Royal Life Saving

THE ROYAL LIFE SAVING SOCIETY AUSTRALIA

Best Practice Profile for Public Swimming Pools Maximising Reclamation and Reuse

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A report by the Royal Life Saving Society Australia
(Western Australian Branch)
for
The Premier's Water Foundation

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The Royal Life Saving Society Australia appreciates the assistance provided by the Premier's Water Foundation

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The Premier's Water Foundation is administered by the Department of Water

PREMIER'S WATER FOUNDATION

Best Practice Profile for Public Swimming Pools
Maximising Reclamation and Reuse

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Table of Contents

List of Tables

List of Figures

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Executive Summary

In Western Australia there are over 250 public aquatic centres that provide a significant benefit in terms of community development, sport, health and fitness. Aquatic centres also use large amounts of water. The aquatic and recreation industry is mindful of its responsibilities to limit water usage. This project looks to investigate water reuse and reclamation practices in public aquatic centres.

Water saving strategies in Western Australian public aquatic centres has been on the agenda for some time and has been promoted to centres over the past few years. While there was found to be limited documented evidence of water saving programs in public aquatic centres, there were a number of strategies identified that have been implemented to reduce water consumption in aquatic centres in Victoria New South Wales which have shown some success. However, there is a lack of information available on water saving strategies and practices in Western Australian aquatic centres. This study hopes to add to the current information and knowledge in this area.

26 Western Australian aquatic centres completed the Industry Survey which was used to assess current levels of water usage, annual patronage and water saving strategies currently in place within the centres. Seven aquatic centres were identified as using technical innovations to encourage water saving and reuse. A case study was conducted for five of these centres which allowed detailed information to be collected on installation, maintenance, training, water consumption and general information for each strategy.

The Industry Survey results indicated that majority of aquatic centres in Western Australia are unsure of their annual water consumption and its associated costs. This lack of knowledge made extensive data analysis and determining water savings in case studies difficult and therefore results presented in this report don't have the quality we were seeking. However, it does provide a clear direction for water saving applications within the aquatics industry and further it demonstrates the need for better understanding and management practices within the industry.

Surveyed centres reported a number of water saving strategies being utilised. Dual flush toilets, pool covers to reduce evaporation, water saving shower heads and flow regulation devices in showers were the most commonly reported strategies.

The purpose of this research was to establish best practice for water saving and reuse. Given the difficulties obtaining data and the lack of knowledge regarding water consumption, it was decided that a series of recommendations for best practice would be more appropriate.

In addition this report recommends that centres utilise sub-meters or water audits to determine and monitor water consumption to identify high usage areas and enables them to select appropriate water saving and reuse strategies for their centres. The study also recommends that staff and patrons be educated and adequately trained on the water saving strategies and practices being used within their centre.

1. Introduction

Western Australia has reached a critical point in the way we use and reuse our water resources. In Western Australia there are over 250 public aquatic centres that provide significant benefit in terms of community development, sport, health and fitness. Aquatic centres also use large amounts of water. To gain a perspective of water usage – Craigie Leisure Centre holds 1,200,000L of water that must be constantly filtered, disinfected and turned over (recycled) to ensure that it is environmentally safe for bathing.

The aquatic and recreation industry is mindful of its responsibilities to limit water usage. Awareness is particularly high in rural and remote Western Australia. Royal Life Saving has been working to generate a level of recognition that aquatic centres need to take a leadership role in implementing water conservation and reuse strategies given the size of water body being managed and the high degree of public usage and scrutiny.

The operation and management of public swimming pools is undertaken by (in the main) local government. While ideas and strategies are being trialed (results are not being formally recorded) by a few in isolation, no mechanism exists for a collective view to be formed on the best way to reclaim and reuse water in aquatic centres. Royal Life Saving has positioned itself to take a leadership role in this area.

The Royal Life Saving Society gained assistance from the Premier's Water Foundation to investigate water saving and reuse strategies in public aquatic centres. The project has worked with key stakeholders to develop a 'best practice' profile to support the aquatic and recreation industry in implementing water saving and reuse technology and techniques. It is anticipated that this will lead to improving the implementation of best practice water efficiency within the industry.

The project objectives are:

- To identify water conservation techniques that have been trialed and applied across the aquatic and recreation industry in Western Australia
- To collect and analyse data and measure efficiency, effectiveness and management success of the techniques identified
- To establish water management benchmarks and develop a best practice profile for water efficiency within the aquatic and recreation industry in Western Australia
- To develop strategies to promote the best practice profile to industry stakeholders

There are a number of benefits that this program will have on the aquatic and recreation industry and on general water conservation.

The demand for research into water saving strategies is emerging and growing within the Western Australian aquatics industry. Many of the public facilities that are regionally based have plant rooms that are reaching the end of their useful life. The application of new technology and best practice in these regional locations will be imperative because of the need to operate efficiently and the limited water supply at a local level.

Targeted strategies will ensure that these pools have the information, knowledge and ability to install appropriate plant and associated equipment. There is a risk that without this information, pools will be redeveloped using inefficient filtration and disinfection systems. In this regard the project will promote the uptake of the new technology in aquatic and recreation centres throughout Western Australia.

The water conservation benefit of the project will be the improved understanding of how to apply technology and operational techniques in this area, which will reduce the need and volume of water wastage, freeing it up for other community uses.

2. Literature Review

Water saving and reuse strategies in public aquatic centres has been on the agenda for some time and has been promoted to centres over the past few years. However, there is little national and international information available on water saving and reuse strategies in public aquatic centres.

Much of the available national and international information focuses on water saving and reuse strategies within the home and school settings. While strategies such as dual flush systems and flow regulation devices are appropriate for public aquatic centres, they are not well documented making comparisons difficult. Applications in Australian public aquatic centres, particularly in New South Wales and Victoria do provide some means of transferable information and data however, the availability of well documented information is limited.

In Western Australia, there are strategies being implemented in isolation, but no mechanism exists to document and form a collective opinion on the best way to save and reuse water in aquatic centres. This study looks to add to the current information and knowledge of the industry.

The Western Australian State Water Strategy

The Western Australian State Water Strategy calls for strong community, government and industry partnerships to ensure a sustainable future for all Western Australians by:

- Improving water use efficiency in all sectors
- Achieving significant advances in water reuse
- Fostering innovation and research
- Planning and developing new sources of water in a timely manner
- Protecting the value of our water resources (Government of Western Australia, 2003)

Frankston City Council – Smart Water Fund

In 2002, Frankston City Council conducted a 'walkthrough' water audit of its two public aquatic centres to identify viable water saving opportunities related to each of the facility's operations. There were a number of water conservation measures that were identified through this audit that aimed to reduce water usage and associated water costs (Frankston City Council, 2005).

The identified water saving measures included:

- Installation of rainwater collection tanks
- Installation of flow regulators in showers and taps
- Installation of timer push button tapware
- Installation of dual flush cisterns in toilets
- Installation of pool blankets to reduce evaporation
- Installation of 'surface evaporation suppressant' systems in pools
- Education of pool users and staff in water saving initiatives

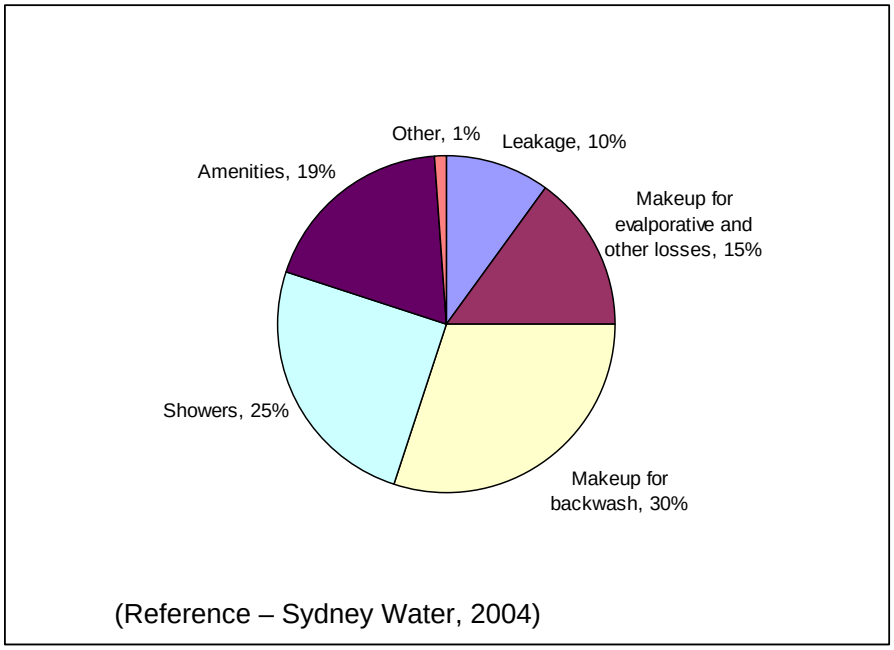
Although it is still too early to determine the effectiveness of these water saving measures and their impact on the overall water consumption within the centre, it demonstrates the value of conducting a water audit to identify the water saving opportunities that exist within the centre. It also shows that these strategies have been identified as potentially efficient strategies and are being used in other similar settings.

Every Drop Counts (EDC) Business Program

Sydney Water has developed the Every Drop Counts (EDC) business program which is designed to assist businesses to reduce their water consumption and associated operational costs. As part of the program, Sydney Water has conducted a series of water efficiency audits at leisure and aquatic centres. These audits are designed to identify a customized water saving plan including cost-effective opportunities for participating businesses to implement.

The average water use for Sydney swimming was approximately 80,000L per day (Sydney Water 2004). Based on these figures, the total amount of water used by all pools in the Sydney area is around 9.6 million litres per day. Research carried out as part of Sydney Water's EDC business program indicates that water usage for all these facilities can be reduced by at least 1.7million litres per day (as reported in Sydney Water, 2004).

Typical water usage breakdown in a community swimming pool



(Reference – Sydney Water, 2004)

The Warringah Aquatic Centre facility includes a 50m indoor pool, 25m outdoor pool, children's pool, public amenities and a kiosk. Since joining the EDC program, the centre has taken a series of steps to improve water efficiency by implementing options identified as part of the program. As a result, the aquatic centre has already reduced water consumption by around 18% or 2.7 million litres per year (Australian Aquatic and Recreation, 2005).

The water saving strategies implemented as part of the program included: installation of flow restrictions in showers and hand basins, dual flush toilets in high use areas, sensors to control urinal flushing, vigorous maintenance program in place to minimise leakage through amenities and the centre encouraged changes in the cleaning practices among contracted staff.

In addition, the centre is looking into the feasibility of installing a rainwater tank that will collect water from the roof that could be used for supplementing pool makeup water.

The initial outlay of the program was $5,200. With a water saving of 2.7 million litres per year and a cost saving of $4,600 per year, the payback period for this initiative will be less than 14 months.

The other pool included in the project was the Leichhardt Aquatic Centre is one of the oldest community aquatic centres in Sydney and is one of Leichhardt Council's biggest water users. The centre joined the EDC program in 2002.

The centre installed a series of sub-meters at the aquatic centre to accurately monitor their water usage. The audit showed that while it was largely water efficient, there was room for improvement. A range of initiatives were presented aiming to achieve a water saving of 23%, equating to around 69.3 kilolitres per day.

The centre established a two stage strategy to reduce their water consumption. Stage one involved the alteration of delay on urinal flushing sensors, flow controls on showers and taps in change rooms and reduction of basin sizes throughout the facility. Stage two involved further monitoring of the sub-meters and maintenance and adjustments of fixtures to reduce flow.

The EDC program also recommends other strategies to improve water efficiency in public aquatic centres including:

- Installation of barriers around the pool to collect and reuse any splashes or overflows
- Use pool covers to reduce evaporation
- Increase customer and staff awareness of water conservation through adequate training and induction procedures and
- Installation of rainwater tanks to collect water for irrigation etc and investigate new and emerging technologies in the recycling of backwash water.

These two examples demonstrate the potential water saving from the implementation of a series of strategies. They also highlight the importance of water monitoring to ensure appropriate strategies are used.

ICLEI Water Campaign

ICLEI – Local Government for Sustainability is a membership based organisation of local governments that have made a commitment to sustainable development. Their water campaign is a capacity building program that supports councils to address water resource management through a performance based milestone framework. Water campaign councils receive ongoing support and technical information to build their capacity to address water quality and water conservation issues in their daily operation and in the community.

Shire of Hornsby (NSW)

The Shire of Hornsby in New South Wales (NSW) identified that participation in the ICLEI Water Campaign would provide them with the opportunity to show the way and be part of a growing number of local governments which support the concept that integrated water resource management makes good economic, social and environmental sense.

Through assessing the current water consumption patterns and practices within the area, it was found that public swimming pools had a high rate of water consumption. The council identified that an opportunity to implement a water reuse strategy was available which would result in reduced overall water consumption and better water management and treatment practices.

Two public swimming pools; Hornsby and Epping were identified and included in the initiative. Originally the wastewater from the pools backwash went into the nearby creek. Due to the high salt content of the water, this was considered unacceptable under their current Environmental Protection Act license.

It was decided that a reverse osmosis filtration system would be installed at each pool. These systems would enable the water to be treated whereby the dissolved salts (sodium and chloride) would be removed from the water during the backwash process allowing it to be put back into the pool or used for irrigation of nearby parklands.

There have been some successes and some failures with the installation of the reverse osmosis filtration systems. When installed, there was no maintenance information or manuals supplied to the centre causing the system to remain dysfunctional for a period of time. This highlights the need for adequate training and information required for the strategy to be effective. The systems are currently functioning in both centres with water savings beginning to become evident. These systems are expensive to install, hence there is a long cost-recovery time period. However, through this project, it was decided that the water saving and environmental benefits were sufficient enough to warrant the project.

City of Whittlesea (Victoria)

In Victoria, nine years of low rainfall, a growing population, climate change and degrading river systems have resulted in a highly variable water supply which was seen unlikely to sustain future generations.

The City of Whittlesea joined the ICLEI Water Campaign in 2004 and conducted a comprehensive water usage audit. This found that 20% of the council's water usage was attributed to indoor water, including aquatic centres.

In the base year, the council's aquatic centres were the third highest ranked water consuming facility, behind the irrigation of playing fields and irrigation of gardens and plantar boxes (City of Whittlesea, 2006).

Mill Park Leisure Centre and Thomastown Recreation and Aquatic Centre were in the top five users with swimming pools using 8.81ML per pool each year (City of Whittlesea, 2006).

A summary of the strategies implemented within the aquatic centres and their associated water savings are presented in Table 2.1.1. Strategies included: water audits, low flow showerheads, flow control technology, pool blankets and staff education.

Table 2.1.1: Summary of water saving strategies

Strategy	**Description**	**Savings (kL)**
Water audits of aquatic centres	Assessment of efficiency of existing fixtures and fittings and recommendations for improvement	N/A
Retrofit	Installation of dual flush toilet systems, water saving showerheads and flow control devices	Average 9,700kL annual saving
Pool Blankets	Installation of pool blankets	To be confirmed
Backwash and water reuse	Treated backwash used for lawn irrigation	700kL annually
Water saving showerheads	Installation of new showerheads	To be confirmed
Water recycling	Installation of water recycling equipment to save 80% of backwash water to reuse in pool make up water	Up to 2,380kL annually
Underwater pool repairs	Pool maintenance performed using underwater divers to avoid emptying the water	1,100kL annually
Education of staff	Maintenance of leaks etc.	Unable to quantify
Educational Signage	Reminders to turn off taps, limit showers and be aware of water saving within the centre	Unable to quantify

(Reference: adapted from City of Whittlesea, 2006)

Summary of Literature Review

Given the limited information and data available on water saving and reuse in Western Australian public aquatic centres, it is important to consider what has been done successfully in other states and what can be transferred to a Western Australian context.

The studies presented in this literature review involve aquatic centres that have similar design and facilities to those in Western Australia, therefore the information gathered from these studies can be seen as relevant and an appropriate guideline for the Western Australian aquatics industry.

Through analysis of the literature, there seems to be a distinct process that centres follow to implement water saving and reuse strategies. Both Frankston City Council and the two local councils involved in the ICLEI Water Campaign conducted water audits to assess and determine areas of high water consumption. In each instance, public aquatic centres were found to be among the highest water consumers. Further audits were undertaken to identify appropriate water saving strategies to minimise water consumption within the designated aquatic centres.

As part of the Every Drop Counts program, the Leichardt Aquatic Centre installed sub-meters to accurately monitor their water usage. This is another strategy which enables centres to identify high usage areas and monitor overall water usage throughout the centre.

These two process of auditing and use of sub-meters are important steps for centres to undertake to initiate water saving and reuse strategies. This is particularly relevant in Western Australian aquatic centres given the lack of knowledge and awareness of water usage and consumption which will be discussed further throughout the report.

Through analysis of the strategies implemented within centres in New South Wales and Victoria effectiveness of selected strategies can be determined. Common strategies implemented include:

- Installation of flow regulation devices in showers and taps
- Installation of dual flush toilet systems
- Installation of pool blankets to minimise heat loss and water loss due to evaporation
- Backwash and filtration systems that allow water to be reused for pool make-up water or irrigation
- Staff and patron education.

These have all resulted in some degree of water saving for the centres with additional benefits in some cases.

The reverse osmosis system utilised has some important lessons for Western Australia pools considering using this technology. It highlights the importance of receiving adequate operational and maintenance manuals and training to ensure the system remains functional. It also demonstrates the benefits (both environmental and water saving) when they are fully functioning and provides some level of feedback on how to ensure the systems function effectively.

3. Methodology

3.1 Sample Selection and Recruitment

Potential survey respondents were selected from public aquatic centres in Western Australia to complete the Industry Survey. Contacts were identified through the Royal Life Saving Society's aquatic centre database. In total, 26 aquatic centres completed the industry survey.

From the aquatic centres that completed the Industry Survey, centres utilizing additional water saving and reuse technical innovations and technologies were approached to participate in a case study. A total of seven centres were identified and approached. Case studies of five centres are reported on in this reporting covering a range of technical innovations currently in place in Western Australia.

3.2 Instrument Development

The Premiers Water Foundation Best Practice Profile for Public Swimming Pools – Maximizing Reclamation and Reuse project utilized two survey instruments; the Industry Survey and the Case Study Template (refer to Appendix A and B).

Industry Survey

The Industry Survey was developed by the Royal Life Saving Society (WA Branch) after extensive consultation with representatives from the aquatics industry and other interested organizations.

The Industry Survey was used to assess current levels of water usage among Western Australian aquatic centres, annual patronage and current measures that have been implemented within facilities to minimize water consumption and maximize water reclamation and reuse.

Case Study Template

The Case Study Template was developed by the Royal Life Saving Society (WA Branch) after extensive consultation with representatives from the aquatics industry and other interested organisations.

The case studies collected detailed information on specific water saving strategies and reuse practices utilised by selected aquatic centres in Western Australia. The case studies collected information on installation, operation, maintenance, staffing and training, patrons, water consumption and general information regarding the water saving strategies and reuse practices in place. The information gathered enabled a cost recovery analysis to be conducted.

3.3 Data Collection and Analysis

Different collection strategies were employed to administer the survey instruments.

Industry Surveys

These surveys were sent out to aquatic centres via email, post and fax. Centre managers or representatives from the aquatic centres were asked to complete the survey and return it to Royal Life Saving for analysis. Follow up contact was made to ensure adequate numbers of surveys were returned.

Data entry was conducted using a Microsoft Excel database. All statistical analysis was completed using the SPSS for Windows Statistical Package. Questions requiring an open-ended, written response were coded by selecting the most commonly used terms and themes and developing a set of coding keys.

Case Study Template

The case studies were conducted using a face-to-face interview technique. Royal Life Saving Society staff members from the project team conducted the interviews with selected aquatic centre managers.

The information collected was then complied and critically analysed to develop a cost recovery analysis and summary for each strategy to develop a best practice profile for water saving strategies and reclamation and reuse practices.

3.4 Survey Limitations

No research is without limitations. Some important limitations were identified in this study which may have influenced the results.

Sample Size

Small sample size increases the margin for error in survey statistics. While a number of centres were involved in this study, they represent a small proportion of the industry. However, the participating centres included a wide range of regional and metropolitan centres which may work to reduce this bias.

Coding of Data

Open-ended questions generally require a written response. For this report, open-ended responses were coded by selecting the most commonly reported themes and terms and developing a set of coding keys. Bias may have occurred through the coder's interpretation of the data and identification of themes, and subsequently the categorisation of responses. Having one person responsible for coding the data may reduce this bias.

Information Bias

It was found that some elements of recall bias may have affected the reliability of the data. Recall bias of the annual water usage may be inaccurate and in many cases was not reported at all. Likewise with the reporting of facility volumes, some centres may have estimated these values which would affect the reliability of the data obtained.

4. Industry Survey Results

In total, 26 aquatic centres completed to Industry Survey. The tables and graphs presented in these results summarise the number of responses to each question and the percentages they represent.

4.1 Centre Description

4.1.1 Centre Facilities

50% of surveyed aquatic centres were primarily indoor facilities, 15.4% were outdoor facilities and the remaining 34.6% of surveyed centres contained both indoor and outdoor facilities.

Results are presented in Figure 4.1.1.

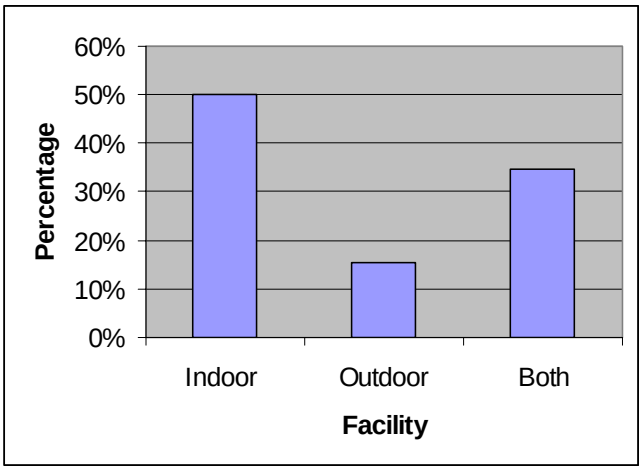


Figure 4.1.1 – Centre Facilities

4.1.2 Centre Location

57.7% of surveyed centres were located within the metropolitan area. The remaining 42.3% were regional aquatic centres. Results are presented in Figure 4.1.2.

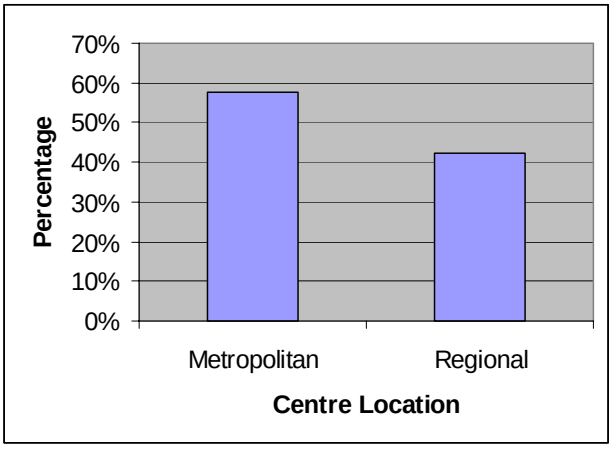


Figure 4.1.2 – Centre Location

4.1.3 Centre Functions

73.1% of surveyed aquatic centres were reported to be multi-purpose facilities, which included facilities such as gyms, aerobics and exercise centres. 26.9% functioned specifically as a swimming pool.

Results are presented in Figure 4.1.3.

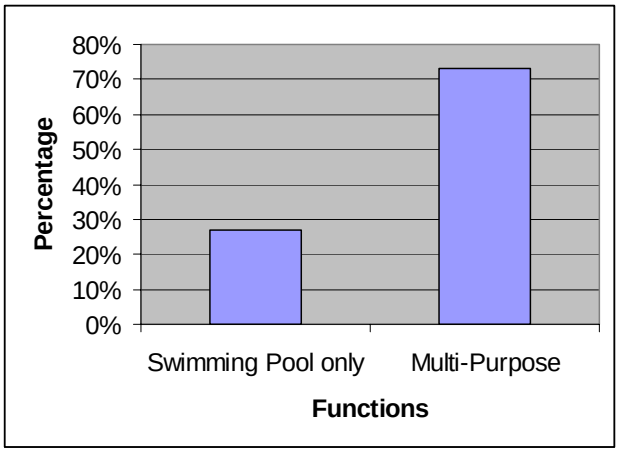


Figure 4.1.3 – Centre Functions

4.1.4 Annual Patronage

Majority of surveyed aquatic centres (50%) had an annual patronage between 0 and 399,999 people. Only 1 centre had no information regarding their annual patronage figure as they were a new centre and had not been open for a year. Results are presented in Table 4.1.4.

Table 4.1.4 – Annual Patronage

Patronage (visits/year)	**Frequency**	**Percentage (%)**
0-99,999	4	15.4
100,000 – 199,999	0	0
200,000 - 299,999	5	19.2
300,000 -399,999	4	15.4
400,000 – 499,999	3	11.5
500,000 - 599,999	2	7.7
600,000 – 699,999	0	0
700,000 – 799,999	2	7.7
800,000 +	5	19.2
No response	1	3.8
TOTAL	**26**	**100**

4.2 Water Usage

57.7% of surveyed aquatic centres were unsure of their current level of water usage. 23.1% currently used between 0 – 10,000 kilolitres per year. Importantly, only 7.6% used over 30,000 kilolitres per year. Results are presented in Table 4.2.1.

Table 4.2.1 – Water Usage

Water Usage (kilolitres/year)	Frequency	Percentage (%)
0 – 10,000	6	13.1
10,001 – 20,000	3	11.5
20,001 – 30,000	0	0
30,001 – 40,000	1	3.8
40,001 – 50,000	1	3.8
No response	15	57.7
TOTAL	**26**	**100**

Majority of aquatic centres (50%) were unsure of their current annual water consumption costs. 24.6% of centres spent between $20,001 and $30,000 on water use each year.

Results are presented in Figure 4.2.2.

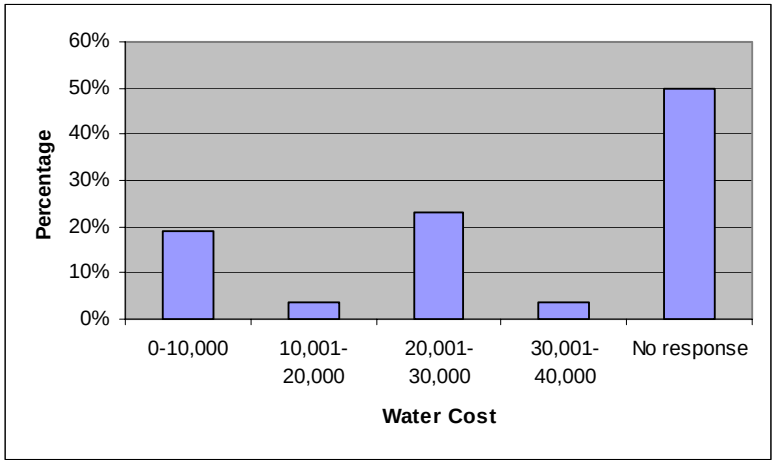


Figure 4.2.2 – Annual Water Usage Cost

4.3 Water Using Facilities Within the Centre

96.2% of aquatic centres surveyed had a 25m pool, 15.4% had a 33m pool and 57.7% had a 50m pool within their facility. Facilities such as showers, toilets and sinks were also reported in majority of centres.

Results and average numbers and volumes of these water-using facilities are resented in Table 4.3.1 and Table 4.3.2.

Table 4.3.1 – Water Using Facilities Within the Centre

	Yes	Percentage (%)	Average Volume
25m pool	25	96.2	646,000L
33m pool	4	15.4	1,812,000L
50m pool	15	57.7	0.36gL
Spa	17	65.4	14, 757 L
Sauna	19	73.1	Not sapplicable

Table 4.3.2 – Water Using Facilities Within the centre – Change rooms

	Yes	Percentage (%)	Average Number
Showers	24	92.3	21.21
Toilets	24	92.3	26.10
Sinks	24	92.3	22.71

Other water facilities within centres that were identified included: drink fountains, urinals and other pools (leisure pool, toddler's pool, hydro pool etc).

4.4 Current Water Saving Strategies

Surveyed aquatic centres were implementing a number of water saving strategies. Most commonly reported strategies included the installation of dual flush toilets (76.9%) and use of pool covers to reduce evaporation (65.4%). Other common strategies were the use of water saving shower heads and flow regulation devices in showers (42.3% each).

34.6% of surveyed aquatic centres reported using a range of technical innovations to reduce water consumption. These provided the basis for the case studies which are discussed in further detail in Section 5. Results are presented in Figure 4.4.1.

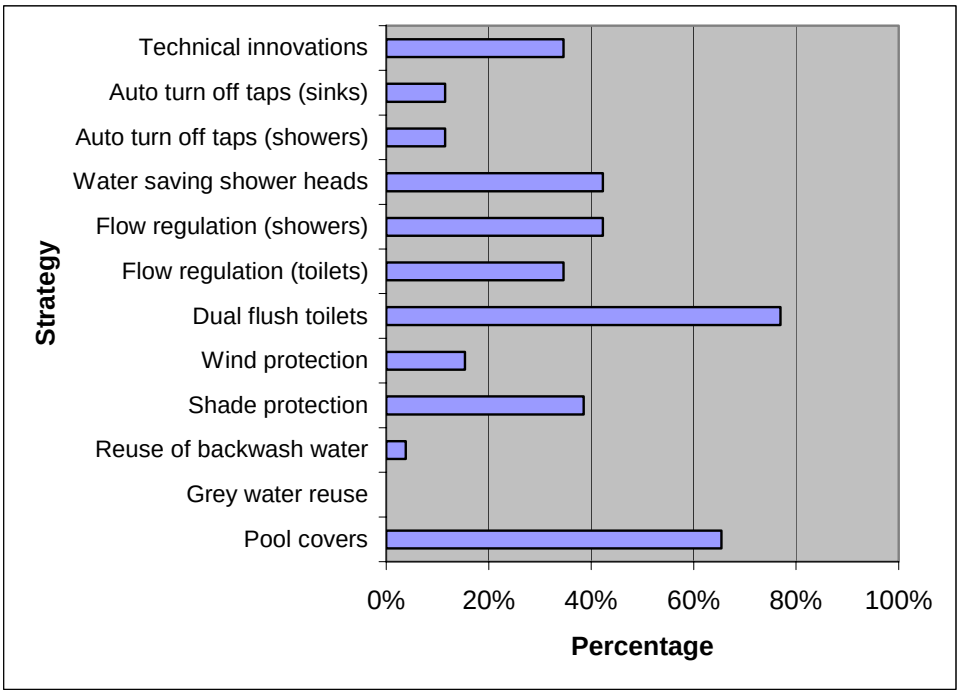


Figure 4.4.1 – Current Water Saving Strategies

4.5 Storage of Captured Water

92.3% of aquatic centres surveyed reported that they did not store captured water. Of those that did, water was stored in tanks and was later used for garden irrigation and to refill the pool after backwashing.

Results are presented in Figure 4.5.1.

Figure 4.5.1 – Does your centre store captured water?

4.6 Patron and Staff Education

Majority of aquatic centres (61.5%) reported that they currently actively promote water saving strategies and reuse practices to their staff and patrons. The most common strategy was promoting limited shower times through stickers and signage (53.8%). Other promotions included staff workshops and encouraging quick maintenance within the facility (3.8% each).

Results are presented in Table 4.6.1.

Table 4.6.1 – Does your centre promote water saving to patrons and staff?

	Frequency	**Percentage (%)**
Yes	16	61.5
No	10	38.5
TOTAL	**26**	**100**

5. Case Study Results

5.1 Case Study One – Terry Tyzack Aquatic Centre

Water Saving and Reuse Strategies

Terry Tyzack Aquatic Centre is currently utilising the following water saving and reuse strategies:

- Pool blankets to minimise heat loss and evaporation
- Dual flush toilet systems
- Flow reduction systems in showers

The use of pool blankets to minimise heat loss and evaporation within the aquatic facility was the focus for this case study.

Installation

The Terry Tyzack Aquatic Centre installed pool blankets to reduce the amount of heat loss and evaporation for both their indoor and outdoor pools (excluding the Toddler's pool and spa). The pool blankets were installed in 2001 by Elite Pool Covers at a total cost of $79,174.70 (including GST). A breakdown of these costs can be seen in Table 5.1.1.

Table 5.1.1 – Pool Blanket Cost Breakdown

Indoor Pools	
Blankets	$14,550
Rollers	$9,600
Outdoor Pools	
Blankets	$30,000
Rollers	$11,509
Blanket Buddy	$6,318
TOTAL	**$71,977**
TOTAL GST	$7,197.70
TOTAL (INC GST)	**$79,174.70**

Each pool was required to close for half an hour for the installation of the pool blankets; however it did not require a major shutdown of the facility.

Operation

The pool blankets are operated by the pool supervisor on a daily basis. Operation of the pool blankets takes around half an hour each morning and night to do all the pools (around 3-6 minutes per sheet). This operation usually requires two staff members. It was noted that the centre does not always use the pool blankets during the summer.

Operational costs of utilising the pool blankets within the centre were related to the additional time staff spent in the morning and at night removing and replacing the blankets at a cost of $17 per hour. The only other identified operational cost was the annual maintenance of the winch, around $500.

Maintenance

The pool blankets have not broken down in the five years since they were installed. However, it was identified by the centre that if the strings break, it is the pool supervisors responsibility to fix them (cost of $2.00). If the winch breaks or the blanket tears, expert assistance is required to fix the problem. This is usually able to be fixed within a fortnight with the only ramification being cold water in the pool.

Staffing and Training

Elite Pool Covers conducted an initial 45 minute training session with key staff at the centre with some internal training to follow, which was included in annual sessions. These sessions were used to introduce the new strategy and provide operational training to the responsible staff members.

The aquatic centre did conduct some awareness training for staff on the pool blankets strategy including signage notifying that the pool is closed when the blankets are on and posters in the foyer explaining what the blankets are and why they are being used. In addition, the centre placed an editorial in the local newspaper to promote use of the new strategy.

No awareness training sessions for staff were undertaken on how they can promote the new water saving strategy to the public was conducted as the blankets are not on the pools when patrons are in the centre.

Patrons

There was no impact on the public when installing and maintaining the pool blankets. There was no need to train the public to use the strategy, however general promotion of the water saving strategy was conducted.

Water Consumption

It was identified that there has been a reduction in the centre's water consumption with an annual saving of $67,514. The pool blankets cost $79,174.70 to install and cost around $3,600 per year to operate and maintain. This means that the strategy will recoup its installation and maintenance costs in around 18 months from installation.

General

Other benefits of the pool blankets has been the reduction of indoor corrosion within the centre with less chloramines in the air as the blankets trap them in. In addition the installation of the pool blankets has resulted in a significant saving in pool chemicals, as the blankets seem to reduce the pollutants in the water, therefore reducing the amount of chlorination required.

5.2 Case Study Two – Bold Park Aquatic Centre

Water Saving and Reuse Strategies

The Bold Park Aquatic Centre is currently utilising ultra fine filtration to reduce their water consumption and maximise water reuse in their centre. These systems allow aquatic centres to backwash pools more efficiently, therefore minimising the amount of waste water produced.

Installation

The Bold Park Aquatic Centre installed an ultra fine filtration system in response to the recent cryptosporidium scares in New South Wales. The system was installed by WJ Pratt as part of a whole pool refit which required the pool to be closed for 10 days.

For a plant required to treat 1000 cubic metres of water, a sand filtration system would cost $305,000 to install, whereas the installation of an ultra fine filtration system would cost $350,000.

Operation

It is the Aquatic Supervisors responsibility to oversee the operation of the ultra fine filtration plant facility, however it is an automatic system. Backwashing with this new system takes 90 seconds instead of 45 minutes using the previous system. Using ultra fine filtration results in a 50% reduction in regular backwashing when compared to their previous system with centres only needing to backwash once a month. Although staff need to check the plant room once every one and a half hours, it was stated that this does not take any additional time out of their usual tasks and routines.

As there are now three filters instead of one, there are increased power costs associated with utilising the ultra fine filtration system. However, there is an associated reduction in the use and cost of pool chemicals which counters the power costs.

Maintenance

There were two minor operational teething problems with the ultra fine filtration system, involving chlorine shutdowns and the replacement of mild steel plates with stainless steel. These problems were rectified as part of the systems warranty.

If the system was to breakdown, it would be the responsibility of the individual staff managers and supervisors to repair. If needed, Trisley or AVP can offer specialist skills. The system includes three filters, so if one breaks down, the system is still able to remain functional.

There are 121 socks in each filter (363 in total), which need to be replaced annually. These costs $21 each, resulting in a total annual maintenance cost of $2,000 per year.

Staffing and Training

The aquatic supervisors and managers were required to undertake initial training to operate the system, however no further staff awareness training was conducted initially. Once the new system was set up, new staff were taken through, shown and explained how the system worked. This enabled the staff to explain the strategy to members of the public attending the centre.

Patrons

The only impact that the new system had on the public was the 10 day closure of the pool while the ultra fine filtration system was installed. This was part of a whole pool refit, so installation of the filtration system alone would result in a much shorter pool closure. Staff members informed the patrons of the new system and what impact this would have on the water quality. Customer evaluation surveys were conducted with centre patrons six weeks after the installation to get their responses to the pool closure, the centre upgrade and the new quality of water.

Water Consumption

It was identified that due to the installation of the ultra fine filtration system the centres water costs have dropped dramatically by $7,000 per year. This means that the associated cost of the system will be recouped in around 3 – 4 years.

General

The Bold Park Aquatic Centre identified that evaporation, amenities and backwash were the greatest sources of water consumption and waste water in their facility. The new ultra fine filtration system addresses the wastage due to pool backwashing.

There are additional benefits to the new system which include better water quality and improved patron comfort and satisfaction as less chlorine is required. Both these result in greater patronage within the centre.

5.3 Case Study Three – Melville Aquatic Centre

Water Saving and Reuse Strategies

The Melville Aquatic Centre is currently looking at implementing the Pilot Recapture Strategy within their facility. This strategy utilises recaptured rainwater, shower water and backwash water to reduce overall water consumption and wastage within the centre. This was the focus for the case study.

Installation

The system installation is currently out to tender and was designed by Brian Beech. The automatic system costs $110,000 to install and the manual system costs $80,000. The installation process does not require the pool to be closed as the work is done on the discharge lines rather than the intake lines, which does not affect patrons.

Operation

Duty Supervisors will be responsible for overseeing and monitoring the system operations. Operation of the new recapture strategy is anticipated to add some tasks to staff duties; however these will be completed and included within their current working hours.

The major operational costs of the proposed system will be the additional power, chemicals and man-hours required to operate and maintain it.

Maintenance

As this is only a proposed strategy, maintenance costs are unknown. However, it was identified that once installed, if the system were to breakdown there would be no disruption to the pool operations. It would be the responsibility of the Aquatics Manager and any outsourced assistance required to repair the problem.

It was identified that the pumps and valves in the system require annual maintenance at a cost of $3,000 - $5,000 per year.

Staffing and Training

The Aquatics Supervisors and Managers will be required to undertake training on how to operate and maintain the strategy. A general awareness training session with other staff members will also be conducted as part of the strategy.

The centre will also ensures that all staff are aware of the water saving and reuse strategies within their centre and how they can promote these to the public.

Patrons

There will be no impact on the public when installing and maintaining the recapture strategy. There will be no need to train the public to use the strategy; however general promotion of the reuse strategies will be conducted.

Water Consumption

It has been identified that this strategy will result in water savings of around 32 gigalitres, for the council and the environment. Based on this it is estimated that cost recovery of the system will occur seven years from installation.

General

In addition the new strategy utilises less power as it uses gravity feeding rather than pumps. Overall, it is estimated that the recapture strategy will save the Melville Aquatic Centre $30,000 - $40,000 per year on water, electricity, maintenance and energy.

5.4 Case Study Four – Bayswater Waves Aquatic Centre

Water Saving and Reuse Strategies

Bayswater Waves Aquatic Centre utilises a number of strategies to reduce their water consumption including:

- Pool blankets to reduce heat loss and evaporation
- Dual flush toilet systems
- Water saving showerheads
- Diatomatious water filtration system and UV upgrade for chlorination and disinfection

The use of water saving showerheads and the diatomatious filtration system was the focus of this case study.

Installation

The water saving showerheads were installed internally by a council plumber at a cost of $110 per showerhead, resulting in a total cost of $1,540. The change rooms were only required to close for a few hours for the new showerheads to be installed, causing minimal disruption to centre patrons.

The filtration system was installed by Trisley around one and a half years ago as part of a complete upgrade of the centre. The cost of the filtration system installation was $1.1 million. Each pool had the system installed individually with a maximum closure period of three days.

Operation

The showerheads are a self serve strategy, whereas the operation of the filtration system is the responsibility of the Pool Supervisors.

Operation of the new filtration system results in a decreased workload, as the pool doesn't have to be backwashed as often. However, it was identified that when they do backwash, it takes 3-4 times longer as they need to reline each filter each time. Overall, operation of the new system probably balances out and takes no more time than the previous system.

Operationally, the new filtration system is fairly expensive, with servicing of filters ranging from $1,500 (spa and hydrotherapy pool) to around $5,000-$8,000 per filter (25m pool). There is also the additional cost of relining the filters after each backwash.

Maintenance

Neither of these strategies has broken down since their installation. It was identified that if the showerheads broke down, the council plumber would be responsible for the repair. If the filtration system had problems, Trisley would need to fix them. If the head filtration plants needed to be fixed it would cost around $8,000-$15,000, however this has not yet been required. Importantly, no closure of the pool is required for either strategy to be repaired.

Staffing and Training

Trisley conducted induction training for the four supervisors on how to use the system. Each supervisor received 12 hours of training on the new strategy. In addition, all new staff employed by the centre are trained as part of their induction. Staff who are not responsible for the strategy do not receive any training and are not permitted to operate the system.

All staff were made aware of the new water saving showerheads when they were installed.

Patrons

The only effect the installation of the new filtration system had on the public was the three day closure, however all other pools were operating so a whole centre closure was not required. The centre also conducted general public awareness of the new water saving showerheads being used in the change rooms.

Water Consumption

As both these strategies are relatively new, it is difficult to determine the associated water savings at this stage.

General

There have been additional benefits to the installation of the water saving showerheads and the new filtration system including cleaner and clearer pool water, more efficient systems running in the centre and although the new system is more technically involved, it is easier to operate than the previous system.

The showerheads do not require any additional costs or resources to operate. The new filtration system uses slightly more power to run the pumps and the UV generators cost significantly more in power.

The new filtration system has resulted in a reduction in chemicals used as the centre switched from liquid chlorine to gas, however they now need to use calcium flakes and sodium bicarbonate to balance the gas levels. It was noted that the chemical savings were countered by the increased power bill for the generators.

5.5 Case Study Five – St Brigid's College Aquatic Centre

Water Saving and Reuse Strategies

The St Brigid's College Aquatic Centre is currently using a reverse osmosis system which enables dissolved salts (sodium and chloride) to be removed from the pool, which allows the water to be pumped back into the pool or utilised for surrounding irrigation to reduce the amount of wastewater produced during backwashing.

Installation

Reverse osmosis systems are quite expensive to install, however in this case it was deemed necessary due to lack of a surrounding sewage system and the proposed environmental benefits. Prominent Fluid Controls Pty Ltd based in New South Wales were contracted to install the reverse osmosis system when the pool was built. Therefore there was no pool closure required to install the system.

Operation

Malcolm Thompson Pumps were employed to operate (although the system is primarily automatically operated) and maintain the reverse osmosis system. The operation of the reverse osmosis filtration system does not require any additional time for centre staff.

Maintenance

The reverse osmosis filtration system remained dysfunctional for a period of time following its installation due to a lack of operational information manuals and training supplied. Since the system has become functional, the centre has experienced a number of regular breakdowns. These were primarily associated with the salt wearing out the pumps (highly corrosive so rusts the pumps) and faulty floats, which results in inaccurate level readings throughout the system.

When the system breaks down, the backwash of the pool is still able to be performed, it is just a slower process. Malcolm Thompson Pumps are responsible for any repairs. Breakdowns usually cost $75 per hour to repair, however the pool is not required to close.

The system floats cost around $150 - $200 to replace and the pump costs $200 - $300 to replace, however these only need to be replaced occasionally.

This is not unique to the St Brigid's College system. Examples provided in the literature review illustrated that other centres utilising these systems had similar operational and maintenance issues initially. The systems are now fully functional after some minor modifications to the system. As this is one of the only pools to utilise this strategy in Western Australia, it may take longer for the system to achieve its desired results.

Staff and Training

It was identified that appropriate staff were given one day of training on how to balance the chemicals, however no formal induction or user manuals were supplied on how to appropriately operate the system. This resulted in the reverse osmosis filtration system remaining dysfunctional for some period of time.

There was no staff awareness or training conducted on this strategy.

Patrons

As the reverse osmosis filtration system was installed when the pool was built, there was no impact on the public. There was also no need to train the public on how to use this system, however general promotion of the water saving strategies within the facility has been conducted.

Water Consumption

Initially it was thought that the amount of wastewater would be reduced to only 5% as a result of the reverse osmosis filtration system. In reality, the system treats 1,400 litres of water per hour producing 450 litres of wastewater (35%). Overall, when the system is fully functioning, the use of this system saves around 10,000 litres of water every week during the backwash.

It was identified that this systems installation and maintenance costs would take a long period of time to recover, however due to the lack of a sewerage system in the area and the water saving and positive effects the system has on the environment, it was considered to be an effective strategy.

General

The system does utilise additional power and chemicals (salt), however these costs are very minimal.

6. Discussion

6.1 Representativeness of the Sample

To ensure that this study was representative of the aquatic industry in Western Australia it was essential that a mix of metropolitan and regional, large and small centres were surveyed. This was achieved with a fairly even split of metropolitan and regional centres surveyed including a number of larger multi-purpose facilities.

26 centres completed the industry survey. Considering that there are around 250 aquatic centres in Western Australia, this is only a small sample. It would have been beneficial to have included more aquatic centres in the study, however given that the surveys were distributed at a particularly busy time of the season, this was more difficult. Further research would include a larger proportion of the industry and more accurate measurement of current water usage and consumption, to gain more data and a more comprehensive overview of the aquatic industry in Western Australia.

6.2 Water Usage

The literature review identified that aquatic centres use a large amount of water. Through the Industry Survey it was found that majority of aquatic centres were unsure of the current annual water consumption. This indicates that most public aquatic centres surveyed in Western Australia do not have an efficient water monitoring and management program in place. Facilities are therefore unable to identify where water is being used in the centre or if the make up water is necessary. With little data on water consumption throughout the centre, managers will find it challenging to determine if various systems are operating efficiently or not.

The use of sub-meters to monitor consumption and water auditing are two strategies that can be used by centres to establish water consumption. These can reveal areas of high consumption and inefficient water usage, allow centres to prioritise water conservation opportunities, identify areas for future review and evaluation and enables centres to determine appropriate water saving and reuse strategies for their centre.

The fact that majority of centres were unaware of their current water consumption has implications for the data reported. It was difficult to determine overall actual water consumption in Western Australian aquatic centres. It also presented difficulties when trying to determine overall water savings from strategies implemented through the case studies. If centres were unaware of their baseline consumption they aren't able to identify the overall savings from the installation of water saving from the installation of water saving and reuse strategies.

Of those centres who were aware of their current water usage, 24.6% of centres used between 0 and 20,000 kilolitres per year with majority of centres spending $20,000-$30,000 on water per year. Not surprisingly, metropolitan multi-purpose centres used the most water as they have larger and more facilities, including amenities that contribute to water usage and consumption.

6.3 Current Water Safety Strategies

The aquatic centres surveyed were implementing and utilising a number of water saving and reuse strategies. The most commonly used strategies included the installation of dual flush toilet systems and the use of pool covers to reduce heat loss and evaporation. Other common strategies included the installation of water saving showerheads and flow regulation devices in the showers.

It was identified that multi-purpose metropolitan centres were the most likely to utilise water saving and reuse strategies. However, regional centres were more likely to utilise shade and wind protection strategies, perhaps due to there being more outdoor facilities and more harsh weather conditions in these areas.

So while it is positive that some centres are using these strategies, they seem to be used in isolation and not as part of a comprehensive program. Public aquatic centres use a large amount of water and while they may be mindful that they need to limit their water usage, they need to take more responsibility. Centres need to start by monitoring and establishing their current consumption to identify areas of high usage and areas that are using water inefficiently to identify priority areas for water saving strategies.

Through the literature review and case studies it was identified that a number of water saving and reuse strategies such as water saving shower heads, flow regulation devices, pool covers, ultra fine filtration systems and dual flush toilet systems are effective in reducing water consumption.

34.6% of surveyed aquatic centres reported utilising technical water saving and reuse innovations such as pool blankets, ultra fine filtration systems, reverse osmosis systems, and water recapture strategies. These strategies were identified as having some positive and some negative effects. Comparisons of the water saving strategies examined in the case studies are presented in Table 6.3.1.

Table 6.3.1: Comparison of water saving and reuse strategies in WA

Strategy	Installation Cost	Water Saving	Recovery Period	Additional Benefits
Pool Blankets	$79,174	$67,514 per year	18 months from installation	Less pool chemicals and less indoor corrosion
Ultra Fine Filtration	$45,000 (upgrade)	$7,000 per year	3-4 years from installation	Improved water quality and patron comfort and less chlorine needed
Water saving showerheads	$4,540 ($110/head)	New strategy – unable to determine	Immediate	-
Diatomatius Filtration system	$1.1 million	New strategy – unable to determine	-	Less chemicals and cleaner water
Reverse Osmosis System	Depends on pool size – very expensive	Approx 52,000L per year	Very long	Environmental benefits and no need for sewage system

The installation of pool blankets, water saving showerheads and ultra fine filtration were found to be the most cost-effective water saving strategies. Again, as previously mentioned it was difficult for some centres to determine overall water savings as they are not aware of their water consumption within the centre.

While there have been initial problems with the installation of a reverse osmosis filtration system in Western Australian centres, similar initiatives in New South Wales have managed to overcome these issues. These centres demonstrate that when functioning the reverse osmosis systems can result in a significant water saving. The new South Wales example in the literature review highlights the need for adequate initial and ongoing training for the centre on how to operate and maintain the to ensure its success.

6.4 Patron and Staff Education

Majority of aquatic centres (61.5%) reported that they currently actively promote water saving strategies and reuse practices to their staff and patrons. The most common strategy used was stickers and signage promoting and encouraging patrons to limit their shower times (53.8%). Other promotions included staff workshops and encouraging staff to report maintenance issues quickly, to limit water loss through leaks etc.

It was noted that promotion of water saving strategies and reuse practices was more likely to occur in larger multi-purpose metropolitan aquatic centres, perhaps as they are more likely to be utilising such strategies and have more staff and patrons.

While there is some degree of education and awareness among staff and patrons in aquatic centres, it was identified in a number of case studies particularly regarding reverse osmosis systems, that there was a lack of supporting information and training. These factors resulted in some strategies taking longer to become functionally effective. This highlights the need for centres to not only create awareness of the strategies and practices being used, but also ensure that staff members receive adequate information and training to understand what the strategies are, how they work and why they are being used. This will enable them to pass on this information to centre patrons and ensure that strategies function efficiently and effectively.

7. Recommendations

The purpose of this research was to establish a best practice for water saving and reuse within Western Australian public aquatic centres. Given the difficulties obtaining data and the lack of knowledge and awareness regarding centres water consumption, it was decided that a series of recommendations for best practice was more appropriate. Five recommendations have been made as part of this report.

Recommendation 1: Water Consumption

Majority of centres did not know how much water their centre consumed on an annual basis. With little information and data on water consumption levels, managers are unable to determine areas of high consumption and if the various systems are operating efficiently or not.

All public aquatic centres should be more accountable and monitor their water consumption either through the use of sub-meters of water audits. This will enable centres to identify and prioritise water saving and reuse opportunities. This will also enable centres to accurately assess water savings from the uptake and installation of water saving and reuse strategies in their centre.

Recommendation 2: General Water Saving Strategies

Many aquatic centres are currently utilising a range of water saving and reuse strategies. Strategies including the use of pool blankets to minimise heat loss and evaporation, dual flush toilet systems, flow regulation devices in showers and basins and water saving showerheads have all been identified as cost-effective water saving strategies, which require minimal cost and maintenance. All aquatic centres in Western Australia should be implementing some if not all of these strategies to minimise water consumption.

Recommendation 3: Pool Filtration and Backwashing Systems

The installation of ultra fine filtration systems to reduce water consumption and maximise water reuse allows centres to backwash their pools more efficiently. These systems have been identified has being relatively cost effective to install and cause minimal disruption to centre facilities to install and maintain. Installation of these systems results in a reduction in the time taken to backwash the pool, less regular backwashing and higher water quality.

Centres, which have utilised this system, have reported significant decreases in water consumption and costs. Centres, particularly large centres where water consumption is high, should consider installing an ultra fine filtration system to minimise water consumption and wastage.

Due to the large costs, the installation of reverse osmosis filtration systems should be considered if centres do not have supporting sewerage systems as an effective strategy to reduce water consumption and improve water reuse. However, centres need to ensure they receive adequate training and information on how to operate and maintain the strategy for it to be effective.

Recommendation 4: Education and Awareness

Education and awareness of water saving and reuse strategies among staff and patrons is essential to ensure the effectiveness of any strategy implemented. Staff must have the knowledge of what strategies the centre is currently utilising to reduce water consumption and why they are being used. Staff should also be encouraged to promote the use of such strategies to centres patrons and the public where appropriate.

Centres also need to ensure that staff members responsible for the operation and maintenance of the systems are given adequate training and information which is readily available to them at all times to ensure they are able to operate and maintain the system efficiently and effectively.

Recommendation 5: Best Practice Strategies in Planning Stages

When planning for an aquatic centre, there are some important things to consider to ensure the centre will use water efficiently. Basic water saving strategies such as pool blankets to minimise heat loss and evaporation, dual flush toilet systems, flow regulation devices in showers and basins and water saving showerheads should be included in the facility design.

Technical water saving and reuse strategies should also be included in the planning and design for any aquatic centre. This will minimise any disruptions to patrons during the installation and may also reduce the cost of installation, as it can be included in the refit or building process. Ultra fine filtration systems, as previously mentioned are a cost-effective strategy that will reduce the amount of water usage and will enable the pool to be backwashed more efficiently.

Reverse Osmosis filtration systems should be considered if there is no current sewerage system at the location or if there are nearby large parks or grounds that require irrigation, reducing overall water consumption by the council. It is imperative if this strategy is utilised to ensure adequate information and manuals are obtained and that sufficient training is conducted with staff to ensure that it remains functional.

The information and results presented in this report will be disseminated to pool managers at the Leisure Institute of Western Australia 2006 conference. This presentation will be in conjunction with a representative of the Water Corporation who will discuss the importance of monitoring water usage and the assessment methods available such as sub-meters and water audits. This will give pool managers a clear direction of action to improve water usage within their centre.

8. References

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3. Government of Western Australia (2003), *A State Water Strategy for Western Australia – Summary Report,* Government of Western Australia, Western Australia

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APPENDIX A

INDUSTRY SURVEY

Best practice profile for public swimming pools – maximizing reclamation and reuse

INDUSTRY SURVEY

This survey is being conducted to assess the level of aquatic facility water usage and measures that have been implemented within the industry to minimise water consumption and maximise water reclamation and reuse.

Please take a few minutes to complete this survey, which will assist us in providing recommendations and a framework to the industry for Best Practice Water Management in Aquatic Facilities. All information is treated with confidentiality and in accordance with the Royal Life Saving Society Privacy and Confidentiality Policy.

Centre Name: _____

Contact Person: _____ **Contact Ph:** _____

Is your facility an indoor or outdoor facility?

Indoor Facility ☐

Outdoor Facility ☐

Both ☐

What is your annual Patronage?

☐ (Total Avg. Annual Figure)

Where is your centre located?

Metropolitan ☐

Regional ☐

What is the function of your facility?

Swimming Pool Only ☐

Multi-Purpose Facility ☐
(eg. Gym, Aerobics, Exercise Centre)

What is your current annual Water Usage?

Gigalitres per year ☐

$ per year ☐

Please outline the Water Facilities within your centre.

Pools	25m	☐	Vol.	☐
	33m	☐	Vol.	☐
	50m	☐	Vol.	☐
Spa	Vol.	☐		
Sauna		☐		
Showers		☐	No.	☐
Toilets		☐	No.	☐
Sinks		☐	No.	☐

Any other Water Facilities?

Do you currently implement Water Saving Strategies? *(Please tick if Yes)*

Pool Covers	
Grey Water Reuse	
Reuse of Backwash Water	
Shade Protection (Outdoor Only)	
Wind Protection (Outdoor Only)	
Dual Flush Toilets	
Flow Regulation (Toilets)	
Flow Regulation (Showers)	
Water Saving Shower Heads	
Auto Turn Off Taps (Showers)	
Auto Turn Off Taps (Sink)	
Technical Innovations (eg. Ultra fine filtration)	

Please Briefly Describe

_____

_____

_____

Water Capture

Do you store captured water? Yes / No **If yes, please answer the following questions*

How much do you store annually?	
How do you store it? (eg. Tank)	
What is it used for?	
Is the water treated?	

Patron and Staff Education

Do you currently actively promote water reuse/saving strategies to your patrons and staff? Yes / No

If yes, please describe

PREMIER'S WATER FOUNDATION

Royal Life Saving
THE ROYAL LIFE SAVING SOCIETY AUSTRALIA

LIWA
LEISURE INSTITUTE OF WA AQUATIC (INC.)

APPENDIX B

CASE STUDY TEMPLATE

Best practice profile for public swimming pools – maximizing reclamation and reuse

CASE STUDY TEMPLATE

The intent of this template is to guide the interviews of case study centres in regard to their highlighted water saving and reuse practices.

Interviewer: _____

Centre: _____

Centre Contact Interviewed: _____

Current Water Saving/Reuse Strategies

Based on the Industry Survey and our current knowledge of your facility, it is our understanding that you utilise these water saving/reuse strategies:

_____

_____

_____

_____

_____

Is this correct are is there any others we can add to this list?

_____

_____

_____

_____

_____

We'd now like to ask you a series of questions for each of the water saving/reuse examples you have highlighted. Let's start with _____.

The following series of questions needs to be asked for each water safety/reuse example provided.

Installation

How much did it cost to install the strategy?

_____

_____

_____

Did you have to close the pool to install? And, if yes, for how long?

_____

_____

_____

Who installed the strategy – outsourced or by the centre?

_____

_____

_____

Operation

Who currently operates the strategy? Did your current staff have the capacity to operate the strategy or did you need to employ expert staff?

_____

_____

_____

Was any specific training required? If yes, please describe. (Training and Cost)

_____

_____

_____

How much time does operating the strategy take away or save for their other roles within their position?

_____

_____

_____

How much does it cost from an operational sense to maintain?

_____

_____

_____

Maintenance

Has the strategy ever broken down? If yes, please describe.

_____

_____

_____

What is the effect on the centre when the strategy breaks down?
(eg. Centre closure, close one pool, close toilets?)

_____

_____

_____

Who is responsible for fixing the problem?

_____

_____

_____

Do you need to bring in expert assistance to fix the problem?

_____

_____

_____

Approximately how much does a breakdown cost the centre in regard maintenance cost, lost time, loss of patronage, pool closure etc.

_____

_____

_____

Are there many parts that need regular replacement and how much do they cost?

_____

_____

_____

Staffing and Training

Were you required to undertake training for all of your staff to operate this strategy?

_____

_____

_____

Did you conduct any awareness training for staff on this strategy?

_____

_____

_____

Have you undertaken any overall awareness training sessions for staff on water saving and reuse, how they can implement it and how they can promote it to the public?

_____

_____

_____

Patrons

Was there any impact on the public in installing the strategy?

_____

_____

_____

Has there been any impact on the public for maintenance of the strategy?

_____

_____

_____

Have you needed to “train” the public in the use of the strategy?

_____

_____

_____

Have you conducted any general public awareness on water saving and reuse?

_____

_____

_____

Water Consumption

How much water does the strategy save annually?

_____

_____

_____

When will it “Pay Back” (recoup it’s installation and maintenance costs)?

_____

_____

_____

Is any additional power required to operate the strategy? If yes, how much power and how much does this cost? If no, has there been a reduction – how much?

_____

_____

_____

Is any additional chemicals required to operate the strategy? If yes, how much chemicals and how much does this cost? If no, has there been a reduction – how much?

_____

_____

_____

General

Where is the greatest loss of water in your centre?

_____

_____

_____

Has there been any other benefits/negatives (spin-off’s) to the strategy?

_____

_____

_____

_____

Cost Analysis and Summary

Just to sum up…….

	Cost	Facility Disruption	Skills & Training	Additional Requirements (Power, Chemicals etc.)	Water Saved
Installation					
Operation					
Maintenance					
Staffing					
Patrons					
Overall Cost: $					
Overall Water Saved:					
Pay Back					