reserve into the W-drain and into the lake. This will assist with salinity in the Reserve and also improve water flow into the lake. • Liaise with the disbanded Lake Towerrinning Catchment group regarding remaining funds and the potential for these funds to be invested into improving the rediversion structure.	As soon as possible so that improvements can be made during low rainfall seasons	Shire/ Landcare officer/ Landowners
Maintain salinity levels in the Lake at <1200ms/m during winter months (Raper and van Wyk, 2009)	Monitor quality of water passing through the re-diversion system during the summer months.	• Monitor the salinity annually at the road crossing/culvert on Scott Road (see Appendix 4).	Winter months	Shire/Lakeside camping
	Monitor salinity levels in the Lake.	• Continue to monitor salinity at bimonthly intervals provide results to the Shire annually. • If significant increases are noticed contact Department of Agriculture and Food for further advice.	Ongoing	Lakeside camping

Goal four cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO

Contain salinity to 15% of the Lake Towerrinning catchment in 2028 (Raper and van Wyk, 2009)	Encourage conservation measures further up the system before water enters Cordering creek.	• Liaise with Landcare officer in relation to encouraging landholders to continue to manage salinity and to determine if funding is available to assist with reducing salinity within the catchment. • Liaise with Department of Primary Industries and Regional Development in relation to water quality measurements from bores within the Lake Towerrinning catchment area.	As soon as possible Annually	Shire/ Landcare officer
To develop a database of information in relation to water quality at Lake Towerrinning	Develop a database of all references and studies associated with Lake Towerrinning.	• Maintain a list of references as part of this Management Plan and keep a copy of all references in the Shire office.	Ongoing	Shire
	Document changes in Lake water levels and quality.	• Continue to sample water quality and measure water levels in Lake Towerrinning. • Collate a database of all information relating to water quality and levels over time. • In the event of an incident or emergency dial 000 which will activate emergency services in accordance with the Local Emergency Management Arrangement or contact the Shire on 9736 2400.	Ongoing Ongoing	Shire Shire

Goal four cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO

To manage the water inflow and outflow through the outlet swamp to minimise smell associated with this area.	Ensure that water from the outlet swamp is able to drain to the Arthur River to ensure regular flushing of the outlet swamp.	• Examine road culverts located on public land to ensure that they are not blocked by silt or debris. • Slash weeds that may block water flow through the area. • Subject to support from private land owners, assist with the development of a scope of works and sourcing of funds to implement proposed changes to improve drainage from outlet swamp to Arthur River.	• Following heavy rainfall and regularly throughout the year • As required • Ongoing	• Shire • Shire/ Lakeside Camping/ Other Landowners
	Ensure regular flushing of the outlet swamps.	• Opening of the gates at the outlet structure from Lake to outlet swamps.	• When levels reach the base level of the original Lake outlet (generally following winter rainfall)	• Lakeside camping

GOAL FIVE: Implement a program for the management of all visitors to Lake Towerrinning.

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
To manage visitors and visitor movement at the public area of the Lake to ensure that the Lake environment is protected and that visitors have a positive experience.	Prevent camping on Shire owned land.	• Shire to maintain appropriate signage indicating that camping is not allowed. • Inform public of alternative arrangements at Lakeside Camping or Darkan Caravan Park. Information to be provided on Shire website. • Shire Ranger to visit when requested and enforce.	Ongoing	Shire
	Provide the public with information relevant to the Lake and surrounds.	• Update the information on the signage at the Lake picnic area. • Pre-visit information available to the public on Shire website. Ensure this remains up to date.	• Update as soon as possible • Maintain as required	Shire
	Determine levels of visitor satisfaction with facilities at the Lake.	• Obtain feedback from visitors in relation to facilities, future improvements etc. through the Shire website and Facebook page.	Ongoing	Shire
	Minimise the impact on natural environment by visitors.	• Provision of rubbish bins and removal of refuse at least once a week and sometimes more during peak season. • Enforce no vehicles on beaches with signs and by blocking access pathways.	Ongoing	Shire

Goal Five cont'd

OBJECTIVE	STRATEGY	HOW	WHEN	WHO
To ensure that visitors are aware of risks associated with swimming or recreating in a natural water body	Provide public with information on water quality at Lake Towerrinning, particularly during low rainfall years.	• Provide information on general signs around the public areas of the Lake. • Monitor levels of bacteria in accordance with Health Department Guidelines. http://ww2.health.wa.gov.au/Articles/A_E/Bacterial-water-quality • Advise public if levels are considered dangerous through Shire website, signage and Shire Facebook page. • In the event of a medical emergency, dial 000 which will activate emergency services in accordance with the Local Emergency Management Arrangement.	• Ongoing • Fortnightly Nov-May • As required • Annually	Shire

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APPENDIX 1 - FLORA LIST – LAKE TOWERRINNING

Family	Taxa
ASTERACEAE	*Angianthus preissianus*
ASTERACEAE	*Cotula coronopifolia*
ASTERACEAE	*Sonchus asper*
CARYOPHYLLACEAE	**Cerastium comatum*
CARYOPHYLLACEAE	*Spergularia marina*
CASUARINACEAE	*Allocasuarina huegeliana*
CASUARINACEAE	*Casuarina obesa*
CHENOPODIACEAE	*Atriplex prostrata*
CRASSULACEAE	*Crassula natans*
CYPERACEAE	*Baumea articulata*
CYPERACEAE	*Baumea juncea*
CYPERACEAE	*Chorizandra enodis*
CYPERACEAE	*Ficinia nodosa*
CYPERACEAE	*Isolepis cernua* var. *setiformis*
CYPERACEAE	*Lepidosperma longitudinale*
CYPERACEAE	*Schoenus subfascicularis*
FABACEAE	*Eutaxia ?empetrifolia*
IRIDACEAE	*Romulea rosea*
JUNCACEAE	**Juncus bufonius*
JUNCACEAE	*Juncus kraussii* subsp. *australiensis*
JUNCACEAE	*Juncus pallidus*
JUNCAGINACEAE	*Triglochin mucronata*
LOBELIACEAE	*Lobelia anceps*
LOBELIACEAE	*Monopsis debilis*
MIMOSACEAE	*Acacia acuminata*
MIMOSACEAE	*Acacia saligna* subsp. *lindleyi*
MYRTACEAE	*Corymbia calophylla*
MYRTACEAE	*Eucalyptus marginata*
MYRTACEAE	*Eucalyptus rudis*
MYRTACEAE	*Eucalyptus wandoo*
MYRTACEAE	*Eucalyptus wandoo* subsp. *orthostemon* x *wandoo*
MYRTACEAE	*Kunzea glabrescens*
MYRTACEAE	*Melaleuca cuticularis*
MYRTACEAE	*Melaleuca preissiana*
MYRTACEAE	*Melaleuca rhaphiophylla*
MYRTACEAE	*Melaleuca viminea* subsp. *viminea*
PHORMIACEAE	*Dianella revoluta*

POACEAE	**Ehrharta longiflora*
POACEAE	**Puccinellia ciliata*
POACEAE	*Bromus diandrus*
POACEAE	*Hordeum geniculatum*
POACEAE	*Lolium rigidum* complex.
POACEAE	*Paspalum vaginatum*
POACEAE	*Polypogon monspeliensis*
POTAMOGETONACEAE	*Ruppia megacarpa*
PRIMULACEAE	*Samolus junceus*
PROTEACEAE	*Banksia attenuata*
PROTEACEAE	*Banksia prionotes*
PROTEACEAE	*Banksia sessilis* var. *sessilis*
ZANNICHELLIACEAE	*Lepilaena cylindrocarpa*

*indicates weed or naturalised plant species

APPENDIX 2 - SIGNIFICANT FAUNA LIST

Bamford Consulting (2012)

Species	Conservation significance*	Wetland Dependence	Distribution and Habitat	Status at Lake Towerrinning
Eastern Great Egret *Ardea modesta*	Migratory bird (EPBC Act) Schedule 3 (WA Act)	Aquatic	Fresh and occasionally brackish wetlands across much of Australia; highly mobile. Favours wetlands with extensive shallows. Forages on aquatic invertebrates and vertebrates.	Not recorded in large numbers but suitable habitat present.
Peregrine Falcon *Falco peregrinus*	Schedule 4 (WA Act)	Not dependant on wet land but hunts water fowl	Occurs across Australia, primarily in open woodland and especially where cliffs provide nesting sites.	Present at Lake Towerrinning and abundance of water birds may provide a major food source at times.
Hooded Plover *Thinornis rubricollis*	P4 (DEC)	Shorebird	Coastline and salt lakes of southern WA; another sub-species on coast of south-eastern Australia. Forages on invertebrates on the shoreline and sometimes shallows.	Not recorded at Lake Towerrinning and low salinity.
Sandpipers (7 species)	Migratory (EPBC Act)	Shorebirds	Throughout Australia on marine tidal shorelines, estuaries and wetlands that provide extensive shallows. Forage on invertebrates on the shoreline and shallows.	Not recorded in large numbers but suitable habitat present.
Species	**Conservation significance***	**Wetland Dependence**	**Distribution and Habitat**	**Status at Lake Towerrinning**

Carnaby's Black Cockatoo *Calyptorhynchus latirostris*	Endangered (EPBC Act), Schedule 1 (WA Act)	Not dependant but may forage in fringing sheoaks	Forests and woodlands of the South-West, formerly widespread breeding visitor to woodlands n the Wheatbelt.	May utilise the 8ha of sheoak trees in outlet swamp. Likely to be a few nest hollows in Lake fringe.
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksia naso*	Vunerable (EPBC Act), Schedule 1 (WA Act)	Not dependant but may forage in fringing sheoaks	Forests of the lower South-West.	May utilise the 8ha of sheoak trees in outlet swamp. Likely to be a few nest hollows in Lake fringe.
Rufous Field wren (west) *Calamanthus campestris montanellus*	Priority 4 (DEC)	Not dependant, but may occur in samphire heaths	Heathlands; patchily distributed across much of southern Australia.	Not recorded at Lake Towerrinning. If present likely to reside in samphire heaths and shrublands.
Rakali *Hydromys chrysogaster*	Priority 4 (DEC)	Aquatic	Lakes, streams rivers and some coastlines throughout Australia.	Unlikely to in high abundance in immediate vicinity of Lake. More likely to occur east of Lake near the Arthur River where remnant vegetation is more extensive.

*Conservation significance definitions

Conservation Categories used for the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

Extinct: Taxa not definitely located in the wild during the past 50 years.

Extinct in the Wild: Taxa known to survive only in captivity.

Critically Endangered: Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered: Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable: Taxa facing a high risk of extinction in the wild in the medium-term future.
Near Threatened: Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent: Taxa whose survival depends upon ongoing conservation measures.
Data Deficient (Insufficiently Known): Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern: Taxa that are not threatened.

- Schedules used in the *Biodiversity Conservation Act 2016* (WA Act)

Schedule 1 Rare and Likely to become Extinct.
Schedule 2 Extinct.
Schedule 3 Migratory species listed under international treaties.
Schedule 4 Other Specially Protected Fauna Define Schedule 4, 3
Priority species listed by Department of Biodiversity Conservation and Attraction (DBCA)
Priority 1 Taxa with few, poorly known populations on threatened lands.
Priority 2 Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 Taxa with several, poorly known populations, some on conservation lands.
Priority 4. Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.
Priority 5 Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (IUCN Conservation Dependent).

APPENDIX 3- SHIRE OF WEST ARTHUR SCHEDULE OF ACTIVITIES

Immediate or As soon as possible

- Update Shire signage around the lake.
- Remove tree stumps in picnic area.
- Inspect rediversion drainage channel and ensure all culverts are clear.

Ongoing

- Weed control – bridal creeper located near boat ramp, on terraced areas and in the ephemeral swamp on the eastern side of the lake.
- Dieback management (through hygiene measures) – all soil removed from machines, equipment and footwear before using in areas that are not paved.
- Lawn maintenance.
- Inspection of visitor facilities (BBQ, toilets, pumps etc).
- Inspect pathways and undertake maintenance as required.

Annually

- Include Lake Towerrinning in bush fire management plan in accordance with lease conditions.
- Assess fuel loads to minimise fire hazards.
- Report to DBCA regarding state of current man made facilities and any repairs undertaken and water quality and suitability for human contact. Such a report is required by October 7th of each year.
- Contact Graeme Peirce and get salinity measures for past year and include in Shire database.
- Advertise boat usage plan and encourage people to be courteous when skiing at Lake Towerrinning through Facebook posts.

Prior to summer swim/ski season

- Ensure weeds are slashed for fire prevention where required.
- Check signage is in good condition and still relevant.
- Inspect jetties and complete report for DBCA.
- Ensure entrance from the road to the Lake is tidy (slash weeds and remove branches if required.

Summer

- Monitor water levels.
- Clean sediment or silt out of re-diversion structure if required.
- Monitor Phosphorous levels in the lake water at the beginning of summer.
- Monitor hydrocarbons in the lake water at the end of summer.

- Examine road culverts on Darkan Road south to ensure they are not blocked by debris or weeds and to allow the swamps to drain effectively (particularly after heavy summer rainfall).
- Monitor water quality for suitability for human contact in accordance appropriate guidelines (including bacteria) on a fortnightly basis.
- Remove rubbish and check facilities on a weekly basis.
- Recreational Waters Microbiological Sampling Program commences in November. Health Department will send a letter and detailed sampling program in October of each year.

Winter

- Monitor salinity of water flowing from the re-diversion at Scott Road during winter months to ensure salinity is not above 1200mS/m.
- Examine road culverts on Darkan Road south to ensure they are not blocked by debris or weeds and to allow the swamps to drain effectively.
- Weed control – lupins and bridal creeper at boat ramp end of lake.

When required

- Clean algae from boat ramp.
- Update map on shire website.

When funding available

- All access pathway.
- Additional shade shelters and BBQ facilities at the ski take off area.
- Investigate possibility of creating an easement to protect rediversion structure and allow shire access.
- Seek funding for reducing salinity further upstream as part of Landcare within the Shire.
- Update signage in the picnic area.

APPENDIX 4 - PROPOSED SALINITY SAMPLING SITE