

A survey of park user perception in the context of green space and city liveability:
Lake Claremont, Western Australia.

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Abstract

This project was undertaken to gather information about visitors' experience and satisfaction levels across various established public open space features when visiting Lake Claremont, Western Australia. Within diminishing opportunities for acquisition of new public open space, the efficient management and continuous improvement of existing public open space sites is crucial. To gather the visitor information, an intercept survey (n=423) was undertaken revealing that a strong majority of visitors perceived the public open space as high performing and were very satisfied with most of the current public open space features. Using the Importance-Performance Analysis tool (IPA), the information collected was further interrogated to reveal areas where servicing levels at the site were not congruent with the visitors desires or expectations (over-servicing or under-servicing). This project reveals how this information can be used from a land owner/managers perspective to increase the efficiency of site management, help inform levels of service as well as direct future management decisions. This project can also act as a blueprint for the land owners/managers of other public open space sites to gather similar information, with the ultimate aim of improving the opportunity and quality of public open spaces with considered use of resources.

Research Declaration

I, Jacqueline Parker, declare that the Master of Environmental Science project thesis entitled 'A survey of park user perception in the context of green space and city liveability: Lake Claremont, Western Australia' is no more than 10,000 words exclusive of tables, figures, appendices, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Signature:

Date:

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Introduction and Research Context

Public open spaces, in many shapes and forms, exist all over the world. These spaces afford us many opportunities, such as chances to exercise, play sports, socialise, relax, learn, and experience nature. These spaces are beneficial for our psychological health, physiological health and have been shown to improve our outlook on life (Keniger et al. 2013; Conteh and Oktay 2016).

Wider social and environmental benefits are provided by public open space (Balram and Dragicevic 2005; Grose 2009; Nasution and Zahrah 2014; Van Den Berg et al. 2007; Hughes 2014; Bratman et al. 2012; Keniger et al. 2013; Cattell et al. 2008). These benefits include enhanced environmental management of underutilised or degraded natural assets, increased conservation efforts of new and existing public spaces and natural assets, micro-climatic advantages which helps to build resilience in highly urbanised cities, and habitat creation and/or improvement. Newton (2012) suggests that further development, utilisation and support of urban public open spaces, and alternative urban design opportunities, will contribute to building a future which is livable, environmentally sustainable and resilient.

With the continuation of population growth in cities, such as Perth, Western Australia, the opportunities for creating new public open spaces is limited. With lifestyles that are increasingly psychologically demanding, preliminary trends of climate variability already evident and increasing social disconnection; the protection and acquisition of quality public open space, has never been so critical (Keniger et al. 2013).

To cater for the current and future needs and desires of public open space users, a substantial effort must be made to understand how public open space sites are being used, the visitor perceptions while at the sites and how public open space

features contribute to a successful visit. With this information, the creation and ongoing management of public open spaces can be enhanced for the users.

A practical, efficient, and widely accepted technique to gain information pertaining to experience, expectation, satisfaction, and values is via social surveys. Social surveys have successfully been tried and tested across many disciplines and for many purposes. Questionnaire surveys allow for quantitative and qualitative information to be extracted from participants in an efficient way, which can then be later analysed (Dallimer et al. 2012).

This project utilises a custom designed survey to collect qualitative and quantitative information from park visitors to capture information about their visit, value placed on different public open space features, their perception of site management and overall satisfaction of the site. The site chosen for the project is Lake Claremont, Perth, Western Australia.

The way in which we choose to spend our recreational time is an important decision. In 2006, Australians reported having approximately four hours of leisure/recreational time every day (ABS 2006), however, not all time investments have the same return (Smith and Oyserman 2015). For example, individual differences aside, investing time into re-watching movies will not provide the same return as investing time building quality relationships with friends and family, experiencing nature or learning something new (Smith and Oyserman 2015). How we decide to spend our leisure time can impact our quality of life, the perception of the life we lead, the perception of the city in which we live, and our psychological outlook on life (Smith and Oyserman 2015; Lin et al. 2014).

Researchers such as Lin et al. (2014), posit that with increased urbanisation the understanding of urban public open space use is imperative to a happy, healthy and functional future for city residents. Lin et al. (2014) suggest that both the opportunity for public open space experience as well as the orientation of the space is crucial for the quality and quantity of the experience for visitors (Lin et al. 2014). This means that we need diverse public open space sites that are available for us, both in proximity and as well as fair/equal access.

When determining the *quality* in quality public open space, the following seven areas appear consistently throughout current literature in the urban public open space domain; functionality, fair and equitable access, conservation and environmental education, water sensitive management, meeting social needs, infrastructure and amenities (Villanueva et al. 2015; Irvine et al. 2009; Giles-Corti et

al. 2005; Antognelli and Vizzari 2017; Shanahan et al. 2015; Taylor et al. 2011). The level of performance of public open space features gives an indication of the overall quality of a location. Examples of high performance among features may include consistent universal access across the site including infrastructure (picnic tables, playgrounds), use of water sensitive turf and plants, and a practicable site layout with installations that meet the current needs of site users. Each of the seven areas above contribute to the visitor experience of a public open space site. Together, it is agreed that they create a foundation of the visitation experience of a typical urban public open space (Villanueva et al. 2015; Irvine et al. 2009; Giles-Corti et al. 2005; Antognelli and Vizzari 2017; Shanahan et al. 2015; Taylor et al. 2011). Understanding the experience and expectations of public open space users is essential for quality site management and planning, continuous management improvement, increasing and supporting current patronage as well as to draw any conclusions of how these spaces are psychologically and physiologically affecting users.

In addition, factors harder to quantify, and measure, also affect visitor's nature experience and urban public open space experience. An example being 'tranquillity'; the tranquillity of urban public open spaces has been linked with psychological and spiritual benefits (Watts 2017). Watts (2017), developed a tool known as *Tranquillity Rating Prediction* with the purpose of measuring the level of man-made noise as well as the existing natural elements of public open space (Watts 2017). Based on this research it is suggested that tranquillity can be created and enhanced; ultimately controlled by limiting human made noise such as traffic, improving aesthetics such as increasing tree planting, installing natural features such as ponds and lakes, and reducing aesthetically displeasing elements such as rubbish (Watts 2017). Increasing the tranquillity of public open spaces has been found to increase the performance of a site and likely increase the level of satisfaction experienced by visitors (Watts 2017).

The concept of city 'liveability' emerged in the 1980's, and refers to the quality of citizen life determined through the assessment and ranking of potentially influential characteristics (Jones and Newsome 2015; Okulicz-Kozaryn 2011; Newton 2012). These characteristics are reported to include, but are not limited to, climate comfort, quality of and access to education, cost and availability of housing, quality of and access to health care, stability of political systems, quality of and access to public transport and affirmation of human rights. These characteristics are assigned a value then consolidated into a final score which is ranked against other

cities around the world. Currently, two prominent global city liveability scales are produced annually; one by the Economic Intelligence Unit (EIU) based across Britain, and the second by Mercer based in London. Both liveability scales feature in prominent media reporting and are utilised in selling the attractiveness of a city as a place to live (Jones and Newsome 2015).

Cities with high ranking liveability scores are sought after and can provide wider social and economic benefits. These benefits can include foreign business and housing investments, local and international economic stimulus, increased local community involvement and an increase in individuals' sense of pride (The Value of Rankings and the Meaning of Liveability 2014), and an increase in tourism (Newton 2012). These benefits are particularly important to cities that rely on international economic stimulus (such as tourism) rather than local economic stimulus (such as retail).

The perception of city liveability is as important as the reported ranking of city liveability. Citizens that perceive a city to be highly liveable are more likely to engage, experience and enjoy the benefits that the city can offer (Jones and Newsome 2015; Okulicz-Kozaryn 2011). Understanding what contributes to the perceptions of city liveability is essential if a true and equitable concept of city liveability is to be realised. Currently the subjective elements, such as opportunities for nature experiences, environmental education, and opportunities for visiting quality public open spaces are under-represented (Jones and Newsome 2015). This may be due to the poor understanding of these elements, the difficulty in quantifying and assigning a score, and the difficulty in verifying their associated performance. The subjective elements that may contribute to city liveability could include how a city protects fragile ecosystems, answers to climate change, funds environmental education programs, and addresses resource recovery and waste. It is posited in this thesis that the presence and prevalence of high quality public open spaces are a contributor to the perception of city liveability.

The capital city of Western Australia, Perth, has a population of 2.59 million people (Australian Bureau of Statistics 2017) and consistently features among the world's most liveable cities (Jones and Newsome 2015; Economist Intelligence Unit 2016), making Perth a suitable liveability research location. Perth has not always valued and protected natural assets such as wetlands and open water bodies (Government of Western Australia 2016; Simpson and Newsome 2017). Pre-development/colonisation, Perth featured an extensive network of wetlands

(Government of Western Australia 2016) and since the 1820's, many of these wetlands have been lost to development and ever-expanding infrastructure (Government of Western Australia 2016).

Lake Claremont, the chosen study site, is located 10 kilometres South West of the Perth CBD. The mixed-use (passive, active and natural areas) site covers approximately 60 hectares and under the WA Environmental Protection Policy (1992) Lake Claremont is listed as a Conservation Category Wetland. Lake Claremont is also a nominated Bush Forever site by the Government of Western Australia and protected via the Wetlands Conservation Policy through the Environment Protection Biodiversity Conservation Act 1999. Lake Claremont is a multifaceted open space and includes major revegetation efforts, a golf course, playgrounds, open turf spaces, a dog exercise area, BBQ facilities and is a local biodiversity hotspot (Simpson and Newsome 2017). Lake Claremont is unique in its contribution to the local and wider community providing many recreational opportunities which are carefully balanced with (competing) conservation values (Simpson and Newsome 2017). Due to its inner-city location, high patronage, and mix of natural and anthropogenic values, Lake Claremont is a valuable public open space research site.

Despite large scale visitor satisfaction surveys pertaining to urban wetlands being limited in the current literature, the recognised benefits of surveying are extensive. These benefits include better decision-making capabilities, strengthening support for infrastructure installations, upgrades, removals and prioritisation for land owners/managers, facilitating better environmental, conservation and educational outcomes, better meeting the needs and desires of the site users and enhancing opportunities for mental and physical wellbeing (Jennings 2001).

When determining the appropriate research questions for this project, several considerations were made. Firstly, the research must contribute to an improved approach to public open space management. Secondly, visitor information must be efficiently collected, analysed and interpreted to provide meaningful, insightful and previously unknown information to inform better management of the site. Lastly, the research must be suitable for replication at other sites to allow for comparison analysis and/or benchmarking.

Based on these considerations, the following research questions were selected for the project:

1. How satisfied are visitors with the Lake Claremont site?

2. Do visitors regard Lake Claremont as a high quality public open space?
3. Does high quality public open space increase the perceived liveability of Perth as a city for visitors at Lake Claremont?

To provide clarification within the context of this paper, the following terms are defined as follows:

Experience: The observation of or participation in events.

Perception: Using the senses or mind to assign value or experience to.

Expectation: Looking forward to or anticipating something.

Importance: The degree of significance placed on an item.

Satisfaction: The level of fulfilment of a need or want.

Performance: The efficiency in which something fulfils its intended purpose.

Targeted Literature Review

It is estimated that around 54.5% (4.05 billion) of the world's population currently live in cities. By the year 2030, this figure is expected to increase to 60% (5.1 billion) (United Nations 2016; United Nations 2015). Living in highly urbanised environments can result in diminished opportunities to experience nature, and the associated benefits. Public open space sites within urbanised areas are therefore crucial to arrest any further disconnect between individuals and nature (Sogaa et al. 2015). Researchers such as Sogaa et al. (2015) advocate for the need to increase the value placed on quality public open spaces, particularly in highly urbanised areas, to halt the disengagement of people with the surrounding natural world.

Australia is not immune from the challenges presented by urbanisation and population growth. Australia is the seventh largest continent in the world and is home to over 23 million people. The majority of Australians live in cities on the south-western coast and the south-eastern coast. Australia's population has been steadily increasing by 2-3% annually (ABS 2013). This population growth is based on both natural increase (aging population, higher birthing rates) and migration (ABS 2013). Perth, as a city, now expands over 200kms in length with a population of over two million people (ABS 2013). Expansion in Perth is currently based upon increasing living densities as well as furthering the urban sprawl.

In 1955, a report titled 'Plan for the Metropolitan Region Perth and Fremantle' (also known as the Stephenson-Hepburn Plan) proposed the

requirement of 3.36 hectare of public open space per every 1000 people. In more recent times, this proposed requirement has been translated into a figure of 10% of land development being allocated to public open space. This percentage features in current Western Australian planning policy (Western Australian Planning Commission 2002) and gains a mention in the Department of Sport and Recreation guides (Department of Sport and Recreation 2013). This 10% public open space requirement has acted as a guide for developing suburbs and has been achieved in many instances. As population densities increase, this 10% allocation is becoming strained, in some instances this allocation no longer accommodates the local needs (such as planned and unplanned sports) and in other cases is now unachievable where the correct planning provisions were not made (Grose 2009). The strain on public open space availability is coupled with the trend of reduced size backyards, ongoing bushland clearing and continued sprawling development of cities (Grose 2009); all factors limiting opportunities for local recreation and outdoor activities.

At the same time, public open space research is receiving more attention by scholars, health professionals, planners, urban designers and citizens. Tangible and intangible benefits are realised from quality public open spaces; some well understood, and some poorly understood. Significant psychological, physiological and environmental benefits of public open space have been well documented (Dallimer et al. 2012).

When exposed to the natural environment and urban public open spaces, we experience a change within ourselves; our psyche. Multiple psychological, physiological and biological factors are responsible for this change (Balram and Dragicevic 2005; Grose 2009; Nasution and Zahrah 2014; Van Den Berg et al. 2007; Hughes 2014; Bratman et al. 2012; Keniger et al. 2013; Cattell et al. 2008). Quantifying these factors has been a focus for neurophysiologists and sociologists, to better understand our responses and to facilitate the natural, organic benefits that public open space provides. Engaging with the natural environment allows us to connect with ourselves, with others, to experience wonder and to inspire us which represents a marked psychological change (Cracknell et al. 2016). In a time that we are highly connected through rapidly progressing technology and highly demanding and competitive working environments, capitalising on opportunities to engage with the natural environment for psychological benefit has never been so important (Cracknell et al., 2016).

Research into physiological improvements of individuals who engage with the natural environment is rapidly progressing. An increase in physical activity, improved physical fitness, improved cardiovascular health and an improvement in children's agility and spatial negotiation skills are just some of the documented benefits (Public Open Space 2017; Nasution and Zahrah 2014). Researchers such as Gladwell et al. (2013), advocate that exposure to nature and nature experiences has physiological (and other) benefits for individuals such as stress reduction, improvements in mood, restoring mental fatigue and changing the perception of we have of our own physiological health. It is also suggested that exercising within the natural environment requires lessened exertion when compared to exercising indoors (Gladwell et al. 2013).

Findings from a study in Japan by researchers Li et al., (2011) are congruent with Gladwell et al. (2013) (United Kingdom), which found that those who partook in physical activity within a *forest environment*, which Spechet (1970) defined as an area with 30% or more canopy cover, tended to exhibit significant physiological improvements in immune function, a reduction in stress hormones, fatigue and the sympathetic nervous system function, and showed an increase in the parasympathetic nervous system function. The participants of this research were reported to have experienced these benefits after spending only two hours in a forest environment (Li et al. 2011).

Cracknell et al. (2016), presents the idea that bodies of water can make us happier, healthier, more connected and better at what we do. They state that water assets of all descriptions; natural (rivers, lakes, oceans) and man-made (fountains, water playgrounds, features) can produce a calming, peaceful and unified mental state which in turn increases one's general sense of happiness and satisfaction with life in that moment. Cracknell et al. (2016) describes water and nature experiences as a natural, organic medicine that can reduce stress, increases creativity and facilitates close relationships. The awe and wonder that individuals can (often) experience while being near to water bodies (natural or made-made) is said to begin the psychological and physiological response which is where the benefits are derived.

Applying the systematic quantitative literature review techniques, a total of 75 original, peer reviewed papers on public open space and city liveability were identified. Several trends were identified in the reviewed papers; 43% proposed a new tool or methodology (new public open space quality assessment tools, new

data collection methods or suggested improvements to existing liveability and public open space assessment tools). A large 87% reported the use of qualitative data collection methods (surveying with open ended questions, in-depth interviews with participants, observations and focus groups) and 73% reported the use of quantitative data collection methods (observations/recording of frequencies, surveying with scales or closed questions and computer generated data). It was noted that 40% of the papers utilised GIS technology, 89% focused on social aspects (sense of community, social needs, social issues, social services and issues that are people focused), and 67% on health and wellbeing (community health, personal health, physical health, mental health and trends of improving or declining health populations). Additional focus areas/concepts that were engaged in by the authors of the papers reviewed, included Quality Open Space (65%), Liveability (65%), Environmental and/or Ecological (59%), Planning and/or Policy (56%) and Economic (52%).

Confidence in connecting contributing factors to increased city liveability is difficult, which in part explains the lack of clear data summarising the objective liveability elements as well as the subjective elements. Of the 75 papers assessed, 57% suggested a link between Quality Public Open Space and increased City Liveability and 40% suggested a link between Biodiversity and/or Ecological Opportunities and increased City Liveability. The remaining four items were recorded as follows; Public Open Space Infrastructure 33%, Easy Access to Public Open Space 32%, Walkability 19% and Tree canopy cover 17%.

In regards to the research effort on public open space and city liveability, 37% of papers claimed there was a lack of research around their chosen focus and/or topic. A further 35% of papers also suggested further research is required and made various recommendations as to the direction the research should take. This information is important when determining the current research/knowledge status of the discipline and future research that is required to progress the discipline in a measured and quality driven way. The papers found on public open space and city liveability were contained within a variety of disciplines. This demonstrates that this emerging field must be viewed as being multidisciplinary in nature with the need to derive learnings and existing research from the various disciplines.

For the purpose of this study, the researched reviewed assisted in identifying important public open space features that contribute to an individual's perception of their public open space experience. These identified features assisted in the

creation of the survey used within this project to test the values, views and satisfaction levels of participants. The features were grouped into the following seven categories with assertions of how the performance of the feature can be assessed;

Functionality

The space caters for the needs of those in the local catchment area as well as those in wider catchments. The public open space facility can provide multiple functions that work seamlessly together, including recreation spaces, playgrounds, meeting spaces, nature spaces and relaxation spaces.

Fair and equitable access

All patrons have access to the public open space facilities in both distance to and from public transport/parking facilities and universal access needs. Effective connectivity exists between local and regional public open spaces to support the use of sustainable movements as well as creating vital fauna linkages (canopy cover of trees, appropriate tree species selection).

Conservation and environmental education

Quality interpretive information on conservation and environmental issues are provided and considered throughout the lifespan of the space. This information is presented in a way which is easily understood by a range of demographics and is designed to fit specifically within the context of the space.

Water sensitive management

Water resources are responsibly managed to support and allow for ongoing quality public open space maintenance. Water sensitive management actions occur including water saving irrigation design and technology, using low water demand turf/plants, grouping areas within the public open spaces based on water requirements and using water saving horticultural practices where practical.

Meeting social needs

Formal and informal facilities are provided to support and encourage park patrons to socialise in a safe and secure space. Social needs are met within a changing population and the needs of a wide demographic are catered for.

Infrastructure

Paths, fences, lighting, playgrounds and other installations are maintained to a high standard and are seamlessly upgraded as they meet the end of their useful life. Existing infrastructure provides a safe environment for patrons to effectively realise the benefits of the space.

Amenities

Toilets, drinking facilities, barbeque and furniture installations are accessible to park patrons and meet the desires and needs of the patrons.

Methodology

The literature review contained in this thesis, guided by Pickering and Byrne (2013) (methodology included as Appendix 4), was undertaken to appraise the current research and knowledge around quality urban public open space, visitor satisfaction findings, visitor experience information and noted public open space contributions (social, economic, and environmental). The literature revealed several (somewhat) universally recognised park features, such as access paths, open turf areas, seating, infrastructure, and playgrounds. These universally recognised park features were assessed in terms of their presence and suitability of use at the Lake Claremont site, and assisted in the construction of the social survey.

Twenty-two park features were selected for the survey after consideration was given to the context of the research site. Each feature selected was used to test the survey participants' perceived importance level as well as performance level. Analysing this information enabled the establishment of user satisfaction indices of these features, as well as the site as a whole. Utilising universally recognised park features allows for enhanced application of this research as well as any potential future comparative research across similar sites.

A Power Analysis was undertaken prior to surveying to ensure sufficient participant numbers would be achieved to allow for suitable inference from the results (Francis and Garing 2013). It was determined that 259 participants were required to be 90% confident of detecting correlations of 0.02 for questions on a Likart Scale. A lesser number of participants were required in order to undertake meaningful analysis of the open-ended questions (Francis and Garing 2013).

The custom-made survey consisted of eighteen questions, six were Y/N or a prescribed tick box, seven were to be rated on a five-point Likart scale and five requested a short answer response.

A Human Ethics Permit (permit number 2016-213) was obtained from the Murdoch University Ethics Committee prior to the commencement of surveying. The 'pen and paper' survey (Appendix 1) was undertaken over seven surveying events between December 2016 and February 2017, with 423 visitors choosing to participate (a number well above the minimum power requirement).

Visitor surveys were undertaken at differing times of the day, across week and weekend days to limit the potential for response bias and cognitive bias (i.e. elevated response of participants during the festive season or weekends in comparison to day-to-day life). The survey did not contain identifying information and all information provided in the survey was kept confidential. Completed surveys were then input into an electronic database suitable for analysis.

Standard confidentiality information (Appendix 2) was provided to participants prior to undertaking the survey, and participants were advised that they may discontinue the survey at any time. An information slip (Appendix 3) was produced for participants to take and there was an opportunity for participants to provide contact details to be sent the survey results.

The tools used for analysis of the information collected in the surveys included simple proportion calculations confirmed with a Chi-Squared test, significance testing to 0.02 and Importance-Performance Analysis (IPA). IPA calculates the satisfaction of an element or component (in this case park feature) by plotting the importance rating against the performance rating (Taplin 2012).

Results

Data analysis was approached in two ways; descriptive statistics and IPA. The descriptive statistics was critical to understand site visitor demographics, their participation behaviour while on site, and their attitudes towards public open space contributions; which were placed on Likart Scales. The IPA was critical in analysing visitor perceptions, importance ratings and satisfaction ratings connected with 22 park features to allow the determination of overall site performance.

Part One – Descriptive Statistics

Demographically, the participants comprised 242 females (57%), 161 males (38%), and 20 participants (5%) who gender identified as 'other'. The gender distribution described above differs from pre-established local (ABS 2015¹) and regional (ABS 2015²) demographic data sets, in both cases this difference is statistically significant (Figure 1).

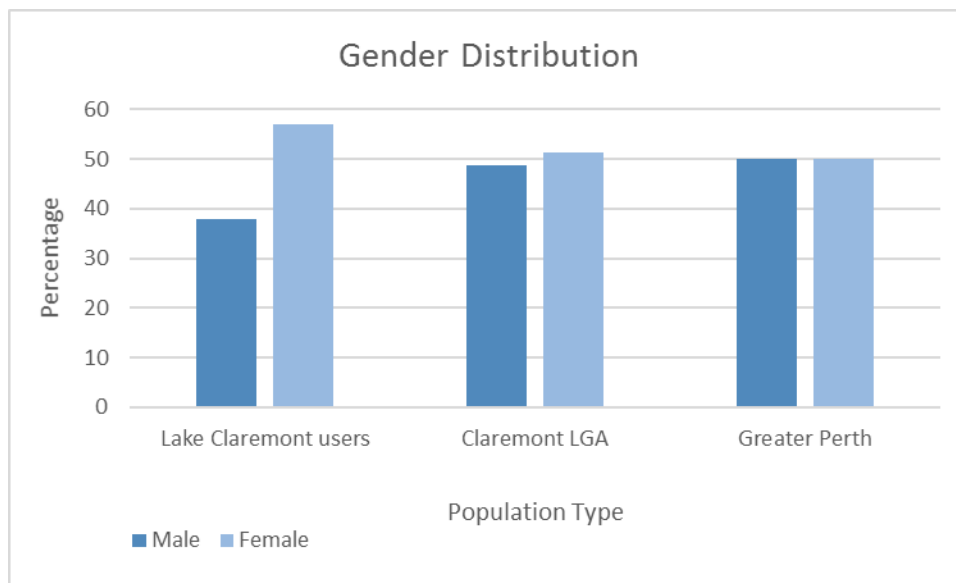


Figure 1. Gender Distribution.

The most common age range of participants was 45-54 years (26%), followed by 65+ years (25%). The age distribution of participants differs from the local (ABS 2015¹) and regional (ABS 2015²) demographic data; both are statistically significant. This reveals that there are aspects of the site (or surrounds) drawing an older population to visit which will be expanded upon in the discussion section of this paper.

Most visitors (n=381; 90%) reported travelling less than five kilometres to get to the Lake Claremont site (Figure 2), with 151 participants (36%) having travelled from Claremont, 84 (20%) from Mount Claremont, and 83 (20%) from Swanbourne. Another 86 participants were visiting from a further 48 suburbs across the Perth Metropolitan, 14 across national Australia and five were international visitors.

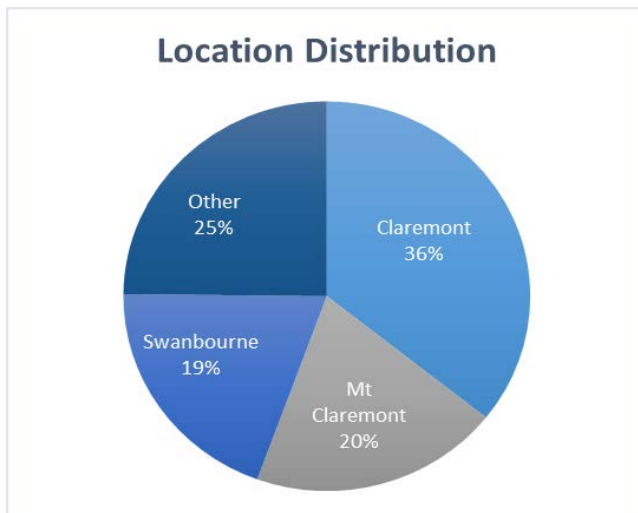


Figure 2. Location Distribution.

Based on the demographic information collected in the survey, the most common user of Lake Claremont is identified as female, between the ages of 45-54 who has travelled less than five kilometres to the site.

A range of activities were undertaken as part of the participants visit on the day of the survey (Figure 3), with 28% of people engaging in exercise, 14% in relaxation, 13% in on-leash dog exercise, 10% in bird watching and 9% in off-leash dog exercise. The visitor participations rates among activities will be addressed in the discussion to capture the implications of this data for site management.

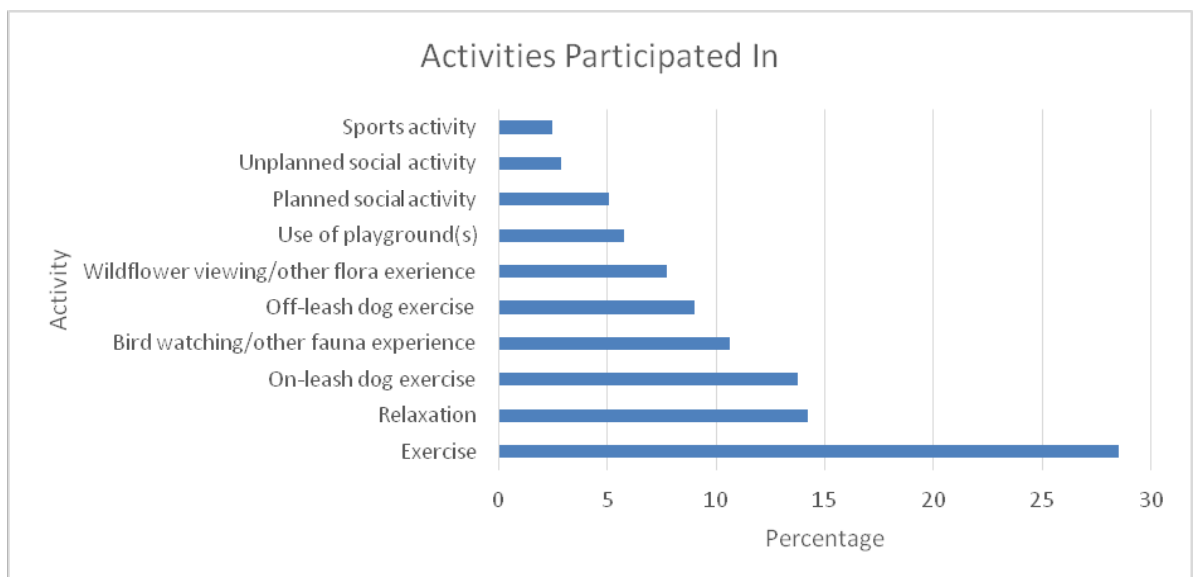


Figure 3. Activities Participated In.

Part Two – Importance Performance Analysis

Importance Performance Analysis (IPA) is a tool that has been utilised in this project to analyse two different dimensions of the same feature against one another to arrive at a score which can then be analysed for meaning; in this case the different dimensions are importance and performance of public open space features present at the Lake Claremont site. IPA has been used to assist in revealing the overall performance of the Lake Claremont public open space site and the satisfaction level of visitors at Lake Claremont.

Each park feature in the satisfaction section of the questionnaire was rated on a five-point scale; 1 not at all satisfied, 2 not very satisfied, 3 somewhat satisfied, 4 very satisfied and 5 extremely satisfied. The mean was calculated of participants' raw satisfaction scores for each park feature. These means ranged from 3.05 to 4.05. A mean score of 2.5 is neutral. The high mean satisfaction figures of between 3.05 and 4.05 demonstrate that overall participants were satisfied with the standard/delivery of each of the 22 features listed (Table 1) in the survey for the Lake Claremont site. Expressed as a percentage format, the satisfaction of participants ranged between 61% and 81%. This reveals Lake Claremont is perceived to be a high quality/well performing public open space.

Table 1: Public open space features used in survey, showing mean satisfaction scores and mean importance scores. Feature numbers also relate to the labels of data points shown in Importance-Performance Analysis figures below.

Feature Number	Feature	Mean Satisfaction	Mean Importance
1	Availability of shade (trees or structures)	3.93	4.16
2	Bird watching infrastructure (observation deck, rotunda)	3.73	3.41
3	Children's playground(s)	3.72	3.57
4	Directional signs within the park	3.52	3.27
5	Dog exercise area	3.29	3.80
6	Ease of access to and around the site	4.05	4.11
7	Fencing	3.65	3.38
8	High quality European/English themed spaces and areas	3.55	2.69
9	High quality infrastructure (paths, lights, toilets, BBQ, benches)	3.36	3.81
10	High quality lake water body	3.58	4.30
11	High quality nature spaces and areas	3.92	4.33
12	High quality services (café, gym, golf club)	3.72	3.69
13	High quality turf	3.68	3.31
14	Interpretive information and signs	3.51	3.53
15	Native fauna presence and activity	3.87	4.38

16	Off-leash dog exercise	3.05	3.61
17	On-leash dog walking	3.72	3.82
18	Other sporting installations	3.77	3.50
19	Par 3 Golf Course	3.49	3.01
20	Park exercise equipment	3.63	3.46
21	Personal safety	3.93	4.28
22	Tree management	3.91	4.39

Along with the mean scores of participants' satisfaction, the mean was calculated for the level of importance participant's placed on the same 22 features (Table 1). These satisfaction and importance means were plotted against each other in an Axis Centred IPA (Figure 4) with all items but one falling into the top quadrant (Keep up the Good Work). This suggests that visitors regard Lake Claremont as a high quality public open space (Figure 4.).

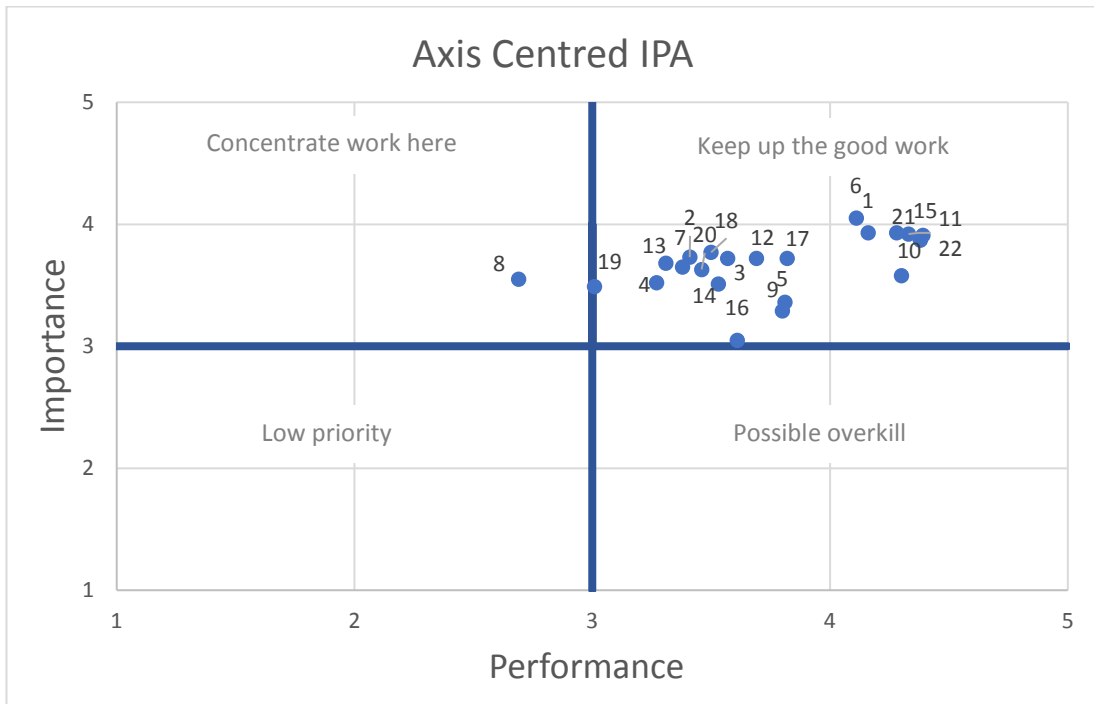


Figure 4. Axis Centred IPA.

In answer to the research question 'Do visitors regard Lake Claremont as a high quality public open space?', the high mean satisfaction results suggest that visitors do regard Lake Claremont as a high quality public open space.

Further quantifying visitor satisfaction levels based on the quantitative information provided in the survey during visitation however is complex. Reasons for this complexity include the variability of responses, variance in participants understanding and familiarity of the site, participants contrasting values and

opinions, and participants ability to articulate their responses in an immediate timeframe (while filling in the survey estimated to take five to ten minutes). For example, first-time visitors to the site that were intercepted early within their visit are likely to respond differently to someone who is well acquainted with the site when asked questions about perceptions of management across specific features. Similarly, the definition of poor, good and excellent may differ between participants which may affect responses.

With considerations made to the results of the Axis Centred IPA (data spread on evenly distributed axes), a Data Centred IPA (data spread on axes that uses scales appropriate for the data spread) was produced (Figure 5), which provides a finer scale insight into the satisfaction reporting's for the 22 selected features (Table 1). A general principle of IPA is that importance reporting's and performance reporting's should produce a linear relationship (Taplin 2012). The stronger the lineal the relationship, the higher the match between performance and importance; ultimately resulting in a higher level of satisfaction (Taplin 2012). A gap analysis (actual data point minus the anticipated data point, i.e. how far the data point is from the lineal line) was produced for the 22 features investigated in the survey (refer Figure 5). Seven features showed a strong linear relationship and 15 showed a statistically significant deviation from the lineal line (Table 2). Based on these results, it is the 15 deviating items that require further investigation, particularly from the perspective of informing management (refer Table 2 for suggested prioritisation).

The gap analysis (Figure 5) has allowed the 15 deviating features to be categorized into two groups; those that deviate in performance (positive gaps) and those that deviate in importance (negative gaps). Positive gaps indicate that the item is being under-serviced, negative gaps indicate that the item is being over-serviced. In a management sense, this assists in prioritisation which is suggested to begin with paying attention to the negative gaps, and then working through to the positive gaps (Taplin 2012) (considered further in the discussion). However, quality prioritisation requires a holistic approach to incorporate other factors in the decision-making process such as financial, social, cultural and political implications and constraints as well as ecological values and environmental services.

In answer to the research question, 'How satisfied are visitors with the Lake Claremont Site?', overall visitors are satisfied with the site. Visitors report that they are very satisfied with seven of the 22 park features (refer Table 2) while there is

some room for improvement on the remaining 15 features (refer Table 2) by adjusting the level of service. For example, data points in the bottom right hand corner grid square (refer Figure 5) can be assessed for the viability in reducing resources or service levels in this area. Such actions may bring these points closer to the lineal line and therefore improve the overall satisfaction for these items from a visitor perspective.

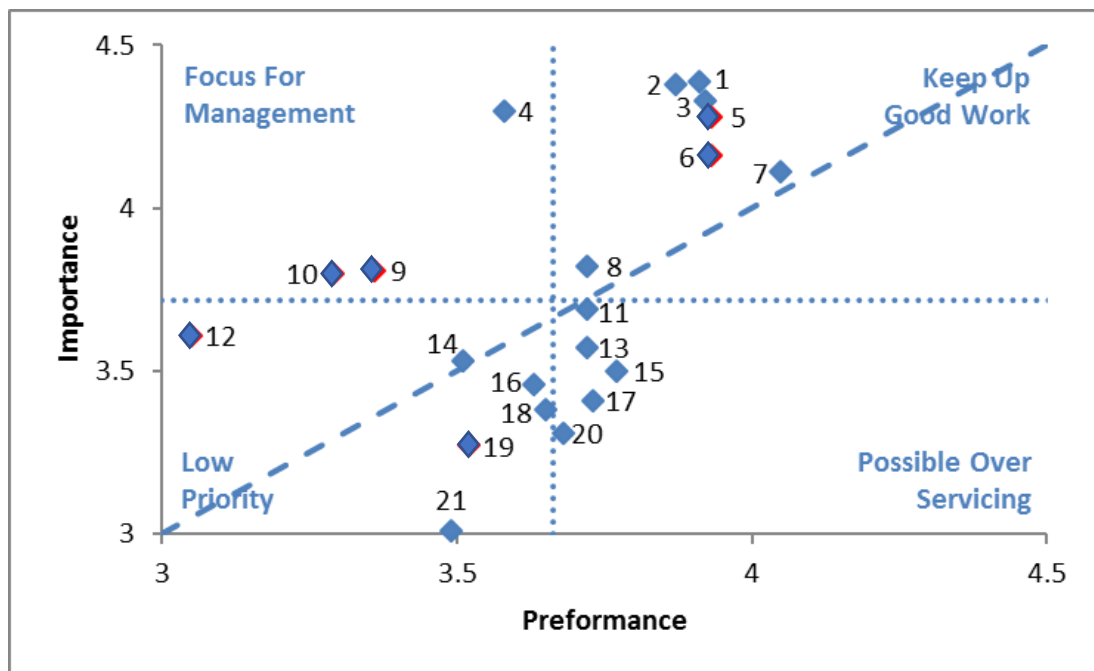


Figure 5. Data-centred Importance-Performance Analysis.

Table 2: Prioritisation for management action/investigation of Public Open Space Features, Ordered by Gap Analysis. Feature numbers relate to the labels of data points shown in Table 1.

Features with a significant correlation between Importance and Performance ordered by priority for management investigation/action (Valid IPA).		
High: Importance exceeds Performance	Medium: Performance exceeds Importance	Low: Performance matches Importance
4. High quality lake water body (-0.72)	21. Par 3 Golf Course (0.48)	1. Tree management (-0.48)
3. High quality nature spaces and areas (-0.51)	20. High quality turf (0.37)	2. Native fauna presence and activity (-0.51)
8. On-leash dog walking (-0.10)	17. Bird-watching deck/rotunda (0.32)	
7. Ease of access to and around the site (-0.06)	18. Fencing (0.28)	
14. Interpretive information and signs (-0.02)	15. Aquatic Centre/Cresswell Oval/Tennis Club (0.27)	
	16. Park exercise equipment (0.17)	
	13. Children's playground(s) (0.15)	
	11. High quality services - café/gym/golf (0.02)	

Further investigation required before management action taken as inconclusive relationship between Importance and Performance (Unreliable IPA)		
Importance may exceed Performance	Performance may exceed Importance	Performance may match Importance
12. Off-leash dog exercise (-0.56)	5. Personal safety (0.36)	
10. Dog exercise area (-0.51)	19. Directional signs within the park (0.25)	
9. High quality POS infrastructure (-0.24)		
6. Shade availability – trees/structures (-0.23)		

The survey asked participants whether nature spaces contribute to improved city liveability; 263 (62.1%) participants extremely agreed with this statement, 125 (29.5%) strongly agreed and 25 (6%) agreed. Only 10 (2.4%) participants did not agree or did not answer. Furthermore, participants were asked whether Lake Claremont, a location that has been determined as high quality, influenced the way in which they viewed the Claremont area as a location; 143 (33.8%) participants extremely agreed, 190 (44.8%) participants strongly agreed and 57 (13.4%) agreed. A small number of 34 (8%) participants did not agree or did not answer.

In answer to the research question ‘Does high quality public open space increase the perceived liveability of Perth as a city for visitors of Lake Claremont?’, for a significant majority of participants, nature spaces made a strong contribution to their perception of city liveability. Lake Claremont, as a high quality nature space, was also confirmed to have influenced the way in which they viewed Claremont as a location. Based on these responses, it is concluded that the majority of the participants that partook in the survey believe that high quality nature spaces increase the perceived liveability of a location.

Discussion

Prominent researchers in this field tend to agree that understanding user experiences, expectations and satisfaction levels whilst visiting a site is of great value to land owners/managers (Lin et al. 2014; Child et al. 2014; Matsuoka and Kaplan 2007; Johnson and Glover 2014). Meeting user needs and desires (physical, psychological, spiritual), as well as providing abundant social, economic, and environmental opportunities, is a primary purpose of public open space (Child et al. 2014). Creating and enhancing the synergy between users and land owners/managers is necessary to improving approaches to management. Striving to

adjust and adapt to the evolving needs and desires of site users is difficult, however paying attention to this represents a best practice approach.

Implications of results

As revealed in the results section, the age distribution of the survey participants did not match the current local or regional distributions, as confirmed by Australian Bureau of Statistics (ABS 2013; ABS 2016). The age of the survey participants was moderately skewed towards an older population. This may indicate that the site provides features/items that are responsible for drawing an older population to visit. Researchers such as Johnson and Glover (2014), suggest that passive park elements, such as resting spaces, viewing infrastructure and features that support flora and fauna experiences are more likely to draw in an older population. The results found at Lake Claremont may also indicate that older populations dedicate more time to visiting public open space sites, such as Lake Claremont, or that the amount of leisure/recreation time is higher for this population. To be confident that any of these factors being relevant in this instance, further investigation would be required. Further investigation may also reveal unknown factors that assist in explaining this skewed age distribution. Having a known prevalence of older visitors has certain implications for management of the site. Items such as safe access, correctly graded paths, support rails and more passive park features may require higher levels of service or prioritisation. Items that engage younger populations may not be in high demand, therefore demanding a lower level of service.

The gender distribution of the surveyed population was also moderately skewed towards females. The gender distribution did not match current local (ABS 2015¹) or regional (ABS 2013) distributions. With more females visiting the site than males, this may indicate that values and choices made towards leisure/recreation activities differ between males and females. This trend has been found among some studies, such as Siu et al. (2012), however is not widely confirmed. The results found at Lake Claremont may indicate that females have more leisure/recreation time than males, or that features at the site are responsible for drawing in more females than males to visit. To be confident in any factors that may be responsible for this finding, further research is required. With more females visiting the site, this has certain implications for management. Items such as sense of safety, lighting, seating, and other infrastructure may require higher levels of service.

Understanding the demographic information of urban public open space visitors is valuable on several levels and this value can be realised through:

1. Ensuring the strategic direction and future planning of the POS by the land owner/manager is aligned and congruent with the site users;
2. Considering the current strategic direction for the POS and to better allow for estimates of future visitor demographics;
3. Assessing proposals for infrastructure installations, upgrades, removals and prioritisation;
4. Assessing maintenance/operating budgets and their ability to service the needs and desires of the site users; and
5. Creating the basis for further investigations, such as quantifying and qualifying the importance and satisfaction levels of the site users.

The activities that visitors participated in while on site are important to consider. As revealed in the results section, most visitors were exercising with a large portion participating in dog on lead and dog off lead exercise (refer Figure 3). This information is important when considering the availability, service levels and opportunities for features in these high use areas. For example, with the highest portion of visitors participating in exercise, it is essential to carefully examine the exercise opportunities on site to ensure sufficient servicing/facilities are provided. Further information is then required to consider value, satisfaction, and perceived management of these facilities. Information on activity engagement can be useful when undertaking cost-benefit analysis of future infrastructure proposals or installations.

By utilising the Axis Centred IPA tool, it was possible to view the performance of site features which give an indication of overall satisfaction of site visitors during their visit. As the Axis Centred IPA matrix is separated into four quadrants, it is easy to separate the performance into four categories; 'Low Priority', 'Concentrate Work Here', 'Keep up the Good Work' and 'Possible Overkill'. This is relevant to management and service regimes and should be carefully considered. As can be seen in this survey, no items fall into the 'Low Priority' category. One item falls into the 'Concentrate Work Here' category (Figure 4) – titled High Quality English/European Style Gardens. This feature yielded the lowest number of participant responses and required the highest need for clarification by participants while undertaking the survey. For this reason, it is believed that the importance and

performance figures for this item may be unreliable. All remaining items appear in the 'Keep up the Good Work' category. Thus, as demonstrated, this tool can provide site managers an effective and simple way of undertaking an analysis of performance at the site to better inform resourcing and service levels.

The Data Centred IPA tool uses a different approach to take a closer look at each individual data point. A gap analysis illustrates how far the item sits from its expected position (expected position is shown in Figure 5 as the lineal line). When using IPA, Taplin (2012) states the larger the discrepancy is between the importance and performance ratings, the lower the satisfaction is likely to be for that item. Again, the Data Centred IPA matrix is split into four categories, however within this analysis the data points have a wider spread across the matrix. The position of data points within the matrix can assist with prioritising areas for attention by using both the matrix category as well as the distance from the lineal line. Depending on the feature, opportunities for financial savings and opportunities to improve site management are likely to appear immediately.

As referred to in the results section and expanded upon below; seven items were a good lineal fit requiring no further investigation. A further 15 items were considered to have deviated from the lineal line to a degree worthy of further investigation. These deviations signified both over servicing (for example an overabundance of items that aren't highly sought after) as well as under servicing (for example the absence of items that are highly sought after).

Items revealed to be over serviced, sorted by their deviation from the lineal line (largest to smallest), include:

- Item 4. High quality lake water body
- Item 3. High quality nature spaces and areas
- Item 8. On-leash dog walking
- Item 7. Ease off access to and around the site
- Item 14. Interpretive information and signs
- Item 21. Par 3 Golf Course
- Item 20. High quality turf
- Item 17. Bird watching deck/rotunda
- Item 18. Fencing

Items revealed to be under serviced, sorted by their deviation from the lineal line (largest to smallest), include:

- Item 12. Off-leash dog exercise area
- Item 10. Dog exercise area
- Item 9. High quality POS infrastructure
- Item 6. Shade availability – trees/structures
- Item 5. Personal Safety
- Item 19. Directional signs within the park

Having identified items being under-serviced above, strategic thinking can now be applied to begin to understand this discrepancy. For the purpose of analysis, item 12 and item 10 can be combined and referred to as 'Dog Management'. The results of the survey are showing that participants believe Dog Management is important, however they are not currently satisfied with the level of service or infrastructure provided at the site. Lake Claremont is not alone in the struggle for effective dog management. Weston et al. (2014) reveals that this issue has become increasingly controversial and complex to manage. Consulting relevant literature, preliminary management actions include thoroughly understanding dog activity at the site in terms of risks to people, animals and vegetation, abundance and distribution of dog activity, associated health risks through disease or excreta and benefits of sharing public open spaces with dogs at the site (Lowe et al. 2014; Reed and Merenlender 2011; Williams et al. 2009). From there, informed management and compliance actions can ensue.

Item 9 (High quality POS infrastructure) can also be examined to improve effectiveness and arrive at a better level of service. By auditing the existing infrastructure on site, it may be easily determined where the opportunities are for additional installations. Based on the existing assets and distribution of assets at the Lake Claremont site, the underserving is suggested to be the absence of easily accessible public toilets. To verify this fact, further specific local consultation would be required.

Changing values and expectations of site users

As a wealthy nation, with a short history of relatively high value being placed on natural assets, the traditional needs of public open spaces identified by the literature are being met; such as open grassed areas, shade, infrastructure, equitable access and playgrounds. Whilst this cannot yet be verified by existing literature, it has been observed within this project that the user needs have now intensified and different performance indicators are now being required by some visitors. Based on the discussions, interactions and feedback from survey

participants, as well as local community members, some emerging and changing values were observed. These include the desire for protection of endemic vegetation, enhancement of lake water quality, desire to increase viewing opportunities of the lake, enhance protection of endemic fauna, remove ecological threats, protect and retain heritage markers and a balanced approach to dog management (Jones and Newsome 2015). Some of these emerging values present complex challenges as interactions between them may occur (i.e. protection of vegetation and enhancement of views to the lake body requiring removal of vegetation). These values may also be difficult to quantify and measure which could result in difficulty assessing their ongoing performance.

To understand these emerging and changing values, targeted research at the Lake Claremont site (and surrounding resident population) is required to quantify these preliminary observations. This research may include more specific and detailed surveying, interviews and/or targeted focus group sessions with surrounding residents and users of the site.

Land owner/manager responsibilities

Through the research within this thesis, support is shown for land owners/managers to take on a flexible, and evolving, approach when managing urban public open spaces. This is likely to allow for better harnessing of opportunities, support quality engagement of site users, and is likely to result in a reduction of resources to yield the same (perceived) quality space. This approach to management will allow spaces to improve in performance and offerings to user's. Land owners/managers should be cautious not to become complacent with well performing spaces, rather opportunities should always be sought to improve urban public open space as the truly valuable assets that they are.

While it is relatively simple to determine if a public open space site is of a high quality, it is much more complex to understand (and express) the relationship between user's values, expectations, importance ratings and the level of satisfaction they experience while visiting a site. This understanding is required before improved management decisions can be made. As such, it is concluded that periodic surveying of site users is required to gain a thorough understanding of the performance of the site and the changes in (perceived) performance from the user's perspective. It is confidently proposed that, across scales and sites, increasing the knowledge of visitor's experiences (through techniques such as surveying) will support better outcomes for POS users, the site and the land owner/manager.

Frequency of surveying

With the intensification of visitor needs, desires and expectations, management must respond quickly and with an evidence based approach if the quality and value of these spaces is to be retained/improved. Frequency of surveying visitors needs to be determined to maintain a confident understanding of visitor expectations and satisfaction levels of the space. While surveying frequency for public open space satisfaction data collection is very limited, some factors to consider when determining frequency may include:

1. Development within the space, including new installations, upgrades, removal of assets;
2. Maturity of the space; spaces in their infancy would likely require an increased surveying frequency than mature spaces;
3. Changes in the patronage of the site; a substantial increase or decrease in patronage (i.e. 20%) may be cause for increased surveying frequency;
4. Changes in political pressures or support for the space, particularly those that could affect financial support;
5. Funding changes including grant opportunities or financial constraints;
6. Social pressures, including changes in social values such as chemical use;
7. Future planning around development or re-zoning; and
8. Available resource for future surveying.

After considering these factors (as well as other site specific factors), a suitable frequency can be determined. A suitable frequency range may be considered to be between two and five years. The status of the public open space itself as well as the location in which the public open space exists may also be responsible for increasing the frequency of surveying.

Limitations of this project

Several limitations are identified within this project. They are listed for consideration below.

1. Within the survey, each feature on question seven (for both importance and satisfaction) asked for a rating on a Likart scale between 1-5; (1 not at all important/satisfied, 2 not very important/satisfied, 3 somewhat important/satisfied, 4 very important/satisfied and 5 extremely important/satisfied). This rating association was slightly skewed and translated into 2.5 being considered neutral. This made analysis harder to readily articulate and may have caused an inference of higher than actual performance (i.e. respondents considering a score of 3 as neutral). A future improvement would be to have 3 on the scale representing neutral (Jennings 2001).
2. Another improvement to the construction of question seven (refer Appendix 1) in the survey, would be to ask for importance ratings and performance ratings (rather than satisfaction ratings) against each feature. This terminology would better align with the use of Importance-Performance Analysis which proved to be a valuable analysis tool within this project.
3. The questions in the survey (namely 11, 13, 14 and 18) used to determine individual's perception of city liveability were not best choice for drawing rigid conclusions. General assertions could be drawn using simple proportion calculations (such as the proportion of respondents reporting against each number on the scale); more robust data is required to perform higher level analysis. A matrix style question (similar to question seven, refer Appendix 1) could be developed to test individual city liveability factors and the perceptions and influence of these factors.

Conclusion

This thesis set out to answer three questions about the satisfaction of public open space (Lake Claremont) visitation and its association with perceived city liveability. The research questions have been revisited below with the conclusions included.

1. How satisfied are visitors with the Lake Claremont site?

Within the survey, participants were asked to rate 22 separate park features on a Likart Scale of 1-5, indicating their level of satisfaction for the feature as well as the importance they place on that feature. The means of the satisfaction and

importance responses were calculated. For satisfaction, the means for each feature ranged from 3.05 to 4.05. With 2.5 as the neutral score, the range of the means indicate that the respondents were moderately to highly satisfied with all 22 features.

To understand *how* satisfied the visitors were, the data was further interrogated via a gap analysis and the results were plotted on a data centred Importance Performance Analysis matrix. This technique showed the discrepancies between participant's ratings of importance and satisfaction. While there were some items that showed gaps that could be used for better informing servicing levels at the site, overall the gaps followed a moderate lineal relationship which confirms that site visitors were moderately satisfied with the site.

2. Do visitors regard Lake Claremont as a high quality public open space?

Using an axis centred Importance Performance Analysis matrix, the means of the satisfaction scores were plotted against the means of the importance scores of the 22 park features. This revealed that all items (except one, High Quality English/European Themed Gardens) appeared in the top performing category. This confirms that visitors regard Lake Claremont as a high quality public open space in the areas included in the survey.

3. Does high quality public open space increase the perceived liveability of Perth as a city for visitors of Lake Claremont?

Within the survey, participants were asked whether nature spaces contribute to improved city liveability. Participants were also asked whether Lake Claremont, a location which has been determined as high quality, influenced the way in which they view Claremont as a location. Both questions yielded a very strong response in support (refer results), indicating that for a significant majority of participants it was believed that high quality nature spaces increase the perceived liveability of a location.

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