



CITY of PERTH



Point Fraser Monitoring and Evaluation Program

2013 Report

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Prepared for,
City of Perth

Mine Water and
Environment
Research Centre

MiWER Centre

Centre for Ecosystem Management

Report No. 2014-6



CENTRE *for*
ECOSYSTEM
MANAGEMENT

1 MINE WATER AND ENVIRONMENT RESEARCH CENTRE

Founded at Edith Cowan University in 2008, the Mine Water and Environment Research (MiWER) Centre was formed by Dr Clint McCullough and Associate Professor Mark Lund. Currently the MiWER Centre is led by Associate Professor Mark Lund. The research group has a focus on pit lakes formed from mining, although research also covers all inland water bodies. Our research covers most aspects of rehabilitation, remediation and the ecology of inland waters.

MiWER is also a member of Edith Cowan University's research centre, the Centre for Ecosystem Management.

More information on MiWER and our projects can be found at www.miwer.org

2 ACKNOWLEDGEMENTS

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2.1.1.1 FRONTISPIECE



Plate 1. Mark Lund collecting water samples at Site W2 (Point Fraser).

This report should be referenced as follows.

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4 EXECUTIVE SUMMARY

Point Fraser was developed in 2004 to convert former lawn area to a recreation space, with environmental values. In addition, a wetland was constructed to intercept and treat a stormwater drain from East Perth (catchment 18.3 ha) that had previously discharged untreated into the Swan River. In 2010, the City of Perth (COP) contracted the Mine Water and Environment Research Centre at Edith Cowan University to undertake a comprehensive monitoring program at the site. The aim was to determine how well the wetland and to a lesser extent other components of the development achieved the goals originally set for the site.

This report covers monthly monitoring of water quality in the wetland from January to December 2013. Results suggest that water quality is generally within the normal ranges that might be expected in stormwater wetland on the Swan Coastal Plain. Salinity was higher than might be expected in a freshwater lake, especially in the last ponds (W3 and W4) of the wetland. This is partially due to influx of saline Swan River water during high tides, and incoming slightly salty water from stormwater and Lake Vasto. The main loss of water from the wetland is evaporation which concentrates the salt up to undesirable levels. Salt levels are becoming problematic and might need active management to control (deliberate draining of the wetland).

Solar powered monitoring stations were established at both inlet and outlets to the wetland. These were designed to allow for quantification of nutrient loads in and out of the system so that the overall removal efficiency could be determined. This year a series of technical issues with the inlet monitoring gear failed to produce any reliable data on inflows, however outflows data was unaffected. These technical issues have been resolved.

The team has identified in previous years issues associated with the inlet structure that means that much of the water (46% of the total water inputs in 2012) that enters the wetland later drains back into the drainage network, and as such it is effectively lost from the wetland. The reasons are two-fold, firstly the shallow slope of all the drains relative to the wetland mean that it is particularly susceptible to the relative heights of water in the incoming drains compared to the wetland (i.e. if the wetland is higher, water drains out and vice versa), and secondarily as there is probably a leak in the drainage network which is continuously reducing the height of the drain water allowing backflow to occur. This issue is significantly impacting on wetland function, as it means that the wetland treats only a proportion of the actual drain flow. Further the lack of water remaining in the wetland costs the COP in the additional expenses associated with using Lake Vasto waters to keep wetland wet. Resolution of this problem is beyond the scope of the monitoring project and needs to be undertaken urgently to ensure the wetland can perform its function.

Equipment issues prevented determination on input loads from the drain and determination of the volume of backflow. Point Fraser with approximately 27 kg of N and 1 kg of P exported to Zone 3. This represents a substantial increase on exported loads in 2012, this appeared to be due to higher outflows and high N concentrations. Total N on a number of occasions (73% of samples) exceeded the target concentrations for discharge. Removal of P appeared successful in preventing exceedances of the target values for discharge. Uptake of P by the Supersorb Zeolite clays added to W1 and W2 appears to be a major pathway for its removal.

Wetland vegetation survived the dry summer conditions of 2012/2013; however *Juncus kraussii* is out-competing the other species, with all the others on the decline. Although *Eleocharis acuta* appeared healthy, the degree of coverage has declined substantially with only a reasonable pocket remaining in W4. *Baumea articulata* and *Typha domingensis* has suffered a large dieback this year, possibly due to increasing salinity. A total of 10.35 kg of P were stored in the plant biomass (living) in October almost half that of 2012, however in May 27.89 kg was stored. This reflects the poor condition of the plants following the dry summer of 2012/13. Nitrogen increased in plants, as they started to recover from the dry conditions. These results indicate that the plant communities are mature and that uptake of nutrients is now dependent on the health of the plants.

Biodiversity measured through bird and macroinvertebrate communities showed communities rich in cosmopolitan common taxa. More bird species were recorded in 2013 than in 2012, with a total of 26 species identified. Macroinvertebrate communities in zone 1 were substantially different to those recorded in previous years and Zone 2. Zone 2 communities were similar to previous years. Increasing salinity in zone 1 may be responsible for the changes seen. Overall species richness was higher than in 2012 at 26 taxa.

Social monitoring was undertaken to see how people use the site. Point Fraser does not appear to be a destination of choice but is used extensively as people pass through it primarily for exercise or park in the car parks to access the city.

Overall the wetland appears to performing its various functions successfully. However, as inflows increase as the catchment is restored, performance appears to be dropping.

5 INTRODUCTION

Point Fraser is named after the colonial botanist Sir Charles Fraser who explored the Swan River in 1827 when he accompanied Captain Stirling's expedition. The site was originally named 'Boodjargabbeelup' by Noongar peoples, when it was still a peninsula and prior to river reclamation in the 1930s. Point Fraser is located between Riverside Drive and the Swan River, next to the Causeway. The land was reclaimed using spoil from the dredging of the river used to deepen the water around Heirisson Island and causeway (see Figure 1a). Prior to 2004, the site was a lawn area containing a car park, a helipad and a shipping container used for bike hire. A stormwater drain (Point Fraser Main Drain) discharged into the river at this point. The catchment of the drain was 18.3 Ha of East Perth located mainly west of the WACA Cricket Ground (Figure 1b).

a)



b)



Figure 1. Aerial photographs of Point Fraser in a) 2000 and b) 2010 (showing catchment area for the wetland in red). Photographs taken from Google Earth, 2011.

After 2000, the City of Perth sort to improve the quality of stormwater discharge to the Swan River and improve aesthetic, recreational and environmental values of the area. This

culminated in the Point Fraser redevelopment; the first stage was the creation of a constructed wetland which was completed in 2004. The second stage saw the redevelopment of the remaining area and was completed in 2007. The redevelopment included construction of new car parks, a bicycle hire facility, grassed areas, BBQ facilities, a children's playground, a mixture of native bush areas and parkland and the constructed wetland.

In 2012, the construction of a commercial development in the Point Fraser reserve commences. This will ultimately consist of shops and food outlets, a jetty and a foot bridge to Heirisson Island. An artist's impression is shown in Figure 2.



Figure 2. Artists impression of the new commercial development (centre) being constructed at Point Fraser (Source: WA Business News - <http://www.wabusinessnews.com.au/article/Point-Fraser-development-gets-go-ahead>)

The objectives of the Point Fraser redevelopment project were to:

1. "Improve the quality of urban stormwater discharging to the Swan River through the Point Fraser wetland, including stormwater management run-off from the surrounding area;
2. Establish a wetland habitat and breeding place for native fauna which will be attractive to avifauna, in particular Black Swans;
3. Promote passive recreation and community education, including use of the wetland to demonstrate stormwater management techniques;
4. Enhance the landscape and visual aesthetic; and
5. Provide a recreational and educational environment and experience for the public." (quoted from Syrinx Environmental PI, 2005)

The effectiveness of the wetland in removing nutrients from stormwater is an important consideration in the entire re-development and will provide value information for similar

projects in the City. The City of Perth commissioned the authors to undertake a 5 year monitoring program to evaluate how the redevelopment was meeting its original objectives. Specifically to monitor, evaluate and report on the following, as taken from the Point Fraser Monitoring and Evaluation Plan (PFMEP; COP, 2010):

1. The quality of urban stormwater discharging to the Swan River long term, as a result of the redevelopment of Point Fraser by determining the amount of pollutant removal via the constructed wetland;
2. The quality of wetland habitat and the quantity and quality of breeding places for native avifauna presence, behaviours and habitat use;
3. The ongoing ecological health of the constructed wetland via its conformance with relevant water quality guidelines and legislation requirements.
4. The quality, quantity and type of recreational and educational use of Point Fraser by determining the diversity of visitor presence, behaviour, use, expectations and satisfaction and awareness of reports/information specific to Point Fraser performance; and
5. The long term integrity and quality of the restoration of the foreshore edge, as a result of the redevelopment of Point Fraser by determining vegetation health and structural reliability.

This is the fourth annual report of the PFMEP and covers the period January to December 2013.

6 METHODS

6.1 STUDY SITE

The majority of the study was conducted in the constructed wetland in the Point Fraser reserve, however foreshore monitoring occurred in two areas (1 & 2) while avifauna and social monitoring were conducted across the entire reserve (Figure 3).



Figure 3. Aerial photograph of Point Fraser (bounded by the red line), showing the constructed wetland (bounded by the blue line), Lake Vasto, the social monitoring sites (red and white circles, SMC1-3) and the foreshore monitoring areas (yellow). Photograph adapted from Google Earth, 2010.

Water enters the wetland from the catchment via the East Perth drain; this arrives at the splitter box where low flows are directed via two pipes into a bubble-up grate (BUG) in W1 (Figure 4). High flows exceed the weir in the splitter box and part of the flow is directed via a pipe and another BUG into the Swan River. Bubble-up grates slow the flow rate reducing erosion and providing opportunities for particulates to settle. Water flows from W1 to W2 (Zone 1), and then when levels exceed those of the weir, water flows into W3 and then W4 (Zone 2) before exiting via a small pipe into the foreshore vegetation (Zone 3) and then into the Swan River. The boardwalk separating W1 and W2 from W3 contains a weir that is set higher than the control weir. The boardwalk weir is designed to overflow only in

exceptionally high flow conditions. A similar weir lies under the boardwalk separating the discharge area from W4. This contains a valve to prevent ingress of water from the Swan River at times of exceptionally high tides, while also permitting exceptional high water levels in W4 to discharge. W1 to W4 are lined to prevent interaction with underlying acid sulphate soils (Syrinx Environmental PI, 2009). W1 and W2 are covered with a thin layer (approx. 20 mm) of Supersorb activated zeolite clay, while W3 and W4 have layer of soil (100-200 mm deep) to grow plants in. The cleared strip between W3 and W4 is actually a small mound that effectively prevents water moving directly from the weir to the discharge point. Excessive build-up of salt in the mound, resulted in removal of the surface layer (Syrinx Environmental PI, 2008), which is why it is currently devoid of plants. As stormwater flows infrequently into the wetland, the ponds W1 and W2 (which must remain under 250-300 mm of water and W3 and W4 which must be under 50-100 mm of water must be topped up with water taken from Lake Vasto (Syrinx Environmental PI, 2009).

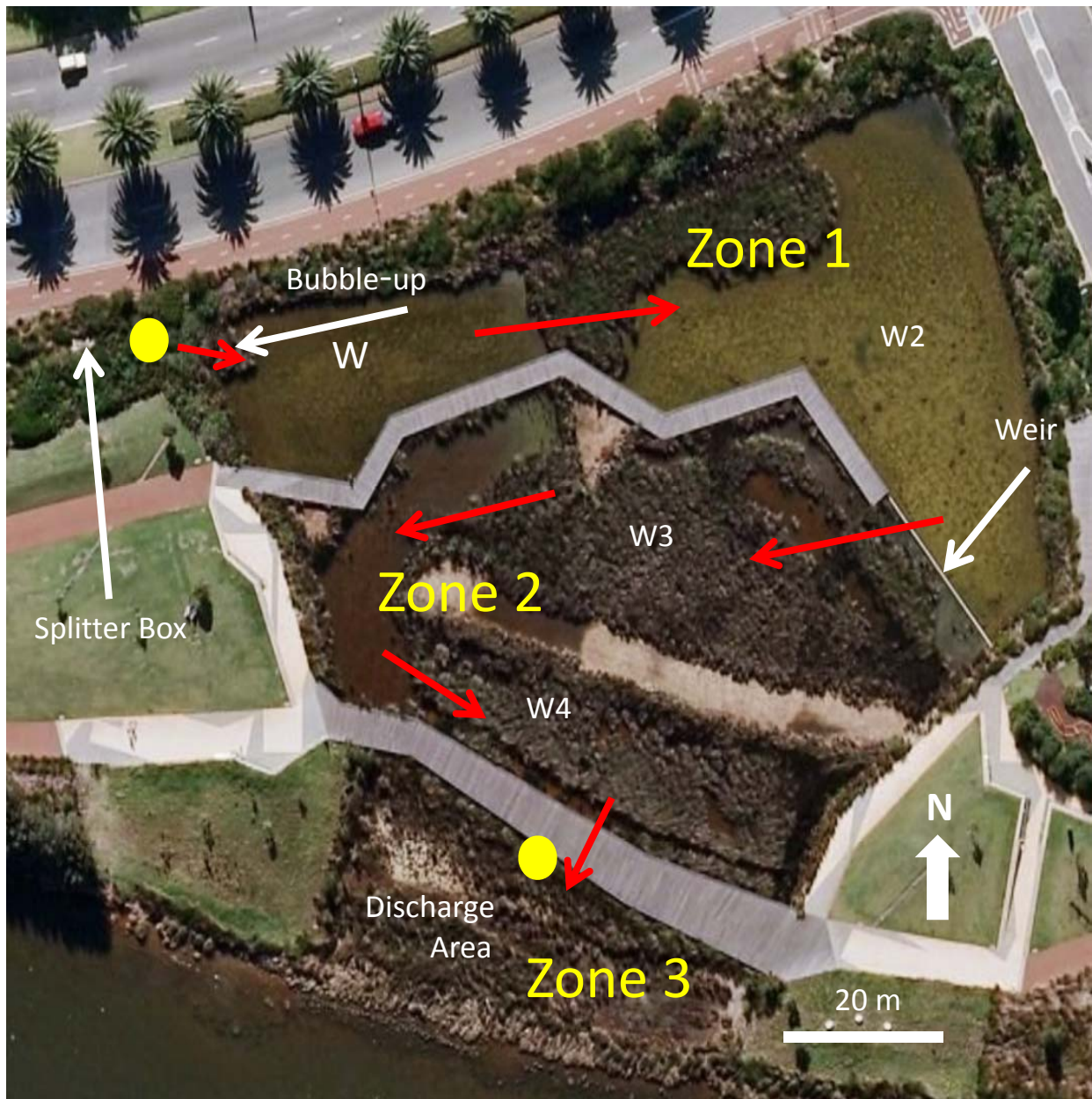


Figure 4. Aerial photograph showing the movement of water (red arrows) through the Point Fraser constructed wetland. Yellow circles mark the fixed inlet and outlet monitoring structures. Sampling sites are indicated as W1 to W4. Imagery adapted from Google Earth, 2010.

Photographs of all the sampling sites are shown in Figure 5.

a) W1



b) W2



c) W3



d) W4



e) Discharge area (Zone 3)



Figure 5. Photographs of the sampling sites in Point Fraser constructed wetland

6.2 SAMPLING

The sampling procedures used in this study are provided in condensed form below but are available in more detail in PFMEP (COP, 2010). The monitoring program commenced in April 2010, however this report covers the period January to December 2013.

6.2.1 WATER QUALITY (WSWQ)

Sampling for this study was conducted on the third week of every month. On each occasion, pH, oxidation reduction potential (ORP), conductivity, temperature and dissolved oxygen (% saturation and mg L^{-1}), turbidity and chlorophyll *a* were measured *in situ* in the water using a Hydrolab Datasonde (4a) multimeter at each site (and Ozone in April). At each site, a water sample was collected, an unfiltered aliquots (subsample) of this sample were bottled for determination of total nitrogen (total N^1) and total phosphorus (total P). Another aliquot was filtered in the field (through $0.5 \mu\text{m}$ Pall Metrigard filter paper) before bottling prior to determination of nitrate/nitrite (NO_x), filterable reactive phosphorus (FRP) and ammonia (NH_3). At quarterly intervals (May, Aug, Nov), water was also collected for determination of Chlorophyll *a* and Phaeophytin, total hardness, metals (Al, Fe, Mn, As, Cd, Cr, Cu, Hg, Pb, Ni, Zn) and total suspended solids). Another aliquot was filtered in the field (through $0.5 \mu\text{m}$ Pall Metrigard filter paper) before bottling prior to determination of dissolved organic carbon (DOC).

Samples were sent to SGS Australia Ltd for analysis. SGS Australia offers NATA accredited analyses and detailed QA/QC processes (except where noted). All samples were collected, stored and preserved as recommended by the company.

6.2.2 SEDIMENT QUALITY (WSQ)

In May 2011, eight sediment cores were randomly taken each from W2 and W3. The cores were clear acrylic tubes (50 mm dia.). Cores were pressed into the sediment to a maximum depth of 100 mm or touching the liner (whichever came first), the top was sealed, core extracted and bottom sealed. Water was carefully decanted from each core and the sediment transferred to a glass jar. Four jars were analysed for total Kjeldahl N (TKN), Total P, total organic carbon (TOC), total metals (Al, Fe, Mn, As, Cd, Cr, Cu, Hg, Pb, Ni, Zn), wet and dry weight and loss on ignition (LOI) at 500°C and 1000°C . All analysis was undertaken at SGS Australia Ltd, except for the LOI which was not NATA accredited and therefore was undertaken at Edith Cowan University.

¹ All nutrients are reported as per their respective elements i.e. Total N-N, Total P-P, FRP-P, NO_x -N and NH_3 -N

Sediment depth in W2 was measured at 8 random sites using a ruler as the distance from the surface to the liner. It was not possible to distinguish between the zeolite layer and accumulated sediment.

6.2.3 QUANTIFICATION OF LOADS IN AND OUT OF THE WETLAND (WSFM & AWWQ)

At the inlet to W1, an ISCO 6712 Autosampler was installed, this was triggered by an ISCO Bubble Flow Module when water depth in the BUG reached a set limit. In addition an Acoustic Doppler Velocity meter (Unidata) was used to measure flows in the pipes linking the splitter box and BUG. In 2010, this was located at the splitter box end of the pipe but was relocated to the BUG end on 2/7/11; this was to improve flow measurements which had been problematic in 2010. A solar panel is connected to the system to recharge the battery for the system. In addition, a tipping bucket rain gauge (Unidata) was installed. The rain gauge and acoustic Doppler are both connected to a data logger with telemetry (Unidata Neon). The autosampler pulls samples from the bubble-up pit; samples are taken every hour whilst flows are occurring.

At the outlet to W4 (pipe), an ISCO 6712 Autosampler was installed, this was triggered by a ISCO Bubble Flow Module. The bubble flow tube was attached to a hydrostatic depth sensor (Unidata) mounted in W4. When water depth exceeds the height of the discharge pipe, water starts to discharge from the wetland triggering sample collection. Samples are collected every 24 hours. This system is connected to a data logger with telemetry (Unidata Neon) and is supported by a solar panel recharging the battery.

Samples from the autosamplers were collected within 2-3 days of collection and sent to SGS for determination of total N and total P, turbidity and total suspended solids.

6.2.4 WETLAND VEGETATION (WV)

In October and May, the wetland vegetation was mapped. Photographs are taken at fixed points (Table 1; Figure 6) to record vegetation health.

Table 1. The Site codes, Site names and Site Coordinated of WV Monitoring Photopoints (GPS co-ordinates use UTM Zone 50 with datum GDA94)

Site Code	Site Name	Easting	Northing	Notes
WV1	Wetland #1 - Weir b/n Zone 1 and 2	393898	6462962	4 photos: NE, SE, E and S directions
WV2	Wetland #2 – Zone 2 middle	393869	6462969	3 photos: E, S and N directions
WV3	Wetland #3 – Zone 2 west side	393832	6462961	2 photos: E and S directions
WV4	Wetland #4 – Mound in Zone 2	393900	6462937	3 photos: NW, W and SW directions
WV5	Wetland #5 – Zone 1	393917	6462988	2 photos: SW and W directions



Figure 6. Location of vegetation monitoring photopoints (WV1-WV5)

Three quadrats (200 mm x 200 mm) were randomly taken from each major plant species (*Baumea articulata*, *Eleocharis acuta*, *Juncus kraussii*) where present in W1 and W2 (combined), W3, and W4. All the plant material (above and below ground) in the quadrat was removed. For each quadrat, the above ground material had each stem length measured, the percentage of leaves that mature, new or senescent determined and the number of flowers recorded. Dry weight of above and below ground material for each quadrat was measured, samples of dried material were sent to SGS Australia Ltd for analysis

of TKN and Total P. Loss on ignition was then performed on composite biomass from each sample area (above and below ground) at 500 °C and then 1000 °C.

6.2.5 MACROINVERTEBRATES (MINVERT)

In May and October macroinvertebrate samples were collected from Zone 1 and Zone 2 using a 250 µm dip net over two 5 m transects per site. Samples were preserved in 70% ethanol and returned to the laboratory for sorting, identification (to Family) and counting.

6.2.6 SOCIAL MONITORING (SM)

In May and October visitor counts and visitor observations was undertaken. Social monitoring for each round was carried out between 7 am and 6:30 pm on a weekday and weekend day. Surveyors were based at each end of Point Fraser (see Figure 3) capturing walkers and cyclists moving through the park, a third person was based near the road entrance to capture people using the Point Fraser car-park for visiting the city. On the hour, for the first 15 minutes, the numbers of people and vehicles entering or leaving the park were recorded at the three sites on Observation Count data sheets. Between the hourly visitor counts, a surveyor walked from the east to west entrance ensuring all areas of the reserve were covered and recorded the behaviour of park users using the Observation Behaviour datasheet. An aerial photograph was used to mark the location of stationary park users. Copies of the datasheets were appended to the 2010 report.

6.2.7 AVIFAUNA

In early June and early November, a survey of all birds seen within the park or flying above it were recorded. Surveys were conducted in the early morning and were timed to avoid adverse weather conditions. During surveys, the entire area of parks and garden were surveyed by walking at a steady pace and recording all birds encountered by both call and sightings. Particular attention was paid to the wetland areas to ensure that cryptic species and water birds were recorded.

6.2.8 FORESHORE MONITORING

In May, the foreshore of Point Fraser was monitored at 3 sites in each of the two areas shown in Figure 3. Photographs were taken at each site and condition assessed. The locations of the foreshore monitoring sites are shown in Figure 7.



Figure 7. Locations of the foreshore monitoring sites (F1A-C and F2A-C) (taken from Google Earth 2010)

7 RESULTS AND DISCUSSION

7.1 HOW WELL DOES THE WETLAND WORK?

The Point Fraser constructed wetland is a highly engineered wetland designed to perform a range of tasks, primarily stormwater treatment but aesthetics and biodiversity values are also important constraints on the design. As the wetland is isolated from groundwater (by a liner) to prevent oxidation of underlying acid sulphate soils, this simplifies the hydrology of the ponds but has constrained the design in terms of wetland depth. Constructed wetlands attempt to maximize the retention time for water entering the systems as the longer the water is retained generally the more treatment is possible. Peak stormwater flows can scour the wetland, reduce treatment times and the overall wetland efficiency. To reduce the potential for this, the wetland has a splitter box that allows high flows to be split with a part of the flow directed into the Swan River.

Perth had below average rainfall in 2013 (782.4 mm), but higher than 608.2 mm in 2012 compared to the 850 mm long-term average (Bureau of Meteorology, Perth Metro station). In Figure 8, daily rainfall measured at Point Fraser and by the Bureau of Meteorology (Perth Metro) is shown for comparison. These sites are all within a 5 km radius of each other, showing local variability in rainfall. Further, rainfall at Point Fraser was recorded each day from 12 am to 12 pm, while Bureau of Meteorology data are recorded at 9 am for each day and reflects the previous 24 h. This explains the Point Fraser data appearing out of sync by a day on some occasions. It also appears that by the end of April, the rain gauge stopped working correctly. As records were still collected, but were obviously well below those recorded by the Bureau of Meteorology, this suggests that it was a connection fault. This problem appears to have been resolved when the new depth gauge was installed in November 2013.

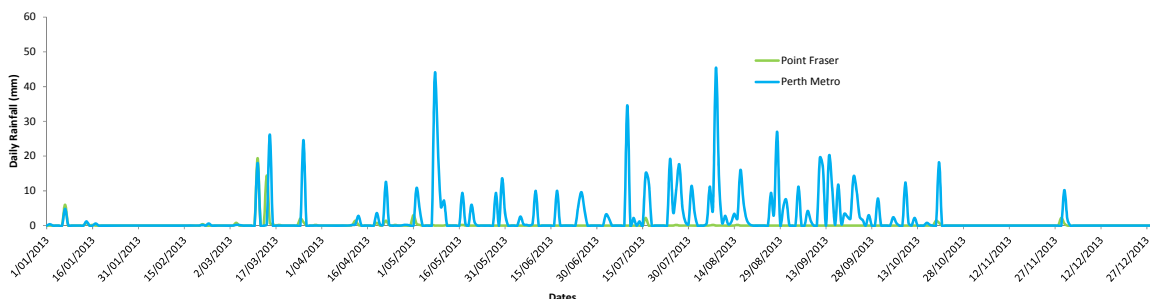


Figure 8. Daily rainfall measured at Point Fraser and Mt Lawley in 2013. Mt Lawley data (Perth Metro) from the Bureau of Meteorology and recorded 9 pm to 9 am, Point Fraser data recorded 12 am to 12 pm.

The largest single rainfall day was 45.4 mm on the 8/8/13 slightly down on the 48.4 mm (29/4/12) and 56.8 mm (24/6/11) recorded in previous years. Another significant event of 43.6 mm occurred on 8/5/13 and on three other occasions rainfall exceeded 20 mm.

7.2 INFLOW AND OUTFLOW

The specific aims of measuring the inflow and outflow of the wetland were to:

1. Create a water budget for the wetland.

This will show how the water moves through the wetland (hydraulic residence times) as well as allowing quantification of nutrient loads.

2. Quantify nutrient loads in and out of the wetland

This will show how nutrient loads change during storm flows (the 'first flush' effect) and allows determination of wetland nutrient removal efficiency.

7.2.1 INFLOWS

This year, the monitoring gear was beset by technical issues, including the ISCO sampler, the battery, rain gauge and Starflow. The new depth sensor was installed in November; this seems to have fixed a number of issues, which suggests that poor connections might have been responsible for some of the problems. The rain gauge was found to be clogged with bird excreta. All gear has now been fixed and appears to be working for 2014. Many of the faults were intermittent which made them difficult to isolate and fix. Therefore very little usable data was achieved for the year.

The catchment (assuming it was 18.3 ha) received a total of 143,180 m³ (compared to 111,000 m³ in 2012) of rainwater. Typically for hard surfaces, a runoff coefficient of 0.6 would be conservative suggesting that at least 85,910 m³ of rainfall from the catchment should have reached the splitter box.

Recommendation 1.

Backflow from W1 into the drainage network remains an important issue reducing the effectiveness of the wetland in treating stormwater.

The wetland is topped up by water pumped automatically from Lake Vasto (Ozone Reserve) when water levels drop to heights that might impact on the vegetation. COP records the

inflows from the pumps and in March, and between May and October 2013 no water was pumped, with 6,242 m³ added throughout the rest of the year (3620 m³ in December). This was a substantial increase on 2012 (total of 2757 m³) and reflects an effort in December to ensure the wetland particularly Zone 2 would not dry out.

In addition, the wetland received direct rainfall of 782.4 mm (using Perth Metro data) in 2013, which equates to 4150.3 m³ (area is 5304.6 m²).

7.2.2 OUTFLOWS

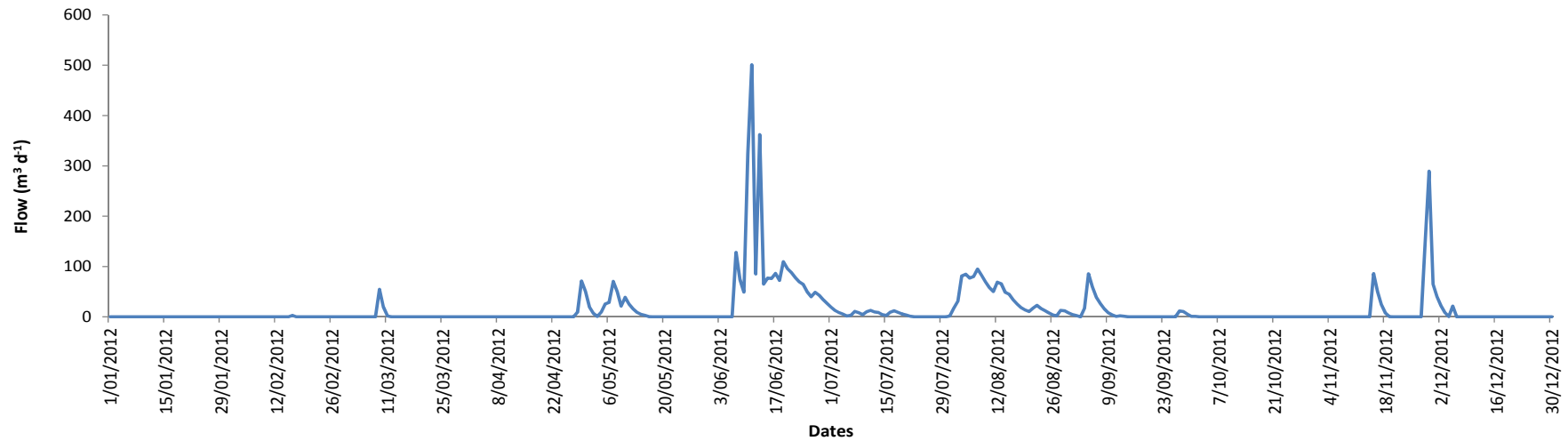
ISCO Bubble Flow module collected depth data for the entire year. The Unidata depth sensor was replaced with a salt tolerant version in November 2013. In December 2013, a valve was added to the discharge pipe to prevent backflow from the river into the wetland. In 2014, the rating curve will need to be re-calibrated to allow for the impact of this on flow measurements.

A rating curve was developed using a Marsh McBirney Flow meter, by measuring velocity at a range of depths. The velocity data were used with cross sectional areas to create flow rates at particular depths, these data were plotted and a polynomial function fitted. As more data are collected this curve will be further refined. The constants from this equation were used to calculate flows for all water heights greater than the outlet (115 mm). Depths greater than 195 mm were considered to have reached the maximum discharge rate (i.e. the pipe was full).

The total daily discharge in and out of the wetland and rainfall for 2013 are shown in Figure 9. Total outflow in 2013 was 9557.3 m³ substantially higher than the 5582.3 m³ in 2012. Calculating likely evaporation (ignoring transpiration, which can increase loss considerably depending on the species (Sanchez-Carrillo *et al.*, 2001)) using Bureau of Meteorology pan evaporations corrected with Black and Rosher (1980) values for the Peel Inlet (as cited in Congdon, 1985), then there was 1498.6 mm of evaporation which equates to a loss of 7946.3 m³ over 2013. Therefore the total outflow of the wetland was 17,503.6 m³, slightly higher than in 2012.

In 2013, there was an experimental release of water from Zone 2 to attempt to remove saline waters. The exact amount of water lost from the area is not known, however anecdotal accounts suggest that comparatively little water was lost.

a) 2012 Outflows



b) 2013 Outflows

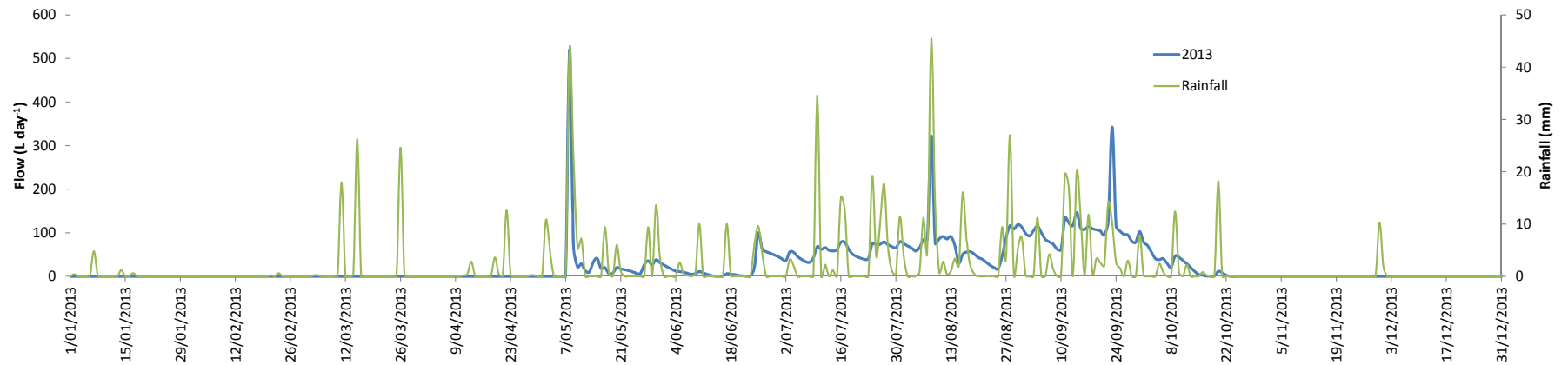
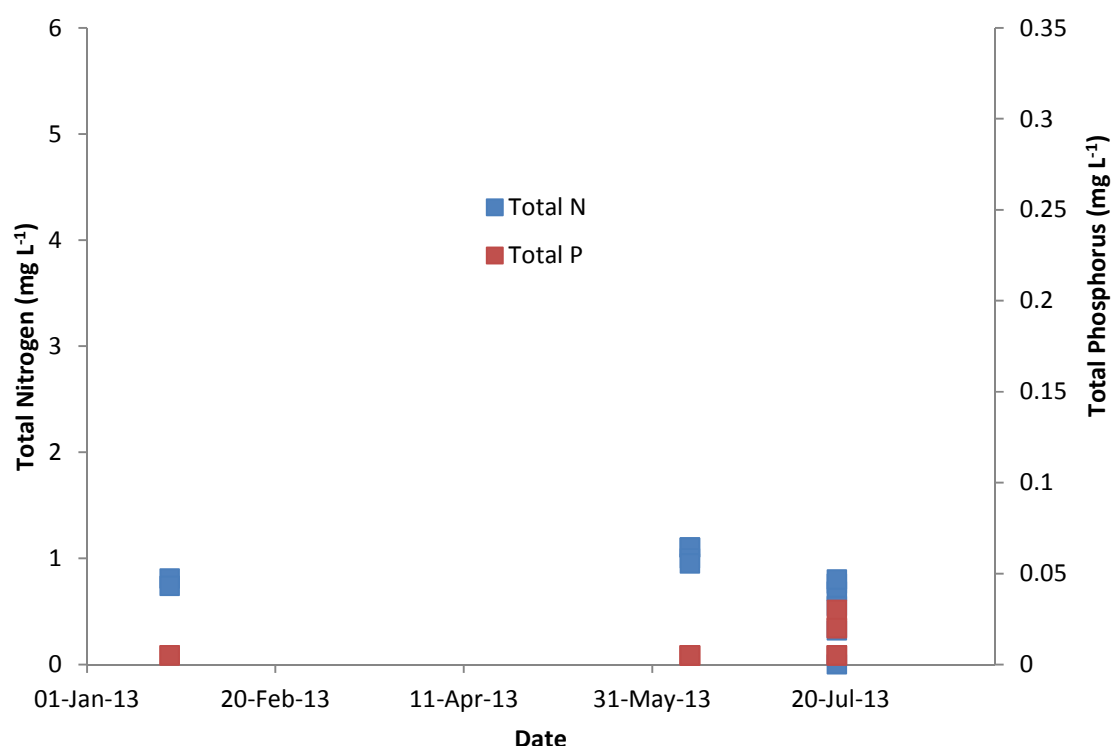


Figure 9. Daily totals for a) 2012 outflows b) 2013 outflows and rainfall, for the Point Fraser wetland.

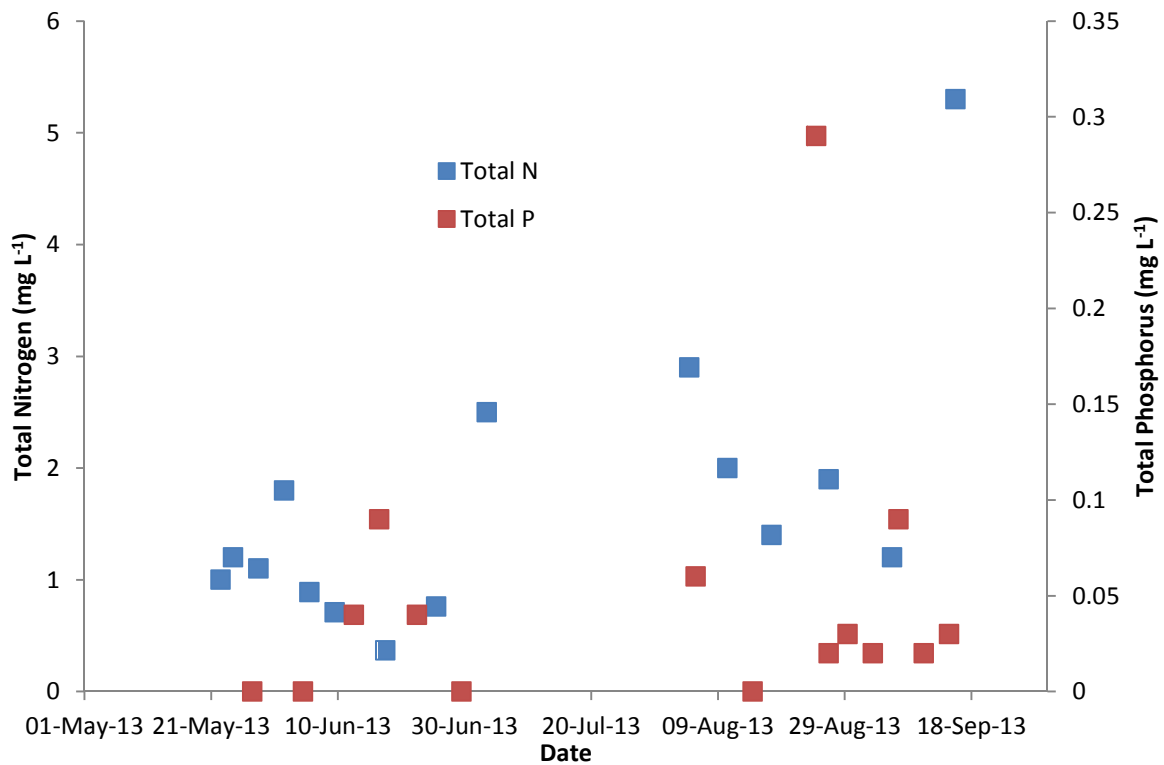
7.2.3 QUANTIFICATION OF NUTRIENT LOADS

Samples were collected during storm events for both the inlet and outlet. Inlet samples were taken at hourly intervals and the outlet at daily intervals reflecting the time that flow was present and the likely changes. Concentrations of total N were generally higher in the outlet than inlet (mean of $1.67 \pm 0.32 \text{ mg L}^{-1}$ compared to $0.77 \pm 0.09 \text{ mg L}^{-1}$), total P showed a similar trend ($0.01 \pm 0.002 \text{ mg L}^{-1}$ vs $0.05 \pm 0.02 \text{ mg L}^{-1}$). The first flush is a theory which suggests that the first heavy rain following a period of dry weather will effectively wash the catchment and so the stormwater will initially contain high concentrations of mainly particulate material, which decreases as the storm event progresses. Although this makes intuitive sense, there is little evidence to support it (see Hall, 2006; Khwanboonbumpen, 2006). Analysing the storm events entering Point Fraser for total P, total N and total suspended solids there appears to be little evidence supporting first flush. Particularly in the outlet, later in the year there is much higher variability in both nutrients. Total P concentrations in the inlet were lower than seen in previous years, although all other nutrient concentrations were very similar on average. It can be seen in Figure 10 that there was no consistent pattern as to when during the storm event that high or low concentrations occurred. Total suspended solids concentrations were generally lower in the outlet ($12.7 \pm 1.6 \text{ mg L}^{-1}$) compared to the inlet ($43 \pm 6.5 \text{ mg L}^{-1}$).

a) Inlet



b) Outlet



c) Total Suspended Solids (Inlet and Outlet)

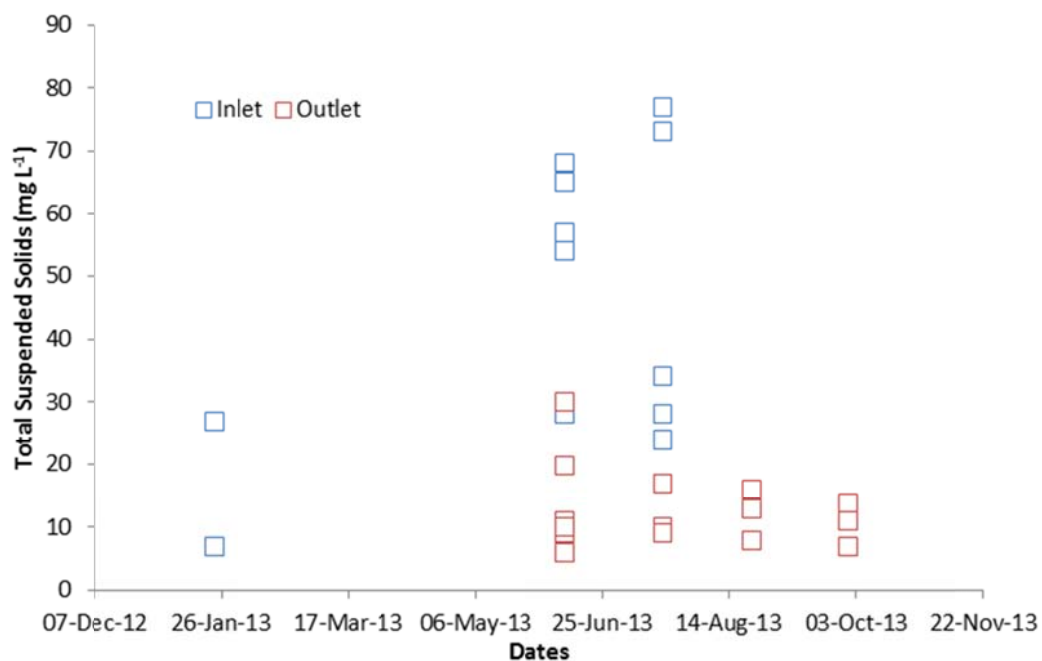


Figure 10. Concentrations of total P and total N recorded in the a) inlet, b) outlet, and c) total suspended solids for both inlet and outlet autosamplers over 2013.

Loads of N and P entering and leaving Point Fraser were estimated by multiplying flows by the concentrations from the storm event sampling. It was assumed that concentrations remained unchanged between sampling events. Lake Vasto loads were estimated from monthly samples taken from Lake Vasto (where available) multiplied by the monthly quantity of water pumped. Rainfall loads were estimated using nutrient concentrations in rainfall taken from Khwanboonbumpen (2006) for Bannister Creek. As inflow could not be directly calculated, it was estimated based on the ratio of inflow to rainfall from 2012. Approximately 26.8 kg of N and 1 kg of P were estimated to be exported to Zone 3, with potentially some further removal prior to reaching the Swan River. This is substantially higher than exports in 2012, but reflects the increased water volume, but also higher concentrations of nutrients particularly late in the year.

Table 2. Water and nutrient budget for the Point Fraser wetland, including removal efficiency for nutrients (? Estimates based on 2012 runoff to rainfall ratio's and average nutrient concentrations – Caution should be used when using these estimated values due to large potential errors).

	Water (m³)	N (g)	P (g)	TSS (kg)
Inflow	?29,588.0	?	?	?
Rainfall	4,150.3	1,112	87	0
Top-up from Vasto	6,242.0	1,737	157	0
Backflow	?-22,476.7	?	?	?
TOTAL INPUTS	?39,980.3	?	?	?
Outflow	9,557.3	26,821	1,027	113.6
Evaporation	7,946.3	NA	NA	NA
TOTAL OUTPUTS	17,503.6	26821	1027	113.6
Removal Efficiency		?	?	?

Total N concentrations should be <1000 µg L⁻¹ to meet the Mounts Bay Water Quality improvement targets (Swan River Trust, 2009a), however in the Point Fraser higher concentrations were seen in the outflow samples (11 out of 15 times) reaching a maximum value of 5300 µg L⁻¹ on the 15/9/13. However, only 4 out of 13 values in the inlet exceeded the threshold for Total N reaching a maximum of 1100 µg L⁻¹ on 10/6/13. Phosphorus concentrations in the wetland were all below a target of <100 µg L⁻¹ (Figure 12) recommended for the Mounts Bay Drain catchment by the Swan River Trust (Swan River Trust, 2009a), as part of the Swan-Canning Water Quality Improvement Plan (Swan River Trust, 2009b).

7.2.4 CONCLUSIONS

1. Create a water budget for the wetland.

A water budget was partially created for 2013, as inflows (due to instrument issues) could not be calculated. Backflow was observed but not measured out of wetland into the drainage network. Outflows from the wetland almost doubled compared to 2012, reflecting increased rainfall, but also most likely increased inflows.

2. Quantify nutrient loads in and out of the wetland

Approximately 2.5 times as much N (26.8 kg) and just under 2 times the P (1.0 kg) were estimated to leave Zone 2 of the Point Fraser compared with 2012. The increased discharge of nutrients was partially due to increased outflows but also to increased concentrations of N in the outflow. Total N concentrations on most occasions exceeded the target concentrations for discharge. Removal of P appeared successful in preventing exceedances of the target values for discharge.

7.3 WATER QUALITY IN THE WETLAND

The specific aims of measuring the water quality in the wetland were to:

1. Determine how physico-chemical variables and nutrient concentrations changed on a monthly timescale

This will show whether there are any management issues associated with water quality over the year. The data will allow the effectiveness of various processes responsible for nutrient uptake or release to be inferred.

2. Examine how key metals and other selected parameters change quarterly between all the ponds.

This will provide information on metal removal by the wetland but also highlight any metals of concern, which might require management actions.

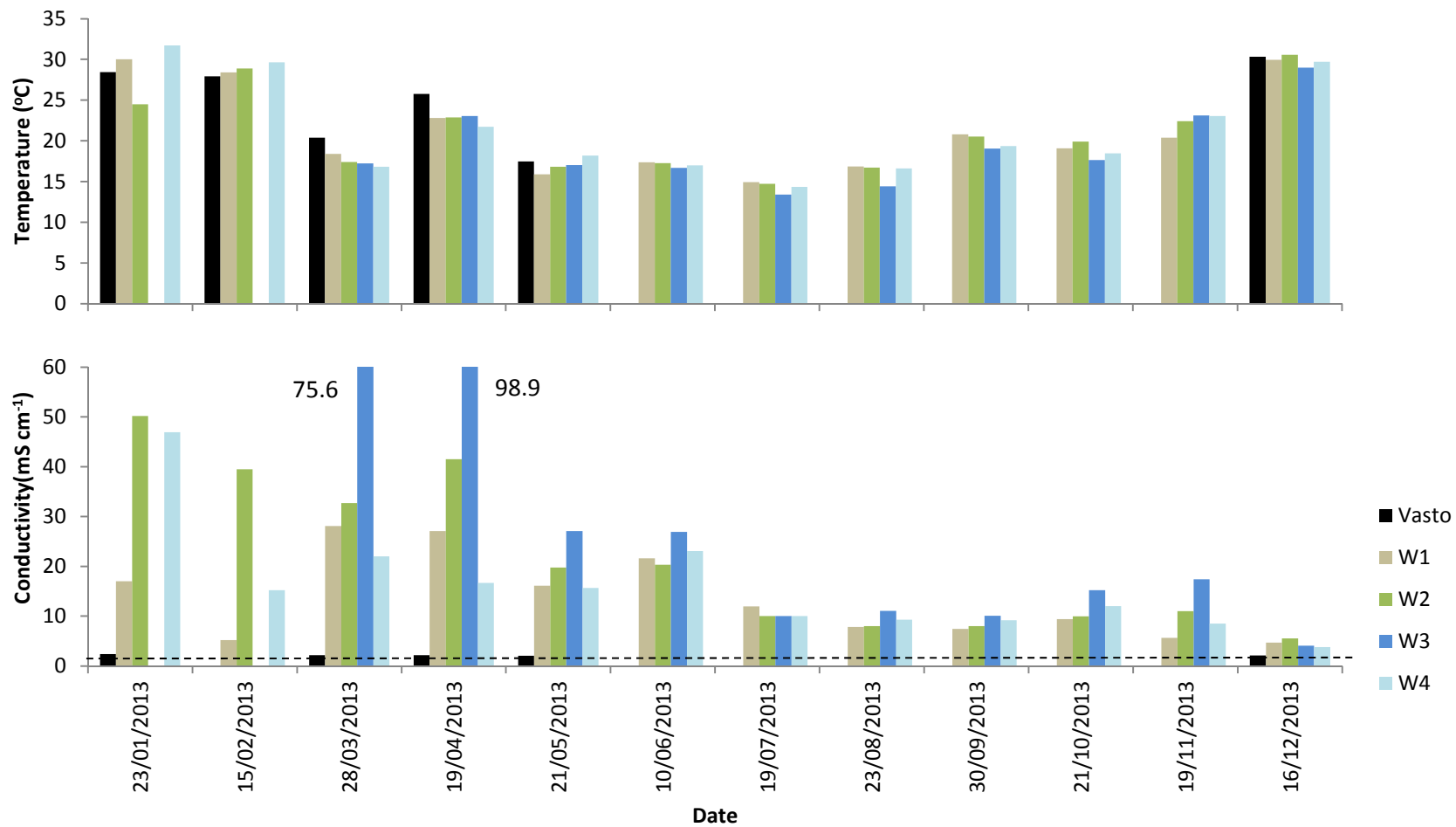
7.3.1 MONTHLY DATA

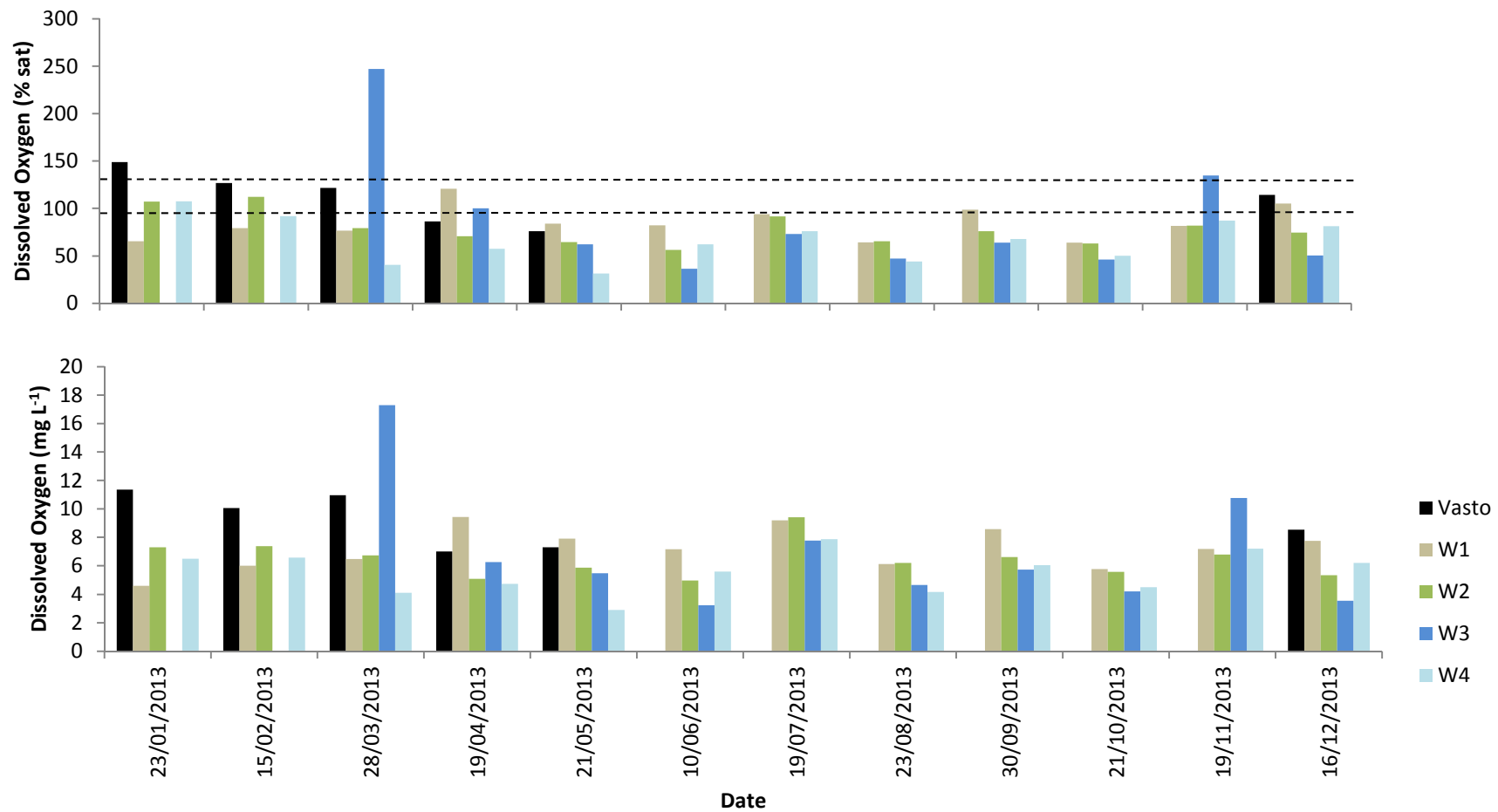
Monthly data for common physico-chemical parameters are shown in Figure 11. Water temperatures at the time of measurement (9-12 am) were >25 °C in January, February, November and December.

Lake Vasto is much less saline ($2.19 \pm 0.06 \text{ mS cm}^{-1}$) than the Point Fraser wetland during the months where it is used as top-up water. It therefore is useful in diluting the high salinities encountered in the wetland during the summer months. In 2011, W1 had much lower conductivities than the other ponds, however in 2012 the average conductivities were very similar in both W1 and W2 (16.6 ± 2.5 and $18.8 \pm 2.2 \text{ mS cm}^{-1}$ respectively). Conductivity is now fairly uniform across the entire wetland (W1 to W4), with W1 occasionally showing lower conductivities presumably due to inputs from Lake Vasto. Extremely high conductivities (75.6 to 98.9 mS cm^{-1}) were recorded in W3 in March and April. Salinities of >7 ppt (James & Hart, 1993) for the plants *Eleocharis acuta*, and >10 ppt for *Juncus kraussii* (Zedler *et al.*, 1990) and *Baumea articulata* (Chambers *et al.*, 1995) are known to impact on growth, this equates to an approximate conductivity of 12.5 and 18 mS cm^{-1} respectively. Conductivities in Point Fraser exceeded 12.5 mS cm^{-1} on 50% of occasions across all ponds, which is an improvement upon 2012 which exceeded on 83% of occasions. Therefore in 2013, despite a couple of extreme conductivities, conductivity was generally lower than in 2012.

Dissolved oxygen concentrations were recorded in excess of 100% saturation on a couple of occasions in all ponds and Lake Vasto (Figure 11), indicating high algal growth in the water (high rates of photosynthesis can temporarily raise % saturation above 100%). At most other times of the year, dissolved oxygen concentrations were slightly below ANZECC & ARMCANZ (2000) recommended guidelines for protection of aquatic systems; occasionally reaching levels that would impact on many species of fish ($<6 \text{ mg L}^{-1}$). This may indicate increasing biological oxygen demand from the sediments due to build-up of organic material. The only fish present, *Gambusia holbrooki*, an introduced fish would not be affected by low dissolved oxygen concentrations as it can air breath to supplement water oxygen levels.

pH was always circumneutral to slightly alkaline, with only a couple of times when values occurred outside recommended guideline levels. Oxidation reduction potential values greater than 100 mV pose no issue for wetland processes. However, under 100 mV, the process of denitrification can occur which is the conversion of nitrates to nitrogen gas by bacteria. This is a desirable process for constructed wetlands as it results in the permanent loss of nitrogen from the system. Although mainly occurring in all ponds between March and April, low ORP occurred on several other occasions particularly in W4.





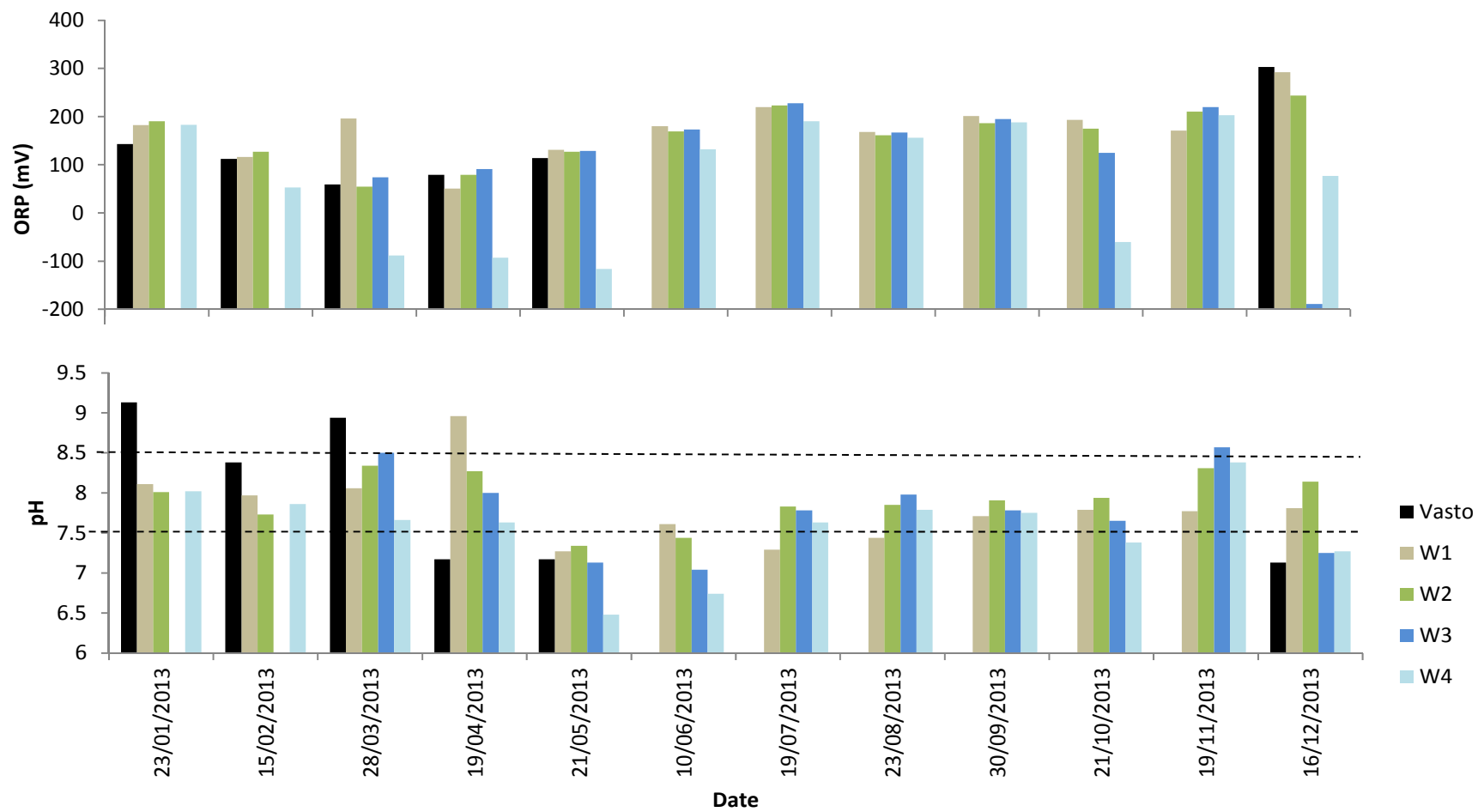
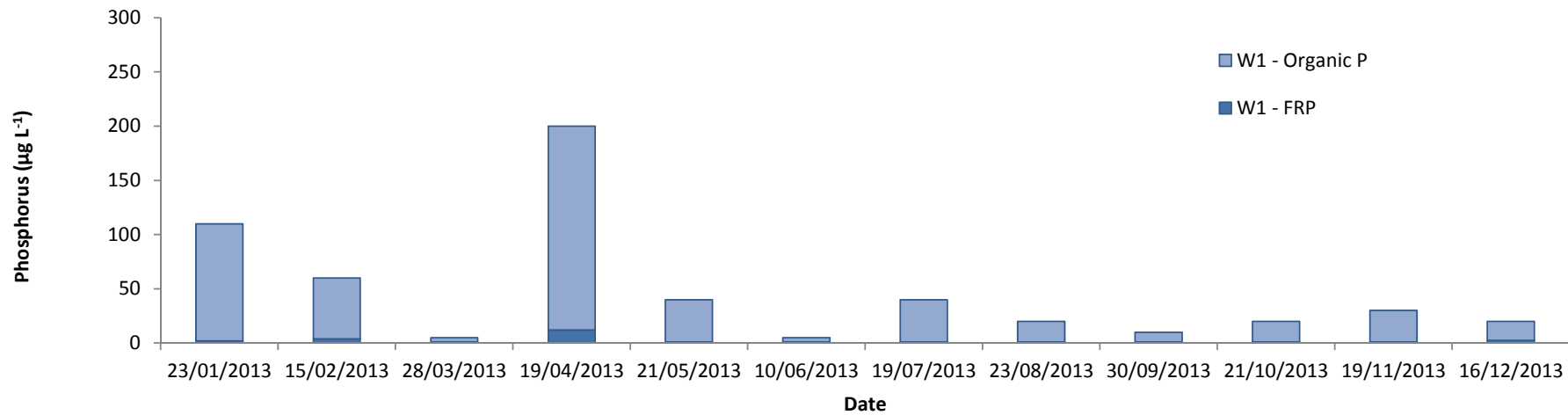
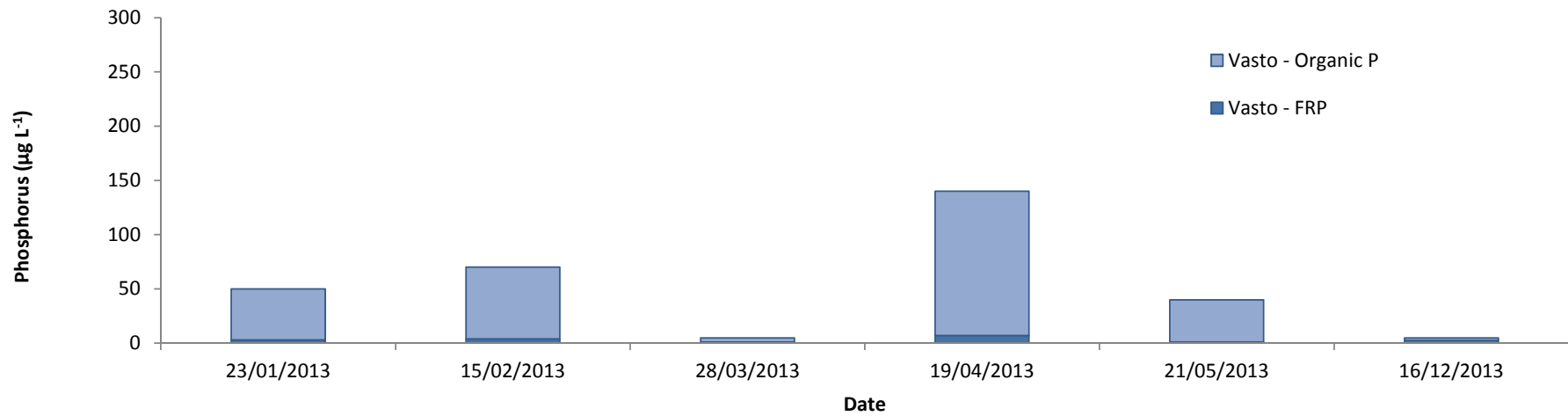
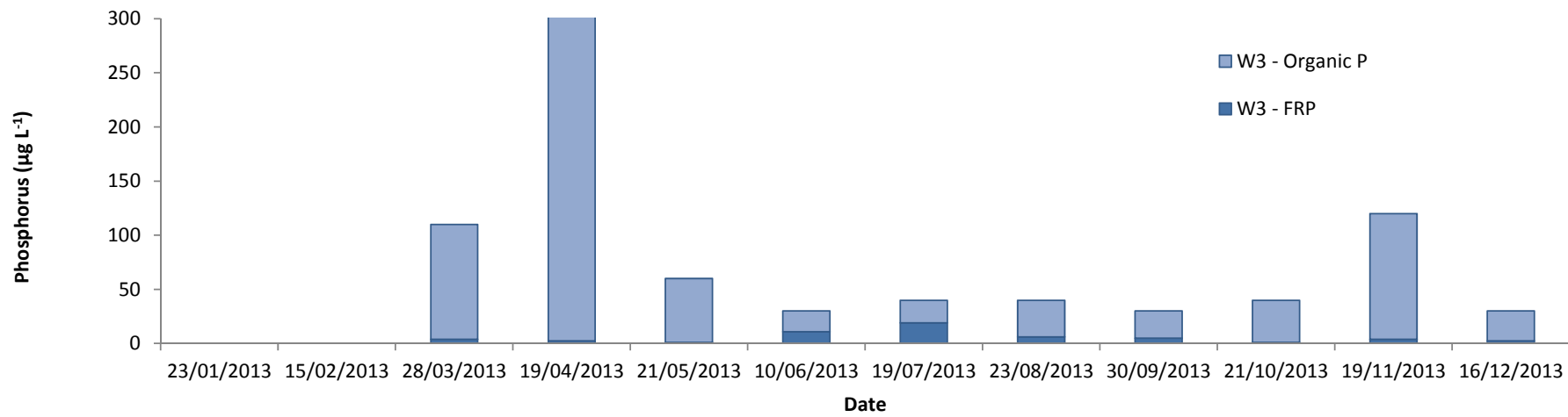
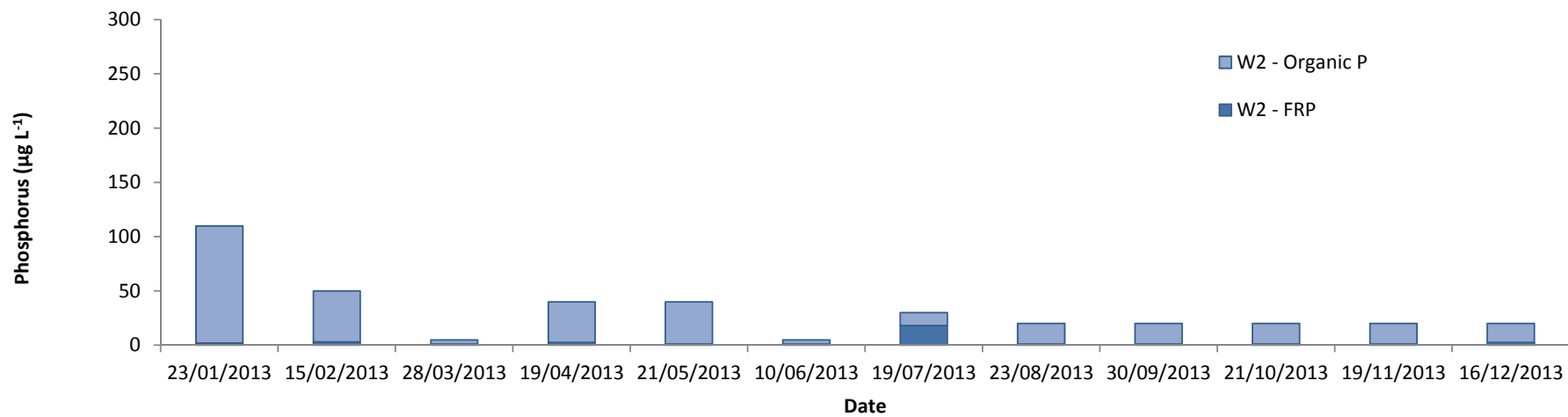


Figure 11. Physico-chemical parameters measured monthly at Point Fraser sites (W1-W4 and Lake Vasto. Dotted lines show relevant ANZECC & ARMCANZ (2000) guideline levels (see Table 3 for details).

Phosphorus concentrations in W1 closely follow those of Lake Vasto during the summer months when topping up of W1 occurred. The majority of the P was in the form of particulate (algae or otherwise) rather than dissolved FRP. Rains appeared to bring in comparatively low concentrations of P, although the intensive monitoring of flows will provide better information on this. Concentrations of P then generally dropped in W2 presumably due to settling of particulates and binding onto the Supersorb clay added to W2. Concentrations picked up in W3 and declined again in W4. These increases are more likely due to the impact of evapo-concentration and water volumes rather than any releases of P from the sediments. Algal blooms also account for occasional spikes of total P across the wetland. Concentrations on a couple of occasions exceeded the targets of $<100 \mu\text{g L}^{-1}$ (Figure 12) in W4 recommended for the Mounts Bay Drain catchment by the Swan River Trust (Swan River Trust, 2009a), as part of the Swan-Canning Water Quality Improvement Plan (Swan River Trust, 2009b). This appears to contradict the findings of the nutrient budget which showed that P was greatly reduced from inlet to outlet. However, at times of outflow, concentrations in W4 were all below the target level. Lake Vasto had lower total P concentrations than seen in 2012.





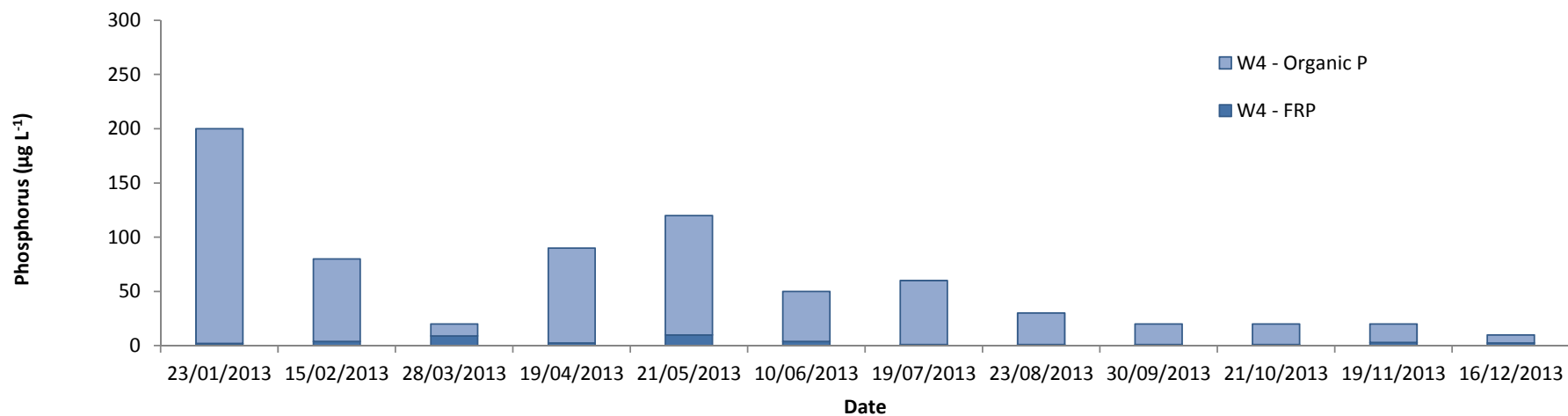
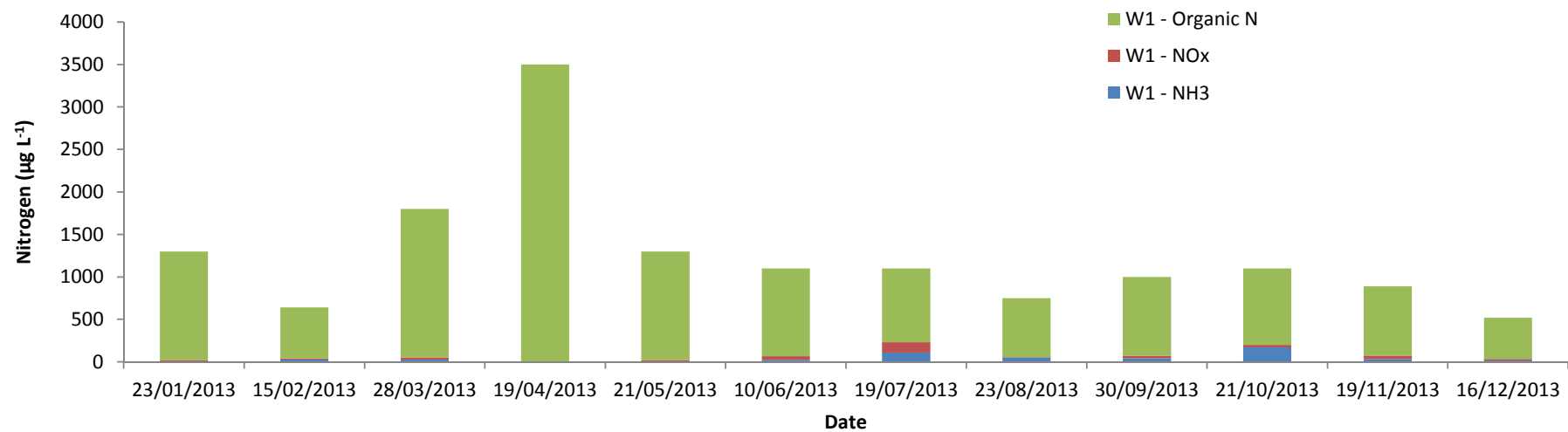
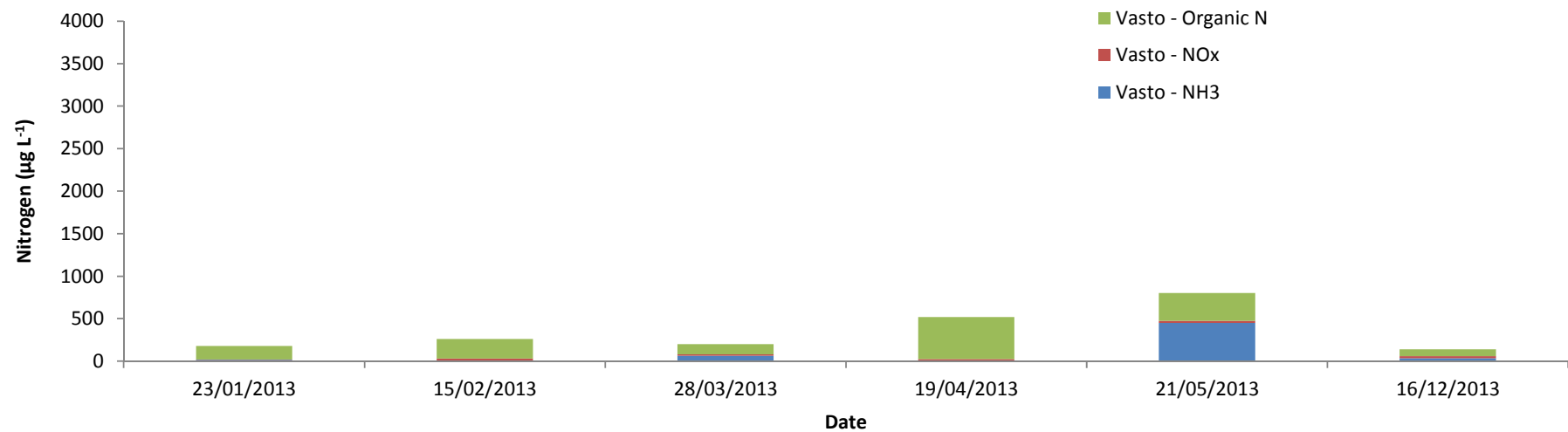
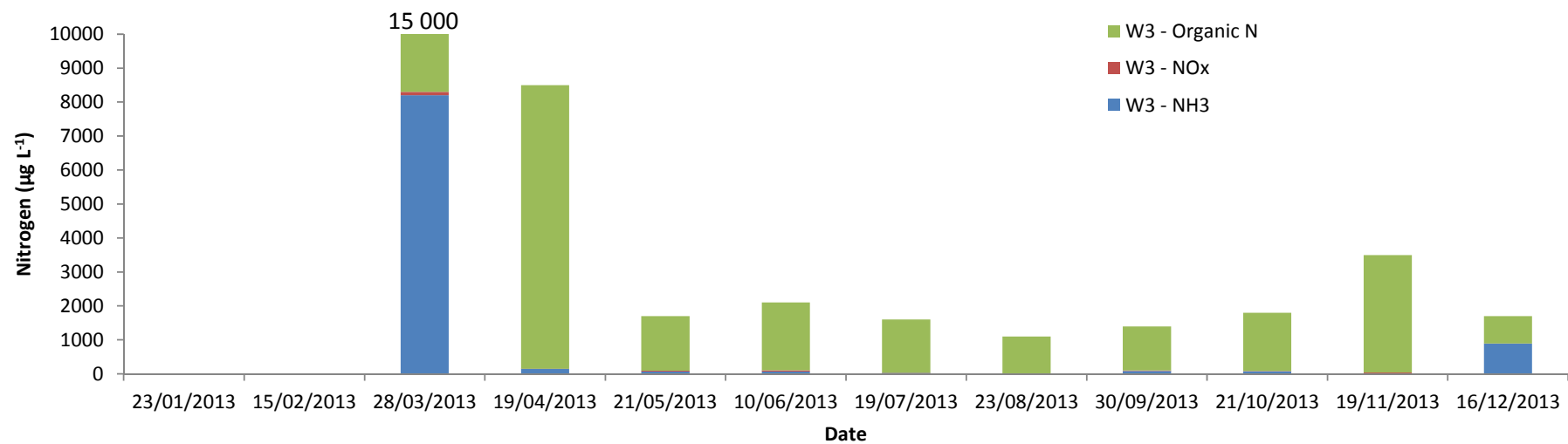
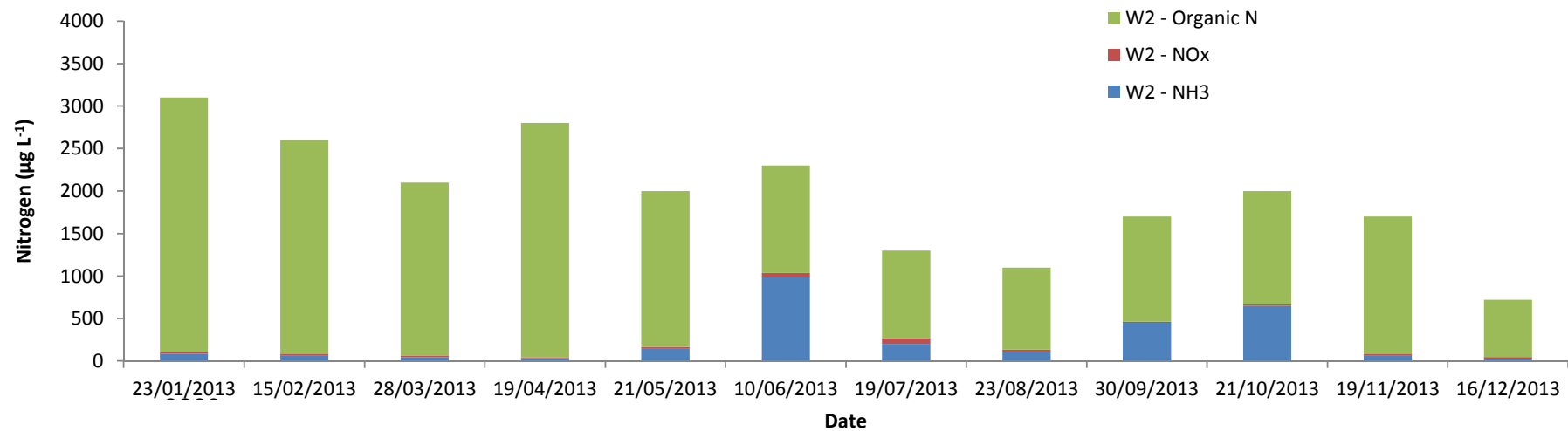


Figure 12. Phosphorus (Total P = Organic P + FRP) concentrations recorded at all sites in the wetland. Majority of FRP concentrations were below detection at $2 \mu\text{g L}^{-1}$.

Lake Vasto contained relatively low total N ($<400 \mu\text{g L}^{-1}$) concentrations with NO_x and NH_3 being low ($<120 \mu\text{g L}^{-1}$), except in May where a very high NH_3 concentration was recorded ($450 \mu\text{g L}^{-1}$). Unlike for P, concentrations of N in W1 were not reflective of Vasto concentrations, but were higher, predominantly in organic/particulate forms. This suggests that algal growth in this pond might be responsible for the higher N concentrations. In W2 concentrations of NH_3 increased substantially (particularly during the winter months), this is surprising as the Supersorb has in previous years been effective in reducing NH_3 concentrations. This may suggest that the Supersorb is either saturated or buried in W2. The source of the NH_3 is unknown, although it can be produced as organic matter breaks down. In all ponds, organic N (organic or particulate) accounted for the majority of the N present. Concentrations of total N generally declined between W2 and W4, although high concentrations of NH_3 were present in W4 between February and May.

The ANZECC/ARMCANZ (2000) guidelines for aquatic ecosystems in the south west of Australia for wetlands or lakes/reservoirs are presented in Table 3. These trigger values are designed for natural wetlands and are only indicative of possible issues. Constructed wetlands would be expected to exceed many of these trigger values as their role is treat water of poor quality, however it would be expected that as water passes through the wetland, the frequency of exceedances would decrease as the water is treated. Overall there is little difference in the number of exceedances across the wetland, indicating the wetland may not be having much influence on water quality. Further in some cases such as FRP, Total P and Total N there are more exceedances in W4 than W1, suggesting the concentrations are worsening across the wetland. Salinities were higher than the guidelines, as the incoming water (at least from Lake Vasto) is already saltier than the guidelines. Dissolved oxygen was both higher and lower than the recommended value at different times. The trend was for low dissolved oxygen concentrations.





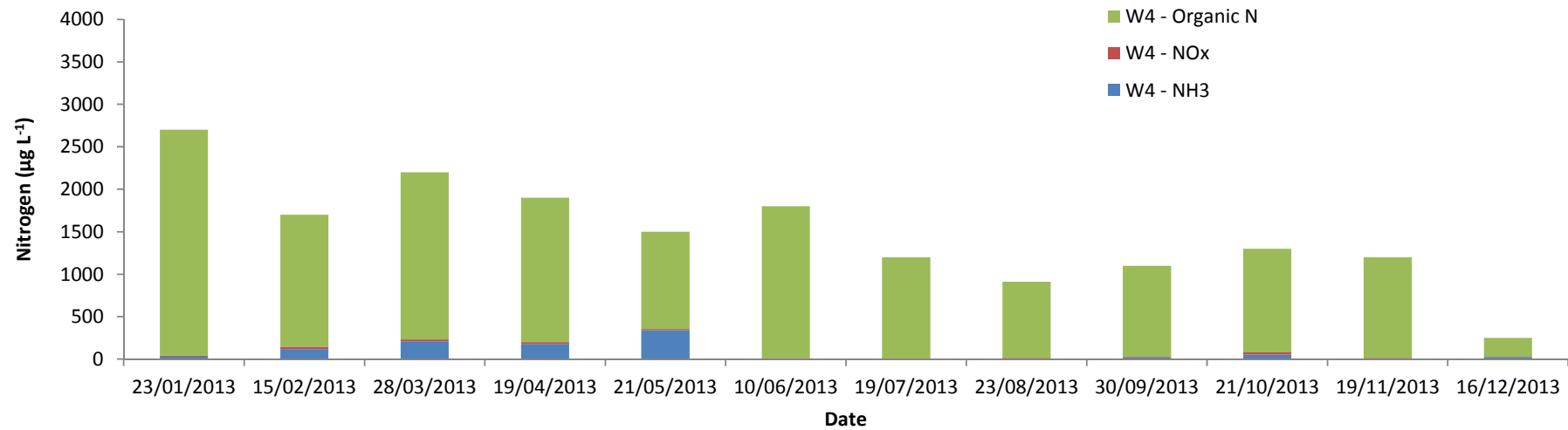


Figure 13. Nitrogen (Total N = Organic N + NH₃ + NO_x) concentrations recorded at all sites in the wetland. Note on the 22/12/10 analytical error prevented Organic N being determined.

Table 3. ANZECC/ARMCANZ (2000) guideline for aquatic ecosystems in the south west of Australia for wetlands or lakes/reservoirs

Parameter	Acceptable range	Number of Exceedances (# samples)			
		W1	W2	W3	W4
Dissolved oxygen	90-120% saturation	10 (12)	9 (12)	8 (10)	10 (12)
pH	7.0-8.5	0 (12)	0 (12)	1 (10)	0 (12)
Conductivity	0.3-1.5 mS cm ⁻¹	12 (12)	12 (12)	10 (10)	12 (12)
Total P	<60 µg L ⁻¹	3 (12)	1 (12)	4 (10)	5 (12)
FRP	<30 µg L ⁻¹	0 (12)	0 (12)	0 (10)	3 (12)
Total N	<1500 µg L ⁻¹	2 (12)	9 (12)	8 (10)	6 (12)
NOx	<100 µg L ⁻¹	1 (12)	0 (12)	1 (10)	0 (12)
Ammonia	<40 µg L ⁻¹	4 (12)	10 (12)	7 (10)	5 (12)

7.3.2 QUARTERLY DATA

A broader range of parameters and metals were sampled from each pond at quarterly intervals (Table 4). Water hardness was 'extremely high' throughout the year, except in Lake Vasto where it was hard (Table 5). TSS tends to be higher in W3 and W4, presumably as Zone 1 is designed to settle particulates while Zone 2 is shallow and potentially more mixed by winds re-suspending sediment. Chlorophyll *a* concentrations were low. Biological oxygen demand remained below detection on all occasions (<5 mg L⁻¹) except in W4 in November where it reached 10 mg L⁻¹.

All the metals measured had concentrations (due to water hardness in some cases) that were below the ANZECC/ARMCANZ (2000) trigger values for the 95% protection of aquatic systems with the exception of Cu and Zn. Zinc exceeded trigger values in all ponds on most occasions reaching 60 µg L⁻¹. Zinc has been exceeded trigger values in previous years, although its appearance is variable and typically intermittent. Copper also exceeded the trigger values on most occasions across the entire wetland reaching a peak of 17 µg L⁻¹. Arsenic, Cd, Cr, Ni and Pb had detection limits that exceeded the trigger value which means that's exceedances may have occurred but the analytical technique used was unable to detect them. Nickel exceeded the trigger value on one occasion (May) in W4.

Table 4 (cont)

Analysis (mg L ⁻¹)	ANZECC (2000)	23/08/2013				19/11/2013				Vasto
	Trigger Values	W1	W2	W3	W4	W1	W2	W3	W4	
Total Suspended Solids		<5	20	18	38	23	<5	<5	14	<5
Total Hardness (CaCO ₃)		140	880	1000	1600	1300	530	1100	2300	820
Ca		14	82	96	140	0.2	110	50	74	160
Mg		25	160	190	290	0.1	240	96	220	480
Al (µg L ⁻¹)	55	<20	<20	<20	<20	<20	<20	<20	<20	<20
As (µg L ⁻¹)	13 As(V)	<20	<20	<20	<20	<20	<20	<20	<20	<20
Cd (µg L ⁻¹)	0.2 ^H	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cr (µg L ⁻¹)	1 Cr ^C (VI)	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cu (µg L ⁻¹)	1.4 ^H	10	8	<5	7	<5	8	5	9	<5
Ni (µg L ⁻¹)	11 ^H	40	8	7	6	8	6	8	9	6
Pb (µg L ⁻¹)	3.4 ^H	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zn (µg L ⁻¹)	8 ^{CH}	40	30	30	30	50	50	20	40	40
Mn (µg L ⁻¹)	1900 ^C	930	44	32	42	16	69	51	68	52
Fe (µg L ⁻¹)		30	50	60	350	300	40	<20	150	220
Hg (µg L ⁻¹)	0.6(Inorganic) ^B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DOC		2.2	11	15	<0.2	19	9	22	47	17
Chlorophyll a (µg L ⁻¹)		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.8	0.7
Phaeophytin (µg L ⁻¹)		5.9	<0.5	<0.5	12	4.2	4	4.6	130	6.1
TKN (µg L ⁻¹)		0.8	0.7	1.1	1.5	0.9	0.85	1.7	3.5	1.2
BOD		<5	<5	<5	<5	<5	<5	<5	10	<5
Turbidity (NTU)	0.1	5.30	0.7	2.2	1.3	0.8	2.7	1.3	6.8	3.7
Cl-	0.2		2800	3400	5300	4300	1800	3800	8000	2800

Table 5 Approximate factors to apply to soft water trigger values for selected metals in freshwaters of varying water hardness (taken from (ANZECC/ARMCANZ, 2000) (TV = Trigger value).

Hardness category (mg/L as CaCO ₃)	Cd	Cu	Pb	Ni	Zn
Soft (0–59)	TV	TV	TV	TV	TV
Moderate (60–119)	X 2.7	X 2.5	X 4.0	X 2.5	X 2.5
Hard (120–179)	X 4.2	X 3.9	X 7.6	X 3.9	X 3.9
Very hard (180–240)	X 5.7	X 5.2	X 11.8	X 5.2	X 5.2

7.3.3 CONCLUSIONS

- Determine how physico-chemical variables and nutrient concentrations changed on a monthly timescale
- Examine how key metals and other selected parameters change quarterly between all the ponds

There were clear exceedances of ANZECC/ARMCANZ (2000) guidelines for metals concentration for both Cu, Zn and on one occasion for Ni. It is likely that the wetland would have discharged some of these concentrations into the Swan River. The wetland appeared to achieve its principal objective of discharging water meeting the requirements of the Swan-Canning Water Quality Improvement Plan (Swan River Trust, 2009a, b) for P (most occasions) but not for N. Close examination of physico-chemical parameters found a number of exceedances of ANZECC/ARMCANZ (2000) guidelines however with the exception of salinity, these exceedances were unlikely to be of significant consequence to wetland function. Salinities within the wetland have increased steadily since 2010 and exceeded that of seawater on two occasions in W3.

7.4 SEDIMENT

The specific aims of measuring the sediment quality in the wetland were to:

- Determine how key metal and nutrients were accumulating in the sediment.

This will show whether there are any management issues associated with sediment quality. The data will allow the effectiveness of various processes responsible for nutrient uptake or release to be inferred.

- To evaluate how the sediment is developing over time.

Comparison to previous years will allow the development of sediment to be measured.

Sediments were sampled in May 2013 for a range of metals and nutrients as shown in Table 6. The average depth of sediment to the liner in W2 was 172.5 ± 28.9 mm, an increase of 61 mm over 2012, a substantial increase of the approximately 12 mm per year seen previously. The sediment in W3 also increased to 252.5 ± 12.7 mm compared to 140 ± 13.7 mm for 2012. In 2012, there appeared to be an analytical discrepancy between the sediment metal concentrations compared to 2011. However the results for 2013, show similarities to both years, which suggests that the metal concentrations in W2 are highly variable spatially, rather than temporally. No metal concentrations exceeded any ANZECC & ARMICANZ (2000) guidelines for sediment. The organic (LOI₅₀₀) and carbonate content (LOI₁₀₀₀) of the sediment has remained largely unchanged in W3 from 2010 to 2013. In W2, 2010 and 2011 had an organic content between 12-15% and a carbonate content of 1-6%, these doubled to 24-31% and 16-17% for 2012 and 2013 respectively.

Table 6. Sediment concentrations of selected metals and nutrients in W2 and W3 in May a) 2013, b) 2012 and c) 2011. (where some of the four replicate samples were below detection levels, the number of samples used in the mean is indicated by n=)

a) 2013

Variable (mg kg ⁻¹)	ANZECC & ARMICANZ (2000) Interim Guidelines (Low-High)	W2	W3
TKN		3275 ± 401	1665 ± 593
TP		400 ± 164	38 ± 7
TOC		2.4 ± 1.4	2.4 ± 0.8
Al		11000 ± 3488	1020 ± 100
As	20-70	2.5 ± 0.3	1.0 (n=2)
Cd	1.5-10	<0.3	<0.3
Cr	80-370	1.9 ± 0.2	3 ± 0.3
Cu	65-270	4.8 ± 0.8	2 ± 0.5
Fe		2925 ± 357	1775 ± 206
Ni	21-52	2.1 ± 0.3	1 ± 0.1
Pb	50-220	8.0 ± 2.1	5.5 ± 1.3
Zn	200-410	23.8 ± 2.8	11.0 ± 1.7
Mn		115.0 ± 15.0	13.8 ± 2.8
Hg	0.15-1	<0.05	<0.05

b) 2012

Variable (mg kg ⁻¹)	ANZECC & ARMCANZ (2000) Interim Guidelines (Low-High)	W2	W3
TKN		725.0 ± 135.1	295.0 ± 106.0
TP		75.3 ± 14.4	57.3 ± 8.1
TOC		5.0 ± 0.4	1.0 (n=1)
Al		2705.0 ± 998.5	1320.0 ± 278.2
As	20-70	<1	1.5 (n=2)
Cd	1.5-10	<0.1	<0.1
Cr	80-370	0.8 ± 0.15 (n=3)	4 ± 1
Cu	65-270	1.5 ± 0.3	4 ± 1
Fe		895 ± 206	2325 ± 394
Ni	21-52	1.0 (n=2)	1 ± 0
Pb	50-220	2.0 ± 0.6	10.0 ± 2.9
Zn	200-410	8.3 ± 1.4	29.0 ± 8.4
Mn		37.3 ± 9.5	14.0 ± 2.9
Hg	0.15-1	<0.05	<0.05

c) 2011

Variable (mg kg ⁻¹)	ANZECC & ARMCANZ (2000) Interim Guidelines (Low-High)	W2	W3
TKN		6975 ± 448	1495 ± 588
TP		775 ± 81	60 ± 15
TOC		1.0 ± 0.8	2.8 ± 2.0
Al		80000 ± 12356	1345 ± 190
As	20-70	14.3 ± 0.9	<2
Cd	1.5-10	<0.4	<0.4
Cr	80-370	11.0 ± 4.8	<5
Cu	65-270	12.0 ± 1.7	<5
Fe		13250 ± 2056	2700 ± 534
Ni	21-52	11.0 ± 3.6	<4
Pb	50-220	32.0 ± 7.1	9.0 ± 0.5
Zn	200-410	82.5 ± 16.1	25.0 ± 6.2
Mn		422.5 ± 67.5	10.3 ± 1.3
Hg	0.15-1	<0.05	<0.05



Figure 14. Photograph of a sediment cores taken at W2 (left) and W3 (right).

7.5 VEGETATION

The specific aims of sampling the vegetation were to:

1. Map the coverage of the aquatic plant species in the wetland.

This will show how the plant communities in the wetland are developing. It will also allow the area of each species to be determined and this information will be used in the nutrient load calculations.

2. Measure development of biomass of major plant species within the wetland (Zones 1 and 2).

This will show whether the plants are becoming larger and/or denser. It also provides a basis to determine nutrient loads in the vegetation.

3. Measure the concentration of nutrients (N & P) in live, dead and below ground parts of each species in each site.

This will allow the total load of nutrients stored in plant material to be determined. It will also indicate which species are best for nutrient uptake.

The specific aims of the foreshore monitoring were to:

4. Establish some regular sites where the condition of the foreshore can be monitored. Key items of interest are erosion, weed invasion and the effectiveness of armouring that may have been put in place.

This will allow issues on the foreshore that require management action to be identified and acted upon before substantial damage is done to the site.

7.5.1 VEGETATION COMMUNITIES

Wetland vegetation mapping and photo-point monitoring were conducted in May 2013 and early November 2013 (2/11/13) as part of biannual monitoring as outlined in the PFMEP (Year 4).

7.5.1.1 CHANGES IN VEGETATION DISTRIBUTION FROM 2010 TO 2013

Five main plant communities were determined and mapped during the initial monitoring in 2010 (Year 1; Figure 15). These communities were remapped in 2011, 2012 and 2013 with particular focus on detecting any change in the extent and condition of these main vegetation types, as well as any recruitment and colonisation by new plants. In general, the spatial distribution of plant communities has remained reasonably stable between 2012 and 2013. Indeed the majority of vegetation types have not changed dramatically since original mapping in 2010 (compare Figure 15 and Figure 16).

Specifically, the following minor changes between 2012 and 2013 were noted:

- 1) *Baumea articulata* – the original single patch of *Baumea articulata* sedgeland which expanded (to triple its size) from 2010 to 2011, and contracted in 2012, has now almost disappeared (Table 7). The remaining patch now contains mostly dead and dying plants, suggesting this species and community type will soon disappear from the wetlands. The contraction of *B. articulata* in the wetland appears to have started during spring 2011 (see 2011 monitoring report) and has progressed since. Most deaths appear to be over summer of 2011/12 and 2012/13 suggesting the decline has been caused by drought and/or increased salinity
- 2) *Eleocharis acuta* – This community is dominated by *Eleocharis acuta* (Common Spikerush, Cyperaceae) but is mixed with small amounts of *Juncus kraussii*. During 2013, there has been further contraction of this sedgeland community at its margins, so that it only covers small amount of its original distribution (Table 7 and Table 8), mainly at the expense of expanding *J. kraussii*-dominated vegetation (Figure 15 and Figure 16). The relative cover of *J. kraussii* has again increased in some patches of this community. This suggests that *J. kraussii* may be slowly taking over this community.

- 3) *Eleocharis acuta* – This community is dominated by *Eleocharis acuta* (Common Spikerush, Cyperaceae) but is mixed with small amounts of *Juncus kraussii*. During 2013, there has been further contraction of this sedgeland community at its margins, so that it only covers small amount of its original distribution (Table 7 and Table 8), mainly at the expense of expanding *J. kraussii*-dominated vegetation (Figure 15 and Figure 16). The relative cover of *J. kraussii* has again increased in some patches of this community. This suggests that *J. kraussii* may be slowly taking over this community.
- 4) *Ficinia nodosa* – this community is dominated by Knotted Club Rush (previously *Isolepis nodosa*) and tends to occur on surrounding slopes on non-inundated areas. Its distribution has been more or less stable over the past year.
- 5) *Juncus kraussii* – this is the most widespread vegetation type of the wetland and dominants each wetland zone. It consists of dense stands of *Juncus kraussii* (Sea Rush, Juncaceae) of between 70 to 100% cover. It is expanding at its margins, particularly where it abuts *E. acuta* community (type 2 above; Figure 15). However this community is also contracting where it abuts open water, and this has been particularly so in zone 2 during 2012-13 (Figure 16). Overall there has been a reduction in area occupied by this community during 2013 (Table 7). The density of *J. kraussii* plants and its dominance over other species is gradually increasing (now generally 80-100% cover).
- 6) Samphire and other halophytes – This community is dominated by *Tecticornia indica* and other *Tecticornia* spp. (commonly known as samphires and until recently in the genus *Halosarcia*). Such species are not on the original planting list and so are likely to have colonised raised mounds of the wetland and other areas which dry in summer. These raised areas appear to accumulate salts during the drying phase and also support other halophytes such as *Frankenia pauciflora* (which has been increasing in cover). This community has expanded in range in 2013 (Figure 16; Table 8).

In addition to these plant communities, other habitats were found:

- Mixed shrubs on embankments – this community consists of a range of shrub species with medium to high cover. Dominant species include *Scaevola crassifolia*, *Kunzea ericifolia*, *Myoporum caprarioides*, *Ficinia nodosa* and *Atriplex cinerea*. Most of these species were planted around the edge of the wetland.
- Open Water – few aquatic plant species are typically found in these areas (with the exception of filamentous algae). However between and 2013 we noticed an increase in aquatic grasses such as water couch (*Paspalum distichum*) in some areas. The area of open water has increased in Zones 1 and 2 over the last year, mainly due to contraction of *J. kraussii* vegetation (Figure 16; Table 7 and Table 8).

- A small patch of *Typha* or *Phragmites* has colonised open water of Zone 2 between May and October 2012 (Figure 16). However during 2013, this small patch had died back considerably and was reduced to a few scattered individuals only. The infestation may have been sprayed or otherwise controlled by council staff.

Tree & Shrub Species

Melaleuca cuticularis – two patches of young trees were observed on slightly raised mounds, both within Zone 2. These are most likely plants surviving from original planting in 2004. The trees are mostly found on the margin of *Juncus* community where it abuts samphire/halophyte community. One mound had 7 trees in 2010; one of these had died during 2013 and another was of poor health as of November 2013, suggesting that these trees are now under stressed, whereas in previous years they were generally healthy (Figure 19). The other mound had 10 trees in 2010, and all these were appear to be healthy in 2013.

Melaleuca lateritia – this compact shrub was found interspersed throughout the *Juncus* community of Zone 2. Some 20 plants were observed in 2010, which had increased to 28 in 2011 and 31 individual plants in 2012. The increase from 2010 to 2012 was likely to be due to improved detectability (due to shrubs emerging above generally dense cover of *Juncus* in this area) rather than recruitment of new individuals. During 2013 monitoring, some 25 plants were counted, suggesting some loss of plants.

7.5.1.2 CHANGE IN AREA CALCULATED USING GIS

B. articulata was only found in Zone 2 and *J. kraussii* was the only species recorded in Zone 1 (Table 8). Zone 1 was predominantly open water as the design intended. *Juncus kraussii* was planted in Zone 1 in an area of deeper sediments and does not appear to have spread out from this area, although it has contracted slightly in Zone 2 in areas of deeper water.

Baumea articulata is a species that prefers deeper and reliable inundation, the highly variable nature of the water levels in Zone 2 do not appear to have helped this species. Possibly the elevated salinity in 2011-13 and/or drought conditions over summers has impacted this species, which suffered a severe decline of this species starting in spring 2011 and continuing to spring 2013. The deep water conditions of Zone 1 might suit this species and it can potentially recruit into this area. *Ficinia nodosa* is only found along the eastern edge of Zone 2 and northern edge of Zone 3. *Eleocharis acuta* occurred in patches and strips around the edge of *J. kraussii* and is contracting in area at expense of expanding *J. kraussii* (Tables 1 & 2). At this stage it is difficult to determine whether these species are finding their specific niches or if competition between species is responsible for changes in distribution. Increasing water salinities may also explain the apparent movement of *J. kraussii* into the *E. acuta* beds during 2012-3, as *E. acuta* has lower salinity tolerance than *J. kraussii*. Samphires appear to have colonized Zone 2 and 3 from areas outside the wetland, being common species along the Swan River. The high salt levels in the sediments resulting

from the drying of the zones appear to favour these species; the samphires do not survive prolonged inundation.

A photographic record of each vegetation community was taken at fixed locations (Figure 17 to Figure 22).

Table 7. Area (m²) of each cover type and its percentage of total study area and of wetland area (as of May 2010, May 2011, October 2012 and November 2013).

Type	2010 Area (m ²)	2011 Area (m ²)	2012 Area (m ²)	2013 Area (m ²)	% total 2010	% total 2013	% wetland 2010	% wetland 2013
<i>Baumea articulata</i>	16.9	64.3	24.2	5.6	0.2	0.1	0.2	0.1
<i>Eleocharis acuta</i>	405.6	352.4	287.3	173.2	4.7	2.0	5.7	2.4
<i>Ficinia nodosa</i>	154.3	154.3	154.3	152.2	1.8	1.8	2.2	2.1
<i>Juncus kraussii</i>	3234.3	3229.3	3179.0	3072.1	37.7	35.7	45.6	43.3
Samphire / halophytes	355.1	383.0	387.7	524.8	4.1	6.1	5.0	7.4
Open Water	2305.0	2287.9	2438.9	2549.9	26.9	29.7	32.5	35.9
Boardwalk, Weir etc	615.9	615.9	615.9	615.9	7.2	7.2	8.7	8.7
Total Wetland	7087.2	7087.1	7087.2	7093.7	82.6	82.6	100	100
Mixed shrubs (slopes)	1285.6	1285.6	1285.6	1285.6	15.0	15.0		
Raised Ground (~bare)	209.9	209.9	209.9	209.9	2.4	2.4		
Grand Total	8582.7	8582.6	8582.7	8589.2	100	100		

Table 8 Area (m²) of each plant community by wetland zone as of November 2013 (area changes in m² from May 2010 are indicated in parenthesis).

Zone	<i>Baumea articulata</i>	<i>Eleocharis acuta</i>	<i>Ficinia nodosa</i>	<i>Juncus kraussii</i>	Open Water	Samphire/ Halophytes	TOTAL
1	0	0	0	588.5 (-18.3)	1382.4 (+18.3)	0	1970.9
2	5.6 (-11.3)	134.6 (-217.2)	65.1	1755.1 (-57.5)	1167.5 (+226.6)	205.8 (+67.8)	3333.7
3	0	38.6 (-15.2)	87.1 (-2.1)	728.5 (-19.2)	0.0	319.0 (+101.9)	1173.2
TOTAL	24.2	173.2	152.2	3072.1	2549.9	524.8	6466.9

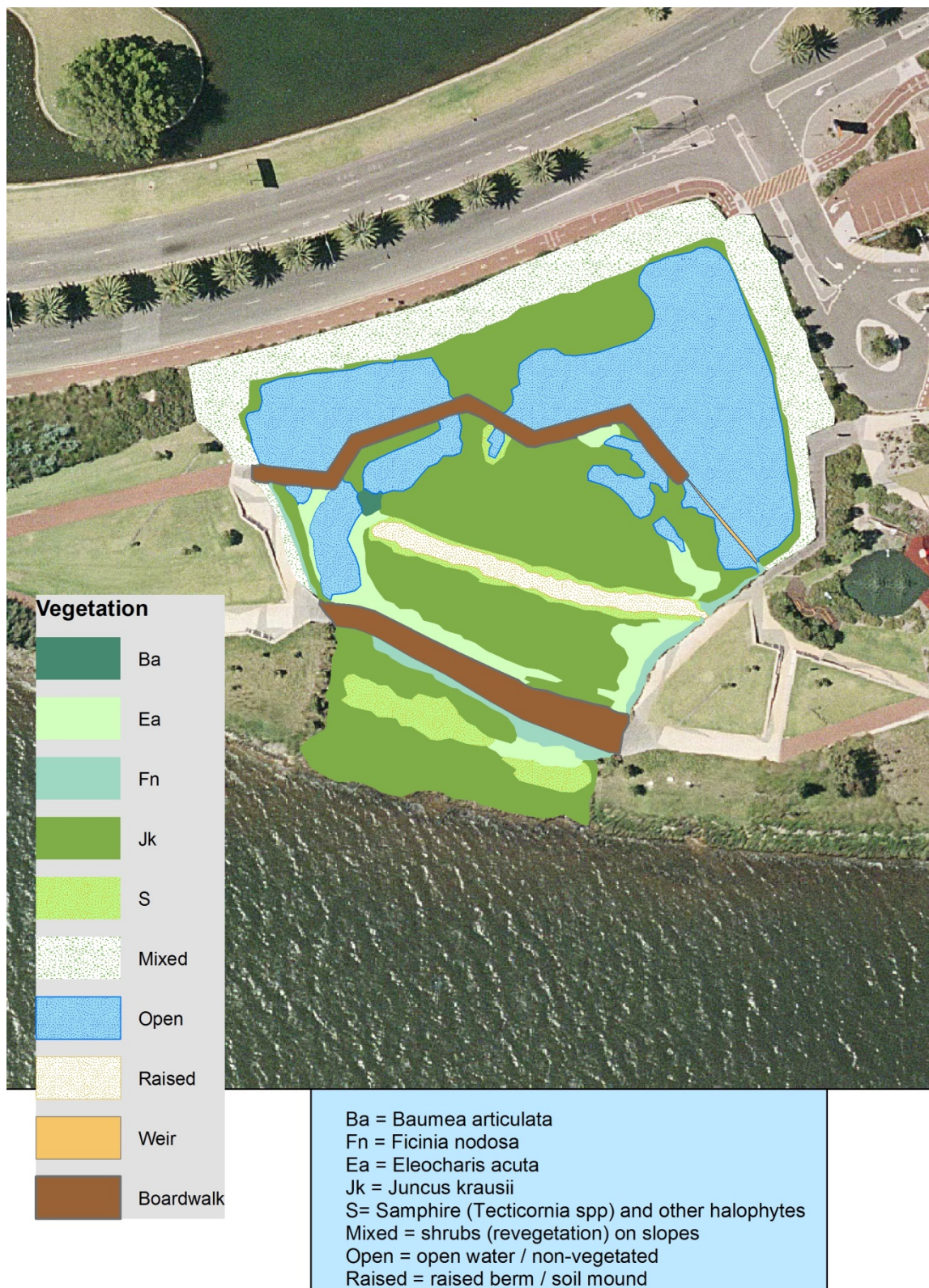


Figure 15. Map of vegetation types and other cover as of May 2010 (original mapping).

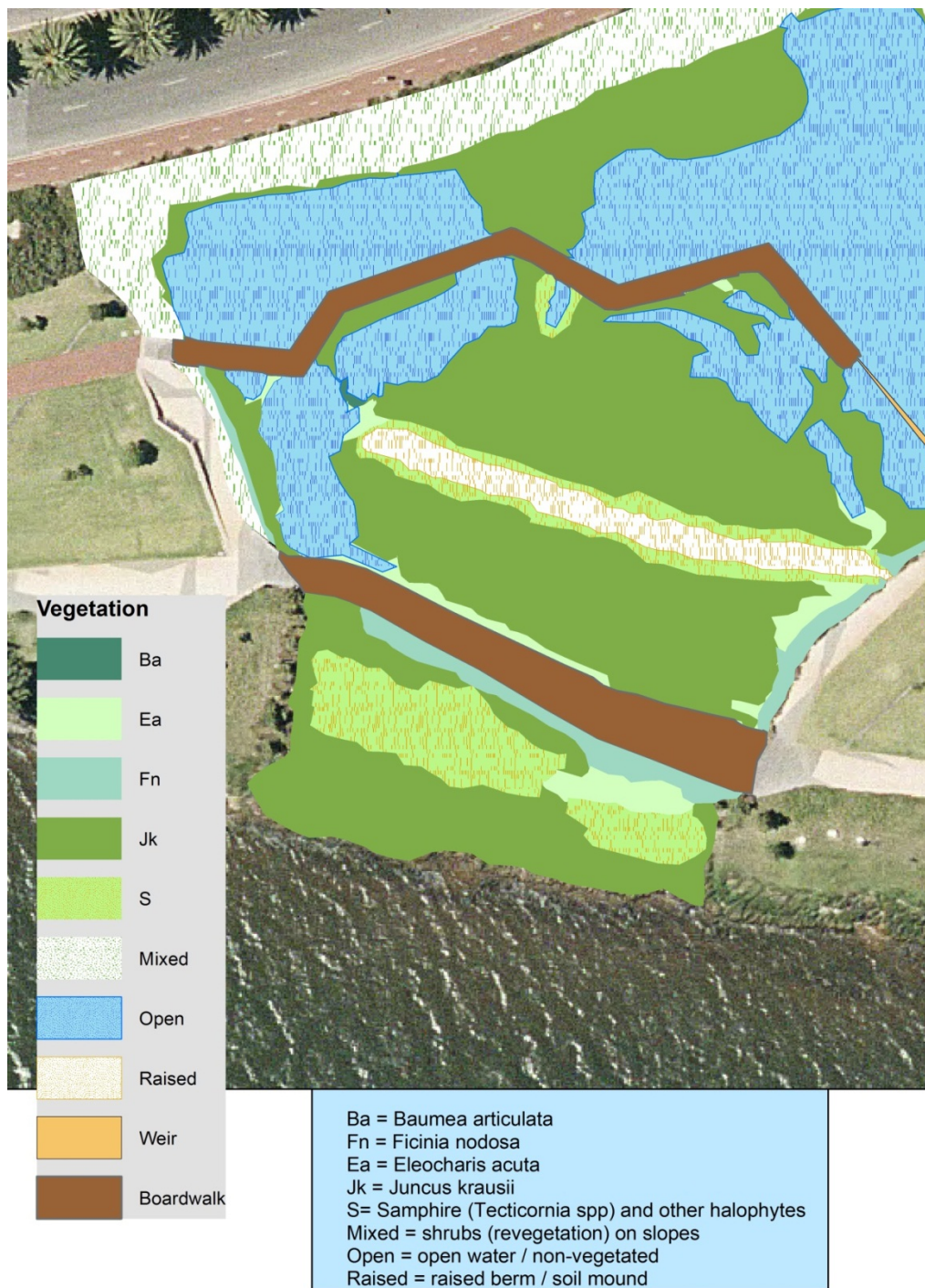


Figure 16. Map of vegetation as of 2nd November 2013.

May 2010



October 2010



October 2011



November 2013

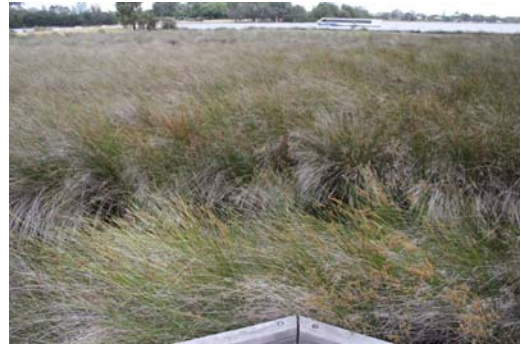


Figure 17. Photographs taken at photopoint WV1 looking south-east

May 2010



October 2011



October 2012



November 2013



Figure 18. Photograph taken at photopoint WV2 looking south. Vegetation here is dense *Juncus kraussii* and its extent and condition is generally stable



Figure 19. Photographs taken at photopoint WV2 looking west towards patch of *Melaleuca* trees. One tree has died (close to boardwalk, whereas another in background in decline).

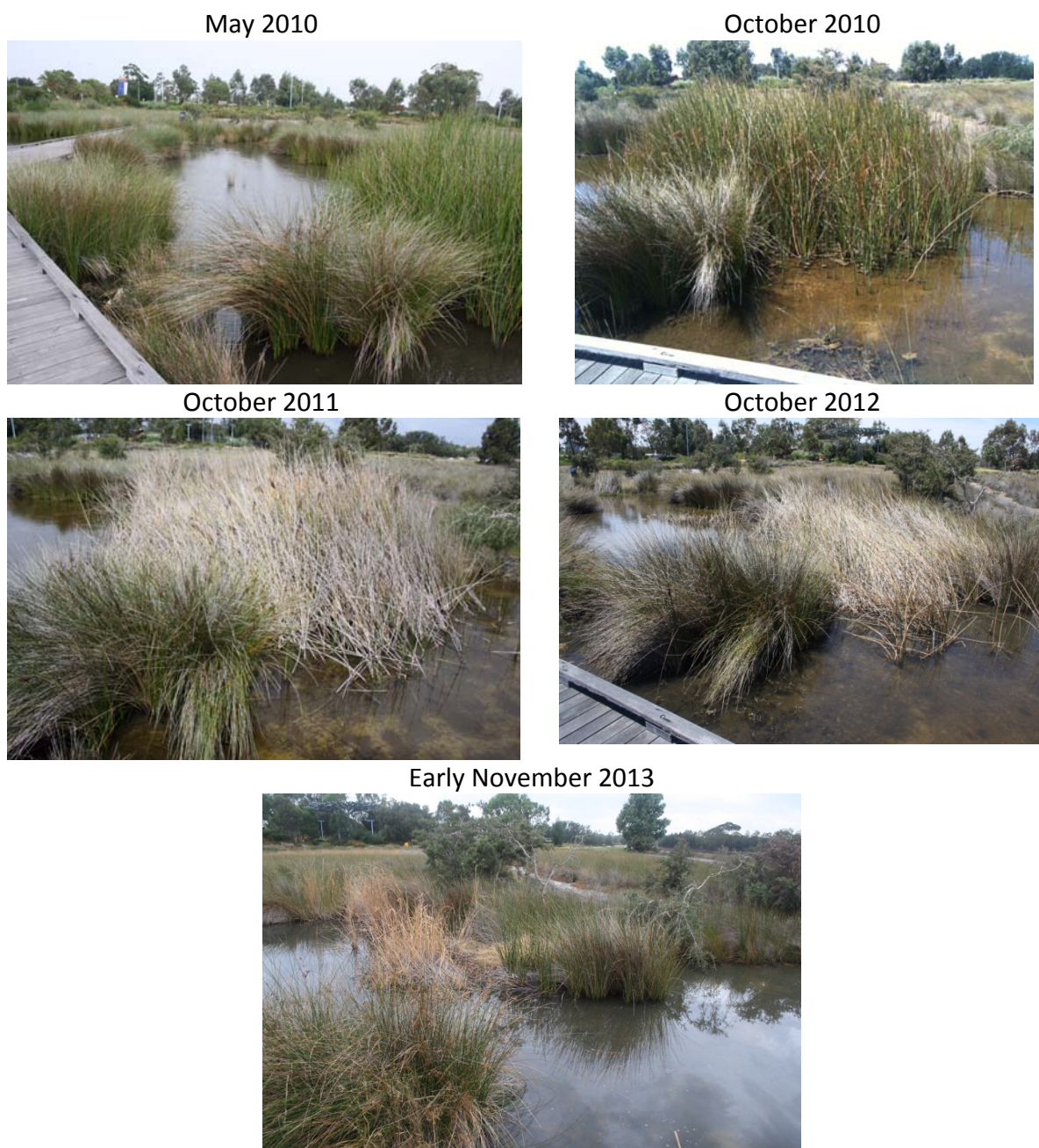


Figure 20. Photograph taken at photopoint WV3 looking east (note expansion and subsequent death of *Baumea articulata* over the years). Photos have been taken in slightly different directions (top is due east, whilst others are ESE to focus more on the declining *Baumea*).



Figure 21. Photographs taken at photopoint WV4 looking west along drainage culvert. Note samphires and other halophytes on the banks of the culvert, and increase levels of surface salt.

May 2010



October 2010



October 2012



November 2013



Figure 22. Photograph taken at photopoint WV4 looking north towards city. NB: Direction and elevation of photograph has varied slightly each year, but generally show increase in open water.



Figure 23. Photographs taken at photopoint WV5 looking south-west

7.5.2 VEGETATION BIOMASS AND GROWTH

No flowers were detected for *Baumea articulata* and *Typha domingensis* in 2012 and 2013, suggesting these species were still struggling to survive in the ponds. The proportion of *Eleocharis acuta* plants with flowers declined by about half in W4 in 2013 and by about 5 times in W3. These declines most likely reflect the on-going decline of this species against *Juncus kraussii*. Similar flowering rates were seen in 2012 and 2013 for *J. kraussii* in all ponds. The mean count of leaves per m² was similar for all species between 2012 and 2013. Mean leaf length was longer in 2012 for *B. articulata* and *T. domingensis* than in 2013 by up to 50%. Both *E. acuta* and *J. kraussii* had similar mean leaf lengths, except for in W3 where *J. kraussii* leaves were shorter in 2013 compared to 2012.

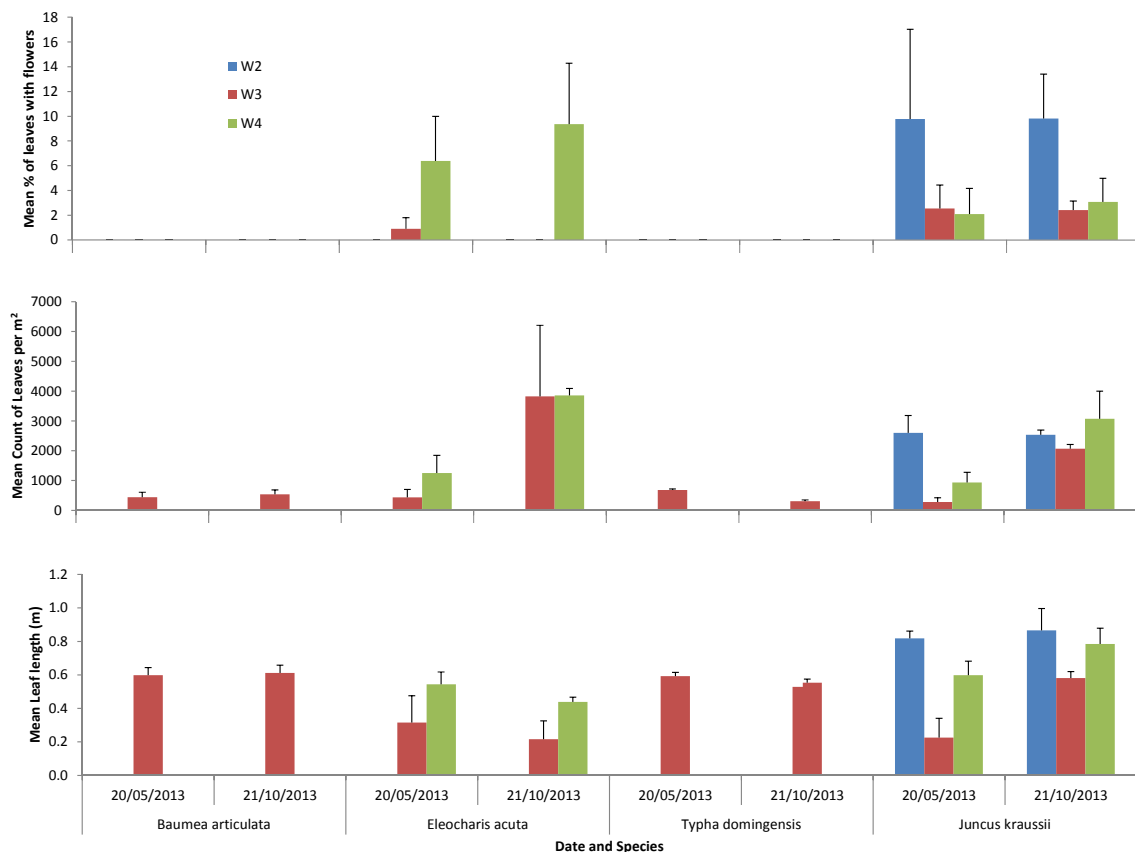


Figure 24. Mean (\pm SE) for percentage of leaves with flowers, count of leaves per m² and leaf length for each species on each sampling occasion for each wetland site.

In May 2013, there was significantly less live plant material than May 2012, reflecting the dry and salty conditions experienced in the summer of 2012-13. This is further reflected in the higher levels of below ground material in most ponds except W4 (Figure 25). In October 2013, the amount of live, dead and below ground material was very similar to October 2012. This suggests that particularly *J. kraussii* has reached full maturity

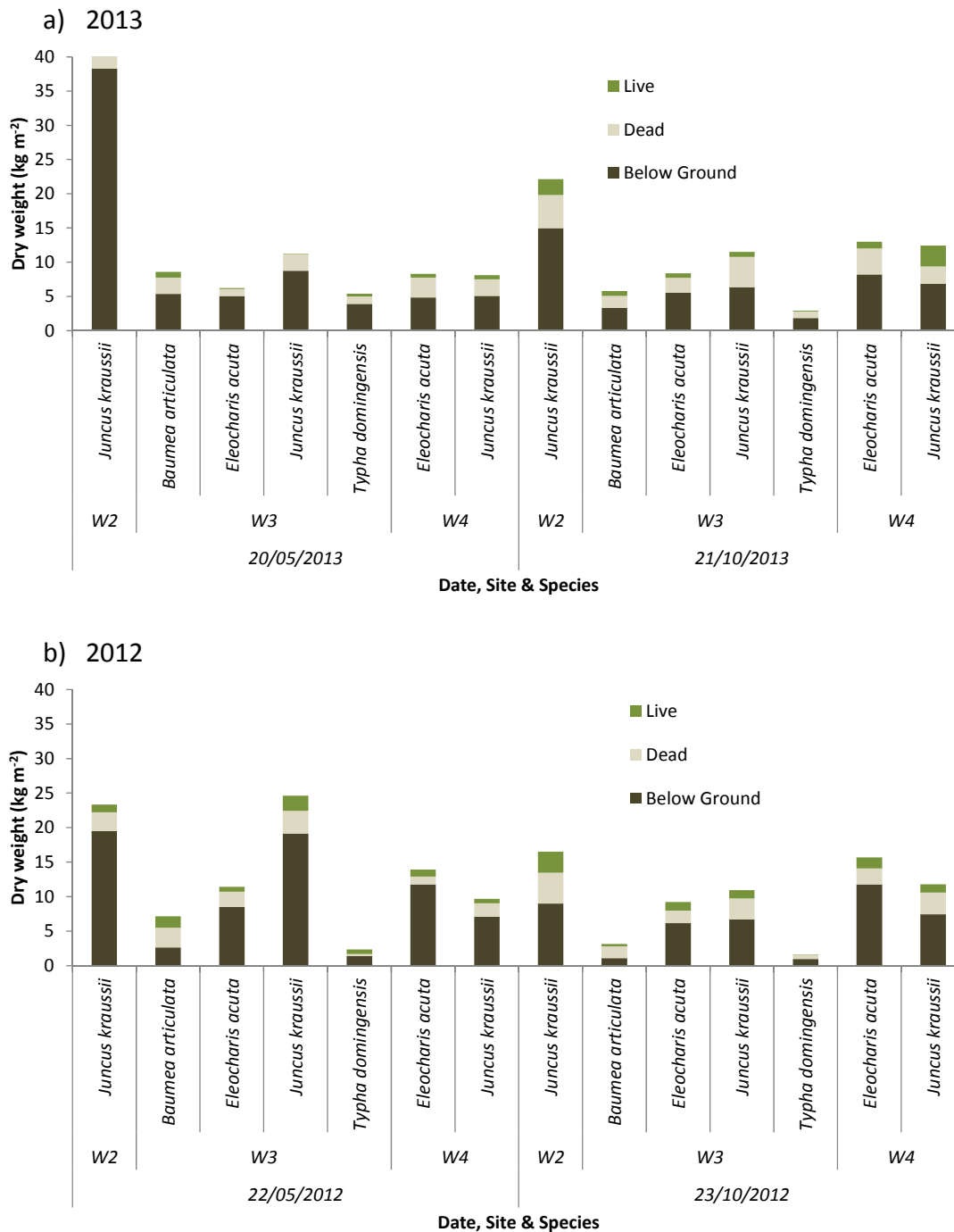


Figure 25 Mean dry weight (g) of live, dead and below material from collected species, from sites on two occasions in a) 2013 and b) 2012.

Loss on ignition (LOI) of plants collected from W2 to W4 is shown in Table 9. At 500 °C LOI shows the portion of the collected plant material that was carbon, while at 1000 °C this shows the proportion of carbonate materials. Below ground material generally has a lower percentage of carbon compared to both live and dead material due to the complex root structures holding sand that could not be washed off. There appears to be no change in LOI 500 or 1000 °C over the monitoring period.

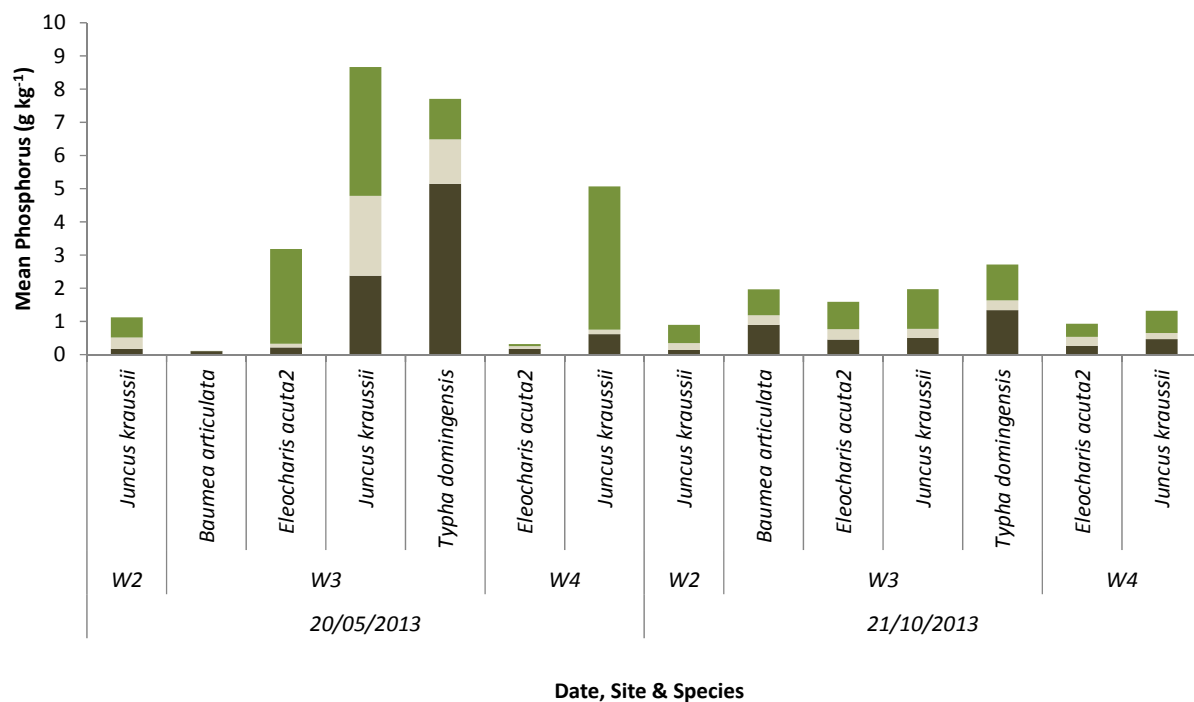
Table 9. Loss on ignition (LOI; at 500 and 1000 °C) for rushes from ponds W2-W4 at Point Fraser between May and October 2010 to 2014 (BG= Below Ground)

Wet land	Species	Type of Material	18/05/2010		26/10/2010		24/05/2011		25/10/2011		22/05/2012		23/10/2012		20/05/2013		21/10/2013		
			LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI	LOI
			500	1000	500	1000	500	1000	500	1000	500	1000	500	1000	500	1000	500	1000	500
			(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	
W2	<i>Juncus kraussii</i>	BG	60.7	1.0	48.9	0.7	32.9	1.6	17.0	0.8	24.0	1.6	44.2	1.5	16.3	0.8	29.5	0.8	
		Dead	95.2	0.9	94.2	0.6	92.5	10.8	87.5	6.7	87.5	2.8	95.0	1.9	91.9	1.8	76.0	1.9	
		Live	95.3	2.5	95.9	2.8	90.7	9.1	95.4	26.9	94.9	3.2	94.4	3.0	95.1	2.6	94.5	2.7	
W3	<i>Baumea articulata</i>	BG	72.8	1.3	65.5	1.6	72.4	6.3	75.8	7.1	42.0	1.3	65.2	2.1	50.4	1.3	62.3	1.2	
		Dead	93.6	0.7	86.5	3.9	89.4	10.9	81.9	7.0	92.2	1.7	89.4	5.8	82.1	1.8	62.7	2.5	
		Live	93.8	3.3	91.4	3.5	89.7	11.5			92.8	2.8	89.9	6.3	92.7	2.8			
	<i>Eleocharis acuta</i>	BG	88.1	1.3	34.5	0.9	27.0	1.0	42.7	1.5	44.8	3.3	68.1	2.6	54.7	4.1	63.9	1.4	
		Dead	89.1	1.2	70.8	8.9	85.0	5.7	66.7	4.2	81.1	3.2	87.2	3.4	90.9	2.2	79.3	2.6	
		Live	94.8	1.7	93.8	2.2	90.9	5.8	91.6	9.2	92.9	1.4	91.6	2.9			92.3	1.8	
	<i>Juncus kraussii</i>	BG	70.3	1.3	21.8	0.7	25.1	1.1	12.2	0.9	40.5	2.7	52.0	1.6	32.2	1.8	36.4	2.1	
		Dead	93.8	1.3	70.0	7.2	89.4	7.3	91.4	1.0	89.2	4.2	86.5	6.5	81.8	3.2	69.6	2.5	
		Live	96.3	2.7	91.5	4.7	94.2	18.4	94.6	28.7	94.5	3.3	94.2	3.7			84.7	4.0	
W4	<i>Typha domin- gensis</i>	BG									80.5	3.3	84.6	7.7	62.7	2.3	44.4	1.3	
		Dead									63.5	6.7	75.9	9.4	83.6	4.4	87.2	2.1	
		Live									89.1	7.5			84.5	7.3	92.9	3.0	
	<i>Eleocharis acuta</i>	BG	56.6	1.0	78.4	1.2	16.6	1.0	21.5	0.9	34.3	1.1	54.5	1.0	54.1	0.9	41.9	0.8	
		Dead	88.7	1.3	88.4	2.6	86.1	10.0	89.8	6.7	82.3	2.6	86.4	3.3	89.2	1.4			
		Live	92.8	0.7	91.6	1.9	93.0	11.3	92.1	5.8	92.1	1.4	92.2	2.1	92.7	1.0			
	<i>Juncus kraussii</i>	BG	72.4	1.8	39.1	1.2	19.6	0.9	15.9	0.9	33.7	2.1	59.3	0.6	42.1	1.5	50.7	1.0	
		Dead	92.1	2.4	91.1	4.7	91.1	9.2	91.6		88.4	3.4	93.6	3.0	87.3	2.3	81.7	2.1	
		Live	95.2	3.2	94.7	3.1	93.2	15.4	94.8	14.8	94.8	3.0	93.6	3.2	94.1	2.7	92.5	2.1	

7.5.3 VEGETATION NUTRIENT LOADS

Although September concentrations of P in plant biomass were very similar between 2012 and 2013 for October they were different for May 2013 (Figure 26). As described above, the amount of live material was much lower in May 2013 compared to 2012; however concentrations of P were much higher, suggesting that P is concentrated in growing tips. Concentrations of P in May 2013 were lower in dead and below ground material except for *J. kraussii* and *T. domingensis* in W3 where they were significantly higher. In May 2013, P concentrations were very low in *B. articulata* and *E. acuta* (W4) but higher than normal for other species. The cause of this variability is probably related to how the species were recovering from the extremely dry summer of 2012/13. In October 2013, concentrations of P were similar between species and with previous year's data. Although *Baumea articulata* and *T. domingensis* have slightly higher P concentrations than the other species.

a) 2013



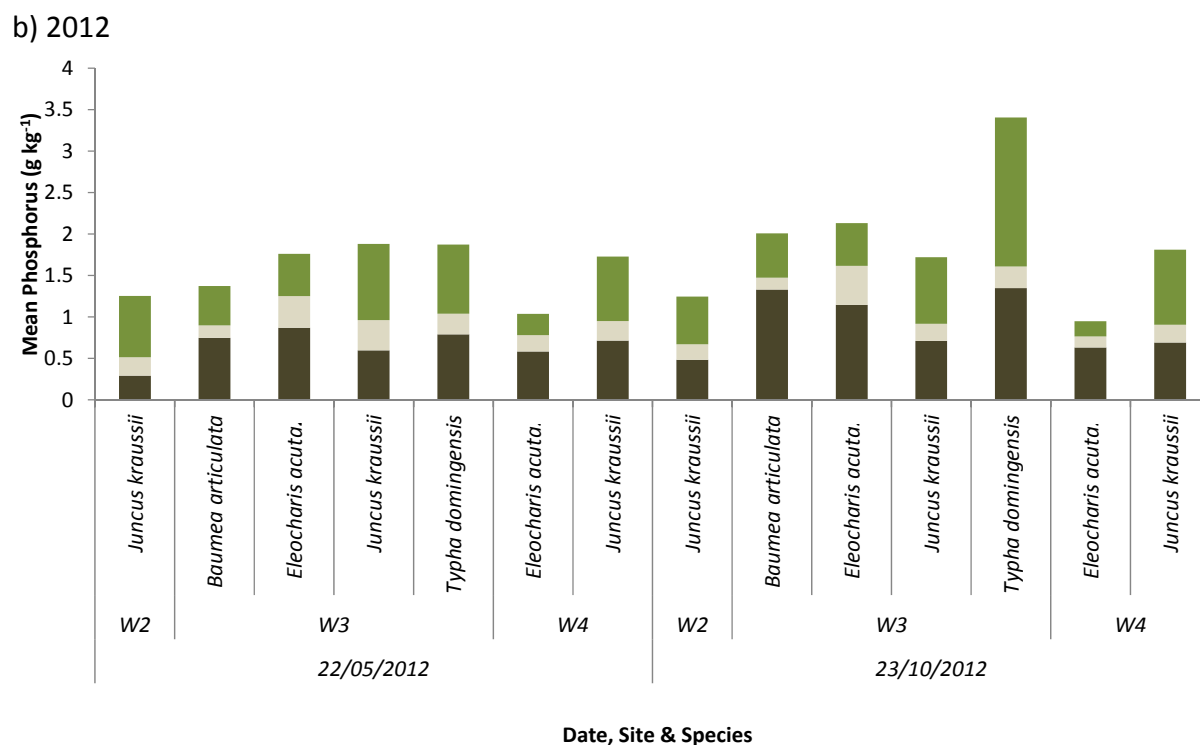


Figure 26. Mean quantities of phosphorus stored per kg of dry weight of live, dead and below ground parts of sampled species, over the seasons and between sites for a) 2013 and b) 2012.

Nitrogen concentrations in plants in 2013, showed a very similar pattern to that seen in 2012 in both seasons, however concentrations were almost double those of 2012 (Figure 27).

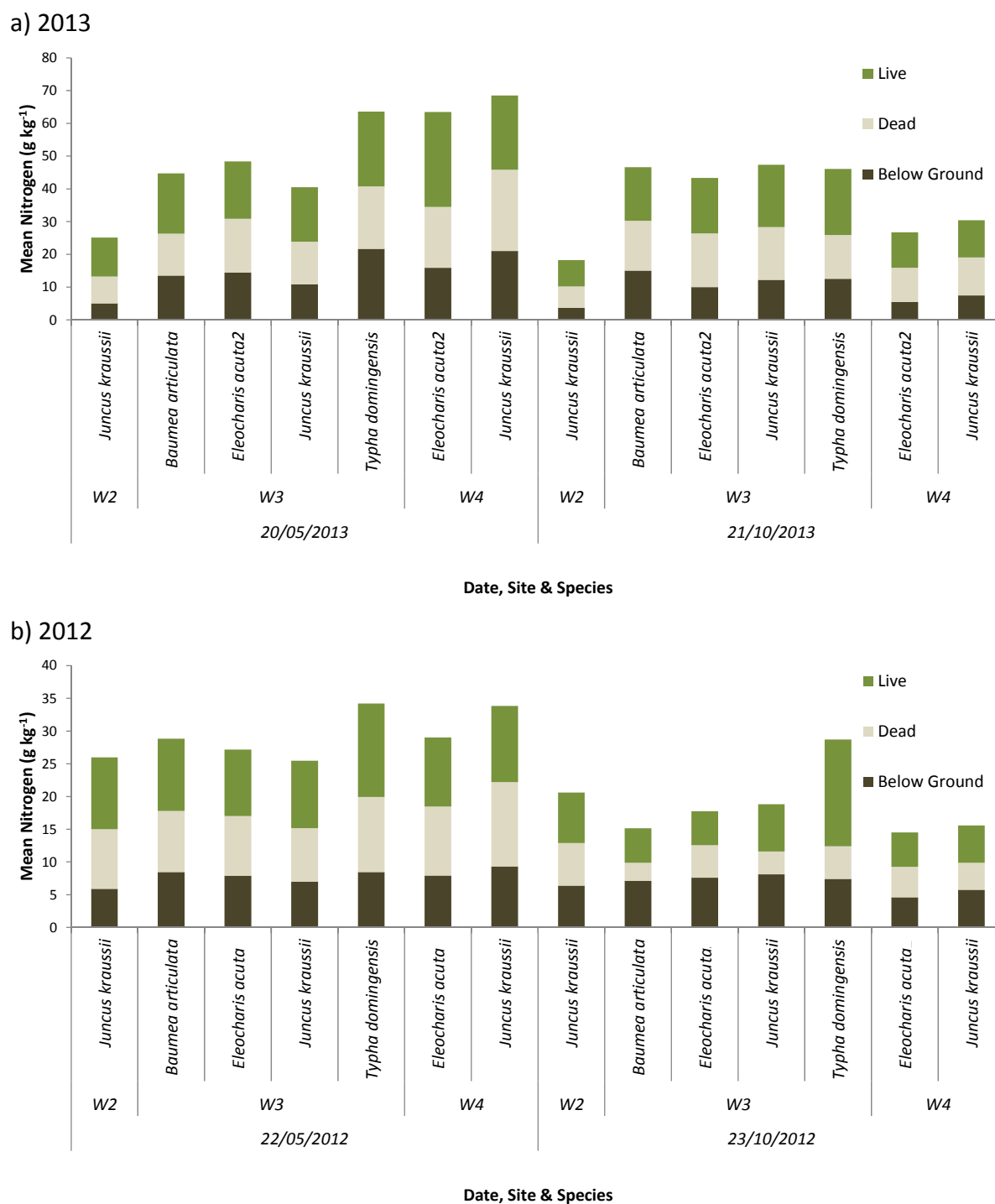


Figure 27. Mean quantities of nitrogen stored per kg of dry weight of live, dead and below ground parts of sampled species, over the seasons and between sites for a) 2013 and b) 2012.

Overall loads of N and P in living biomass increased substantially over 2012 (possibly due to the better growing conditions), the only exceptions being *T. domingensis* and *B. articulata* (species that struggled to survive in 2013). Nutrient stores in dead plant material remained similar to 2012 (Table 10).

Table 10. Total loads of N and P in living (above and below ground) and dead biomass per area of stands at each site. Note that the 2010 figures have been recalculated for *Eleocharis acuta* and *Juncus kraussii* for Zone 2.

Date	Zone	Species	Area (m ²)				P Live (kg)				N Live (kg)			
			2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
May	1	<i>Juncus kraussii</i>	625.1	625.1	625.1	588.5	3.02	2.54	0.67	3.946	36.42	54.97	20.39	119.988
	2	<i>Baumea articulata</i>	16.9	64.3	24.2	64.3	0.04	0.07	0.05	0.029	0.37	1.03	8.71	43.433
		<i>Eleocharis acuta</i>	351.8	309.7	244.6	134.6	1.35	1.21	0.15	0.203	10.01	22.14	8.01	10.779
		<i>Juncus kraussii</i>	1861.4	1865.4	1815.2	1755.1	5.74	12.45	1.35	23.683	58.56	180.03	9.71	170.414
		<i>Typha domingensis</i>	-	-	10	1	-	-	2.97	0.030	-	-	11.30	0.113
October	1	<i>Juncus kraussii</i>	625.1	625.1	625.1	588.5	1.66	4.67	0.34	1.998	34.33	83.22	7.38	50.210
	2	<i>Baumea articulata</i>	16.9	64.3	24.2	64.3	0.08	0.02	0.35	0.226	1.05	0.07	6.28	0.000
		<i>Eleocharis acuta</i>	351.8	309.7	244.6	134.6	1.18	1.69	0.29	0.385	17.33	23.29	6.09	0.000
		<i>Juncus kraussii</i>	1861.4	1865.4	1815.2	1755.1	8.13	11.13	0.44	7.739	122.25	140.49	8.58	0.022
		<i>Typha domingensis</i>	-	-	10	1	-	-	0.18	0.002	-	-	2.19	43.433

Table 10 cont.

Date	Zone	Species	P Dead (kg)				N Dead (kg)			
			2010	2011	2012	2013	2010	2011	2012	2013
May	1	<i>Juncus kraussii</i>	1.12	1.08	0.11	0.631	17.62	38.89	2.89	16.990
	2	<i>Baumea articulata</i>	0.00	0.06	0.00	0.000	0.00	1.63	2.95	1.899
		<i>Eleocharis acuta</i>	0.20	0.27	0.02	0.027	6.51	6.60	3.42	4.600
		<i>Juncus kraussii</i>	1.06	1.91	0.20	3.568	43.61	101.19	4.78	83.885
		<i>Typha domingensis</i>	-	-	0.09	0.001	-	-	1.83	0.018
October	1	<i>Juncus kraussii</i>	0.49	0.50	0.10	0.592	27.00	15.65	3.11	18.312
	2	<i>Baumea articulata</i>	0.01	0.01	0.05	0.033	0.28	0.98	2.70	1.733
		<i>Eleocharis acuta</i>	0.13	0.14	0.09	0.121	4.87	3.90	3.75	5.048
		<i>Juncus kraussii</i>	1.95	2.03	0.08	1.447	54.73	54.56	4.94	86.752
		<i>Typha domingensis</i>	-	-	0.03	0.000	-	-	1.11	0.011

Table 11. Total loads of N and P in living (above and below ground) and dead biomass per area of stands at each site standardized for a fixed stand size of 100 m².

Date	Zone	Species	P Live (kg)				N Live (kg)				P Dead (kg)				N Dead (kg)			
			2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
May	1	<i>Juncus kraussii</i>	0.48	0.41	0.50	0.67	5.83	8.79	9.97	20.39	0.18	0.17	0.06	0.11	17.62	2.82	2.51	2.89
	2	<i>Baumea articulata</i>	0.26	0.11	0.27	0.05	2.18	1.59	3.99	7.38	0	0.1	0.04	0.00	0	0	2.64	2.95
		<i>Eleocharis acuta</i>	0.38	0.39	0.63	0.15	2.85	7.15	7.99	8.01	0.06	0.09	0.06	0.02	6.51	1.85	1.55	3.42
		<i>Juncus kraussii</i>	0.31	0.67	1.03	1.35	3.15	9.65	11.19	9.71	0.06	0.1	0.07	0.20	43.61	2.34	2.50	4.78
		<i>Typha domingensis</i>	-	-	0.16	2.97	-	-	2.05	11.30	-	-	0.01	0.09	-	-	0.32	1.83
October	1	<i>Juncus kraussii</i>	0.27	0.75	0.60	0.34	5.49	13.31	7.92	8.53	0.08	0.08	0.08	0.10	27	4.32	2.86	3.11
	2	<i>Baumea articulata</i>	0.45	0.12	0.17	0.35	6.19	0.42	0.99	0.00	0.04	0.04	0.02	0.05	0.28	1.67	0.50	2.70
		<i>Eleocharis acuta</i>	0.33	0.48	0.77	0.29	4.93	6.62	5.22	0.00	0.04	0.04	0.06	0.09	4.87	1.38	0.99	3.75
		<i>Juncus kraussii</i>	0.44	0.6	0.61	0.44	6.57	7.55	5.29	2.19	0.1	0.11	0.07	0.08	54.73	2.94	1.11	4.94
		<i>Typha domingensis</i>	-	-	0.13	0.18	-	-	0.78	7.38	-	-	0.02	0.03	-	-	0.27	1.11

When the effects of area are removed and simply efficiency of storage is assessed as in

Date	Zone	Species	Area (m ²)				P Live (kg)				N Live (kg)			
			2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
May	1	<i>Juncus kraussii</i>	625.	625.	625.	588.	3.0	2.5	0.6	3.94	36.4	54.9	20.	119.
		<i>Baumea articulata</i>	1	1	1	5	2	4	7	6	2	7	39	988
		<i>Eleocharis acuta</i>					0.0	0.0	0.0	0.02			8.7	43.4
	2	<i>Juncus kraussii</i>	16.9	64.3	24.2	64.3	4	7	5	9	0.37	1.03	1	33
		<i>Eleocharis acuta</i>	351.	309.	244.	134.	1.3	1.2	0.1	0.20	10.0	22.1	8.0	10.7
		<i>Juncus kraussii</i>	8	7	6	6	5	1	5	3	1	4	1	79
		<i>Typha domingensis</i>	186	186	181	175	5.7	12.	1.3	23.6	58.5	180.	9.7	170.
		<i>Typha domingensis</i>	1.4	5.4	5.2	5.1	4	45	5	83	6	03	1	414
		<i>Typha domingensis</i>							2.9	0.03			11.	0.11
		<i>Typha domingensis</i>	-	-	10	1	-	-	7	0	-	-	30	3
		<i>Typha domingensis</i>	625.	625.	625.	588.	1.6	4.6	0.3	1.99	34.3	83.2	7.3	50.2
October	1	<i>Juncus kraussii</i>	1	1	1	5	6	7	4	8	3	2	8	10
		<i>Baumea articulata</i>					0.0	0.0	0.3	0.22			6.2	0.00
		<i>Eleocharis acuta</i>	16.9	64.3	24.2	64.3	8	2	5	6	1.05	0.07	8	0
	2	<i>Juncus kraussii</i>	351.	309.	244.	134.	1.1	1.6	0.2	0.38	17.3	23.2	6.0	0.00
		<i>Eleocharis acuta</i>	8	7	6	6	8	9	9	5	3	9	9	0
		<i>Juncus kraussii</i>	186	186	181	175	8.1	11.	0.4	7.73	122.	140.	8.5	0.02
		<i>Typha domingensis</i>	1.4	5.4	5.2	5.1	3	13	4	9	25	49	8	2
		<i>Typha domingensis</i>							0.1	0.00			2.1	43.4
		<i>Typha domingensis</i>	-	-	10	1	-	-	8	2	-	-	9	33
		<i>Typha domingensis</i>	625.	625.	625.	588.	1.6	4.6	0.3	1.99	34.3	83.2	7.3	50.2
		<i>Typha domingensis</i>	1	1	1	5	6	7	4	8	3	2	8	10

Table 10 cont.

Date	Zone	Species	P Dead (kg)				N Dead (kg)			
			2010	2011	2012	2013	2010	2011	2012	2013
May	1	<i>Juncus kraussii</i>	1.12	1.08	0.11	0.631	17.62	38.89	2.89	16.990
	2	<i>Baumea articulata</i>	0.00	0.06	0.00	0.000	0.00	1.63	2.95	1.899
		<i>Eleocharis acuta</i>	0.20	0.27	0.02	0.027	6.51	6.60	3.42	4.600
		<i>Juncus kraussii</i>	1.06	1.91	0.20	3.568	43.61	101.19	4.78	83.885
		<i>Typha domingensis</i>	-	-	0.09	0.001	-	-	1.83	0.018
October	1	<i>Juncus kraussii</i>	0.49	0.50	0.10	0.592	27.00	15.65	3.11	18.312
	2	<i>Baumea articulata</i>	0.01	0.01	0.05	0.033	0.28	0.98	2.70	1.733
		<i>Eleocharis acuta</i>	0.13	0.14	0.09	0.121	4.87	3.90	3.75	5.048
		<i>Juncus kraussii</i>	1.95	2.03	0.08	1.447	54.73	54.56	4.94	86.752
		<i>Typha domingensis</i>	-	-	0.03	0.000	-	-	1.11	0.011

Table 11, it shows that in May 2013, overall there was a general increase in amounts of N and P stored compared to previous years, except for *B. articulata* and *T. domingensis* which were very variable. In October 2013, nutrient concentrations in plants per 100 m² tended to be slightly lower than in previous years. As nutrient stores appear not to change

substantially this supports a plant community at maturity with limited additional uptake of nutrients.

7.5.4 FORESHORE MONITORING

The deterioration in foreshore condition at Monitoring Area 1 measured during 2011 and 2012 has continued in 2013. Further erosion of the river bed has occurred and root systems of recently planted and older *Casuarina* trees on river banks are increasingly being exposed, jeopardising the health of these trees. There are now several dead *Casuarina* trees at the margin (see photographs below), with several more dying during 2013. A greater proportion of foreshore in Monitoring Area 1 is classified as having significant to severe erosion now 70-90%, up from 10-30% in 2010; Table 12). Planted and naturally colonised areas of *Juncus* and other fringing wetland plants have all but disappeared along this section of foreshore and this appears to have made the sediment in this area more prone to erosion by wind- and boat-driven waves. PVC pipes, presumably buried in the sediment as part of an irrigation system to facilitate revegetation of foreshore, has now been exposed due to erosion, which demonstrates that a strip of sediment several metres wide and up to 30 cm deep has been lost to erosion in Monitoring Area 1. Further exposure of roots is likely which will result in more tree death.

The headland area between Monitoring Areas 1 & 2 has been particularly affected by increased erosion. Since 2010, root systems of several large (and presumably old) *Casuarina* trees had been exposed through erosion of sediment despite various attempts to protect this stand of trees by rock re-enforcement and shells/pebbles. During 2011 one large tree died and fell into the river. The health of several of the other trees (as evident from crown condition) appears to in decline with increasing amounts of erosion and root exposure during 2012-13.

It is recommended that Area 1 (including the headland between Areas 1 & 2) receive immediate remedial treatment in the form of sandbagging, further rock armoury or other re-enforcement, and then infill planting of fringing sedges/rushes to reduce erosion and help prevent further loss of trees.

Recommendation 2.

It is recommended that the foreshore around Area 1 (including the headland between Areas 1 & 2) receive immediate remedial treatment in the form of sandbagging and planting of fringing sedges/rushes to reduce erosion and help prevent further loss of trees.

Monitoring Area 2 remains relatively stable with dense *Juncus* and sedge cover protecting the foreshore from erosion (Table 12; Section 7.6). Access to Foreshore Monitoring sites 2A and 2B was restricted in 2013 due to redevelopment in the area (i.e. fenced off) and therefore it was not possible to fully complete foreshore assessment and monitoring photographs during 2013 (although a nearby photo was taken for site 2A – see below).

Table 12. Condition Summary Table at each Study Site as of early November 2013. Data for 2010 and 2012 is included in parentheses (**in red for 2010 and blue for 2012**). Note F2A and F2B could not be monitored in 2012-13 (fenced off due to new foreshore development).

Site	Erosion	Slumping	Sedimentation	Vegetation	Regeneration	Weeds	Log/Brush	Rock Work	Beach Areas	Fauna Use	Comments / Notes
F1A	0% Minimal (30% , 0%); 10% Localised (60% , 25%); 40% Significant (10% , 50%); 30% Severe (0% , 25%)	10% Minimal (40% , 20%); 30% Localised (50% , 30%); 40% Significant (10% , 30%); 20% Severe (0 , 20%)	70% Minimal (80% , 80%); 30% Localised (20% , 20%)	3 (2 , 3)	3 (3 , 4)	3 (3 , 3)	N/A	Mostly consists of shell; Increased erosion of shells and underlying mud	Stable; but some erosion at high water mark	Nil	Needs new rock armoury at edge and infill planting to stop erosion; erosion is mostly confined to areas with little plant (rush) cover. Rush/sedge cover is severely reduced from 2010 (cause for concern)
F1B	0 Minimal (20% , 0); 10% Localised (30% , 20%); 30% Significant (50% , 30%); 60% Severe (10% , 50%)	20% Minimal (40% , 20%); 30% Localised (50% , 30%); 20% Significant (10% , 30%); 30% Severe (0% , 20%)	80% Minimal (70% , 80%); 20% Localised (30% , 20%)	3 (2 , 3)	3 (3 , 4)	3 (3 , 3)	N/A	Rock armoury around headland no longer effective. Wave action and high tides have eroded soil around trees exposing roots	Mostly stable; some erosion around edges near headlands	Nil	Erosion of headland either side of beach is significant exposing roots of trees; one tree has fallen into river and others are in decline; these areas need rock (or sandbag) armoury and infill planting.
F1C	20% Minimal (85% , 20%); 20% Localised (10% , 25%); 30% Significant (5% , 25%); 30% Severe (0% , 30%)	20% Minimal (90% , 20%); 30% Localised (10% , 40%); 40% Significant (0% , 40%); Severe 10% (0% , 0%)	70% Minimal (60% , 80%); 30% Localised (40% , 20%)	3 (1 , 3)	4 (3 , 4)	4 (4 , 4)	Limited effectiveness	N/A	Loss of rushes and sedges at edge. Major increase in erosion in this area	Nil	Stability from dense rush/sedge cover has been lost since 2010. Increased erosion including roots of Casuarina trees
F2A	100% Minimal	100% Minimal	70% Minimal (60%); 30% Localised (40%)	2	3	2 (3)	Stable	Small amount of sedimentation	N/A	Trampling of veg'n by waterbirds	Increase in amount of rubbish washed up from river (high tide). More couch grass invasion.
F2B	60% Minimal; 10% Localised (20%); 20% Significant; 10% Severe (0%)	70% Minimal; 10% Localised; 20% Significant	90% Minimal (70%); 10% Localised (30%)	2 (1)	4	3	Stable	Intact with minimal sedimentation	N/A	Trampling of veg,n by waterbirds	Some human trampling (to access river)
F2C	50% Minimal (95% , 75%); 10% Localised (5% , 5%); 25% Significant (0% , 25%); 15% Severe (0% , 5%)	90% Minimal; 10% Localised (<i>stable since 2011</i>)	75% Minimal (70% , 80%); 25% Localised (30% , 20%)	2 (1 , 2)	3 (2 , 3)	2 (3 , 2)	Stable	Minor sedimentation; rock work not effective against high tides and storm surges – erosion of mud around tree roots	Erosion mostly on margins; Reasonably stable	Nil	Stable embayment, but increased erosion of headland and flanks; vegetation condition mostly finem but increasing erosion

- Note 1: Erosion/Slumping/Sedimentation Classes: 0-5 % Minimal - Little evidence of erosion/slumping/sedimentation; 5-20 % Localized - Localized areas of erosion/slumping/ sedimentation; 20-50 % Significant - Active erosion/slumping/sedimentation is obvious along many parts of this section; >50% Severe - Significant erosion/slumping/sedimentation is more or less continuous along this section.
- Note 2: Vegetation Condition: 1=Healthy- There is no observable damage or injury to the vegetation; 2=Some Sick - Some species show signs of insect/human damage above normal levels or a general decline in health such as defoliation or presence of dying branches; 3=Many sick or dying- Many plants show sign of severe decline in health with a number of dead and dying plants present; 4=Majority dead- Few of the native plants present are healthy
- Note 3: Vegetation Regeneration: 1=Abundant- Seedlings occur in high numbers and are observable from any section of the area; 2=Frequent- Seedlings are common. Regeneration may occur in small stands of sporadically over large areas of the section; 3=Occasional: Seedlings are infrequent, occurring no more than once or twice with the area; 4=Rare: Seedlings occur very infrequently and may be observed only once or twice within the surveyed section.
- Note 4: Weeds: 1=Abundant- Weeds are predominating. They can be seen from any section of the surveyed area; 2=Frequent- Weeds are common. They are patchy or occur in low numbers over a large percentage of the site; 3=Occasional- Weeds occur sporadically, more than once or twice within the area; 4=Rare- Weeds occur infrequently within the area. They may be observed only once or twice.

7.6 FORESHORE PHOTOGRAPHS

Photographs taken at Foreshore Monitoring Site 1A in an easterly direction. Note: loss of sedge/rush vegetation and increased erosion at the river edge with impacts on trees appearing in 2012-13.

May 2010



May 2011



October 2010



October 2012



Early November 2013



Photographs taken at Foreshore Monitoring Site 1A showing severe erosion at October 2012 and November 2013

October 2012



October 2012



Early November 2014



Early November 2014



Photographs taken at Foreshore Monitoring Site 1B in westerly direction. Note: *Casuarina* tree on headland has fallen into the river.

May 2010



May 2011



Early Nov 2013



October 2012



Photographs taken at Foreshore Monitoring Site 1B in an easterly direction

May 2010



October 2012



Early November 2013



Photographs taken at Foreshore Monitoring Site 2A in a Southerly direction. Note access to this site was restricted in 2012-13 due to redevelopment program

May 2010



May 2011



October 2012



Early November 2013



Photographs taken at Foreshore Monitoring Site 2C in a southerly direction

May 2010



October 2011



October 2012



Early November 2013



Photographs taken at Foreshore Monitoring Site 2C in a Westerly direction
May 2010



October 2011



October 2012



Early November 2013



Photographs taken at Foreshore Monitoring Site 2C in Easterly direction
May 2010



October 2012



May 2011



Early November 2013



Photographs taken of *Casuarina* Trees at Headland between Foreshore Monitoring Sites 2C and 1A

May 2010



October 2011



October 2012



October 2010



October 2011



Early November 2013



7.6.1 CONCLUSIONS

1. Map the coverage of the aquatic plant species in the wetland.

Aquatic plant coverage was successfully mapped with *Juncus kraussii* remaining as the dominant plant species, followed by *Eleocharis acuta*. Areas dominated by *Juncus kraussii* were lost and taken over by open water habitat; however this was more-or-less equal to spread of *J. kraussii* into patches of *E. acuta* vegetation. The small patch of *Baumea articulata* has continued to contract during 2013. A small patch of *Typha* or *Phragmites* colonised open water in Zone 2 during 2012 but by the end of 2013, was almost dead. There is little evidence of weed invasion, although the wetland appears to have been colonised by species from the foreshore (possibly including *J. kraussii*). Overall, the extent of the various plant species and vegetation types has remained relatively stable from over 2013.

2. Measure development of biomass of major plant species within the wetland (Zones 1 and 2).

Biomass of all major plant species in the wetland were measured in both May and October (dead, above ground and below ground). Biomass appears to be stabilising and has changed little from 2012, except for high growth in May (presumably related to improved rainfall).

3. Measure the concentration of nutrients (N & P) in live, dead and below ground parts of each species in each site.

Loads of nutrients in aquatic plants increased/decreased slightly between 2012 and 2013 indicating that the wetland vegetation might be approaching maturity which might limit its ability to uptake nutrients from incoming water.

4. Establish some regular sites where the condition of the foreshore can be monitored. Key items of interest are erosion, weed invasion and the effectiveness of armouring that may have been put in place.

Sites have been established and erosion in some areas was significant.

7.7 AVIFAUNA

The specific aims of sampling the avifauna were to:

1. Determine the range of birds utilizing the park

Biodiversity is an important goal of the redevelopment of the Point Fraser reserve and avifauna are a good indicator of changes in biodiversity.

Since 2010 a total of 27 species of bird have been recorded at Point Fraser, with 26 species in 2013 (Table 13). This is a substantial improvement over 2012 when species richness dropped to 12 (although only June was sampled). Pacific Black Ducks are always encountered and are likely to be resident throughout most of the year. Other species of waterbird tend to be uncommon and brief visitors to the site. This is likely to reflect the low availability of food, roosting and nesting habitats for many duck species.

Based on the surveys so far, the Point Fraser wetlands support only a moderate diversity of water birds and a low diversity of other bird groups. One encouraging trend first noted in 2012, was the low number of introduced Rainbow Lorikeets. This may be a reflection of ongoing control actions by the Department of Environment and Conservation. This is to be seen as a positive outcome given the competitive interactions between this and local native species of nectarivore.

Native honeyeater species continue to be well represented at the site, with 5 species recorded in 2013 and in good numbers. All species are utilising the flowering native species for feeding and are a positive indication of the success of local plantings in the area. A juvenile white cheeked Honeyeater indicates that there is probably breeding of this species on site. The Little Egret is a rare record for the river. Large numbers of Little Grassbirds is a positive indicator of the health of the planted native vegetation.

Table 13. Avifauna recorded in the Point Fraser Reserve in May and October 2013.

Common Name	Species	May	October	Notes
		No.	No.	
Anatidae (ducks and swans)				
Hardhead	<i>Aythya australis</i>		2	In pond
Australian Shelduck	<i>Tadorna tadornoides</i>	2		In flight
Grey Teal	<i>Anas gracilis</i>		5	In pond
Pacific Black Duck	<i>Anas superciliosa</i>	7	5	Loafing in pond
Columbidae (pigeons and doves)				
Laughing Dove	<i>Streptopelia senegalensis</i>	2		Perched in tree
Spotted Dove	<i>Streptopeila chinensis</i>	5	4	Foraging on ground
Laridae (terns and gulls)				
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	2		In flight
Psittacidae (lorikeets and parrots)				
Rainbow Lorikeet	<i>Trichoglossus haeatodus</i>	10	21	Introduced
Phalacrocoracidae (cormorants)				
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	1		In flight
Ardeidae (herons)				
Eastern Great Egret	<i>Ardea modesta</i>	1		Foraging in tuart
Little Egret	<i>Egretta garzetta</i>	1		On riverbank
White-faced Heron	<i>Egretta novaehollandiae</i>	6		One in wetland, others on riverbank

Common Name	Species	May	October	Notes
		No.	No.	
Acanthizidae (Scrubwrens and allies)				
Western Gerygone	<i>Gerygone fusca</i>	1		Foraging in tuart
Pardalotidae (pardalotes)				
Striated Pardalote	<i>Pardalotus striatus</i>	2		In <i>E. rudis</i>
Meliphagidae (honeyeaters)				
Singing Honeyeater	<i>Lichenostomus virescens</i>	6	4	
Red Wattlebird	<i>Anthochaera carunculata</i>	12	6	All honeyeaters
Brown Honeyeater	<i>Lichmera indistincta</i>	1	11	foraging in planted
White-cheeked Honeyeater	<i>Phylidonyris niger</i>	8	1	gardens
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>		2	
Campephagidae (cuckoo-shrikes)				
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	2	1	In low trees
Rhipiduridae (flycatchers)				
Willie Wagtail	<i>Rhipidura leucophrys</i>	4	1	Around lawns
Corvidae				
Australian Raven	<i>Corvus coronoides</i>	2		In tuart tree
Locustellidae (old world warblers)				
Little Grassbird	<i>Megalurus gramineus</i>	6	5	Actively foraging in rushes of wetland
Zosteropidae (white-eyes)				
Silvereye	<i>Zosterops lateralis</i>	1	1	Heard only
Hirundinidae (swallows)				
Welcome Swallow	<i>Hirundo neoxena</i>	2	6	Aerial feeding

		May	October	
Common Name	Species	No.	No.	Notes
Monarchidae				
Magpie-lark	<i>Grallina cyanoleuca</i>	2		Foraging on lawns
Number of Species		23	15	

7.7.1 CONCLUSIONS

1. Determine the range of birds utilizing the park

Achieved, with 26 species recorded.

7.8 MACROINVERTEBRATES

The specific aims of the macroinvertebrate monitoring program were to:

1. Determine what species were using different zones of the wetland

This will show the ability of the wetland to support biodiversity and provides a baseline for any development of biodiversity.

A total of 26 taxa were collected in the wetland in 2013 (Table 14) a slight increase over 2012, but a reduction from 35 in 2011, and identical to 2010 (Figure 28a &b). Taxa were generally salt tolerant and Foraminifera and Polychaeta are primarily marine groups. The taxa collected were generally cosmopolitan and tolerant. The most abundant taxa were the Ostracoda; the high numbers were partially due to the use of 250 µm net which ensures these taxa are collected. October or spring is generally considered the time of highest species richness and abundance on the Swan Coastal Plain (Davis *et al.*, 1993). This was reflected in the Point Fraser wetlands particularly in species richness which increased by over 5 taxa, but not for abundance. In contrast to previous years, Zone 1 had lower taxa richness than Zone 2. Increasing salinity in Zone 1 is probably responsible for the change in taxa richness and abundance, with the loss of sensitive species.

The Primer 6 (Primer-E Ltd) software package was used to produce ordinations of the data (MDS), a technique for translating the similarities in communities in terms of richness and abundance into a physical distance and then plotting that distance to visually demonstrate those relationships. In Figure 28 c, it can be seen that 2013 communities were more similar to previous years than 2012 particularly for Zone 1.

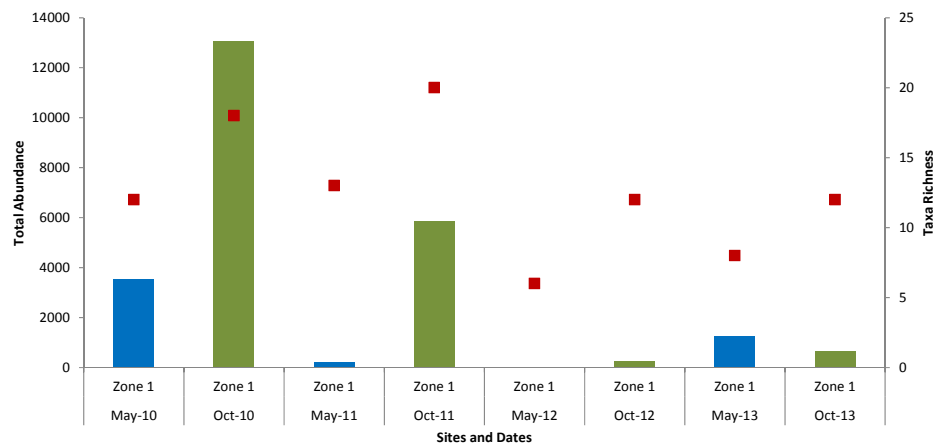
The introduced fish *Gambusia holbrooki* was observed in W1 and W2 in the summer months. They are known predators of a many surface dwelling macroinvertebrates and amphibians (Pyke, 2008). On occasion, *G. holbrooki* were also seen in W3 and W4. Removal and control of *G. holbrooki* populations is difficult and ultimately unlikely to be effective. Amphibians were not sampled during this study.

Table 14. Total abundance (from two 5 m transects) at Zone 1 and 2 of macroinvertebrates (>250 µm) in May and October 2010 to 2013; J=Juveniles (too small to identify), L= larvae, P = Pupa.

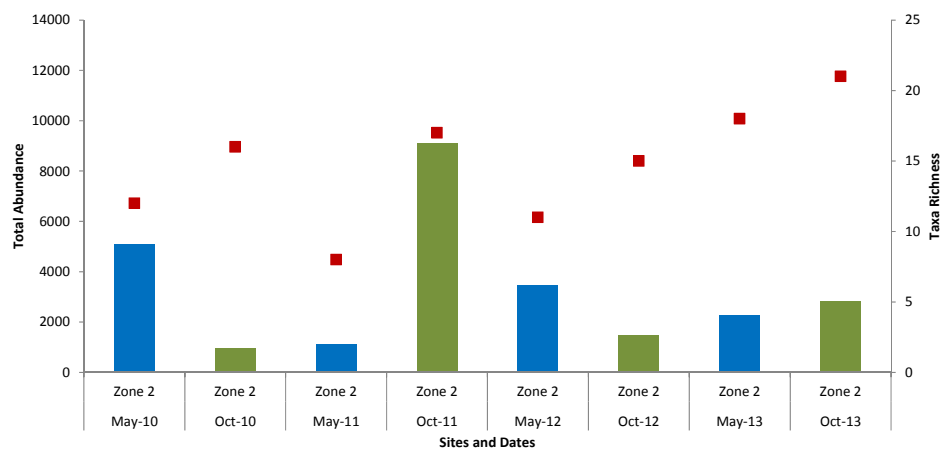
[illegible]

Phyla	Class	Order	subOrder	Family	subFamily	Life-stage	2010				2011				2012				2013																								
							May		October		May		October		May		October		May		October																						
							Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2																					
	Crustacea	Trichoptera	Coenagrionidae																																								
																								L																			

a) Zone 1



b) Zone 2



c)

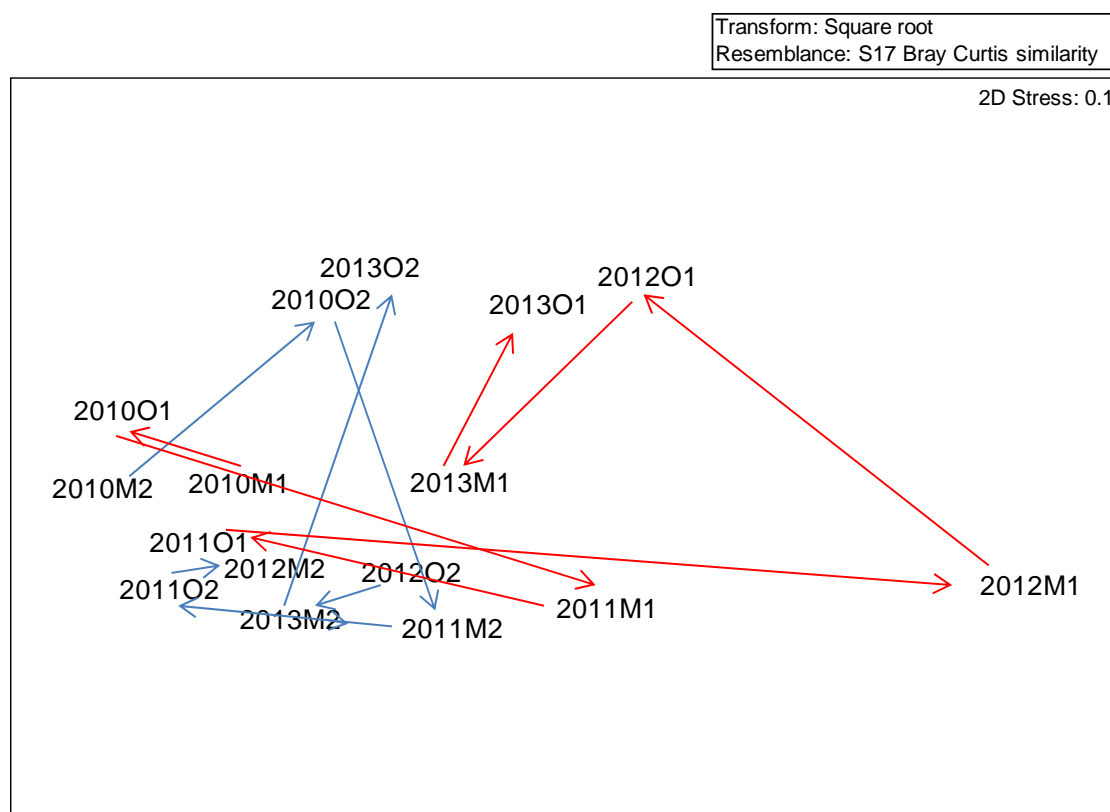


Figure 28. Macroinvertebrate a) Abundance and taxa richness, and b) Multi-dimensional scaling plot showing similarity of sites to each other in terms of community structure, data collected from zones (2010M2 – year, month (May or October) and zone) at Point Fraser in May and October 2010 to 2013 (arrows indicate direction of movement in that zone over time).

7.8.1 CONCLUSIONS

1. Determine what species were using different zones of the wetland

Achieved, with 26 taxa collected which is higher than recorded in 2012. Taxa richness and abundance have improved since 2012, with taxa richness in Zone 2 being the richest since 2010.

7.9 SOCIAL MONITORING

The specific aims of the social monitoring program were to:

1. Determine visitor usage of Point Fraser

This will show how people are utilising the reserve, including the mode of transport in and out

2. Observe usage of Point Fraser by the public

This will show what people are doing once at the reserve

3. Interview park users for why they used the park

This will provide a better understanding of why the park is being used by the public.

In order to achieve the aims, three assessment tools were applied in a biannual (May and October) sampling program: (1) visitor counts; (2) visitor surveys; and (3) visitor behaviour observations. Survey collection, visitor counts and observation of behaviour occurred for two days each monitoring event as outlined in Table 15. No visitor surveys were conducted in Round 4, 5 or 6 as per agreement with City of Perth due to issues of survey saturation identified during Round 3. Visitor surveys were resumed in Year 4, Rounds 7 and 8.

Table 15. Dates of Year 1 to 4 assessment events.

Dates of Data Collection					Types of Data Collection	
Year		Round	Weekday	Weekend	Visitor Observations & Behaviour Counts	Visitor Surveys
YEAR 1 - 2010	May	1	Wed 19 May 2010	Sat 29 May 2010	Yes	Yes
	October	2	Wed 27 Oct 2010	Sat 30 Oct 2010	Yes	Yes
YEAR 2 - 2011	May	3	Wed 25 May 2011	Sat 28 May 2011	Yes	Yes
	October	4	Wed 26 Oct 2011	Sat 5 Nov 2011	Yes	No
YEAR 3 - 2012	May	5	Wed 23 May 2012	Sat 26 May 2012	Yes	No
	October	6	Wed 24 Oct 2012	Sat 27 Oct 2012	Yes	No
YEAR 4 - 2013	May	7	Wed 22 May 2013	Sat 25 May 2013	Yes	Yes
	October	8	Wed 23 Oct 2013	Sat 26 Oct 2013	Yes	Yes

7.10 VISITOR COUNTS

Visitor observation counts were conducted during the weekday monitoring event and the weekend monitoring event for each survey round, across three points within Point Fraser parkland in 2013. SMC1 is the most eastern point of the parkland, in close proximity to both the river and Riverside Drive. Data collected at this point includes both observations inside the park and outside the park. The most western point of the park, adjacent to the river and to the Causeway is SMC2. The final observation point is SMC3, with the entrance to the commuter car park and the central most northern point of the park. The data is presented for May in Table 16, October in Table 17 at all three observation points, SMC1, SMC2 and SMC3. Table 18 displays the monitoring results from the path along the outside of Point Fraser parkland at SMC1. The data was recorded for a 15 minute period and extrapolated to hourly data.

Consistent with previous survey rounds, the main entry points for both pedestrians and cyclists were the West (SMC1) and East (SMC2) Entrances while the car park entrance (SMC3) was predominately used as an access point for a commuter car park by city workers during the week. As with previous years, on the weekend, car park use was lower as it appears that fewer people access Point Fraser by car specifically for recreational purposes.

In general, during the week the peak use is in the early morning and later in the afternoon, when people are commuting or exercising. On the weekend, the peak use is in the middle of the day, with more equal presence of walkers and cyclists. There are some early morning walkers on the weekend, particularly at SMC1 and less so at SMC2. In previous years there were higher volumes of both walkers and cyclists over all sites. Most notably there is a significant reduction in cyclists, predominately commuters in the early morning and late afternoon. The decline in visitor numbers can be attributed to the ongoing construction of the new commercial development at Point Fraser. This has been confirmed in visitor survey comments. In the middle of the day on a weekday, it is common in both May and October for Point Fraser to be used as a place to eat lunch or to walk for exercise, though this has also reduced in 2013 compared with previous years.

Overall SMC1 has substantially more visitors on foot than cyclists, either during the week or weekend and either in May or October. SMC2 has more comparable numbers of visitors on foot and cycling and this is consistent over the different days and months the data was collected. It is evident that SMC3's main use is as a commuter car park during the week, with a correlation between vehicles going into the car park and pedestrians going out. There is less use by cyclists and people on foot at SMC3.

SMC1 outside the park records the volume of people who travel either on foot or by bike along the path around Point Fraser. There are consistently high numbers of both pedestrians and cyclists that do not go into the park. It appears that people exercising on foot are more likely to use the park but cyclist, bypass the park. At this point, there is consistently, over the different days of the week and months, a higher volume of cyclists compared to walkers. It has been noted that the entrance for the car park is not ideal as the cycle path crosses the entrance.

Table 16. Extrapolated visitor counts data – Round 7, May 2013 survey round (All sites)

WEEKDAY - MAY 2013																				
Site	SMC1				SMC2				SMC3								Total (SMC1 & SMC2)			
Type Time*	Walking		Cycling		Walking		Cycling		Walking†		Cycling†		Vehicle†		Walking‡		Walking		Cycling	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
7	8	0	0	0	4	8	12	0	0	0	0	4	20	8	0	24	12	8	12	0
8	8	4	0	0	12	12	4	4	0	12	4	0	124	0	0	108	20	16	4	4
9	8	4	0	0	0	4	8	0	0	0	0	0	52	4	0	28	8	8	8	0
10	12	16	0	0	12	8	12	12	0	4	0	4	12	0	4	8	24	24	12	12
11	8	36	0	0	0	4	4	8	8	0	0	0	16	12	4	4	8	40	4	8
12	16	0	0	0	0	16	0	0	0	0	0	0	36	28	0	16	16	16	0	0
13	20	20	8	0	20	8	8	12	12	4	0	8	8	12	0	0	40	28	16	12
14	4	4	0	8	12	28	8	8	0	0	0	0	8	4	8	0	16	32	8	16
15	16	8	0	0	12	4	20	0	0	0	0	4	0	8	8	0	28	12	20	0
16	16	16	4	0	24	0	0	0	0	4	0	4	8	84	72	4	40	16	4	0
17	12	12	8	0	0	12	8	12	4	24	4	12	4	72	72	4	12	24	16	12
18	0	8	0	0	24	0	0	0	0	8	0	0	20	40	16	0	24	8	0	0
Total	128	128	20	8	120	104	84	56	24	56	8	36	308	272	184	196	248	232	104	64
% by transport mode & park survey point	90%		10%		62%		38%		7%		4%		54%		35%		74%		26%	

* hourly data was extrapolated from hourly 15 minute counts commencing on the hour

† main road entrance

‡ pedestrian entrance

Table 16 (cont.)

WEEKEND - MAY 2013																				
Site	SMC1				SMC2				SMC3								Total (SMC1 & SMC2)			
Type Time*	Walking		Cycling		Walking		Cycling		Walking†		Cycling†		Vehicle†		Walking‡		Walking		Cycling	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
7	20	0	0	0	16	12	0	4	4	4	4	0	0	0	0	4	36	12	0	4
8	20	12	0	0	28	20	8	0	0	4	12	8	4	8	0	0	48	32	8	0
9	8	20	0	0	28	4	20	16	0	0	0	16	12	0	0	0	36	24	20	16
10	8	4	16	0	4	20	20	8	0	8	0	20	16	4	0	12	12	24	36	8
11	28	40	4	0	8	36	48	16	12	8	0	8	24	12	0	0	36	76	52	16
12	8	20	12	28	24	8	24	28	4	8	8	12	20	24	0	0	32	28	36	56
13	28	16	0	0	16	20	20	24	0	12	8	16	16	16	4	16	44	36	20	24
14	8	4	0	0	12	28	0	36	0	20	20	0	28	32	0	12	20	32	0	36
15	16	16	8	4	72	0	28	8	0	92	0	4	40	36	0	60	88	16	36	12
16	52	28	12	0	8	40	40	16	8	8	0	8	20	16	0	4	60	68	52	16
17	12	4	8	0	12	0	4	12	0	12	0	4	8	12	0	0	24	4	12	12
18	0	0	8	0	0	4	4	0	0	0	8	12	8	8	0	0	0	4	12	0
Total	208	164	68	32	228	192	216	168	28	176	60	108	196	168	4	108	436	356	284	200
% by transport mode & park survey point	79%		21%		52%		48%		24%		20%		43%		13%		62%		38%	

* hourly data was extrapolated from hourly 15 minute counts commencing on the hour

† main road entrance

‡ pedestrian entrance

Table 17. Extrapolated visitor counts data – Round 8, October 2013 survey round (All sites)

WEEKDAY - OCTOBER 2013																					
Site	SMC1				SMC2				SMC3								Total (SMC1 & SMC2)				
Type	Walking		Cycling		Walking		Cycling		Walking†		Cycling†		Vehicle†		Walking‡		Walking		Cycling		
Time*	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	
7	72	8	0	0	0	3	0	0	0	8	0	0	48	0	0	32	72	11	0	0	
8	24	4	0	0	0	3	0	0	8	12	0	0	108	8	0	104	24	7	0	0	
9	12	12	12	8	8	2	0	0	0	12	0	0	88	8	0	76	20	14	12	8	
10	0	0	0	0	8	0	20	0	0	0	0	4	8	0	0	0	8	0	20	0	
11	28	0	0	0	4	4	0	0	0	0	0	0	24	20	0	4	32	4	0	0	
12	4	0	0	0	8	12	4	0	4	0	0	4	16	8	8	8	12	12	4	0	
13	8	0	0	0	12	12	8	0	0	0	0	4	12	12	0	4	20	12	8	0	
14	8	8	4	0	0	24	4	8	8	0	0	8	12	12	0	0	8	32	8	8	
15	8	20	4	0	12	0	0	0	4	4	0	4	0	20	12	0	20	20	4	0	
16	12	4	0	0	0	48	8	8	8	8	8	4	20	100	100	4	12	52	8	8	
17	16	8	8	0	8	48	0	4	8	12	4	0	4	128	84	0	24	56	8	4	
18	16	44	0	0	64	48	8	0	0	0	0	4	12	60	16	12	80	92	8	0	
Total	208	108	28	8	124	204	52	20	40	56	12	32	352	376	220	244	332	312	80	28	
% by transport mode & park survey point	90%		10%		82%		18%		7%		3%		55%		35%		86%		14%		

* hourly data was extrapolated from hourly 15 minute counts commencing on the hour

† main road entrance

‡ pedestrian entrance

Table 17 (cont)

WEEKEND - OCTOBER 2013																				
Site	SMC1				SMC2				SMC3								Total (SMC1 & SMC2)			
Type	Walking		Cycling		Walking		Cycling		Walking†		Cycling†		Vehicle†		Walking‡		Walking		Cycling	
Time*	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
7	54	8	0	0	4	16	12	0	0	40	0	8	4	4	0	16	58	24	12	0
8	28	20	4	0	28	24	12	8	0	4	0	8	16	0	0	4	56	44	16	8
9	28	16	8	0	12	12	4	0	0	8	4	8	16	20	4	12	40	28	12	0
10	20	16	12	0	8	4	8	20	0	4	0	8	4	16	8	8	28	20	20	20
11	40	52	12	8	28	20	8	4	0	16	0	0	8	8	0	12	68	72	20	12
12	20	28	24	4	4	36	24	40	4	4	0	12	24	8	4	8	24	64	48	44
13	4	12	8	8	16	36	32	28	0	8	8	0	32	28	0	44	20	48	40	36
14	8	8	20	4	16	4	12	36	4	0	0	0	20	20	0	8	24	12	32	40
15	4	8	0	0	0	20	0	4	12	0	8	4	20	20	0	12	4	28	0	4
16	20	0	0	12	0	12	12	0	0	0	0	0	20	12	0	0	20	12	12	12
17	4	2	0	0	4	8	4	24	0	4	0	0	4	0	0	4	8	10	4	24
18	16	8	0	4	8	8	28	0	0	0	0	20	4	4	4	0	24	16	28	4
Total	246	178	88	40	128	200	156	164	20	88	20	68	172	140	20	128	374	378	244	204
% by transport mode & park survey point	77%		23%		51%		49%		16%		13%		48%		23%		63%		37%	

* hourly data was extrapolated from hourly 15 minute counts commencing on the hour

† main road entrance

‡ pedestrian entrance

Table 18. Extrapolated visitor counts data – Round 7 and Round 8 survey rounds (SMC1 – Path along the outside of parkland)

SMC 1 - OUTSIDE PATH								
MAY 2013								
Type Time*	WEEKDAY				WEEKEND			
	Walking/Running		Cycling		Walking/Running		Cycling	
	To city	From city	To city	From city	To city	From city	To city	From city
7	20	24	84	16	60	36	380	32
8	24	12	212	60	56	40	356	92
9	16	4	28	12	24	32	120	56
10	44	24	40	40	36	36	56	68
11	8	24	20	8	24	16	28	68
12	20	36	24	32	44	16	68	72
13	44	32	8	36	16	36	64	68
14	24	16	24	20	12	24	48	36
15	12	16	8	16	184	32	24	56
16	24	24	40	68	56	48	36	56
17	64	48	76	160	52	20	28	44
18	116	120	24	132	12	12	24	16
Total	416	380	588	600	576	348	1232	664
% by transport mode	40%		60%		33%		67%	
OCTOBER 2013								
7	40	32	156	40	56	80	148	60
8	32	0	152	36	48	24	412	60
9	24	16	40	28	48	8	108	84
10	20	12	32	76	68	44	64	72
11	48	4	16	20	44	16	56	44
12	8	36	24	4	16	28	52	32
13	24	24	20	0	12	16	52	36
14	8	8	32	16	20	24	36	44
15	16	8	12	32	36	28	20	52
16	16	20	32	120	8	8	8	24
17	36	28	68	208	52	16	36	44
18	56	136	40	172	20	28	32	28
Total	328	324	624	752	428	320	1024	580
% by transport mode	32%		68%		32%		68%	

*hourly data was extrapolated from hourly 15 minute count commencing on the hour.

7.11 VISITOR SURVEYS

In 2013 over survey rounds 7 and 8, 372 surveys were collected (Table 19). This is in addition to the 364 surveys completed during survey rounds 1 and 2 in 2010 and 204 surveys from Round 3 in May 2011. Over the duration of the social monitoring, 940 surveys have been collected in total. A copy of the survey is attached, see Appendix A.

Table 19. Number of surveys collected

	Survey rounds					Total
	Round 1 May-10	Round 2 Oct-10	Round 3 May-11	Round 7 May-13	Round 8 Oct-13	
Weekday	69	73	89	48	84	363
Weekend	123	99	115	81	159	577
TOTAL	192	172	204	129	243	940

100% of surveys collected onsite.

7.11.1 DEMOGRAPHICS

In round 7, the survey respondents were made up equally of men (50%) and women (50%), while in round 8, 56% of survey respondents were male and 44% were female (Table 20 & Figure 29). Over the 5 survey rounds, the representation of male and female survey respondents is 51% and 49% respectively.

Table 20. Respondent gender (%) by survey round.

		Male	Female
Round 1	Weekday	59	41
	Weekend	49	51
	Total	53	47
Round 2	Weekday	47	53
	Weekend	45	55
	Total	46	54
Round 3	Weekday	57	43
	Weekend	45	55
	Total	50	50
Round 7	Weekday	55	45
	Weekend	46	54
	Total	50	50
Round 8	Weekday	55	45
	Weekend	57	43
	Total	56	44
Total		51	49

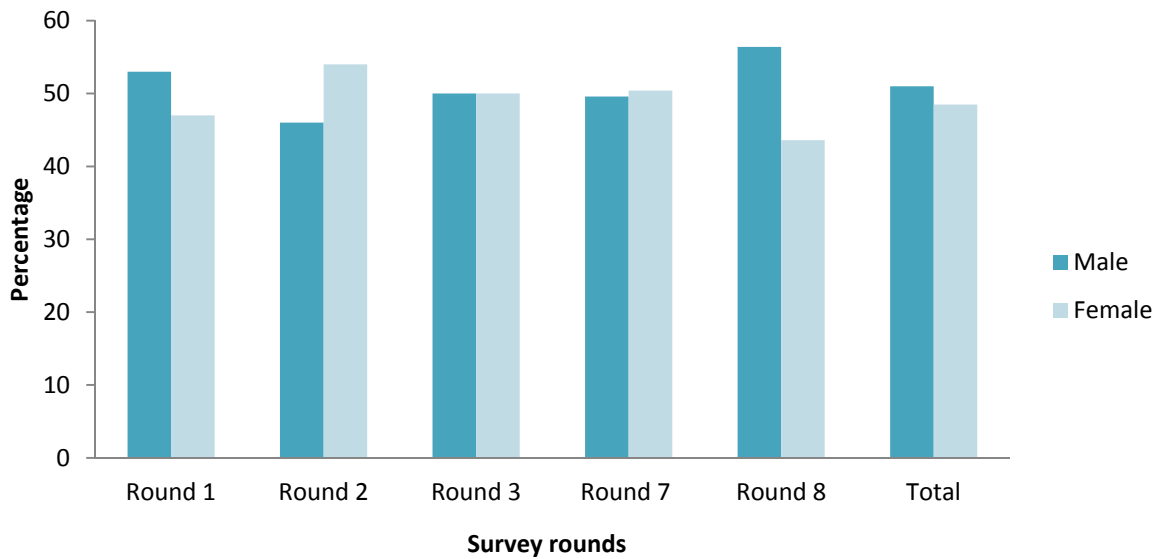


Figure 29. Respondent gender (%) by survey round.

In round 7, the 21-30 years and >60 years age group were the most frequent users (23% each) of Point Fraser parkland, followed by the 51-60 years age group (21%) (Table 21 and Figure 30). The 41-50 years age group and 31-40 years age groups made up 15% and 14% of respondents respectively. There were minimal respondents under the age of 21 years (4%). The most frequent users in round 8 were the 21-30 years age group (30%), followed by the 31-40 years age group (20%). Eighteen percent (18%) of users were in the 51-60 years age group, while the >60 years age group made up 15%, closely followed by the 41-50 years age group with 14%. The most infrequent users were from the <21 years age group with just 4% represented. Over the five survey rounds, the 21-30 year age group is consistently the highest proportion of users and the <21 years age group the lowest.

Table 21. Respondent age (%) by survey round.

		< 21	21 – 30	31 – 40	41 – 50	51 – 60	> 60
Round 1	Weekday	4	23	12	22	20	19
	Weekend	4	28	20	14	21	14
	Total	4	26	17	17	21	16
Round 2	Weekday	1	25	18	17	18	21
	Weekend	8	20	19	16	16	20
	Total	5	22	19	16	17	21
Round 3	Weekday	6	27	13	22	17	15
	Weekend	3	29	15	17	20	17
	Total	4	28	14	20	19	16
Round 7	Weekday	6	17	15	13	27	23
	Weekend	2	27	14	16	17	23
	Total	4	23	14	15	21	23
Round 8	Weekday	6	25	20	15	21	12
	Weekend	3	32	19	13	16	17
	Total	4	30	20	14	18	15
Total		4	26	17	16	19	17

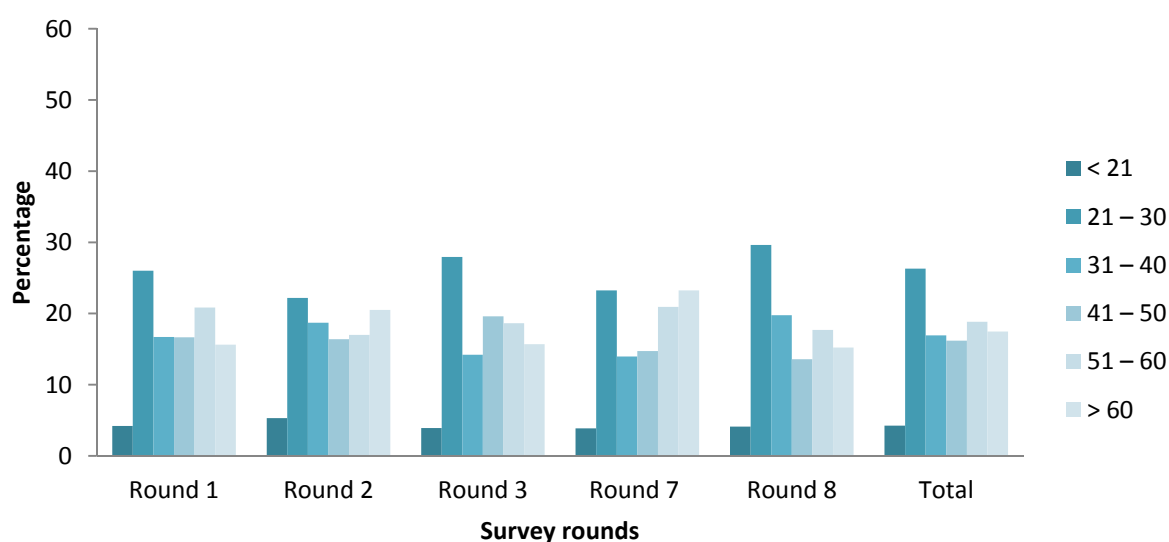


Figure 30 Respondent age (%) by survey round.

In round 7, 81% of respondents were Australian residents and 19% of respondents were not Australian residents and therefore, came from overseas (Table 22 and Figure 31). In round 8, 78% of respondents were Australian residents and 22% came from overseas. On average, over the five survey rounds, 74% of respondents were Australian residents.

Table 22. Australian resident (%) by survey round.

		Yes	No
Round 1	Weekday	74	26
	Weekend	73	27
	Total	73	27
Round 2	Weekday	60	40
	Weekend	71	29
	Total	66	34
Round 3	Weekday	66	34
	Weekend	77	23
	Total	72	28
Round 7	Weekday	79	21
	Weekend	83	17
	Total	81	19
Round 8	Weekday	83	17
	Weekend	76	24
	Total	78	22
Total		74	26

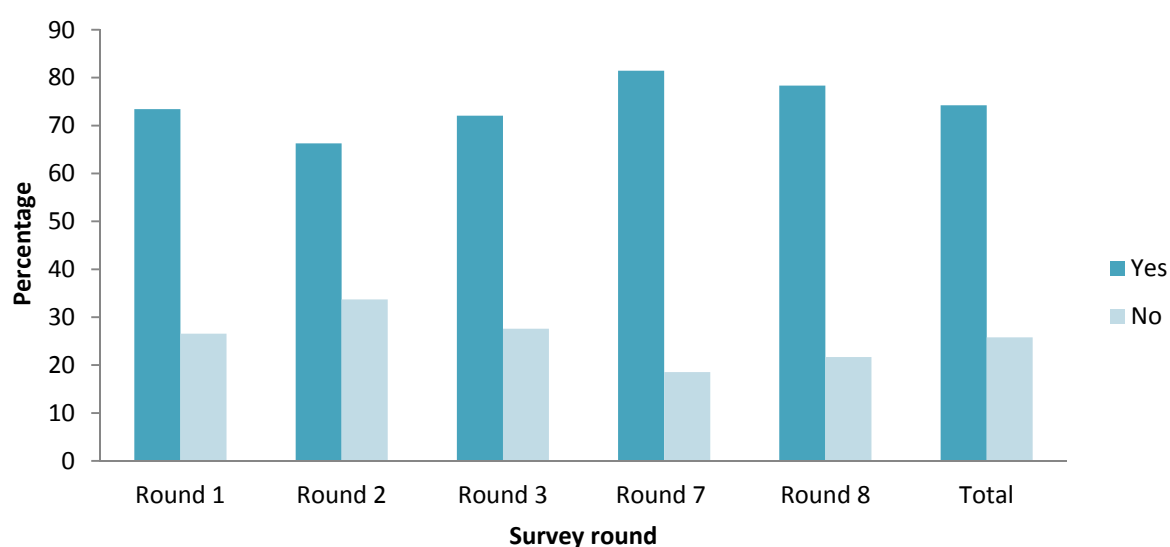


Figure 31. Australian resident (%) by survey round.

In both rounds 7 and 8, the vast majority of respondents were from Western Australia, 87% and 90% respectively (Table 23 and Figure 32). Small percentages of respondents came from other states in round 7, including New South Wales (7%), South Australia (5%) and Queensland (2%). Similarly in round 8, respondents from other states had minimal representation with 5% from Victoria, 2% from South Australia, 2% from New South Wales, 1% from the Australian Capital Territory and 1% from Queensland. Over the five survey

rounds, there is a clear trend for most respondents to be residents of Western Australia, almost 90% and in some cases more.

Table 23 Australian respondent state of origin (%) by survey round.

		ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Round 1	Weekday	0	2	0	0	0	4	6	89
	Weekend	1	5	0	0	0	0	3	91
	Total	1	4	0	0	0	1	4	90
Round 2	Weekday	0	10	0	6	2	0	2	80
	Weekend	0	3	0	0	1	0	4	92
	Total	0	6	0	3	2	0	3	87
Round 3	Weekday	0	3	0	6	0	0	7	84
	Weekend	1	6	0	1	0	0	1	91
	Total	1	5	0	3	0	0	4	88
Round 7	Weekday	0	10	0	0	3	0	0	88
	Weekend	0	5	0	3	6	0	0	86
	Total	0	7	0	2	5	0	0	87
Round 8	Weekday	2	3	0	3	0	0	6	87
	Weekend	0	1	0	0	3	0	5	92
	Total	1	2	0	1	2	0	5	90
Total		0	4	0	2	1	0	4	88

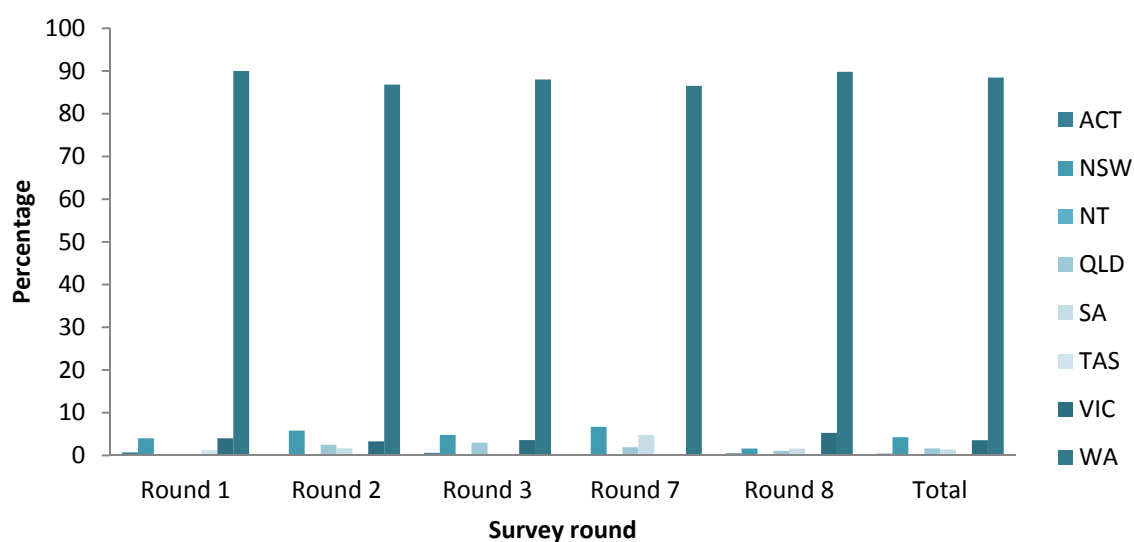


Figure 32. Australian respondent state of origin (%) by survey round.

The largest percentage of respondents from Perth residents came from the postcode 6004 (East Perth) (15.9%), followed by postcodes 6000 (Perth) (10.2%) and 6100 (Burswood, Lathlain, Victoria Park) (4.5%) for round 7. In round 8, most respondents came from the postcode 6004 (East Perth) (13.9%), followed by postcodes 6151 (Kensington, South Perth)

(9.6%), 6000 (Perth) (6.0%), 6100 (Burswood, Lathlain, Victoria Park) (6.0%), 6152 (Como, Karawara, Manning, Salter Point, Waterford). Over the five survey rounds, the postcodes 6000, 6004, 6100, 6151 were the most represented of the Perth residents, consistent with the data from the individual rounds. These postcode areas are all within close proximity to Point Fraser. However, there were respondents represented from all over Perth, both north and south of the river. This data reflects that Perth residents who use Point Fraser are not limited to a particular geographical region of the city; however, the largest user groups live within very close proximity to the park. Appendix B lists all the postcodes of Perth residents.

Of the round 7 respondents, 19% came from overseas and 22% in round 8 (Table 8 & Figure 31). The largest group of overseas respondents were from New Zealand and the United Kingdom with 19% each. This was followed by Germany (10%), France (10%) and the USA (10%) in round 7. In round 8 the most common nationality of an overseas visitor was from the USA (19%), followed by Taiwan (15%) and the United Kingdom (6%). Over the five survey rounds, 37 different nationalities have visited Point Fraser. British (16%), American (12%), German (8%) and New Zealand (8%) visitors are the largest groups of non-Australian residents visiting Point Fraser, considering all data collected to date. The complete list of the origin of overseas survey respondents is shown in Appendix C.

7.11.2 PARK USE

In round 7, the majority of respondents travelled by foot (71%) to Point Fraser (Table 24 and Figure 33). The second most popular mode of transport was by car (16%), followed by bicycle (5%). Five percent (5%) of respondents used a mixture of transport modes to get to Point Fraser and 2% used public transport. No respondents used a boat to get to Point Fraser. In round 8, 63% of respondents walked, followed by 16% who travelled by car to Point Fraser. A higher proportion than most recent rounds travelled by bicycle (14%). One percent (1%) travelled by public transport and 6% used a mixture of travel modes to get to Point Fraser. Over the five survey periods, consistently, walking (63%) is the most common mode of transport, followed by car (17%) and bicycle (11%).

Table 24. Mode of travel (%) by survey round.

		On Foot	Car	Boat	Bicycle	Public Transport	Mixture of above	Other
Round 1	Weekday	49	15	0	23	1	12	0
	Weekend	48	22	0	17	9	4	0
	Total	48	19	0	19	6	7	0
Round 2	Weekday	59	29	0	3	4	6	0
	Weekend	69	12	0	8	2	8	0
	Total	65	19	0	6	3	7	0
Round 3	Weekday	71	14	0	8	3	3	1
	Weekend	68	18	0	5	1	7	1
	Total	69	16	0	6	2	5	1
Round 7	Weekday	73	13	0	6	6	2	0
	Weekend	70	17	0	5	0	7	0
	Total	71	16	0	5	2	5	0
Round 8	Weekday	71	14	0	10	0	5	0
	Weekend	58	17	1	16	1	6	1
	Total	63	16	0	14	1	6	0
Total		63	17	0	11	3	6	0

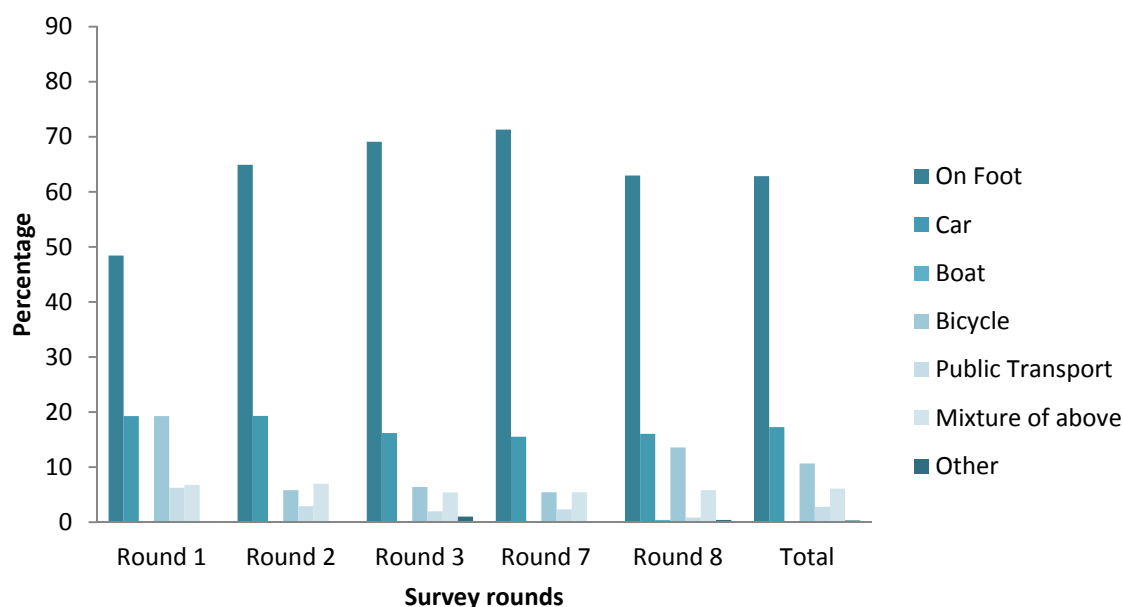


Figure 33. Mode of travel (%) by survey round.

Over rounds 7 and 8, 5% and 6% respectively, utilised a mixture of modes to travel to Point Fraser (Table 25 and Figure 34). In round 7, the most common mixture of transport modes was car / walk (63%) and in round 8, public transport / walk (36%). Other combinations of travel modes used in round 7 were bicycle (13%), car / walk / bicycle (13%) and public transport / walk (13%). While in round 8, other combinations of travel modes included car / walk (29%), bicycle / walk (21%) and car / bicycle (14%). Over all survey rounds, the most common travel combination is car / walk (42%).

Table 25. Mode of travel combinations (%) by survey round.

		Bicycle / walk	Car / bicycle	Car / walk	Car / walk / bicycle	Public transport / bicycle	Public transport / walk
Round 1	Weekday	13	13	38	0	13	25
	Weekend	20	0	80	0	0	0
	Total	15	8	54	0	8	15
Round 2	Weekday	0	0	33	33	33	0
	Weekend	13	13	63	0	0	13
	Total	9	9	55	9	9	9
Round 3	Weekday	0	33	33	0	0	33
	Weekend	63	0	13	13	0	13
	Total	46	9	18	9	0	18
Round 7	Weekday	100	0	0	0	0	0
	Weekend	0	0	71	14	0	14
	Total	13	0	63	13	0	13
Round 8	Weekday	25	25	0	0	0	50
	Weekend	20	10	40	0	0	30
	Total	21	14	29	0	0	36
Total		21	9	42	5	4	19

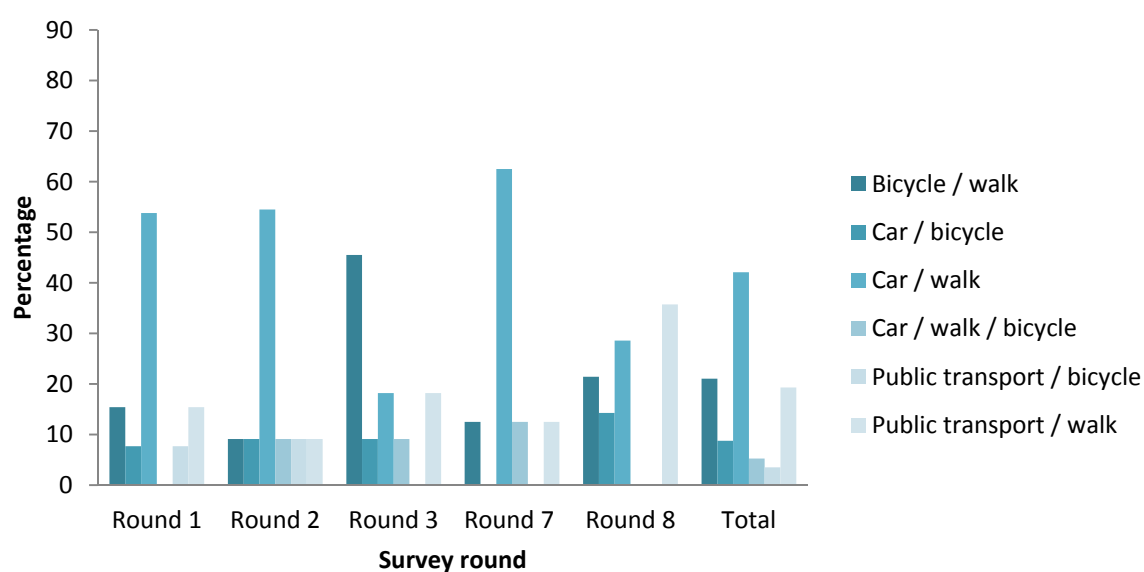


Figure 34. Mode of travel combinations (%) by survey round.

In round 7, 67% of respondents had visited Point Fraser before. Twenty-six percent (26%) visited weekly (Table 26 and Figure 34). Thirteen percent (13%) visited once or twice a year, followed by 10% of respondents who visited daily, 10% who visited less than once a year and 8% who visited monthly. It was the first time to visit Point Fraser for 33% of survey respondents. Round 8 survey data produced similar results, with 69% of respondents had visited the park previously. Twenty-eight percent (28%) of respondents visited Point Fraser weekly. Thirteen (13%) of respondents indicated that they visited daily and also once or

twice a year. While 12% respondents indicating that they visit monthly and 3% less than once a year. In round 8, the largest group of respondents (31%) were first time visitors to Point Fraser. Considering all the data gathered to date, the most common frequency of visitors was weekly (31%), followed closely by first time visitors (28%).

Table 26 Frequency of visiting point Fraser (%) by survey round.

		First time	Daily	Weekly	Monthly	Once or twice a year	Less than once a year
Round 1	Weekday	25	6	33	13	16	7
	Weekend	25	4	30	15	22	3
	Total	25	5	31	15	20	5
Round 2	Weekday	30	14	26	11	14	6
	Weekend	32	10	41	6	3	8
	Total	31	11	35	8	8	7
Round 3	Weekday	24	21	33	8	7	8
	Weekend	21	8	37	11	17	6
	Total	22	14	35	10	12	7
Round 7	Weekday	28	24	30	9	4	4
	Weekend	35	3	24	8	18	14
	Total	33	10	26	8	13	10
Round 8	Weekday	37	16	37	4	6	1
	Weekend	28	11	24	17	17	3
	Total	31	13	28	12	13	3
Total		28	11	31	11	13	6

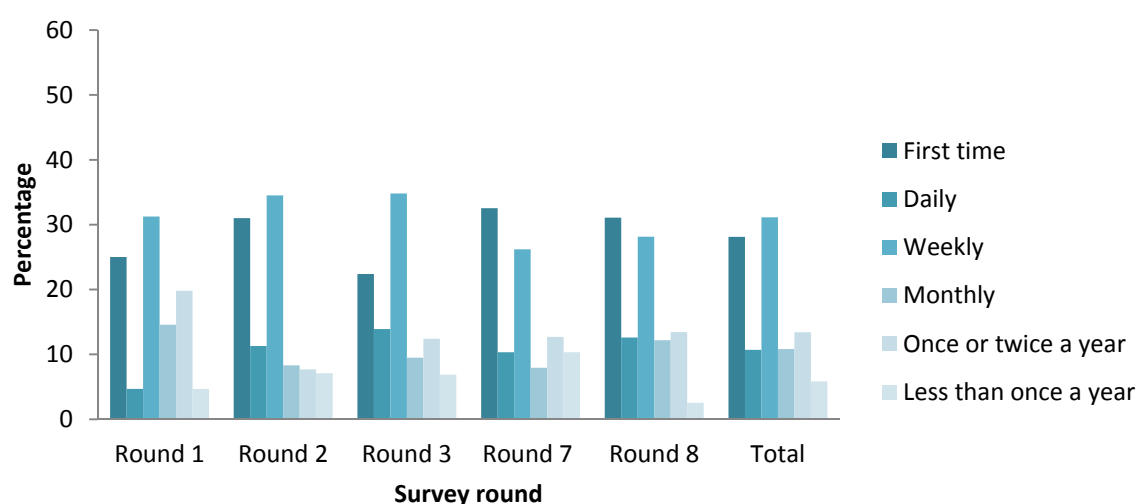


Figure 35. Frequency of visiting point Fraser (%) by survey round.

The majority of respondents (37%), in round 7, were visiting Point Fraser with their partner, while 29% were visiting on their own and 15% with friends (Table 27 and Figure 36). Thirteen percent (13%) of respondents visited with family and 5% with work associates. In round 8, most respondents (36%) visited Point Fraser on their friends. Following this, 32%

visited Point Fraser on their own and 26% with their partner. A very small proportion, 2% visited with other family and also 2% with work associates. In both round 7 and 8, 1% of respondents (two people) in each round selected 'other' and indicated that they were visiting the park with their baby or their dog. Several respondents indicated that they were at Point Fraser both with more than one person, these combinations included, their partner and friends and their partner and other family. Over the five survey rounds, the common response for who the respondent visits Point Fraser with has varied, from on my own, partner and friends.

Table 27. Respondent visiting with (%) by survey round.

		On my own	Partner	Family	Friends	Work associates	Community groups	Other
Round 1	Weekday	40	2	28	22	2	0	7
	Weekend	27	3	28	37	1	0	4
	Total	31	3	28	32	1	0	5
Round 2	Weekday	43	11	11	24	7	0	4
	Weekend	38	16	13	31	1	0	2
	Total	40	14	12	28	4	0	3
Round 3	Weekday	53	7	5	29	5	0	2
	Weekend	30	37	14	17	0	0	2
	Total	40	23	10	22	2	0	2
Round 7	Weekday	45	26	9	9	13	0	0
	Weekend	20	44	15	19	0	0	1
	Total	29	37	13	15	5	0	1
Round 8	Weekday	45	17	2	27	5	1	2
	Weekend	25	31	2	41	1	0	0
	Total	32	26	2	36	2	0	1
Total		35	20	12	28	3	0	2

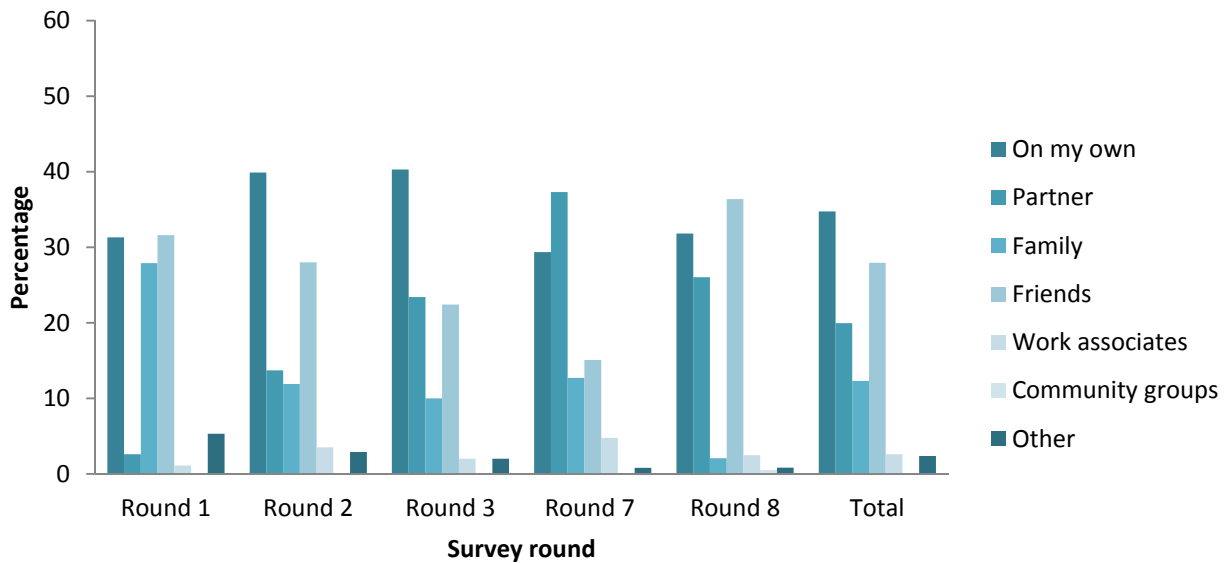


Figure 36. Respondent visiting with (%) by survey round.

Unlike previous survey rounds, the majority of respondents in round 7 arrived at Point Fraser over the middle of the day, with 15% arriving at 10-11am, followed by 13% at 9-10am and also 13% at 12-1pm (Table 28 and Figure 37). Ten percent (10%) of visitors arrived at 8-9am, 11-12pm and 1-2pm. Consistent with previous survey rounds, in round 8, there were three peak periods during the day, with 14% arriving between 7-8am, 12% between 10-11am and 12% between 5-6pm. In general Point Fraser was busiest in the morning, at lunchtime and with fewer arrivals towards early afternoon and evening. Depending on the time of day, the week day or weekend could be busier.

Table 28. Visitor arrivals over time (%) by survey round.

	Between	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm
Round 1	Weekday	4	0	4	22	16	12	9	9	9	6	7	3
	Weekend	0	11	6	11	20	12	5	7	15	10	3	2
	Total	2	7	5	15	18	12	6	8	13	8	5	2
Round 2	Weekday	1	14	7	11	14	14	7	12	7	7	4	3
	Weekend	3	10	16	9	9	5	4	9	10	8	5	10
	Total	2	12	12	10	11	9	5	11	9	8	5	7
Round 3	Weekday	1	13	7	6	8	8	14	8	12	9	10	5
	Weekend	2	15	12	8	9	13	10	5	8	10	8	1
	Total	2	14	10	7	9	11	12	6	10	10	9	2
Round 7	Weekday	2	4	7	11	11	15	11	11	7	11	9	2
	Weekend	1	6	11	15	18	8	15	9	3	5	6	4
	Total	2	6	10	13	15	10	13	10	4	7	7	3
Round 8	Weekday	5	7	4	8	7	4	14	11	10	4	8	19
	Weekend	3	17	7	6	14	11	4	9	9	7	4	8
	Total	4	14	6	7	12	9	8	10	9	6	6	12
Total		2	11	8	10	13	10	9	9	9	8	6	6

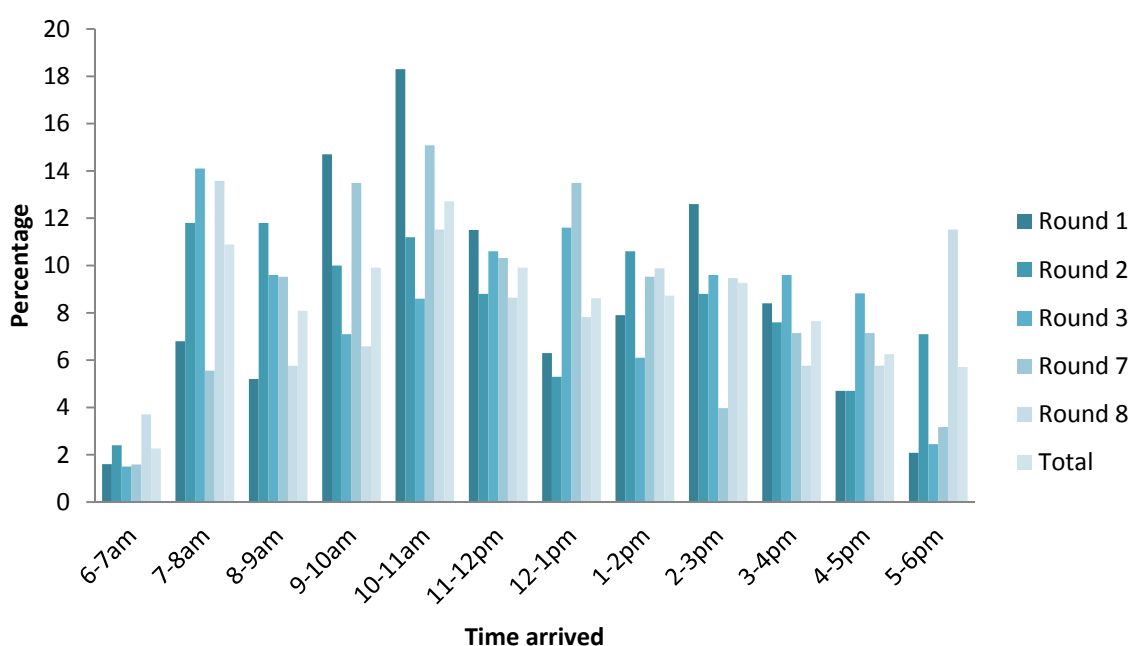


Figure 37. Visitor arrivals over time (%) by survey round.

As with previous survey rounds, the vast majority of respondents (64%) in round 7, indicated that they were passing through Point Fraser when asked how long they were planning to stay at the parkland (Table 29 and Figure 38). Of those respondents who were not passing through, 21% stayed for 1-2 hours and 13% stayed for less than 1 hour. A small proportion

of respondents, 2% stayed for 2 – 4 hours. Over half (58%) of survey respondents were passing through Point Fraser in round 8. Of those respondents who were not passing through, 21% stayed for 1 - 2 hours and 16% stayed for less than 1 hour. A small proportion of respondents, five (5%) stayed for 2 – 4 hours and just 2% for more than 4 hours.

Table 29. Time stayed (%) by survey round.

		Passing through	< 1 hour	1 - 2 hours	2 - 4 hours	> 4 hours
Round 1	Weekday	55	13	17	10	4
	Weekend	40	22	26	9	2
	Total	45	19	23	9	3
Round 2	Weekday	46	18	21	6	10
	Weekend	62	14	16	5	3
	Total	55	16	18	5	6
Round 3	Weekday	62	21	11	3	2
	Weekend	52	21	23	4	1
	Total	56	21	18	3	1
Round 7	Weekday	65	15	20	0	0
	Weekend	63	12	22	2	0
	Total	64	13	21	2	0
Round 8	Weekday	58	19	18	4	1
	Weekend	57	14	23	5	1
	Total	58	16	21	5	1
Total		55	17	20	5	2

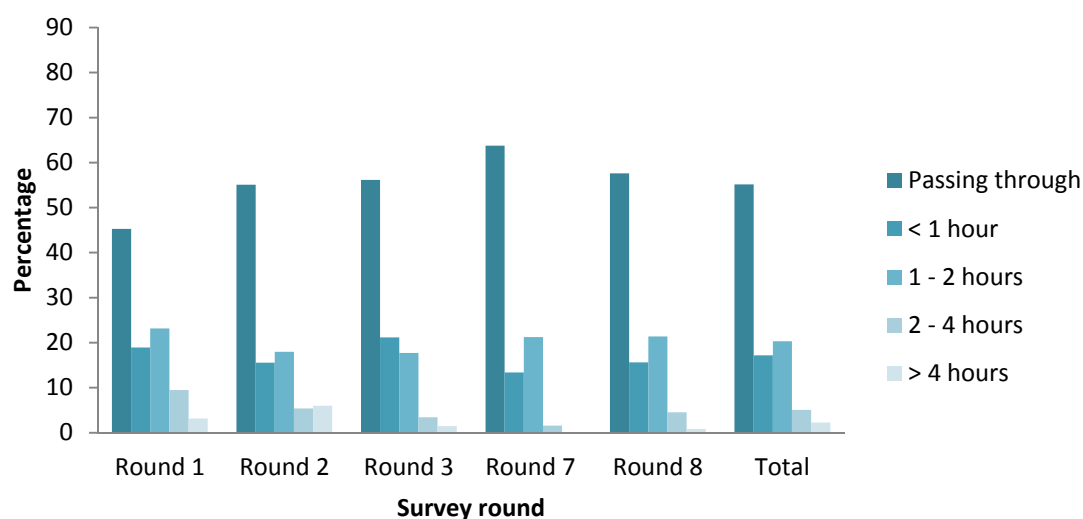


Figure 38. Time stayed (%) by survey round.

To explore park use, respondents were asked what activities they were doing at Point Fraser. There have been a number of changes to this survey question which reflect the fluctuations in the data. Initially there was an option of 'passing through' which was selected at such high rates that it provided limited insight into what the respondent was actually doing (Table 30). Therefore, in the second survey round, cycling, running / jogging and walking were added as activity choices to the survey. This affected the results of Round 2, leading to a dramatic reduction in the percentage choosing 'passing through', though it was still an option which yielded little information about the actual activity the respondent was undertaking. In the third survey round, 'passing through' was removed completely to gain a clearer insight of the specific activities respondents were undertaking. For example rather than a survey respondent just indicating that they were 'passing through', they were now required to specify if they were 'walking' or 'cycling' or 'running'. This gives more clarity to the data.

Survey respondents were asked what activities they were doing at Point Fraser and were able to select multiple responses. In round 7, as with previous rounds, by far the majority of respondents (74%) were 'walking' in and mostly through the reserve (Table 30 and Figure 39). Of the remaining round 7 survey respondents, 19% were at Point Fraser for 'general enjoyment', 14% for cycling and 10% running / jogging. Photography was an activity selected by 6% of respondents and 5% were at the park for a BBQ / picnicking. Four (4%) percent were using the services of About a Bike Hire and also to utilise interpretative trails (3%), playground (3%) and other (2%). Compared to round 8, a smaller proportion of respondents were walking (66%), this was followed by cycling (20%) and running / jogging (17%). Thirteen percent (13%) of respondents were visiting Point Fraser for 'general enjoyment'. Unlike round 7, respondents in round 8 had selected high proportions of a variety of different activities, for example, photography (9%), playground (9%), using services of about bike hire (7%) and BBQ / picnic (4%). The 'other' activities specified by respondents included, car park, canoeing, enjoying time with grandchildren, Frisbee, looking and walking dog. For a full list of other activities undertaken at Point Fraser by survey round, see Appendix D.

Table 30. Activities undertaken at (%) for round 1 and 2.

		Passing through	Walking	Running / jogging	Cycling	BBQ / Picnic	General enjoyment	Interpretive trails	Photography	Playground	Using services of About Bike Hire	Other
Round 1	Weekday	80	0	0	0	0	17	0	0	3	10	13
	Weekend	79	0	0	0	3	20	3	7	8	11	6
	Total	79	1	1	2	2	19	2	5	6	11	5
Round 2	Weekday	30	62	11	11	0	14	1	7	7	4	18
	Weekend	38	68	8	12	1	11	1	4	1	1	4
	Total	35	65	9	12	1	12	1	5	4	2	10

Table 31. Activities undertaken at (%) by survey round.

		Passing through	Walking	Running / jogging	Cycling	BBQ / Picnic	General enjoyment	Interpretive trails	Photography	Playground	Using services of About Bike Hire	Other
Round 3	Weekday	0	65	21	19	3	5	0	8	1	3	3
	Weekend	0	82	13	18	4	17	6	10	5	4	4
	Total	0	75	17	19	3	11	3	9	3	4	3
Round 7	Weekday	0	67	13	17	0	10	2	4	6	4	2
	Weekend	0	79	9	12	7	24	5	7	1	4	1
	Total	0	74	10	14	5	19	4	6	3	4	2
Round 8	Weekday	0	66	18	16	5	13	2	14	2	10	4
	Weekend	0	67	16	22	4	13	3	6	2	5	5
	Total	0	66	17	20	4	13	3	9	9	7	5

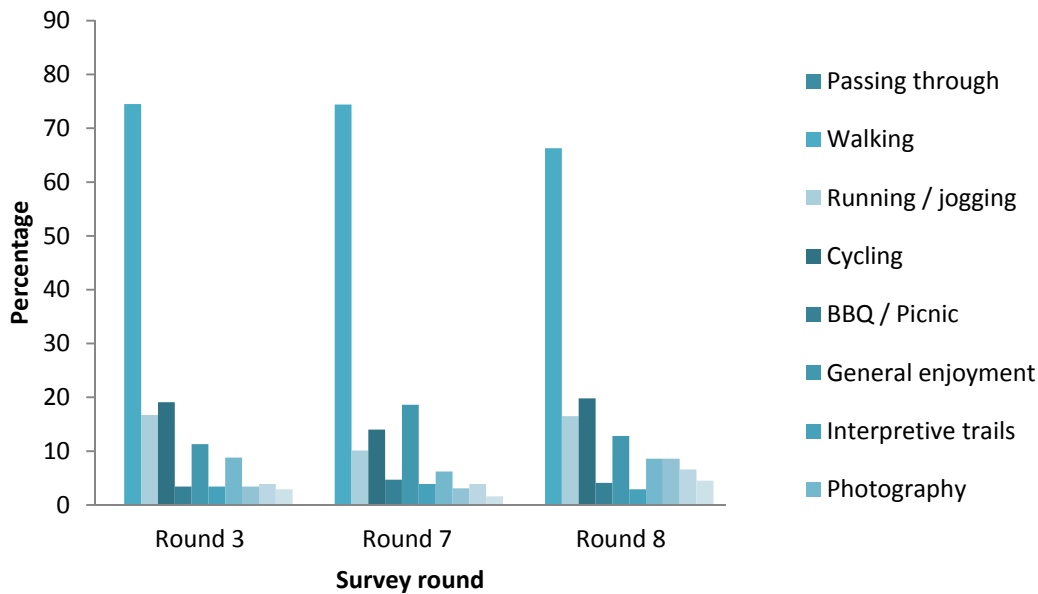


Figure 39. Activities undertaken (%) by survey rounds.

Respondents were asked what their main reason for visiting Point Fraser was. More than 67% indicated that they were visiting Point Fraser for exercise in Round 7 (Table 32 and Figure 40). Spending time with family / friends was selected by 11% of respondents. Less popular reasons for visiting Point Fraser included ‘experiencing nature’ (5%), ‘rest and relax’ (5%), ‘seeing wildlife’ (4%), ‘scenery’ (2%), ‘other’ (2%), ‘something new and different’ (1%), ‘proximity to the city’ (1%) and ‘learn about storm water’ (1%). Of the respondents who selected other, they specified, coming to see kangaroos at Heirisson Island, exercise, stress relief (lunch break), sat on picnic blanket, and walking to a meeting. In Round 8, exercise was considered by the majority (69%) of respondents for visiting Point Fraser and was followed by ‘spending time with family and friends’ (11%). Other reasons for visiting Point Fraser included ‘rest and relax’ (5%), ‘other’ (5%), ‘seeing wildlife’ (4%), ‘scenery’ (3%), ‘proximity to the city’ (2%), ‘something new and different’ (1%) and ‘proximity to the river’ (1%). The five percent (5%) who selected other, specified, finding a water station, kayaking, stretching my body, talking and enjoying the silence and visiting East Perth.

Although stating quite clearly in the survey, ‘what is your **main** reason for visiting Point Fraser today (**select only 1**)?’, this question has been the most misunderstood question in the survey with quite high rates of missing data due to the selection of multiple responses.

Table 32. Main reason for visiting (%) by survey round.

		Time with friends / family	Exercise	Experience nature	Learn about storm water	Seeing wildlife	Scenery	Something new and different	Proximity to the city	Rest and relax	Learn about the environ- ment	Proximity to the river	For solitude	Other
Round 1	Weekday	7	62	7	0	2	0	3	3	7	0	2	0	8
	Weekend	32	48	3	0	0	2	2	0	4	0	1	0	9
	Total	23	53	4	0	1	1	2	1	5	0	1	0	9
Round 2	Weekday	17	45	5	0	5	2	5	8	5	0	5	0	6
	Weekend	29	61	3	0	1	0	2	1	1	0	0	0	1
	Total	24	54	4	0	3	1	3	4	3	0	2	0	3
Round 3	Weekday	16	70	1	0	0	5	0	2	0	0	0	1	6
	Weekend	25	59	3	0	0	4	2	0	4	0	2	0	3
	Total	21	64	2	0	0	4	1	1	2	0	1	0	4
Round 7	Weekday	9	65	3	0	9	6	0	0	6	0	0	0	3
	Weekend	13	68	6	2	0	0	2	2	4	0	0	0	2
	Total	11	67	5	1	4	2	1	1	5	0	0	0	2
Round 8	Weekday	8	71	2	0	0	2	2	0	8	0	0	0	7
	Weekend	12	68	5	0	0	4	1	4	3	0	1	0	4
	Total	11	69	0	0	4	3	1	2	5	0	1	0	5
Total		19	61	3	0	2	2	2	2	4	0	1	0	5

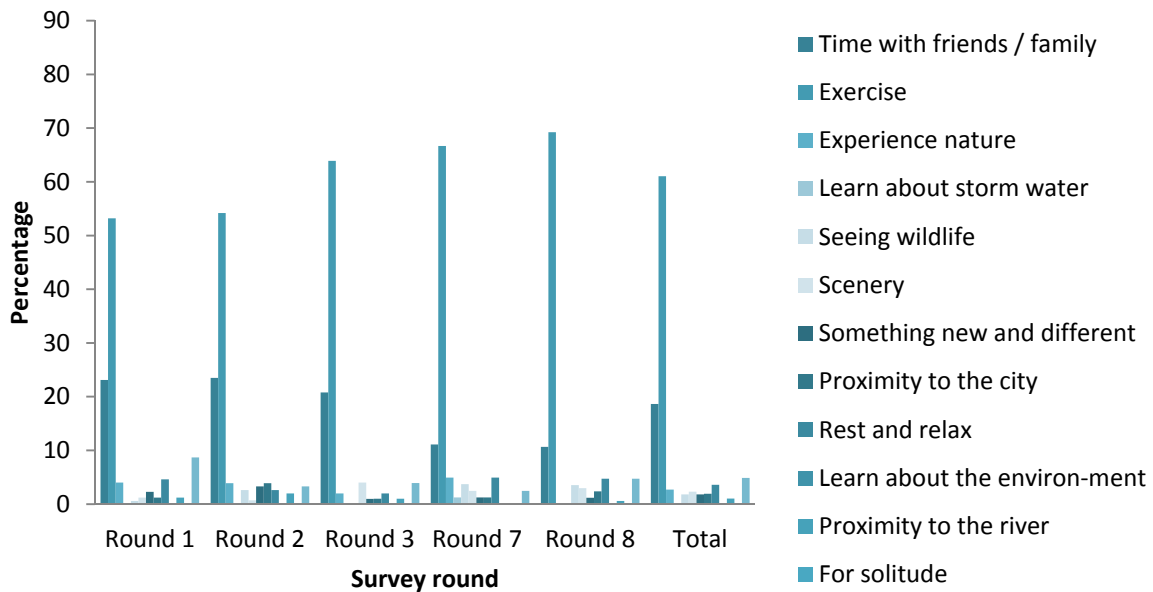


Figure 40. Main reason for visiting (%) by survey round.

7.11.3 PARK SATISFACTION

Respondents were asked about the quality of the features at Point Fraser using a 5-point scale (1=very poor to 5=excellent). Overall satisfaction was high, with few negative ratings with the exception of the rating of the toilet facilities.

In round 7, all respondents were satisfied with the cleanliness of Point Fraser parkland. Forty-three percent (43%) rated the cleanliness as excellent, 50% as good and 3% as satisfactory (Table 33 and Figure 41). Only 2% were dissatisfied in Round 8, while all of the remaining respondents considered cleanliness of the parkland to be either satisfactory (9%), good (41%) and excellent (47%).

Table 33. Quality of features – Cleanliness (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	2	0	5	30	64	0
	Weekend	0	0	3	39	58	0
	Total	1	0	4	36	60	0
Round 2	Weekday	0	1	12	26	59	1
	Weekend	1	0	3	42	52	1
	Total	1	1	7	35	55	1
Round 3	Weekday	0	1	0	39	58	1
	Weekend	0	1	5	49	45	0
	Total	0	1	3	45	51	1
Round 7	Weekday	0	0	6	40	53	0
	Weekend	0	0	8	55	37	0
	Total	0	0	7	50	43	0
Round 8	Weekday	1	0	8	42	46	2
	Weekend	0	2	9	41	48	0
	Total	0	1	9	41	47	1
Total		0	1	6	41	51	1

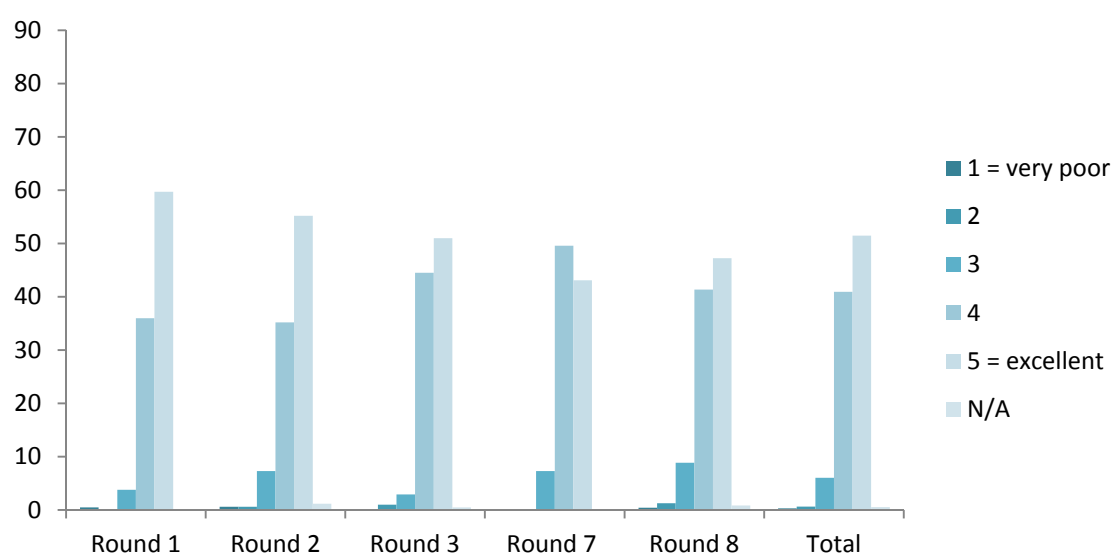


Figure 41. Quality of features – Cleanliness (%) by survey round

Access was predominately rated as good (44%) or excellent (43%) by the majority of respondents, with 11% rating it as satisfactory and 2% rating it as poor in round 7 (Table 34 and Figure 42). In round 8, 46% of respondents considered access to be excellent, 36% good, 14% satisfactory and 2% poor. The comments in Appendix H (Suggestions to improve Point Fraser) highlight areas for improvement with regards to access, including negative comments regarding paid parking and lack of public transport.

Table 34. Quality of features – Access (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	2	0	5	28	65	2
	Weekend	0	1	7	37	53	2
	Total	1	1	6	34	57	2
Round 2	Weekday	0	1	12	26	55	6
	Weekend	0	0	7	41	50	2
	Total	0	1	9	34	52	4
Round 3	Weekday	0	2	2	33	62	1
	Weekend	0	1	7	44	48	0
	Total	0	2	5	39	54	1
Round 7	Weekday	0	2	6	46	46	0
	Weekend	0	1	15	43	41	0
	Total	0	2	11	44	43	0
Round 8	Weekday	1	1	12	32	49	4
	Weekend	0	2	15	38	45	1
	Total	0	2	14	36	46	2
Total		0	1	9	37	51	2

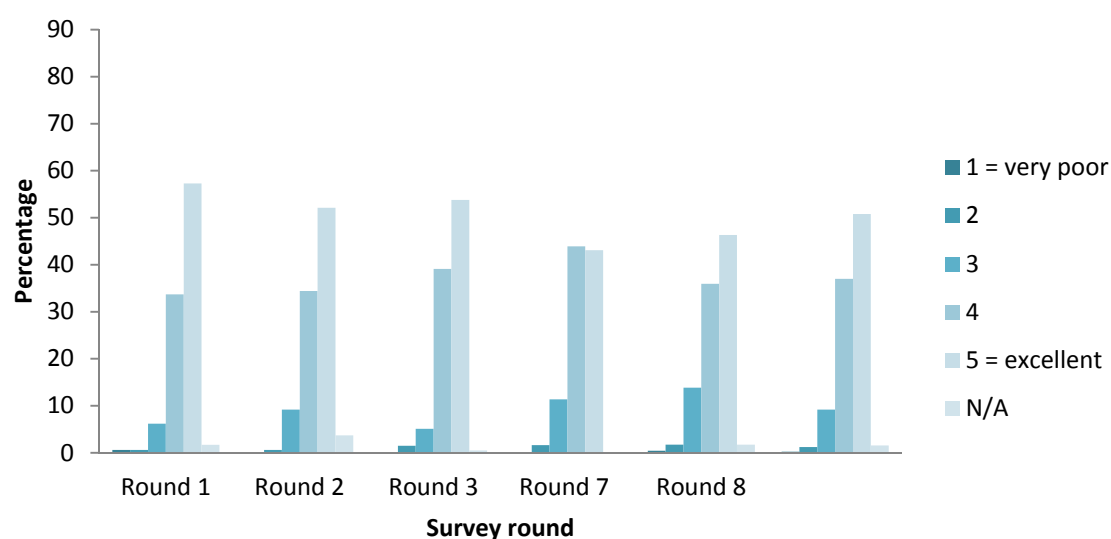


Figure 42. Quality of features – Access (%) by survey round

Playground facilities were also rated positively in both Rounds 7 and 8. Although more than a quarter, 26% in Round 7 and 27% in Round 8, of respondents ticked ‘not applicable’, suggesting that they did not use or were not familiar with the playground facilities (Table 35 and Figure 43).

Table 35. Quality of features – Playground facilities (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	0	5	11	25	22	38
	Weekend	0	0	13	20	30	36
	Total	0	2	12	22	27	37
Round 2	Weekday	0	1	14	17	26	41
	Weekend	1	3	13	28	24	31
	Total	1	3	13	23	25	35
Round 3	Weekday	0	2	18	29	24	27
	Weekend	0	2	16	21	31	30
	Total	0	2	17	24	28	29
Round 7	Weekday	0	2	15	28	22	33
	Weekend	0	1	18	40	19	22
	Total	0	2	17	35	20	26
Round 8	Weekday	1	0	16	26	25	32
	Weekend	0	1	19	32	24	24
	Total	0	1	18	30	24	27
Total		0	2	16	27	25	31

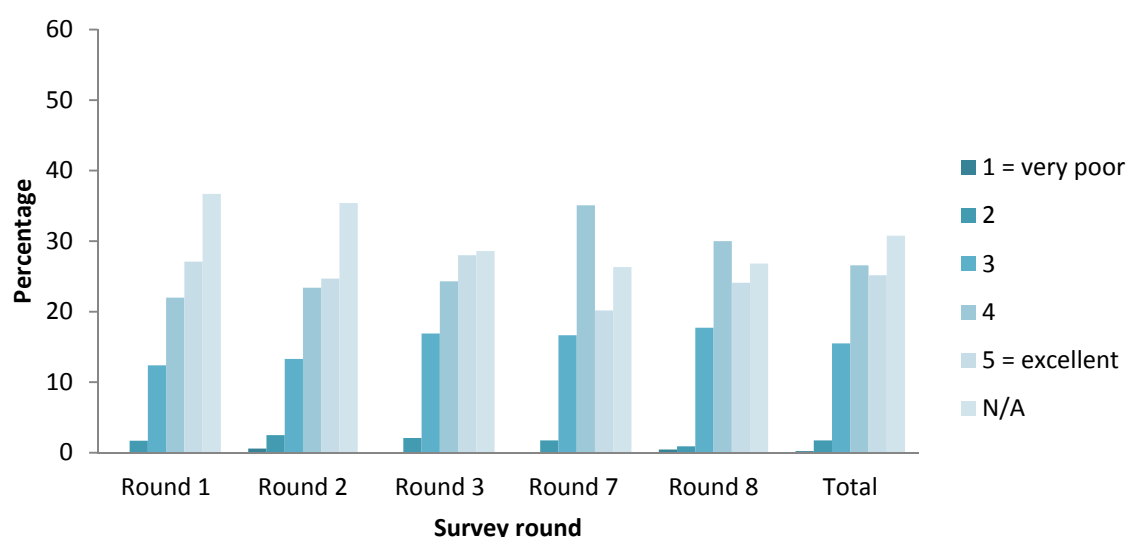


Figure 43. Quality of features – Playground facilities (%) by survey round.

In round 7, Point Fraser parkland was rated highly for its scenic beauty with 90% rating the parkland as good (37%) or excellent (53%) (Table 36 and Figure 44). Nine percent (9%) of respondents were neutral about the scenery and 1% selected poor. Similarly in Round 8, 54% of respondents considered the scenic beauty to be excellent and 36% good, while 6% selected satisfactory and 1% poor.

Table 36. Quality of features – Scenic beauty (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	2	0	5	27	67	0
	Weekend	0	1	5	31	62	1
	Total	1	1	5	30	64	1
Round 2	Weekday	0	0	15	35	45	6
	Weekend	0	0	9	41	45	6
	Total	0	0	11	38	45	6
Round 3	Weekday	0	0	17	28	53	2
	Weekend	0	0	5	38	57	0
	Total	0	0	10	34	55	1
Round 7	Weekday	0	0	7	35	59	0
	Weekend	0	1	11	39	49	0
	Total	0	1	9	37	53	0
Round 8	Weekday	0	1	4	33	56	5
	Weekend	1	1	7	37	53	1
	Total	0	1	6	36	54	2
Total		0	1	8	35	55	2

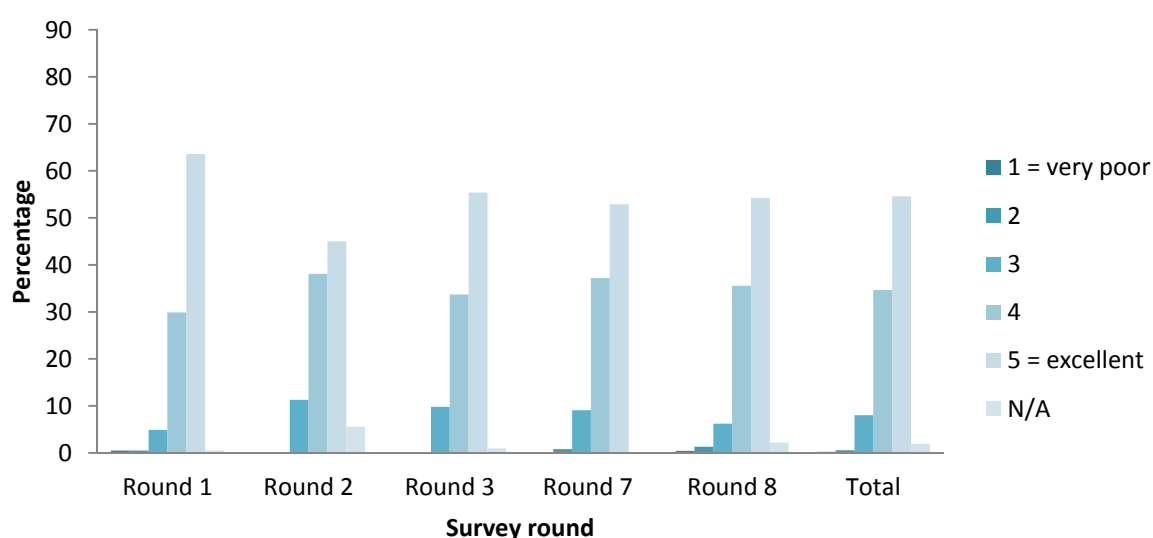


Figure 44. Quality of features – Scenic beauty (%) by survey round.

As with previous rounds, a high proportion (36% in Round 7 and 8 respectively) of respondents selected ‘not applicable’ with regards to the quality of barbeque facilities which suggests a lack of awareness, familiarity with or use of the facilities. Of the respondents who used or were familiar with BBQ facilities, 10% considered them to be excellent, 26% good, 21% satisfactory, 7% poor and 1% very poor in round 7 (Table 37 and Figure 45). Respondents from Round 8 rated the BBQ facilities in a similar manner to round 7. As per suggestions for improvements (Appendix H) and as illustrated in site photographs (see 2010 report), there is scope for adding barbeque facilities in more frequented areas as

well as providing support structures such as tables and shade facilities to make these areas more user-friendly and attractive.

Table 37. Quality of features – BBQ facilities (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	0	6	6	16	13	59
	Weekend	0	1	19	16	17	48
	Total	0	3	14	16	15	52
Round 2	Weekday	0	9	9	16	19	46
	Weekend	1	0	16	25	11	47
	Total	1	4	13	21	15	47
Round 3	Weekday	1	6	25	23	14	30
	Weekend	0	7	18	25	14	37
	Total	1	7	21	24	14	34
Round 7	Weekday	2	7	25	23	14	30
	Weekend		6	18	28	8	40
	Total	1	6	21	26	10	36
Round 8	Weekday	1	3	17	21	9	49
	Weekend	3	5	26	22	15	29
	Total	2	4	23	22	13	36
Total		1	5	19	21	14	41

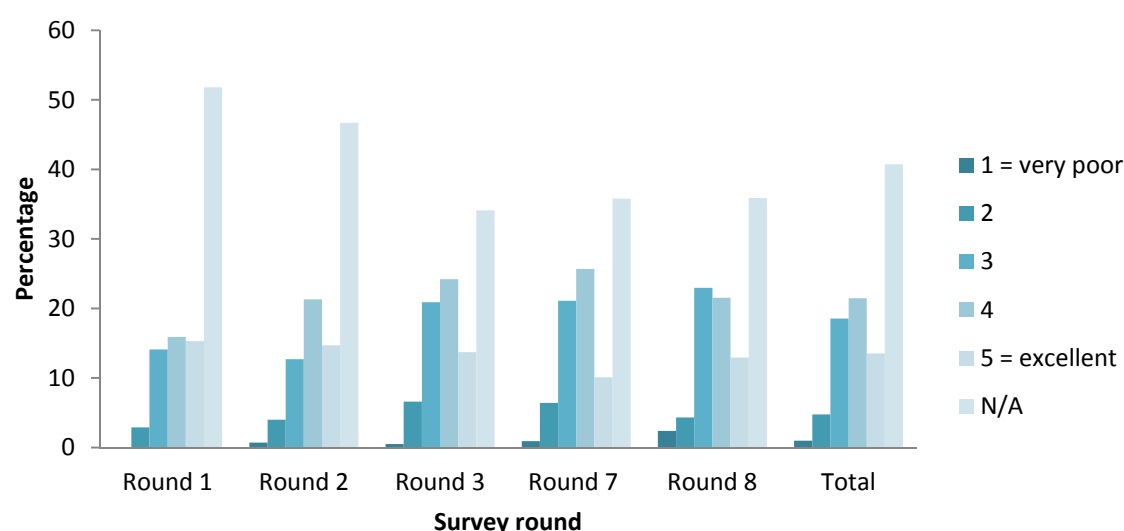


Figure 45. Quality of features – BBQ facilities (%) by survey round

Out of the surveyed features of Point Fraser parkland, the toilet facilities attracted the most criticism. Despite almost a quarter of respondents in both round 7 and 8 selecting ‘non-applicable’, a total of 27% rated the toilet facilities as very poor or poor, compared to a 29% of positive responses and 20% rating them neither good nor bad in Round 7 (Table 38 and Figure 46). While in round 8, a total of 21% rated the toilets as either very poor or poor. Twenty-nine percent (29%) selected satisfactory and a total of 25% rated them as either good or very good. Issues of availability, placement, cleanliness and accessibility (i.e.

disabled access) as also highlighted by a substantial number of suggestions (see Appendix H) require immediate attention.

Table 38. Quality of features – Toilet facilities (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	10	8	16	25	12	30
	Weekend	6	13	17	22	11	31
	Total	7	11	17	23	11	30
Round 2	Weekday	7	12	21	13	13	34
	Weekend	6	8	23	26	7	32
	Total	6	10	22	20	10	33
Round 3	Weekday	12	11	24	21	11	21
	Weekend	10	18	19	24	12	17
	Total	11	15	21	23	11	19
Round 7	Weekday	15	15	19	19	11	21
	Weekend	7	18	21	22	6	26
	Total	10	17	20	21	8	24
Round 8	Weekday	13	10	22	18	8	29
	Weekend	5	15	34	17	8	22
	Total	8	13	29	17	8	25
Total		8	13	22	21	10	26

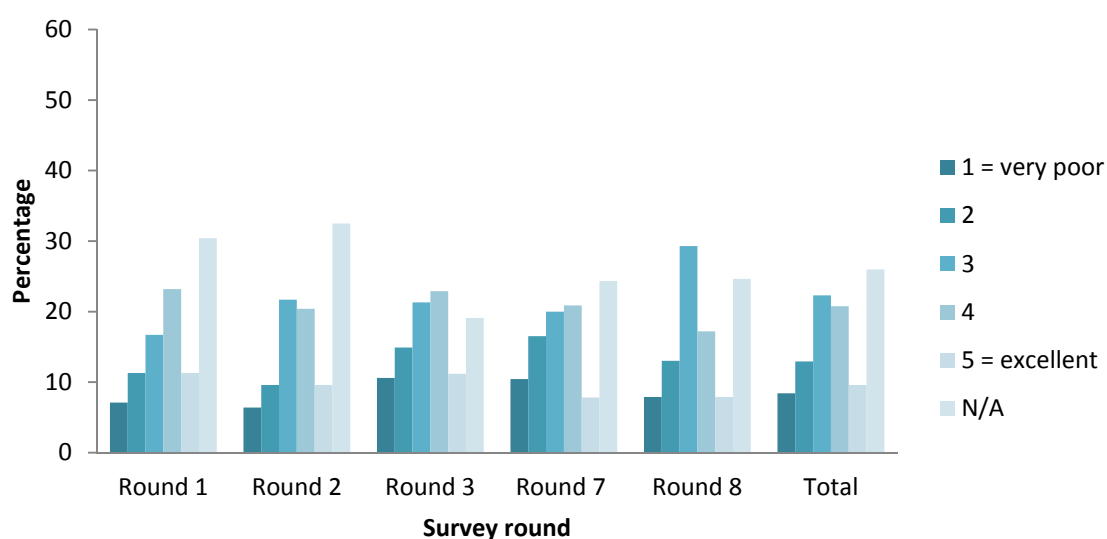


Figure 46. Quality of features – Toilet facilities (%) by survey round

Nine percent (9%) of round 7 respondents rated the signage as poor or very poor, 36% were neutral and 50% were positive (Table 39 and Figure 47). While in round 8, 11% considered signage to be very poor or poor, 28% were neutral and 53% were positive. Comments have been made in the recent rounds and also previous rounds by survey respondents highlighting the need for more signs and in particular directional signage. The survey does not make a distinction between directional, informational or interpretive signage. Use,

perception, needs and effectiveness of different types of signage in the reserve are aspects that warrant further research.

Table 39. Quality of features – Signage (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	0	3	24	37	30	6
	Weekend	3	6	21	33	24	13
	Total	2	5	22	34	26	10
Round 2	Weekday	0	4	23	30	33	10
	Weekend	0	0	19	45	21	15
	Total	0	2	21	38	26	13
Round 3	Weekday	2	7	31	31	22	7
	Weekend	3	10	28	39	20	1
	Total	3	9	29	35	21	4
Round 7	Weekday	0	4	35	35	19	6
	Weekend	1	10	37	35	13	4
	Total	1	8	36	35	15	5
Round 8	Weekday	4	8	29	27	22	10
	Weekend	0	11	27	37	19	6
	Total	1	10	28	33	20	8
Total		1	7	27	35	22	8

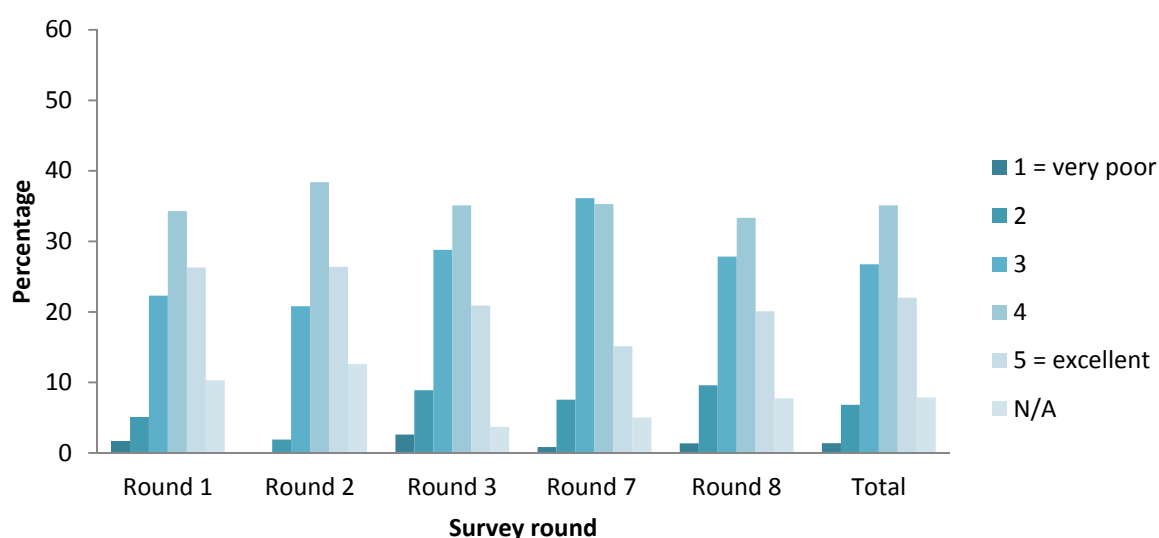


Figure 47. Quality of features – Signage (%) by survey round.

In rounds 1 and 2, seating and tables had been combined (Table 40). However, since there are no tables in the Point Fraser parkland, it was considered that seating and tables should in fact be separated to present a more accurate picture.

Table 40. Quality of features – Seating and Tables (%) by survey round 1 and 2.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	0	0	17	40	33	10
	Weekend	1	3	18	39	22	17
	Total	1	2	18	39	26	14
Round 2	Weekday	1	9	14	25	19	32
	Weekend	0	5	16	39	20	20
	Total	1	6	15	32	20	25
Total		1	4	17	36	23	20

In round 7 almost 70% of respondents were positive about the quality of the seating (Table 41 and Figure 48). While 21% considered the seating to be neither good or bad and 6% were dissatisfied. Slightly less respondents in round 8 were positive about the seating at Point Fraser with 66% selecting either good or excellent. Twenty percent (20%) were neutral about seating and 4% were dissatisfied.

Table 41. Quality of features – Seating (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 3	Weekday	1	4	18	38	27	12
	Weekend	0	5	15	49	24	7
	Total	1	4	16	44	26	9
Round 7	Weekday	0	2	27	41	23	7
	Weekend	1	7	17	40	33	1
	Total	1	5	21	40	29	4
Round 8	Weekday	4	1	18	36	28	13
	Weekend	0	4	21	41	26	8
	Total	1	3	20	39	27	9
Total		1	4	19	41	27	8

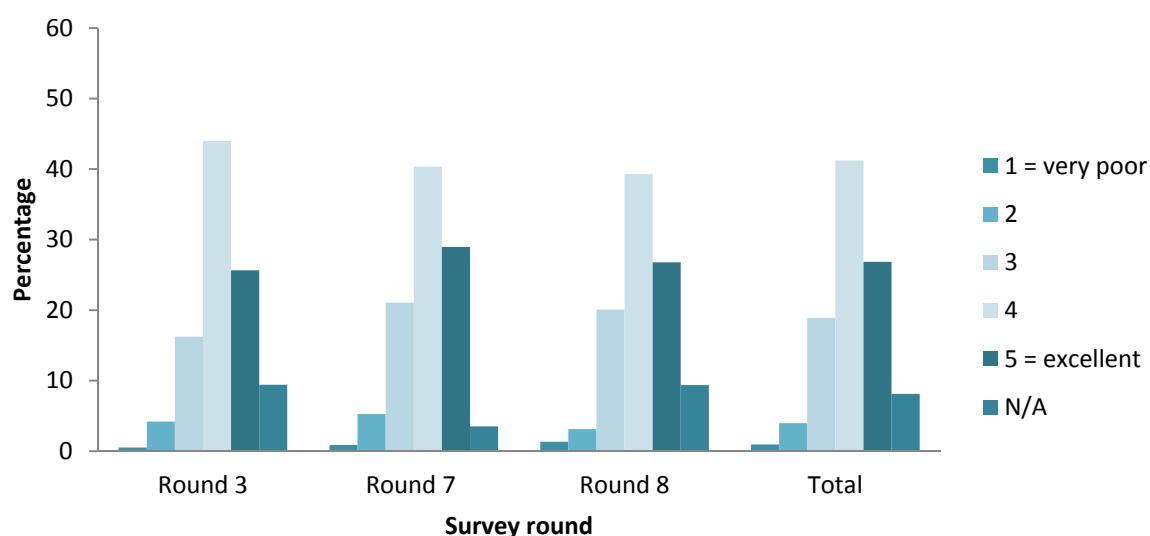


Figure 48. Quality of features – Seating (%) by survey round.

In round 7, 16% of respondents considered the quality of tables negatively, 28% neutral and 34% were positive (Table 42 and Figure 49). Similarly in round 8, 14% of respondents rated the quality of the tables negatively, 26% were neutral and 36% were positive. It is interesting that tables which don't exist can be rated positively by respondents, potentially highlighting a lack of awareness on their behalf or the length of the survey.

Table 42. Quality of features – Tables (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 3	Weekday	2	10	30	22	11	25
	Weekend	9	9	26	25	10	20
	Total	6	10	28	24	11	22
Round 7	Weekday	7	9	27	27	7	24
	Weekend	3	13	28	28	6	22
	Total	5	11	28	28	6	23
Round 8	Weekday	5	13	20	24	9	29
	Weekend	3	8	29	28	9	23
	Total	4	10	26	27	9	25
Total		5	10	27	26	9	23

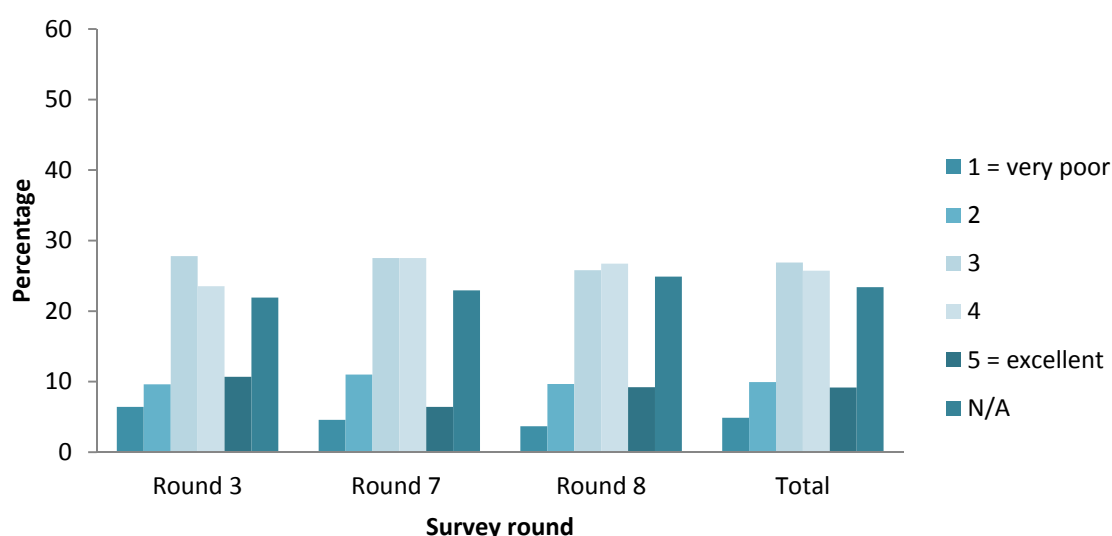


Figure 49. Quality of features – Tables (%) by survey round.

Almost a quarter (24%) of respondents rated education as not applicable, with 45% rating it as good or excellent, 21% neither good nor bad, and 10% as poor or very poor (Table 43 and Figure 50). While in round 8, 30% considered education as not applicable, 35% positively, 21% as neutral and 11% negatively. There was no definition of 'education' presented in the survey and as such it was up to the respondents to identify what they considered to be education. As no guided tours were offered during the survey period, we consider this response as relating predominately to the signage or visitor interpretation.

Table 43. Quality of features – Education (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	2	3	20	16	15	44
	Weekend	2	6	19	29	15	30
	Total	2	5	19	24	15	35
Round 2	Weekday	3	3	20	24	19	31
	Weekend	2	5	17	15	14	47
	Total	3	4	18	19	16	40
Round 3	Weekday	1	8	25	26	15	25
	Weekend	0	7	25	30	17	21
	Total	1	7	25	28	16	23
Round 7	Weekday	2	2	15	35	22	24
	Weekend	0	13	24	26	13	24
	Total	1	9	21	29	16	24
Round 8	Weekday	4	8	23	17	10	38
	Weekend	2	10	23	25	15	25
	Total	3	9	23	22	13	30
Total		2	7	22	24	15	30

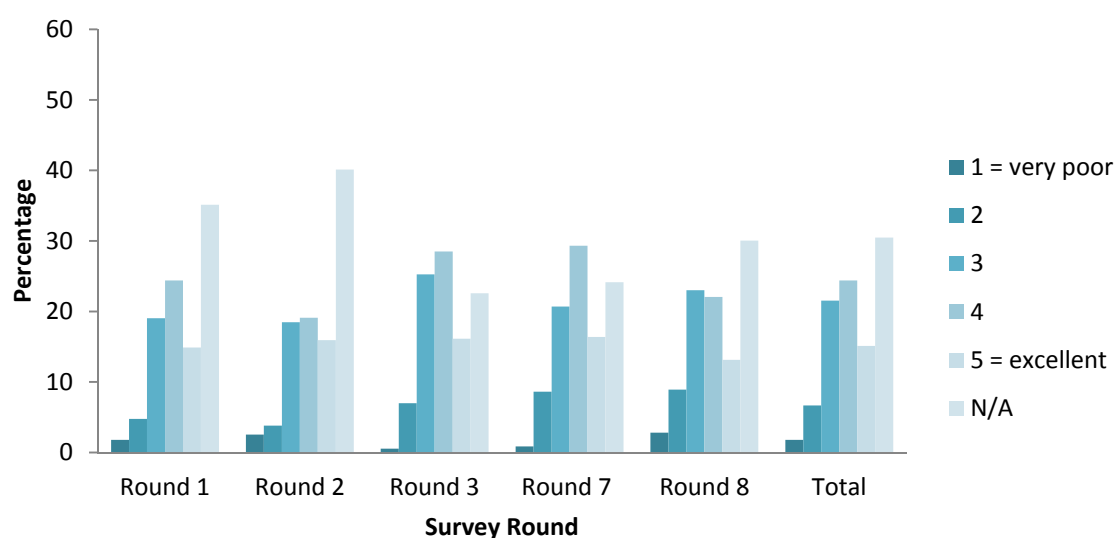


Figure 50. Quality of features – Education (%) by survey round.

As with some other features of Point Fraser, the quality of About a Bike Hire was rated as not applicable by a high proportion of respondents, both in round 7 (39%) and round 8 (32%) (Table 44 and Figure 51). This indicates that the respondents had not used the services of About Bike Hire, had no need to use it or were unaware of it. These figures were also reflected in the question on staff interaction. These data require cautious interpretation as it appears that there is limited awareness of the name and presence of 'About a Bike hire' amongst respondents. Of the respondents who were aware of the bike hire business, in

Round 7, 40% of respondents were positive about 'About a Bike Hire', 15% were neutral and 6% negative. Forty-seven (47%) percent of respondents ranked 'About a Bike Hire' as excellent or good, 14% as neither bad nor good and 7% as either poor or very poor.

Table 44. Quality of features – About a Bike Hire (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	2	2	2	19	21	55
	Weekend	0	4	6	21	21	48
	Total	1	3	4	21	21	50
Round 2	Weekday	1	5	10	14	10	59
	Weekend	1	5	10	14	10	59
	Total	1	3	8	14	17	57
Round 3	Weekday	5	4	14	22	21	35
	Weekend	2	4	12	19	24	40
	Total	3	4	13	20	22	38
Round 7	Weekday	0	2	11	22	22	42
	Weekend	4	3	18	21	18	37
	Total	3	3	15	21	19	39
Round 8	Weekday	3	1	12	22	18	44
	Weekend	3	5	15	27	25	25
	Total	3	4	14	25	22	32
Total		2	3	11	20	21	43

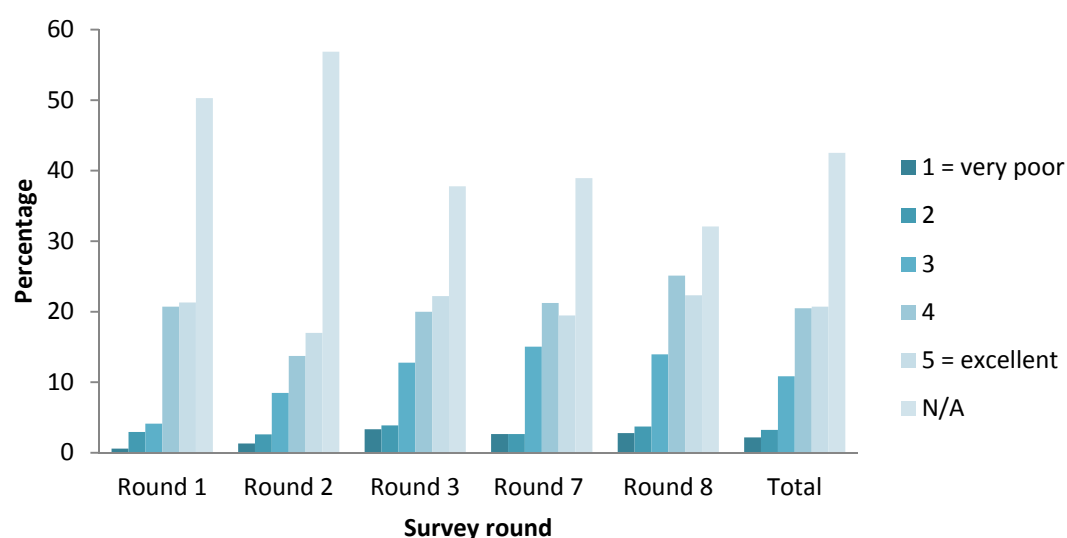


Figure 51. Quality of features – About a Bike Hire (%) by survey round.

In round 7, 35% of respondents ranked staff interaction as excellent or good, 14% as neither bad nor good and 6% as either poor or very poor (Table 45 and Figure 52). While in round 8, 41% rated staff interaction positively, 13% neutral and 9% negatively. There were high percentages of respondents who selected not applicable, in round 7, 46% and in round 8, 34%. This indicated the respondents either didn't have any interaction with About Bike

Hire staff while visiting Point Fraser and/or didn't have any awareness of the service. In some cases respondents thought staff referred to City of Perth staff, while others reported on interactions with ECU survey teams or About a Bike Hire staff. Thus as per comments regarding the previous item, caution is required with the interpretation of these results.

Table 45. Quality of features – Staff interaction (%) by survey round.

		1 = very poor	2	3	4	5 = excellent	N/A
Round 1	Weekday	0	5	10	15	16	55
	Weekend	3	5	14	11	18	50
	Total	2	5	12	12	18	51
Round 2	Weekday	0	5	8	16	27	44
	Weekend	0	5	11	12	17	55
	Total	2	3	10	14	21	51
Round 3	Weekday	8	11	9	16	26	30
	Weekend	4	7	14	15	20	39
	Total	6	9	12	16	23	35
Round 7	Weekday	2	4	13	17	24	39
	Weekend	5	0	14	17	14	51
	Total	4	2	14	17	18	46
Round 8	Weekday	4	5	12	12	27	41
	Weekend	6	3	15	23	23	30
	Total	5	4	13	19	25	34
Total		4	5	12	16	21	43

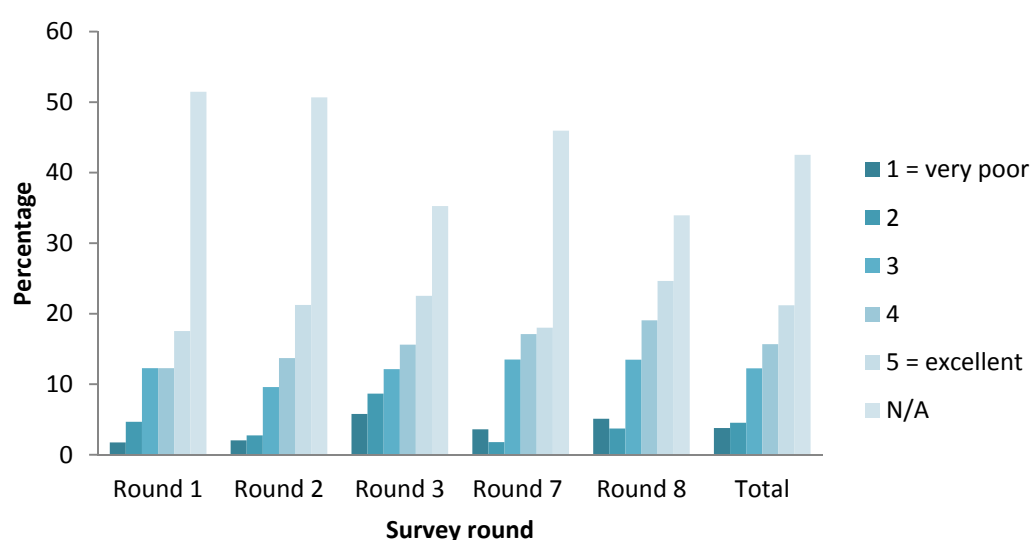


Figure 52. Quality of features – Staff interaction (%) by survey round.

In addition to the listed features, there was also the option for 'other' features not listed. In round 7, respondents listed the following as 'other' features of quality, including: cycling / walking / physical activity level; drinking fountains; dual use path ways dangerous; and lights

broken. While in round 8, bike and walker interface; and, bins very poor, were raised. For a full list of 'other' quality of features see Appendix E.

To further explore the analysis of visitor park satisfaction, importance of park features were added in round 3, using a 5-point scale (1=low importance; 5=high importance). Overall respondents considered cleanliness of the park to be important, with 80% selecting high importance and 18% selecting important in round 7 (Table 46 and Figure 53). In round 8, 83% rated cleanliness as of high importance and 15% as important.

Table 46. Importance of features – Cleanliness (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	0	1	1	21	76	0
	Weekend	0	0	3	15	82	0
	Total	0	1	2	18	79	0
Round 7	Weekday	0	0	0	26	74	0
	Weekend	0	0	3	14	83	0
	Total	0	0	2	18	80	0
Round 8	Weekday	0	0	1	15	82	1
	Weekend	0	0	2	15	83	0
	Total	0	0	1	15	83	0
Total		0	0	2	17	81	0

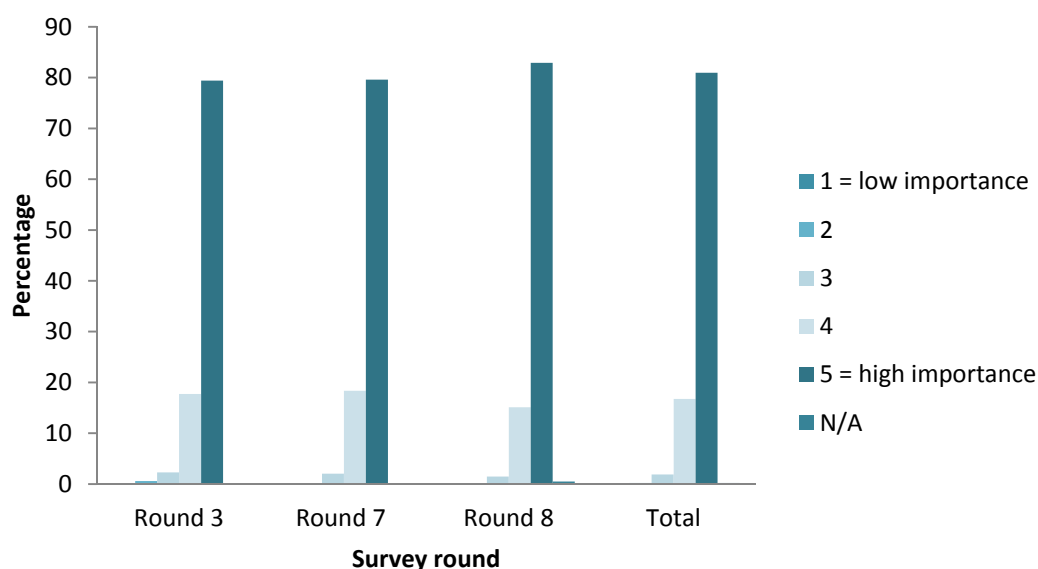


Figure 53. Importance of features – Cleanliness (%) by survey round.

Access was considered to be an important feature with 92% either selecting important or high importance, 7% were neutral and 1% considered it to be of low importance in round 7 (Table 47 and Figure 54). Consistent with the previous round, in round 8, 93% rated access to a feature of high importance, with 5% neutral and 2% considering it not to be important.

Table 47. Importance of features – Access (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	0	1	4	36	57	1
	Weekend	1	1	6	24	67	0
	Total	1	1	5	30	63	1
Round 7	Weekday	0	0	6	29	65	0
	Weekend	2	0	8	21	69	0
	Total	1	0	7	24	68	0
Round 8	Weekday	0	1	1	27	69	1
	Weekend	0	2	6	26	65	1
	Total	0	2	5	26	67	1
Total		0	1	5	27	65	1

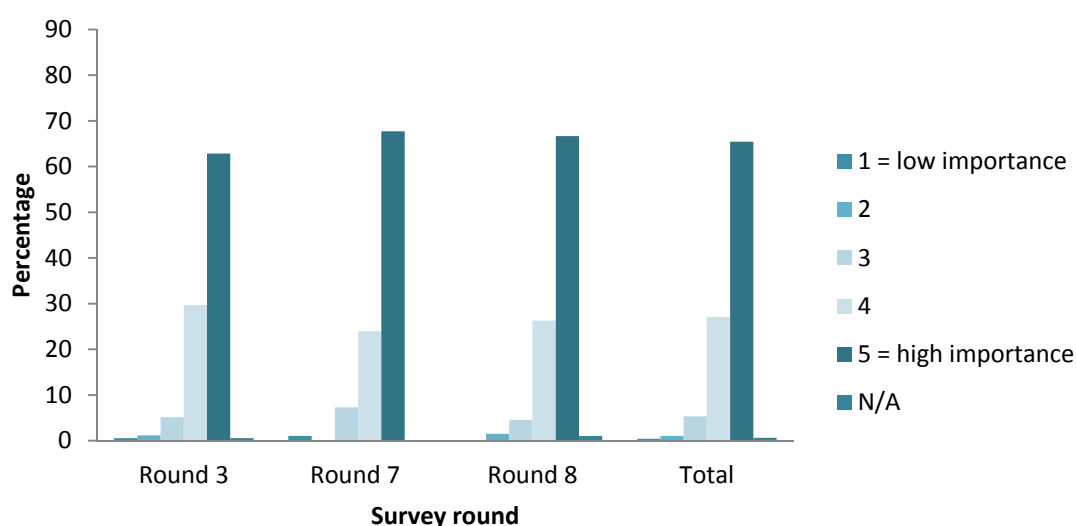


Figure 54. Importance of features – Access (%) by survey round.

In round 7, the importance of playground facilities was quite varied with 16% considering it to be of low importance or not important and 14% were neutral on its importance (Table 48 and Figure 55). Sixty percent (60%) indicated playground facilities to be either of high importance or important. Similarly in round 8, 15% considered playgrounds to be either low or not important and 18% were neutral. The importance of playground facilities was rated by 59% as either important or very important. In both round 7 and 8 more than 10% indicated that the importance of playgrounds was not applicable to them.

Table 48. Importance of features – Playground facilities (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	5	11	19	30	22	12
	Weekend	13	8	16	18	32	13
	Total	10	9	18	24	27	13
Round 7	Weekday	10	7	17	30	23	13
	Weekend	5	10	13	30	33	10
	Total	7	9	14	30	30	11
Round 8	Weekday	9	6	21	19	39	7
	Weekend	11	5	16	23	37	8
	Total	10	5	18	21	38	8
Total		9	7	17	24	32	10

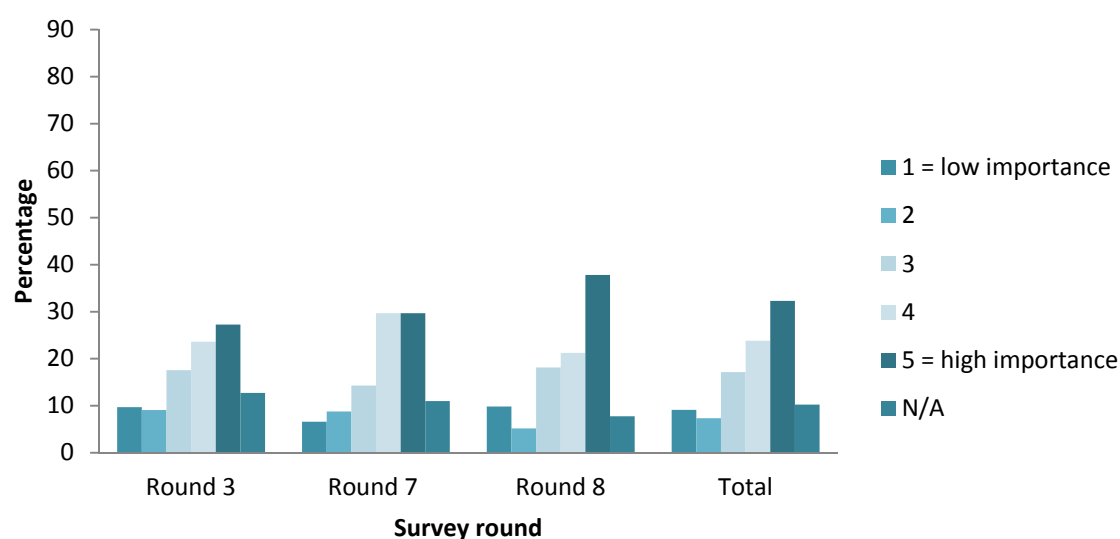


Figure 55. Importance of features – Playground facilities (%) by survey round.

The majority of round 7 respondents considered scenic beauty to be of high importance (67%) or important (27%) to them (Table 49 and Figure 56). Five percent (5%) were neutral and 1% selected scenic beauty to be of low importance. There were similar trends in round 8 with 68% indicating that scenic beauty at Point Fraser was of high importance to them, and 25% selecting important. Again 5% were neutral on the importance of scenic beauty. Two percent of respondents considered it to be of low importance (1%) and not important (1%).

Table 49. Importance of features – Scenic beauty (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	0	3	8	32	57	0
	Weekend	1	0	2	26	71	0
	Total	1	0	1	5	29	65
Round 7	Weekday	0	3	3	28	66	0
	Weekend	0	0	7	26	67	0
	Total	0	1	5	27	67	0
Round 8	Weekday	0	1	4	21	72	1
	Weekend	2	0	5	27	66	2
	Total	1	1	5	25	68	2
Total		1	1	5	27	67	1

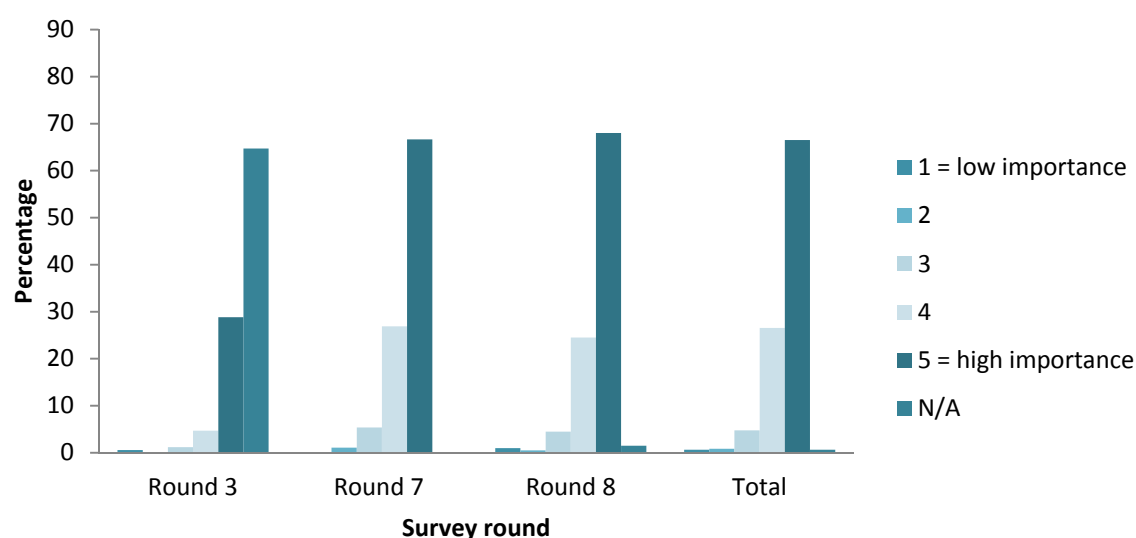


Figure 56. Importance of features – Scenic beauty (%) by survey round.

The importance rating of barbeque facilities varied. In round 7, the majority of respondents rated BBQ facilities to be either important (30%) or of high importance (23%) (Table 50 and Figure 57). Twenty-five (25%) percent of respondents were neutral, while 8% considered BBQ facilities to be of low importance and 5% not applicable. Thirty percent (30%) of respondents in round 8, considered BBQ facilities to be important and 29% of high importance. While, 20% were neutral, 6% considered BBQ facilities not to be important and 8% of low importance. A small proportion of respondents in both survey rounds selected not applicable in regard to the importance of BBQ facilities.

Table 50. Importance of features – BBQ facilities (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	4	8	24	28	27	8
	Weekend	5	9	21	29	21	15
	Total	5	9	22	29	23	12
Round 7	Weekday	6	13	22	22	22	16
	Weekend	5	5	26	34	23	7
	Total	5	8	25	30	23	10
Round 8	Weekday	1	6	25	38	23	7
	Weekend	11	7	17	25	33	7
	Total	8	6	20	30	29	7
Total		6	7	22	30	26	9

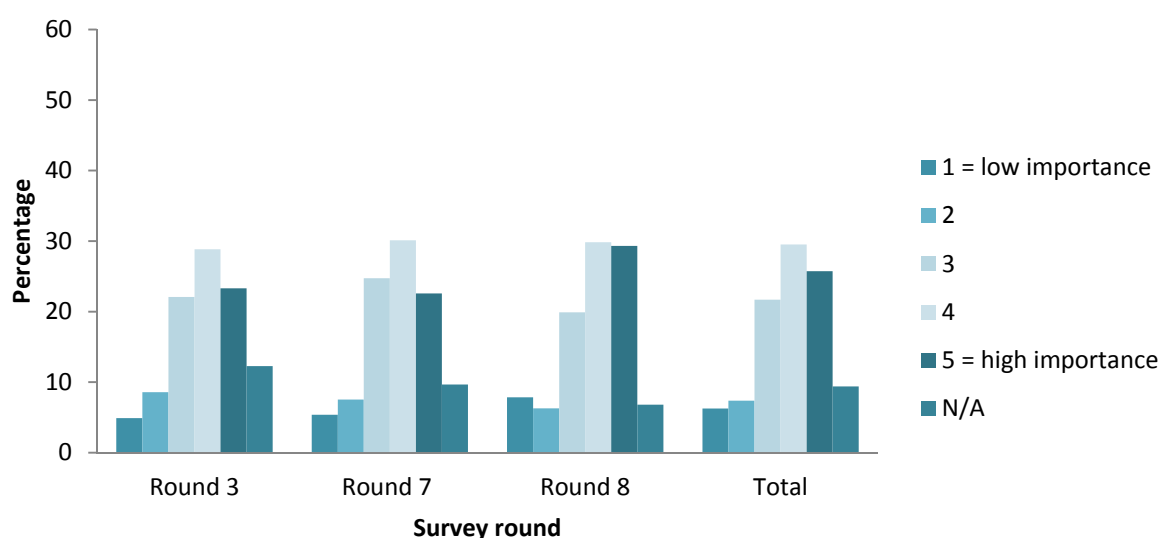


Figure 57. Importance of features – BBQ facilities (%) by survey round.

Toilet facilities were considered to be of high importance to 52% of respondents and of importance to 32% in Round 7 (Table 51 and Figure 58). A smaller proportion of respondents ticked either neutral (6%), less important (3%) and 6% considered toilet facilities to be not applicable. While in round 8, 58% of respondents considered toilets to be of high importance and 32% important. Ten percent (10%) were neutral, 3% rated toilets to be not important and 2% of low importance.

Table 51. Importance of features – Toilet facilities (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	2	1	4	32	58	3
	Weekend	1	4	9	27	53	5
	Total	2	2	7	30	56	4
Round 7	Weekday	0	6	36	42	15	0
	Weekend	0	2	10	30	57	2
	Total	0	3	6	32	52	6
Round 8	Weekday	1	3	13	27	50	6
	Weekend	2	3	8	23	62	3
	Total	2	3	10	24	58	4
Total		1	3	8	28	56	4

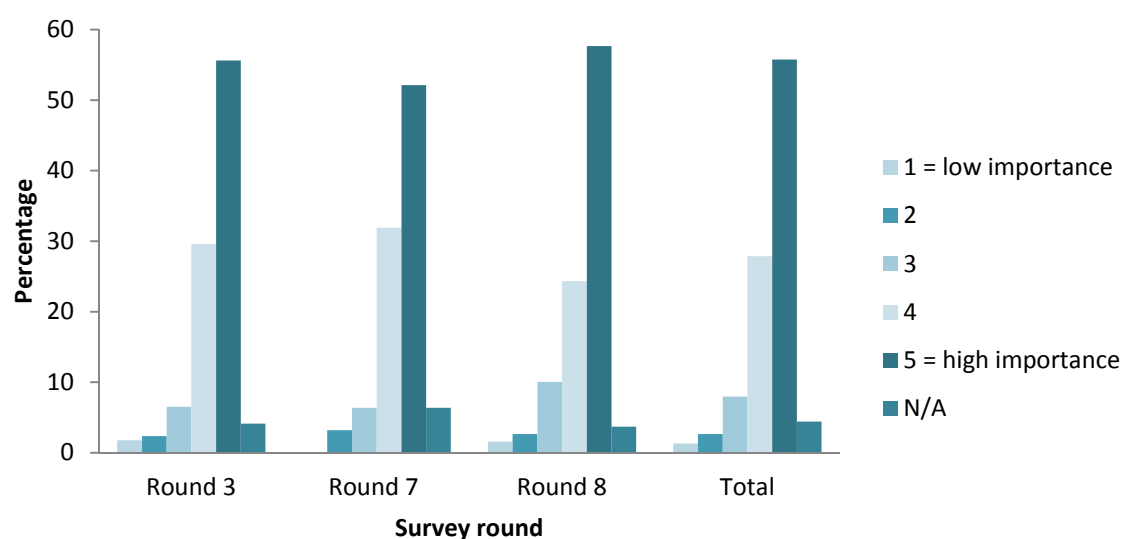


Figure 58. Importance of features – Toilet facilities (%) by survey round.

Signage, in round 7, was considered to be a feature in the park of importance, with 43% indicating high importance and 31% important (Table 52 and Figure 59). Of the respondents, 15% were neutral, 5% considered signage to be less importance and 2% low importance (Table 52 & Figure 59). Again there was a strong correlation with round 8 data, 42% rating signage to be of high importance and 30% important. Neutral was selected by 19%, while 4% considered signage to be less important and 2% of low importance.

Table 52. Importance of features - Signage (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	1	7	14	43	32	3
	Weekend	3	2	14	36	45	0
	Total	2	4	14	39	40	1
Round 7	Weekday	3	6	15	27	42	6
	Weekend	2	5	15	33	43	2
	Total	2	5	15	31	43	3
Round 8	Weekday	1	6	20	28	39	6
	Weekend	2	3	18	31	44	2
	Total	2	4	19	30	42	4
Total		2	4	16	33	41	3

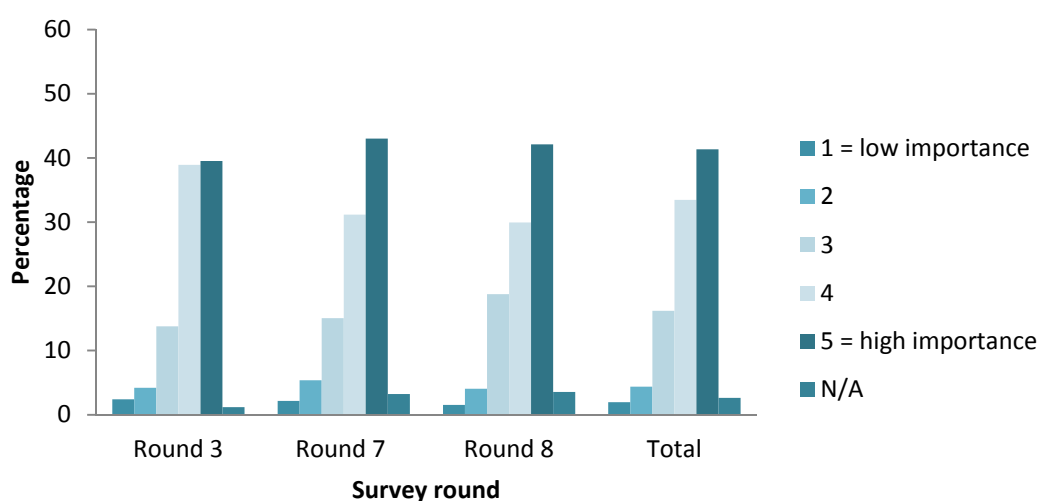


Figure 59. Importance of features – Signage (%) by survey round.

In round 7, the importance of seating was rated highly among respondents, with 34% high importance and 46% importance (Table 53 and Figure 60). Eleven (11%) percent of respondents considered seating to be neither important nor not important and 5% less or low importance. While in round 8, 39% of respondents considered seating to be of high importance and 36% to be important. Of the remaining respondents, 16% were neutral on the importance of seating, 2% considered it not to be important and 2% of low importance. While in round 8, 39% of respondents considered seating to be of high importance and 36% to be important. Of the remaining respondents, 16% were neutral on the importance of seating, 2% considered it not to be important and 2% of low importance.

Table 53. Importance of features – Seating (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	0	5	11	47	32	4
	Weekend	4	2	10	40	40	3
	Total	2	4	10	43	37	4
Round 7	Weekday	3	9	9	48	24	6
	Weekend	0	2	12	45	40	2
	Total	1	4	11	46	34	3
Round 8	Weekday	0	3	17	38	39	3
	Weekend	3	2	16	36	40	4
	Total	2	2	16	36	39	4
Total		2	3	13	41	37	4

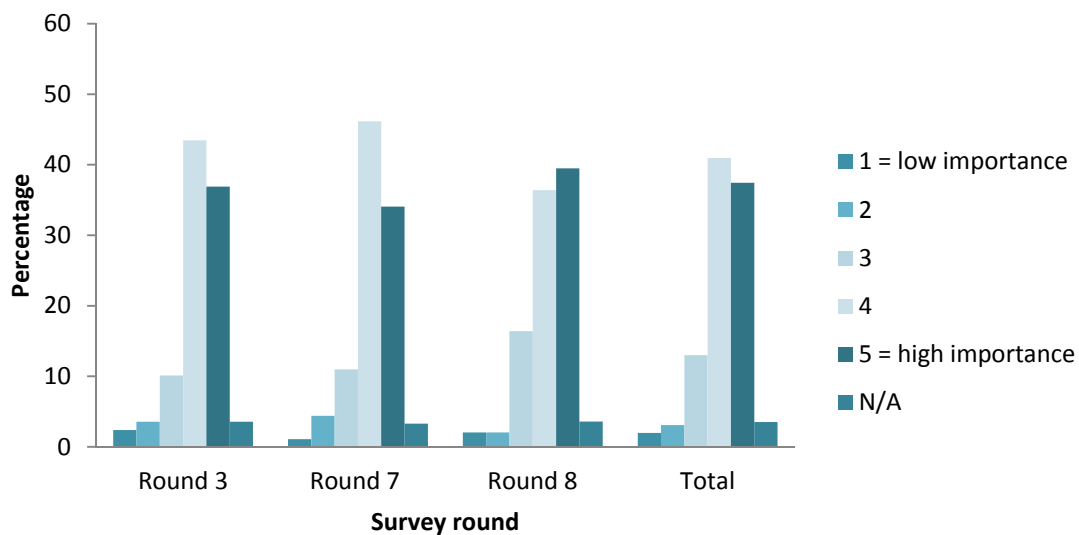


Figure 60. Importance of features – Seating (%) by survey round.

The importance of tables as a feature, in round 7, was more varied with 27% considering them to be of high importance, while 38% selected important (Table 54 and Figure 61). Twenty (20%) percent were neutral about the importance of tables and 8% considered tables to be of less or low importance. Tables were not applicable for 7% of respondents. While in round 8, 28% rated tables to be of high importance and 31% importance. Twenty-three percent (23%) of respondents were neutral about the importance of tables, while 10% were considered them to be either less important or of low important.

Table 54. Importance of features - Tables (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	1	10	16	50	18	4
	Weekend	5	3	16	34	32	9
	Total	4	6	16	41	26	7
Round 7	Weekday	3	16	13	34	25	9
	Weekend	0	2	24	41	29	5
	Total	1	7	20	38	27	7
Round 8	Weekday	1	7	19	35	28	10
	Weekend	5	5	25	29	28	8
	Total	4	6	23	31	28	9
Total		3	6	20	36	27	8

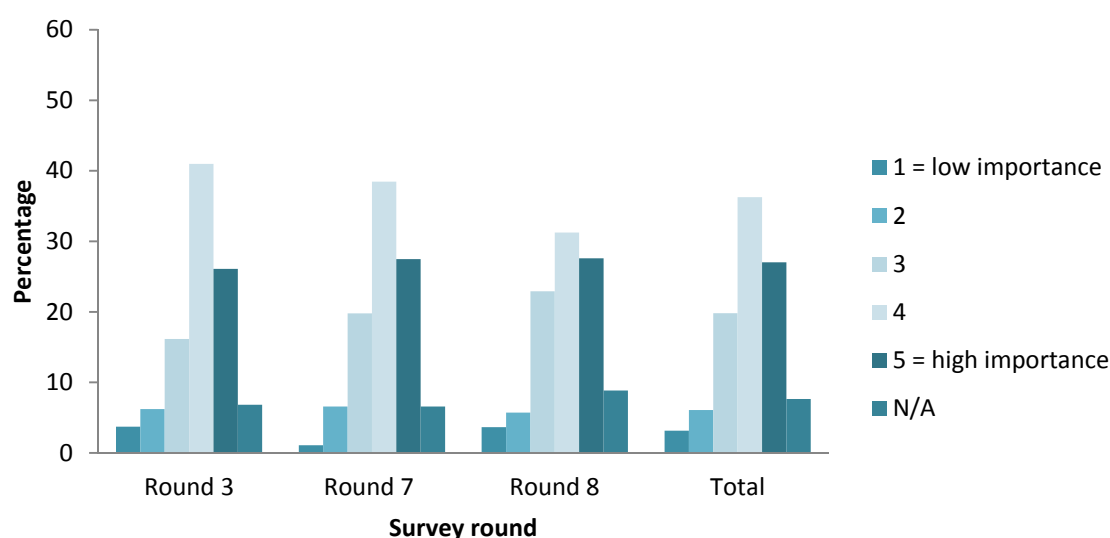


Figure 61. Importance of features – Tables (%) by survey round.

In Round 7, education was considered to be of importance or high importance by a total of 61% of respondents, 21% were neutral and 10% less or low importance (Table 55 and Figure 62). Eight percent (8%) considered education to be not applicable. There were similar trends in the Round 8 data with 60% rating education to be of high importance or to be important. Nineteen percent (19%) rated education as neutral and 11% not important or of low importance. Education was considered to be not applicable to 9% of respondents.

Table 55. Importance of features - Education (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	3	9	27	30	20	11
	Weekend	4	3	17	35	28	13
	Total	4	5	21	33	24	12
Round 7	Weekday	3	10	10	33	33	10
	Weekend	2	7	27	36	22	7
	Total	2	8	21	35	26	8
Round 8	Weekday	3	9	22	29	26	12
	Weekend	5	7	17	28	35	8
	Total	4	7	19	28	32	9
Total		4	7	20	31	28	10

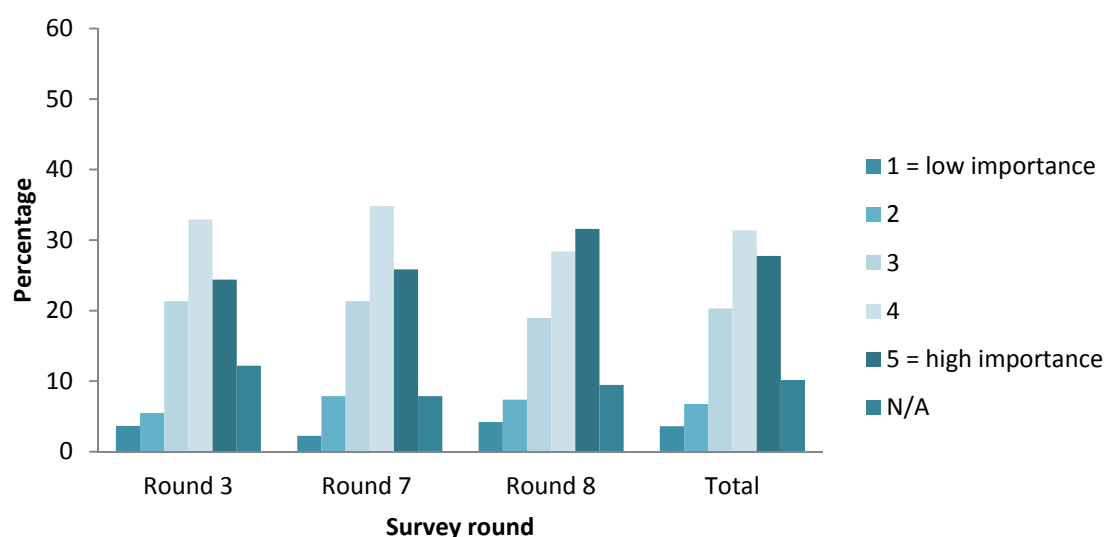


Figure 62. Importance of features – Education (%) by survey round.

Of the round 7 survey respondents, 11% considered the importance of About a Bike Hire to be not applicable to them (Table 56 and Figure 63). Forty-six percent (46%) viewed About a Bike Hire as an important feature, 26% were neutral and 17% considered it to be of low importance. Fifteen percent (15%) of survey respondents considered About a Bike Hire to be not applicable. The service was rated as important by more than 50% of respondents, with 17% neutral and 13% considering it to be of low importance.

Table 56. Importance of features – About a Bike Hire (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	5	8	18	36	18	15
	Weekend	11	3	19	26	22	19
	Total	8	5	19	30	21	17
Round 7	Weekday	10	13	13	32	19	13
	Weekend	5	8	33	30	13	10
	Total	7	10	26	31	15	11
Round 8	Weekday	6	9	16	25	22	23
	Weekend	7	7	18	30	29	10
	Total	6	7	17	28	26	15
Total		7	7	20	29	22	15

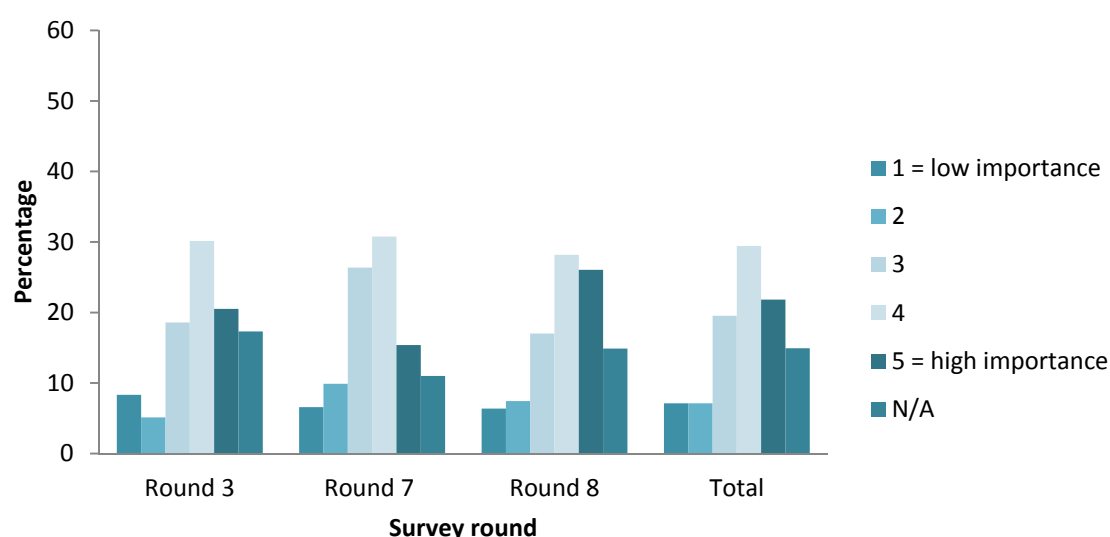


Figure 63. Importance of features – About a Bike Hire (%) by survey round.

Staff interaction at About a Bike Hire was considered to be of high importance to more than 40% of respondents in round 7 (Table 57 and Figure 64). While 29% of respondents were neutral about staff interaction and 16% considered it to be of low importance. Fourteen percent (14%) felt this feature was not applicable. The data in round 8 varied slightly with 53% rating staff interaction to be of importance to them. Neutral was selected by 16% of respondents and 7% rated this feature as not important and 5% of low importance. Staff interaction was considered by 19% as not applicable.

Table 57. Importance of features – Staff interaction (%) by survey round.

		1 = low importance	2	3	4	5 = high importance	N/A
Round 3	Weekday	14	6	22	27	19	13
	Weekend	11	2	19	22	24	21
	Total	12	4	20	24	22	18
Round 7	Weekday	10	10	26	23	19	13
	Weekend	7	7	31	20	20	15
	Total	8	8	29	21	20	14
Round 8	Weekday	6	9	14	20	26	25
	Weekend	4	6	16	28	29	16
	Total	5	7	16	25	28	19
Total		8	6	20	24	24	18

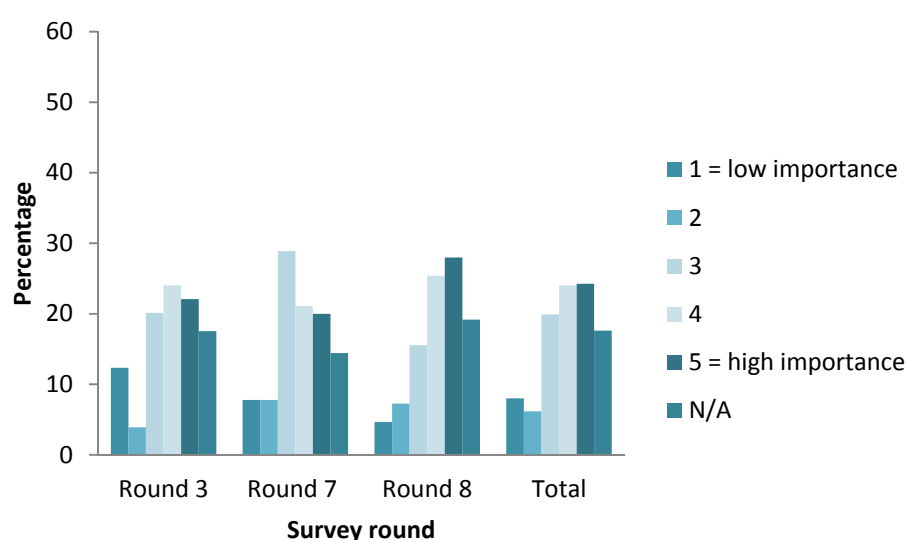


Figure 64. Importance of features – Staff interaction (%) by survey round.

Respondents were given the opportunity to indicate if there were ‘other’ features of importance to them. In round 7 one respondent specified that ‘drinking fountains’ was another feature considered to be important but not listed in the survey question. Also ‘bins’ were specified by a respondent in Round 8 as an important feature.

7.11.4 AVAILABILITY OF FEATURES

Respondents were asked about the availability of certain features at Point Fraser, including toilets, BBQs, seating, tables, signage and the number of other people, using a 4-point scale (1=too few; 2=about right; 3=too many; 4=didn’t matter). Generally, respondents indicated that the availability of the facilities was ‘about right’, with the exception of the availability rating for toilet facilities, which had a high percentage for ‘too few’. A high proportion of respondents noted that the availability of some park features ‘didn’t matter’ which reflects

either that they were passing through the park and didn't have a need for such facilities or a lack of awareness of facilities.

In round 7, 35% of respondents indicated that there were 'too few' toilets, which adds to the issues with toilet facilities outlined in quality of features and comments provided by respondents (Table 58 and Figure 65). While 40% considered the availability of toilets 'about right' and 25% 'didn't matter'. No respondents indicated that there were 'too many' toilets. The high proportion of respondents who said that the availability of toilets didn't matter is potentially a reflection of the significant number of people passing through the parkland. Data from round 8 had very similar trends to the previous round, with 33% indicating that there were 'too few' toilets, while 42% of respondents said the number of toilets was 'about right'. One percent (1%) of respondents felt there were 'too many' toilets and for 25% the availability of toilets didn't matter.

Table 58. Availability of features – Toilets (%) by survey round.

		1 = too few	2 = about right	3 = too many	4 = didn't matter
Round 1	Weekday	18	42	2	39
	Weekend	30	45	0	25
	Total	26	44	1	30
Round 2	Weekday	25	46	3	26
	Weekend	23	51	0	26
	Total	24	49	1	26
Round 3	Weekday	39	46	0	16
	Weekend	38	45	2	15
	Total	38	45	1	15
Round 7	Weekday	33	42	0	26
	Weekend	37	38	0	25
	Total	35	40	0	25
Round 8	Weekday	28	40	0	32
	Weekend	36	42	1	21
	Total	33	41	1	25
Total		31	44	1	24

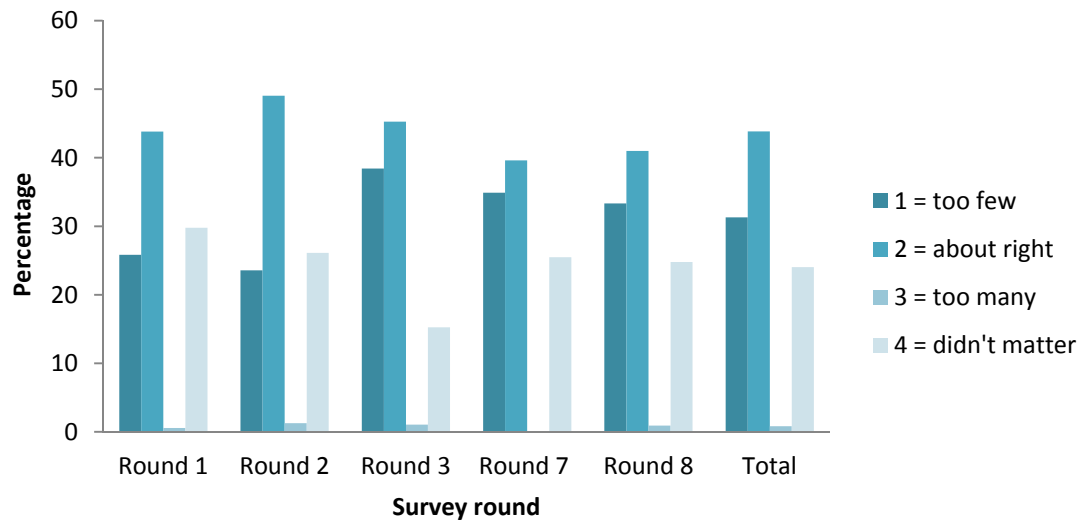


Figure 65. Availability of feature – Toilets (%) by survey round.

Of round 7 respondents, 15% considered that there were 'too few' barbeque facilities (Table 59 and Figure 66). While 42% indicated that the number of barbeque facilities was 'about right', 4% said there were 'too many' and 40% said that it 'didn't matter'. Thirteen percent (13%) of round 8 respondents indicated that there were 'too few' BBQ facilities, 51% 'about right' and 35% 'didn't matter'. The number and availability of barbeque facilities is limited and impacts the opportunities for recreational use of the park, also exacerbated by the lack of tables and seating. The significant number of people passing through the park reflects the high proportion of respondents indicating that the availability of barbeques 'didn't matter'.

Table 59. Availability of features – BBQs (%) by survey round.

		1 = too few	2 = about right	3 = too many	4 = didn't matter
Round 1	Weekday	5	37	0	58
	Weekend	15	45	0	40
	Total	12	42	0	47
Round 2	Weekday	12	47	1	40
	Weekend	11	47	1	41
	Total	11	47	1	40
Round 3	Weekday	15	52	1	32
	Weekend	16	47	2	35
	Total	16	49	2	34
Round 7	Weekday	14	47	2	37
	Weekend	16	38	5	41
	Total	15	42	4	40
Round 8	Weekday	11	49	0	41
	Weekend	14	52	2	32
	Total	13	51	1	35
Total		13	47	1	39

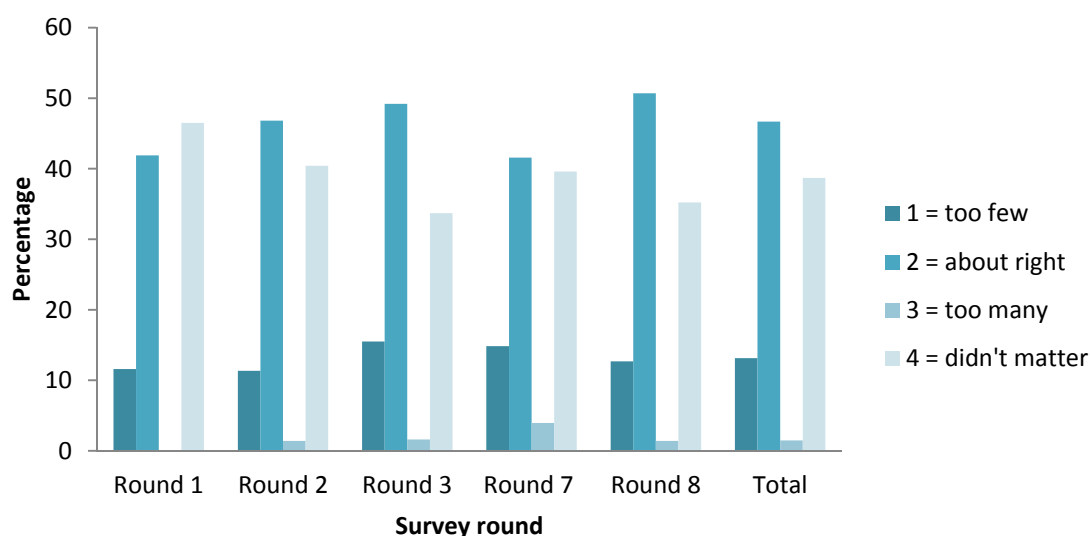


Figure 66. Availability of feature – BBQ facilities (%) by survey round.

Initially in rounds 1 and 2, the respondents were asked about availability of both seating and tables as one feature, however, given that there are no tables in the park the data could be presented more clearly with it being differentiated. In round 3 survey, the question regarding the availability of seating and tables was separated. In round 7, 12% of respondents indicated that the availability of seating was ‘too few’ (Table 60 and Figure 67). A large proportion of respondents, 64%, indicated that the availability of seating was ‘about right’ and 22% said it ‘didn’t matter’ suggesting either not needing to use these facilities or a lack of awareness that these facilities exist within the park.

Table 60. Availability of features – Seating (%) by survey round.

		1 = too few	2 = about right	3 = too many	4 = didn't matter
Round 3	Weekday	13	63	1	22
	Weekend	10	65	3	22
	Total	12	64	2	22
Round 7	Weekday	12	60	0	29
	Weekend	12	67	0	22
	Total	12	64	0	25
Round 8	Weekday	8	67	1	24
	Weekend	8	65	5	22
	Total	8	66	4	22
Total		10	65	2	23

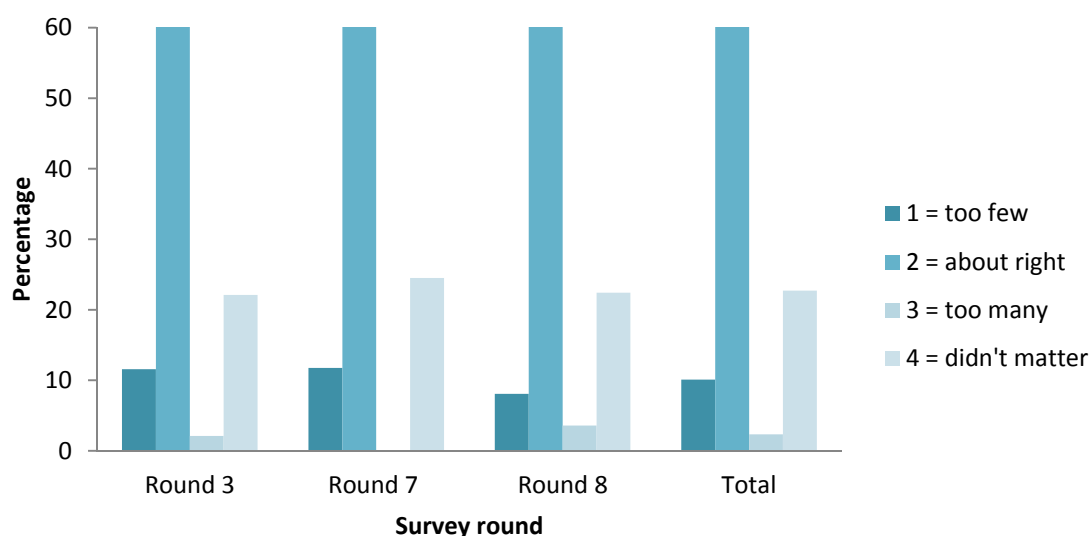


Figure 67. Availability of feature – Seating (%) by survey round.

Given that there are no tables at Point Fraser parkland, the high response to the question of availability of tables is interesting, potentially reflecting a lack of awareness of the facilities and / or the survey is too long for respondents. Forty-nine percent (49%) of respondents suggested that the number of tables was 'about right' in round 7 (Table 61 and Figure 68). While 17% indicated that there were 'too few' tables at Point Fraser and for 30% it didn't matter. Similarly in round 8, 50% of respondents considered the number of tables to be 'about right', 19% 'too few' and surprisingly, 3% noted that there were 'too many'. For 28% the number of tables didn't matter. While for the significant percentage for which tables didn't matter, it is important to consider the type of activities (e.g. walking, passing through etc.) respondents undertake when considering these responses. The majority of respondents (Table 31) were not undertaking activities which would require a seat and table, therefore they are not relevant to them.

Table 61. Availability of features - Tables (%) by survey round.

		1 = too few	2 = about right	3 = too many	4 = didn't matter
Round 3	Weekday	21	56	0	23
	Weekend	25	47	1	27
	Total	23	51	1	26
Round 7	Weekday	20	46	2	32
	Weekend	16	52	3	29
	Total	17	49	3	30
Round 8	Weekday	22	46	1	30
	Weekend	18	52	4	26
	Total	19	50	3	28
Total		20	50	2	27

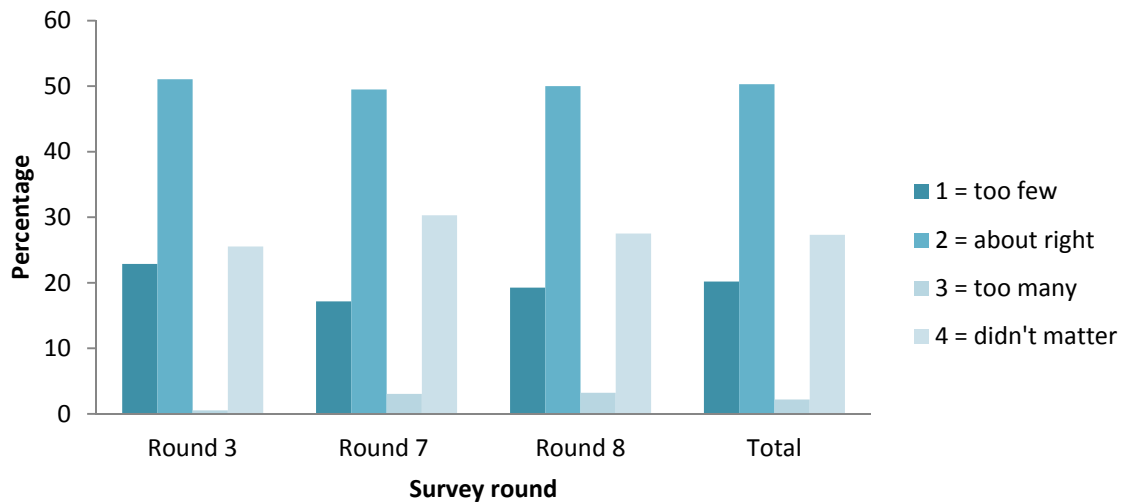


Figure 68. Availability of feature – Tables (%) by survey round.

The majority of respondents in round 7 considered that the availability of signage at Point Fraser is 'about right' (Table 62 and Figure 69). Seventeen percent (17%) felt that there were 'too few' signs and for 19% it 'didn't matter'. One percent of respondents said that there were 'too many' signs. As with the previous round in round 8, the vast majority of respondents indicated that there availability of signage was 'about right'. While 15% felt there were 'too few' signs, for 18% it didn't matter and 4% indicated that there were 'too many' signs at Point Fraser. As outlined above in quality of features – signage, issues of signage vary from expectations of further interpretation of natural features and park history, to a perceived lack of directional, information and/or instructional signs as highlighted by respondents' comments.

Table 62. Availability of features – Signage (%) by survey round.

		1 = too few	2 = about right	3 = too many	4 = didn't matter
Round 1	Weekday	6	68	2	24
	Weekend	12	72	1	15
	Total	10	70	1	18
Round 2	Weekday	12	61	7	20
	Weekend	9	66	5	20
	Total	10	64	6	20
Round 3	Weekday	16	66	3	15
	Weekend	21	64	1	14
	Total	19	65	2	14
Round 7	Weekday	16	60	0	23
	Weekend	18	64	2	16
	Total	17	63	1	19
Round 8	Weekday	20	61	0	19
	Weekend	13	65	6	17
	Total	15	63	4	18
Total		14	65	3	18

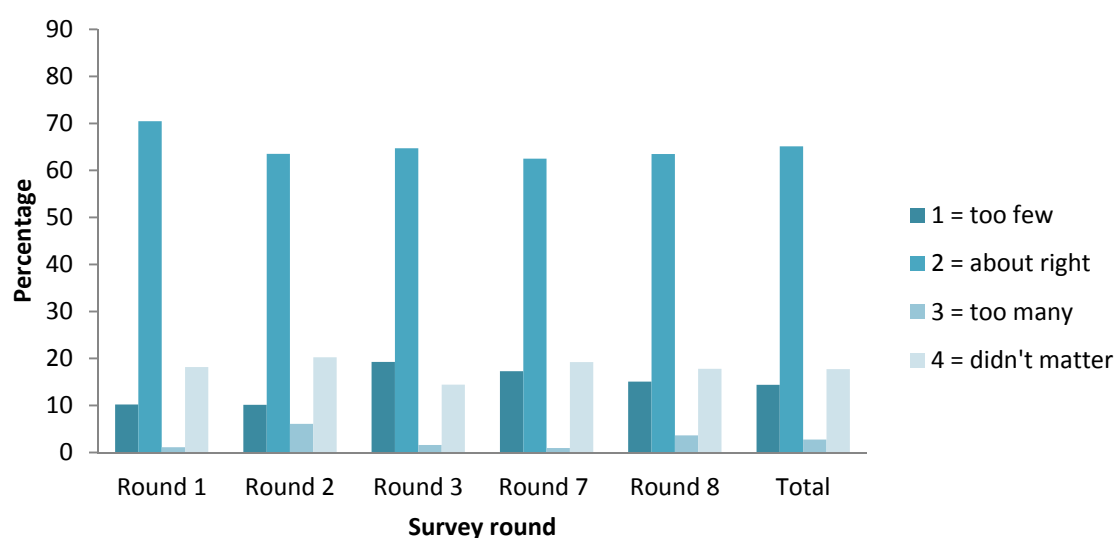


Figure 69. Availability of feature – Signage (%) by survey round.

The majority of respondents (65%) in round 7 indicated that the number of other people at Point Fraser was 'about right'. Five percent (5%) felt that there were 'too few' other people, while 6% thought there were 'too many'. For 20% it didn't matter. In round 8, 62% of respondents said that the number of other people was 'about right', while 10% indicated that there were 'too few' other people. Four percent (4%) considered that there were 'too many' other people and for almost a quarter (24%), it 'didn't matter' how many people there were at Point Fraser.

Table 63. Availability of features – Number of other people (%) by survey round.

		1 = too few	2 = about right	3 = too many	4 = didn't matter
Round 1	Weekday	13	63	3	22
	Weekend	19	60	3	18
	Total	17	61	3	20
Round 2	Weekday	8	53	5	35
	Weekend	14	58	5	23
	Total	11	56	5	29
Round 3	Weekday	11	66	1	21
	Weekend	11	65	4	20
	Total	11	65	3	21
Round 7	Weekday	5	71	5	20
	Weekend	5	68	6	21
	Total	5	69	6	20
Round 8	Weekday	18	61	0	21
	Weekend	6	62	6	26
	Total	10	62	4	24
Total		11	62	4	23

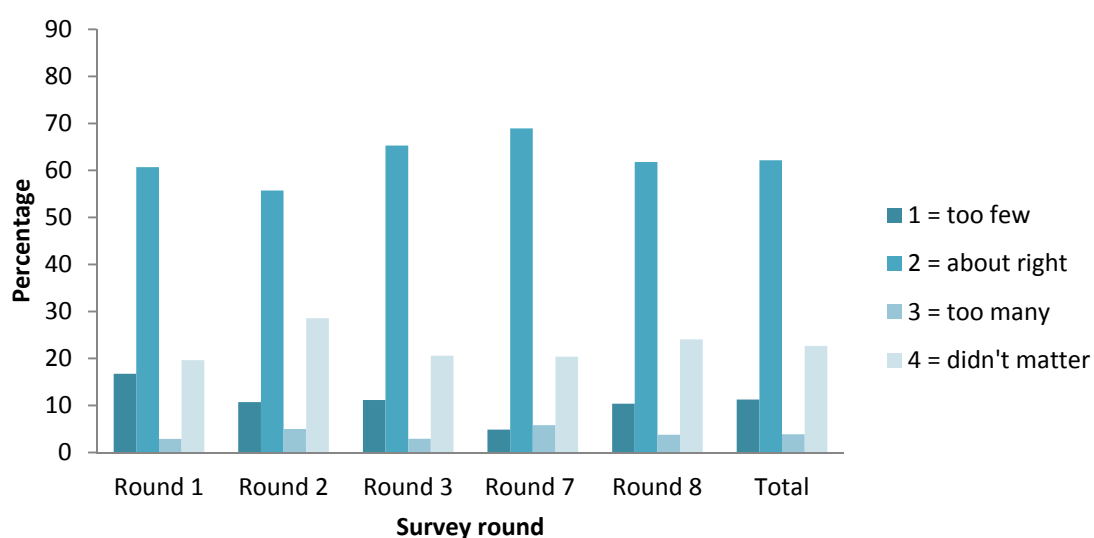


Figure 70. Availability of feature – Number of other people (%) by survey round.

In addition to the features which respondents rated availability, there was also the option for 'other' features not listed. In round 7 exercise was listed in round 8, another water fountain, coffee shop and prepaid parking. For a full list of 'other' quality of features, see Appendix G.

7.11.5 OVERALL SATISFACTION AND RECOMMENDATIONS

Respondents were asked about their overall satisfaction with their Point Fraser experience. Of the round 7 survey respondents, 35% were very satisfied with their experience and 53% were satisfied (Table 64 and Figure 71). Thirteen percent (13%) indicated that they were neither satisfied nor dissatisfied. Results from the round 8 were quite similar with, 27% very satisfied, 51% satisfied and 11% were neither satisfied nor dissatisfied with their visit to Point Fraser.

Table 64. Overall satisfaction (%) by survey round.

		1 = very dissatisfied	2	3	4	5 = very satisfied
Round 1	Weekday	0	0	5	42	54
	Weekend	1	1	8	48	42
	Total	1	1	7	46	46
Round 2	Weekday	0	3	21	36	40
	Weekend	2	2	7	59	30
	Total	1	2	13	49	34
Round 3	Weekday	1	1	11	51	36
	Weekend	0	1	12	47	40
	Total	1	1	11	49	38
Round 7	Weekday	0	0	7	50	43
	Weekend	0	0	16	54	30
	Total	0	0	13	53	35
Round 8	Weekday	0	0	12	42	46
	Weekend	0	1	10	56	33
	Total	0	0	11	51	37
Total		0	1	11	49	38

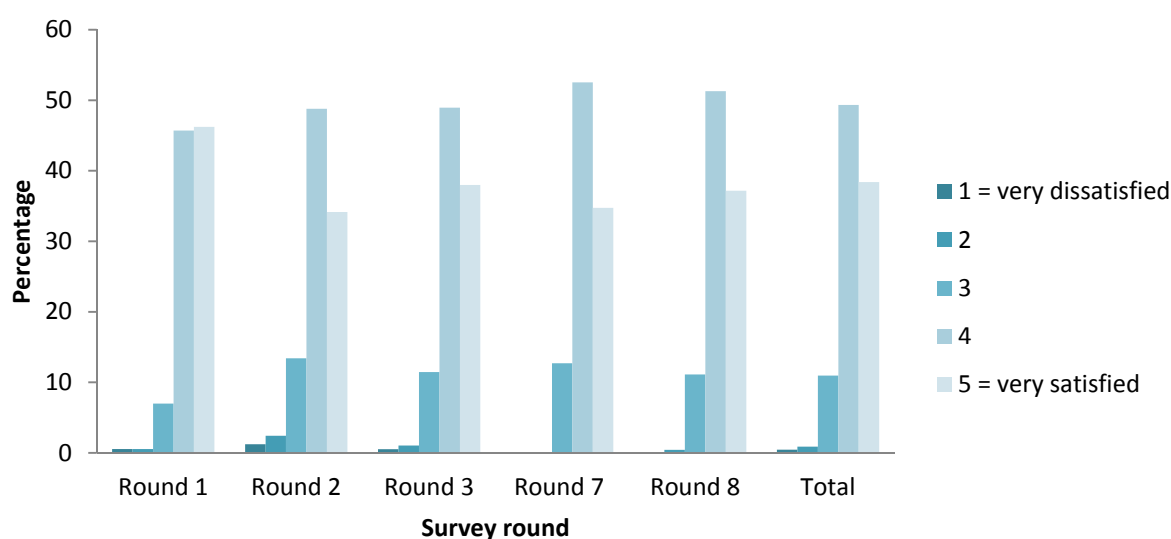


Figure 71. Overall satisfaction (%) by survey round.

Respondents from round 7 and 8 provided suggestions on how to improve Point Fraser. The full list of responses for all five survey rounds is provided in Appendix G.

Respondents were asked if they would visit Point Fraser again. Ninety percent (90%) in round 7 said that they would visit again (Table 65 and Figure 72). While 2% said no and 9% said maybe they would visit Point Fraser again. While in round 8, 91% would visit again, 1% would not visit again and 8% might visit Point Fraser again.

Table 65. Repeat visitation (%) by survey round.

		Yes	No	Maybe
Round 1	Weekday	91	0	9
	Weekend	96	0	4
	Total	94	0	6
Round 2	Weekday	81	4	15
	Weekend	86	1	13
	Total	84	2	14
Round 3	Weekday	90	1	9
	Weekend	97	3	0
	Total	94	1	6
Round 7	Weekday	88	0	13
	Weekend	91	3	6
	Total	90	2	9
Round 8	Weekday	87	2	11
	Weekend	94	1	6
	Total	91	1	8
Total		91	1	8

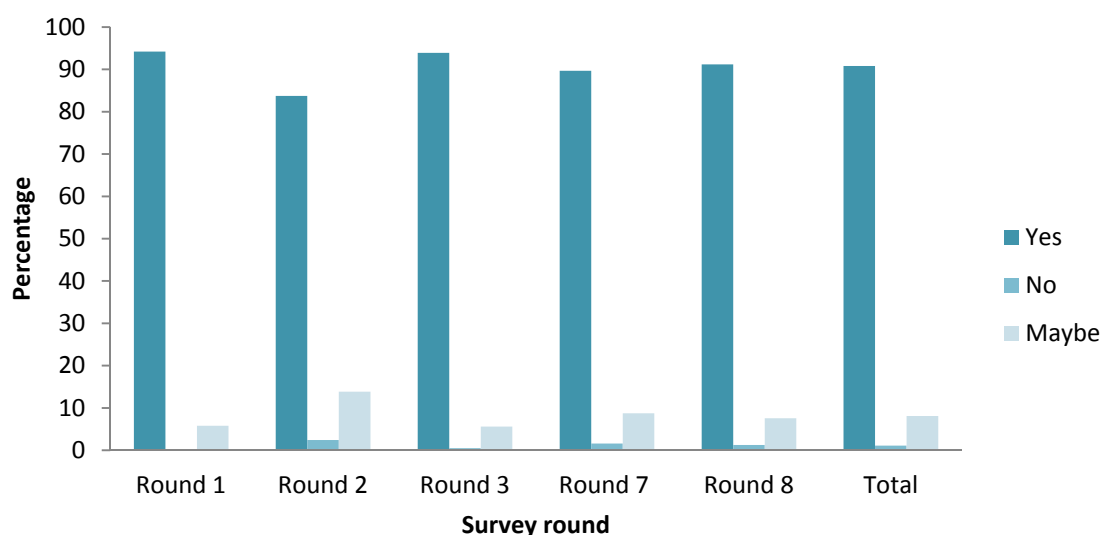


Figure 72. Repeat visitation (%) by survey round.

Following on from the question about repeat visitation, respondents were asked why or why not they would visit Point Fraser again. Appendix H lists the responses.

Respondents were asked if they would recommend Point Fraser parkland to other people. In round 7, 88% of respondents said that they would recommend Point Fraser to others and 9% maybe would (Table 66 and Figure 73). Three percent (3%) said that they wouldn't recommend Point Fraser to other people. In round 8, similar results were recorded with 89% of respondents indicating that they would recommend Point Fraser to others, 10% maybe would and 1% wouldn't recommend the parkland.

Table 66. Recommend visitation (%) by survey round.

		Yes	No	Maybe
Round 1	Weekday	93	0	8
	Weekend	95	2	3
	Total	94	1	5
Round 2	Weekday	89	0	11
	Weekend	86	2	12
	Total	87	1	12
Round 3	Weekday	94	0	6
	Weekend	95	1	4
	Total	95	1	5
Round 7	Weekday	89	2	9
	Weekend	88	3	10
	Total	88	3	9
Round 8	Weekday	91	0	9
	Weekend	88	2	10
	Total	89	1	10
Total		91	1	8

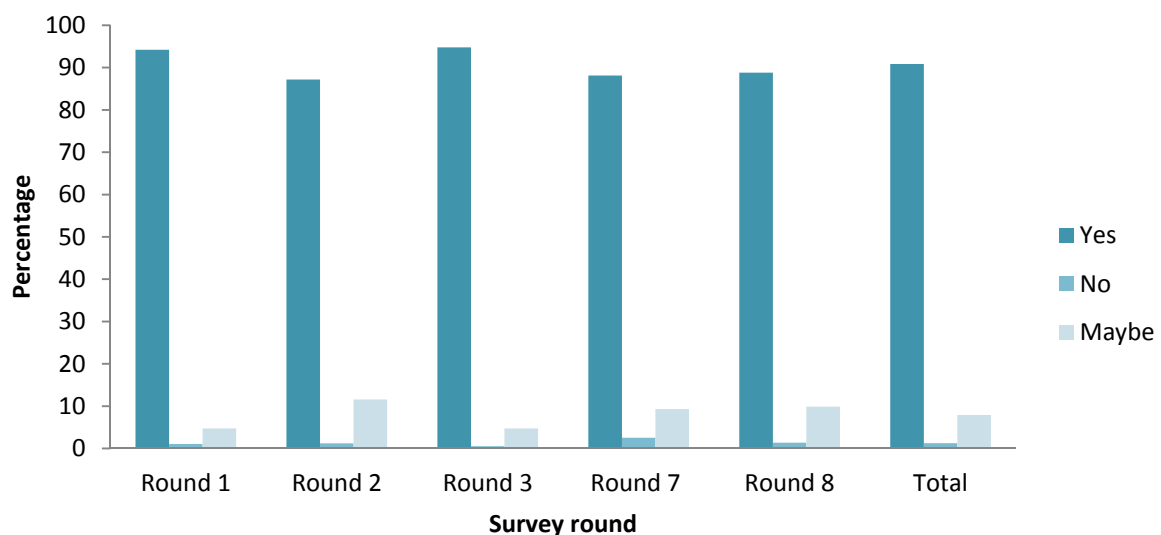


Figure 73. Recommend visitation (%) by survey round.

Prior to round 7, the visitor survey was amended to include an additional two questions which would explore visitor's views on the approved commercial development at Point

Fraser. A photograph of the model and a list of the components of the development were included. Respondents were asked if they thought the new facilities would affect their experience of Point Fraser parkland. Fifty-six percent (56%) of respondents were positive about the new commercial development and 29% were negative (Table 67 and Figure 74). Respondents were asked to provide comments on this. Although outcome of the question indicated that the majority of respondents were positive about the development, there were strong comments against the development. Many respondents valued that there was a pocket of nature in the city and that it is unique. They commented that there were already many eating and dining facilities in close proximity. Respondents supporting the development commented that Point Fraser would attract more people and create something to do. The full list of comments is in Appendix I.

Table 67. Experience affected by new facilities (%) by survey round.

		Positive	Negative	No change
Round 7	Weekday	60	29	11
	Weekend	63	29	8
	Total	62	29	9
Round 8	Weekday	59	29	12
	Weekend	54	29	17
	Total	56	29	15
Total		58	29	13

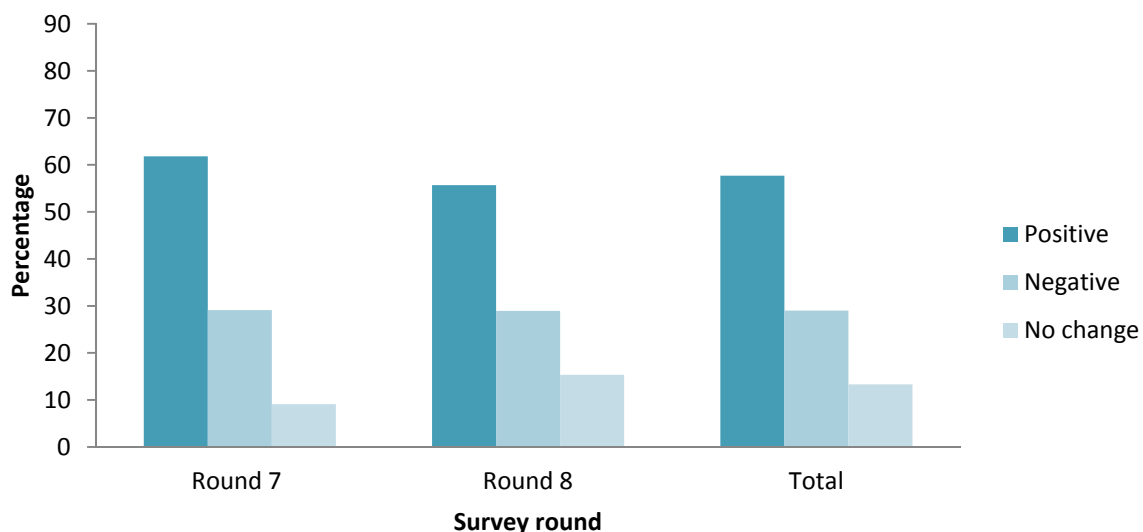


Figure 74. Experience affected by new facilities (%) by survey round.

Respondents were also asked if they thought the type of development fit with the place and space of Point Fraser. Seventy percent agreed and 30% indicated that the new commercial

development didn't fit with the place and space of the parkland (Table 68 and Figure 75). Comments by respondents on whether the type of development fits with the place and space of Point Fraser are listed in Appendix J.

Table 68. Development fit with the place and space (%) by survey round.

		Yes	No
Round 7	Weekday	72	28
	Weekend	68	32
	Total	70	30
Round 8	Weekday	64	36
	Weekend	61	39
	Total	62	38
Total		65	35

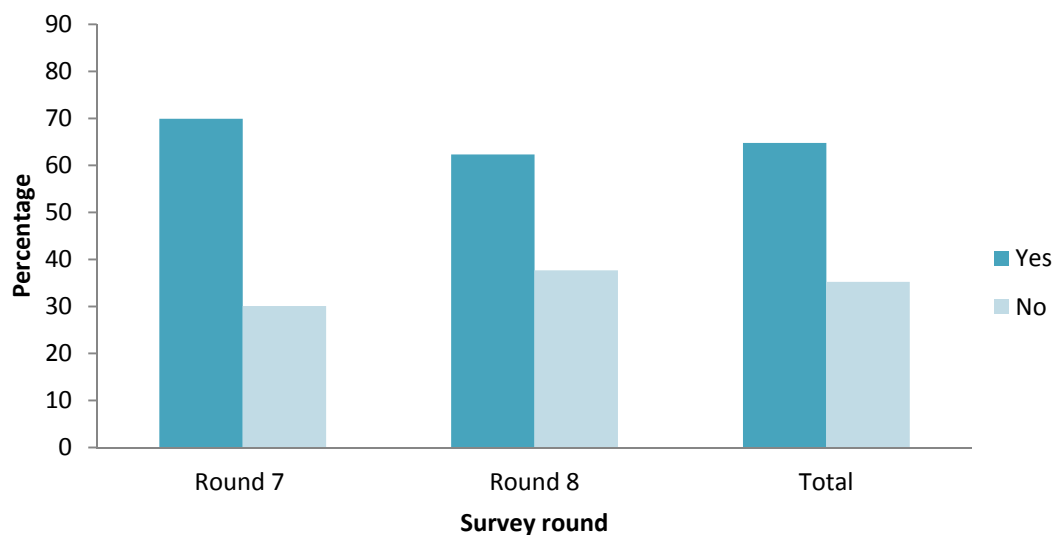


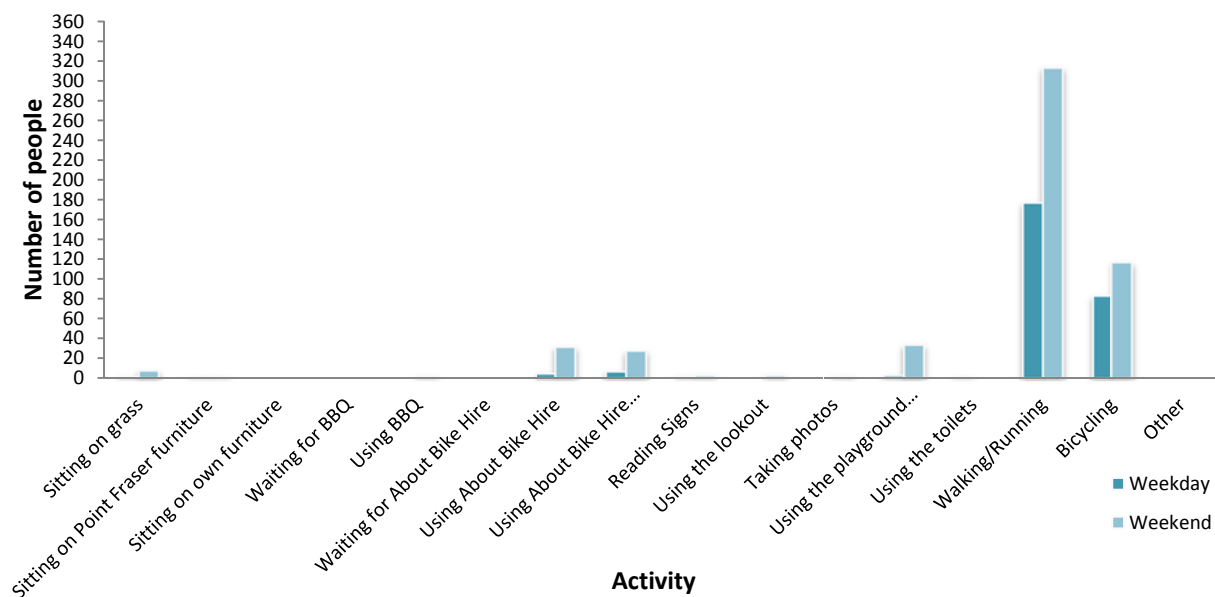
Figure 75. Development fit with the place and space (%) by survey round.

7.11.6 VISITOR OBSERVATIONS – BEHAVIOUR

Between the hourly visitor counts, a surveyor walked from the east to west entrance ensuring all areas of the reserve were covered and recorded the behaviour of park users using the Observation Behaviour datasheet. They also had an aerial photograph to record the spatial arrangement of stationary visitors. Nevertheless, very few people were stationary and as such this tool rendered insufficient data for useful analysis.

Visitor behaviour observations highlights that the vast majority of visitors use the parkland as an area to pass through during their regular exercise activity such as walking, running or cycling (Figure 76). The activities undertaken are similar across May and October and between weekday and weekend, with similar numbers of visitors over both survey rounds despite the difference in weather. The volume of visitors was consistently higher on the weekend. Recreational facilities, such as About a Bike Hire was more commonly used on the weekends.

a) Round 7 – May 2013



b) Round 8 – October 2013

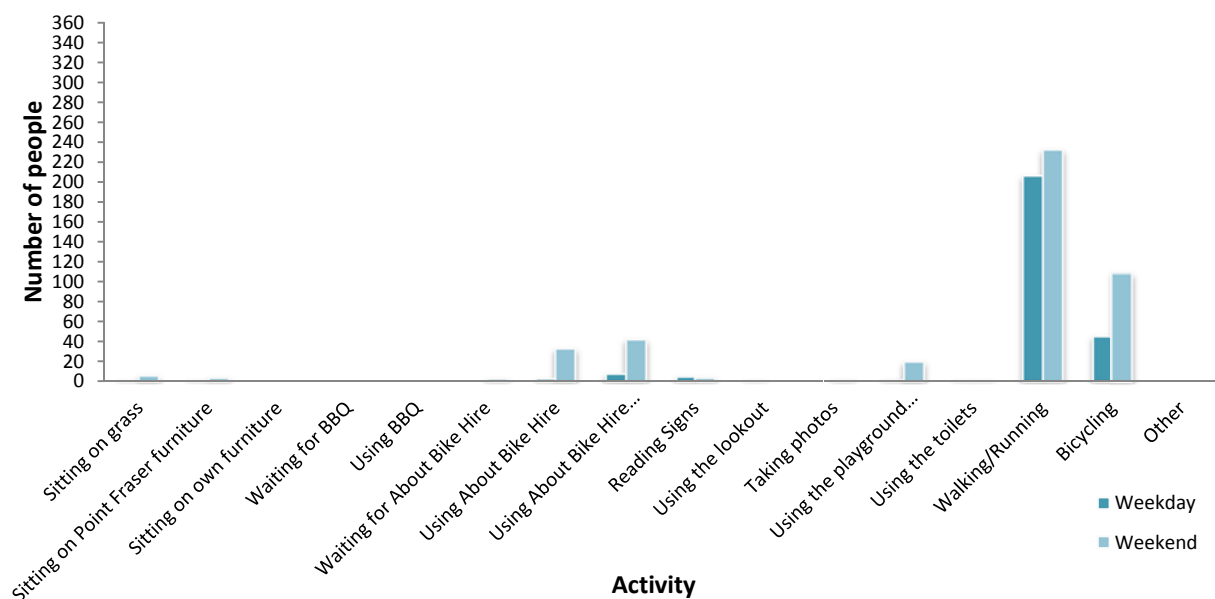


Figure 76. Number of people observed to engage in specific activities during hourly single-pass behaviour observations.

7.11.7 CONCLUSIONS

1. Determine visitor usage of Point Fraser
2. Observe usage of Point Fraser by the public
3. Interview park users for why they used the park

Point Fraser is well visited by the public, however most are passing through as part of an exercise regime (walking, jogging or cycling). Awareness of 'Destination Point Fraser' and its features, particularly relating to its ecological function, seems very low amongst respondents. Accordingly, few people surveyed indicated that they had come to Point Fraser specifically, but most are simply using it as a thoroughfare. The car park is heavily used by city workers during the week. Improvements to signage and the construction of a café are likely to see the park become more of a destination in its own right.

8 CONCLUSIONS

1. The quality of urban stormwater discharging to the Swan River long term, as a result of the redevelopment of Point Fraser by determining the amount of pollutant removal via the constructed wetland;

In 2013, instrument issues prevented calculation of inflows from the drain; as such treatment efficiency could not be determined. However, with likely increased inflows in 2013, efficiencies have probably dropped, particularly for N. This can be seen in the very high load of N being exported from Zone 2 to Zone 3 compared to previous years (2-3 times higher). Backflow out of the wetland has still not been resolved; it reduces the accuracy of water budget estimation and removal efficiencies. No evidence of a first flush was recorded although higher concentrations of nutrients were recorded earlier in the year in the stormwater. Although wetland retention of metals and P kept concentrations below guideline levels for the most part, N concentrations did exceed guidelines and appear to increase across the wetland (ANZECC/ARMCANZ, 2000; Swan River Trust, 2009a, b).

2. The quality of wetland habitat and the quantity and quality of breeding places for native avifauna presence, behaviours and habitat use;

Wetland vegetation is developing strongly with three main species *Juncus kraussii*, *Eleocharis acuta* and *Baumea articulata* competing with each other for space especially in Zone 2. *Baumea articulata* and *Typha domingensis* (which colonised in early 2012) although initially expanding in area, suffered a major dieback, possibly due to the high salinities. Weed penetration into the wetlands is very low. The vegetation has survived well with minor issues associated with low water levels on occasion and peaks in water salinity. Increasing water salinity remains a major concern and concentrations are now often likely to limiting plant growth and recruitment. The wetland has attracted a broad range of avifauna, including a number of exotics. It does not appear that the wetland is currently being used heavily for breeding.

3. The on-going ecological health of the constructed wetland via its conformance with relevant water quality guidelines and legislation requirements.

The wetland is developing a typical macroinvertebrate community, although the salinity levels in Zone 2 are encouraging more marine species than typical wetland species. The community is mainly composed of cosmopolitan and tolerant fauna. A more sensitive taxa was recorded which suggests that the wetland biodiversity will continue to improve. The introduction of *Gambusia holbrooki* (Mosquitofish) probably from the drainage network is unfortunate as they have a negative impact on surface dwelling macroinvertebrates. They are virtually impossible to eliminate without use of rotenone or by drying the wetland.

4. The quality, quantity and type of recreational and educational use of Point Fraser by determining the diversity of visitor presence, behaviour, use, expectations and satisfaction and awareness of reports/information specific to Point Fraser performance; and

Point Fraser is heavily used by the public, however the main reasons for visiting are for parking (during the week) and passing through (mainly for exercise as part of the pathway around this part of the Swan River).

5. The long term integrity and quality of the restoration of the foreshore edge, as a result of the redevelopment of Point Fraser by determining vegetation health and structural reliability.

The foreshore was damaged in a number of areas by high tides and strong winds resulting in the loss of some *Melaleuca*'s, on-going management of this area is required to prevent erosion becoming more difficult to control.

9 SUMMARY OF RECOMMENDATIONS

Recommendation 1.

Backflow from W1 into the drainage network remains the most important issue reducing the effectiveness of the wetland in treating stormwater.

Priority: HIGH

Responsibility: COP

Comments: Leaks in the drain line upstream of the wetland appear responsible for the W1 backflowing into the drainage network. Flows into the wetland are well below estimates for the design catchment which indicate that the wetland is operating well below its design capacity which may also be responsible for the high removal efficiencies seen.

Recommendation 2.

It is recommended that the foreshore around Area 1 (including the headland between Areas 1 & 2) receive immediate remedial treatment in the form of sandbagging and planting of fringing sedges/rushes to reduce erosion and help prevent further loss of trees.

Priority: HIGH

Responsibility: COP

Comments: None

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11 APPENDIX

11.1 APPENDIX A – UPDATED VISITOR SURVEY

Time: Date: .../.../201... Surveyor Name: Version 5.1/052013

ECU **Point Fraser Visitor Survey** 

Thank you for visiting Point Fraser in the City of Perth. We would greatly appreciate if you could take a moment of your time and tell us about your experience.

1. Where are you from? (where do you normally live)

Australia: Postcode & State.....

Overseas: City..... & Country.....

2. Your gender:

☐ Male ☐ Female

3. Your age:

☐ Under 21 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ Over 60

4. How did you travel to Point Fraser?

☐ On Foot ☐ By Car ☐ By Boat

☐ By Bicycle ☐ By Public Transport ☐ Other (please specify):

☐ Mixture of above (please specify):

5. How often do you visit Point Fraser?

☐ First time ☐ Daily ☐ Weekly ☐ Monthly ☐ Once or twice a year ☐ Less than once a year

6. Who are you visiting Point Fraser with?

☐ On my own ☐ Partner/Spouse ☐ Other family

☐ Friends ☐ Work associates ☐ Community group

☐ Other (please specify):

7. What time did you arrive at Point Fraser? (Select only 1)

Morning (am)						Afternoon (pm)					
6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6

8. How long are you planning to stay at Point Fraser?

☐ just passing through ☐ < 1 hour ☐ 1-2 hours ☐ 2-4 hours ☐ Over 4 hours

9. What activities are you doing at Point Fraser? (Select all that apply)

☐ BBQ/Picnic ☐ Visit for general enjoyment ☐ Exploring interpretive trails

☐ Photography ☐ Visiting playground ☐ Using services of About Bike Hire

☐ Walking ☐ Cycling ☐ Running/jogging

☐ Other (please specify):

Please turn page

10. How would you rate the **quality** and **importance** of the following features of Point Fraser? (please circle)

	Quality						Importance							
	Very poor	1	2	3	4	5	N/A	Low importance	1	2	3	4	5	N/A
Overall cleanliness	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Access	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Playground facilities	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Scenic beauty	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
BBQ facilities	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Toilet facilities	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Signage	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Seating	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Tables	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Education	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
About Bike Hire	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Staff interaction	1	2	3	4	5	N/A	1	2	3	4	5	N/A		
Other (please specify) _____	1	2	3	4	5	N/A	1	2	3	4	5	N/A		

11. How would you rate the **availability** of facilities for your Point Fraser experience? (please circle)

	Too few	About right	Too many	Didn't matter
Toilets	1	2	3	4
BBQs	1	2	3	4
Seating	1	2	3	4
Tables	1	2	3	4
Signage	1	2	3	4
No. of other people	1	2	3	4
Other (please specify) _____	1	2	3	4

12. What is your **main** reason for visiting Point Fraser today? (Select only 1)

- ☐ Spending time with friends & family
 ☐ Exercising
 ☐ Experiencing nature
☐ Learn about storm water
 ☐ Seeing wildlife
 ☐ Scenery
☐ Doing something new & different
 ☐ Proximity to the City
 ☐ Rest and relax
☐ Learn about the environment
 ☐ Proximity to the river
 ☐ For solitude
☐ Other (please specify): _____

13. Do you think you will visit Point Fraser again?

- ☐ Yes
 ☐ No
 ☐ Maybe

b) Why or why not? Please explain. (Please provide as much detail as possible.) _____

Please turn page

14. Would you recommend visiting Point Fraser to others?

☐ Yes☐ No☐ Maybe

15. Overall, how satisfied were you with your visit to Point Fraser? (circle only 1)

	Very						Very
	dissatisfied						satisfied
Overall Experience	1	2	3	4	5		

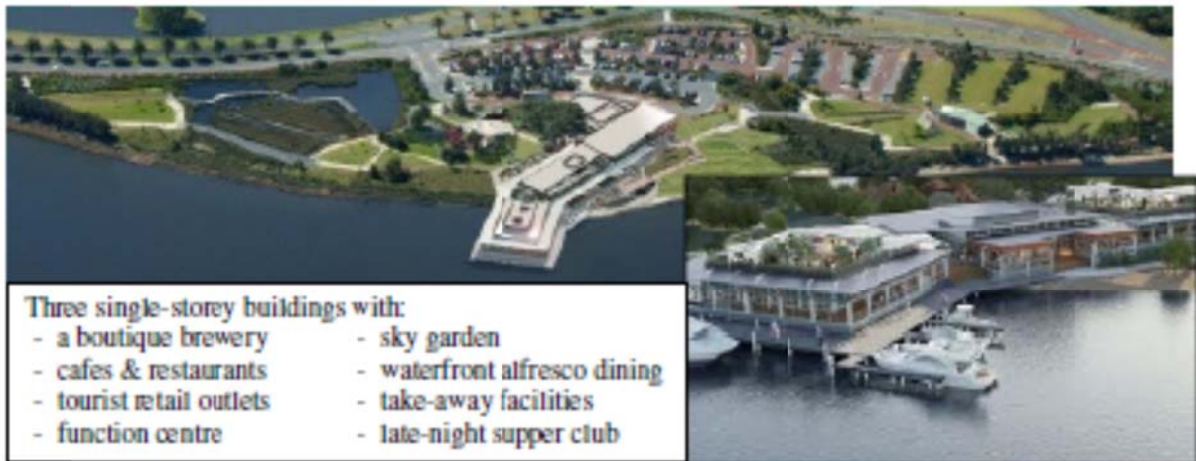
16. Do you have any suggestions how we could improve your experience at Point Fraser?

.....

.....

.....

17. Finally, construction of the following development is underway at Point Fraser:



A) How do you think the new facilities will affect your **experience** of the Point Fraser parkland?

☐ Positive☐ Negative☐ No change

Please comment:

.....

.....

.....

B) In your view, does the type of development **fit with the place and space** of Point Fraser?

☐ Yes☐ No

Please comment:

.....

.....

.....

Thank you for your time.

11.2 APPENDIX B - PERTH RESIDENT'S POSTCODE (%)

Perth resident's postcodes (%)							Key:	5-10%	10-15%	15%+
Postcode	Suburb	Round 1	Round 2	Round 3	Round 7	Round 8	Total			
6000	Perth	3.1	6.7	6.3	10.2	6.0	6.2			
6003	Highgate, Northbridge			0.7	1.1	0.6	0.5			
6004	East Perth	6.1	13.5	13.2	15.9	13.9	12.3			
6005	Kings Park, West Perth	0.8	1.9	0.7		2.4	1.3			
6006	North Perth	0.8	4.8	1.4	1.1	0.6	1.6			
6007	Leederville, West Leederville		1.9	1.4		0.6	0.8			
6008	Daglish, Shenton Park, Subiaco	3.1	1.0	2.8		1.2	1.7			
6009	Crawley, Dalkeith, Nedlands	3.1		1.4	3.4	4.8	2.7			
6010	Claremont, Karrakatta, Mount Claremont, Swanbourne		1.0	0.7		0.6	0.5			
6011	Cottesloe, Peppermint Grove		1.9		1.1		0.5			
6012	Mosman Park		1.0	1.4			0.5			
6014	Floreat, Jolimont, Wembley	3.1	1.9				0.9			
6016	Glendalough, Mount Hawthorn	0.8		0.7			0.3			
6017	Herdsmen, Osborne Park	0.8	1.0			0.6	0.5			
6018	Churchlands, Doubleview, Gwelup, Innaloo, Karrinyup, Woodlands	4.6	2.9		3.4	0.6	2.1			
6019	Scarborough, Wembley Downs	1.5	1.9	0.7	2.3	1.2	1.4			
6020	Carine, Marmion, North Beach, Sorrento, Watermans Bay					1.2	0.3			
6021	Balcatta, Stirling			0.7		0.6	0.3			
6022	Hamersley	0.8		0.7		0.6	0.5			
6023	Duncraig	0.8		0.7			0.3			
6024	Greenwood, Warwick	1.5				0.6	0.5			
6025	Craigie, Hillarys, Kallaroo, Padbury		1.0	0.7	1.1		0.5			
6026	Kingsley, Woodvale	3.1		1.4	2.3	0.6	1.4			
6027	Beldon, Connolly, Edgewater, Heathridge, Joondalup, Mullaloo, Ocean Reef			1.4	3.4	0.6	0.9			
6028	Burns Beach, Currambine, Iluka, Kinross		1.0		1.1		0.3			
6030	Clarkson, Merriwa, Mindarie, Quinns Rocks, Ridgewood, Tamala Park	1.5					0.3			
6036	Butler, Jindalee					0.6	0.2			
6050	Coolbinia, Menora, Mount Lawley	0.8	1.9	2.8		3.0	1.9			
6051	Maylands		1.9	0.7			0.5			
6052	Bedford, Inglewood	0.8	1.0	0.7		0.6	0.6			
6053	Bayswater	0.8	1.9	1.4	2.3	0.6	1.3			
6054	Ashfield, Bassendean, Eden Hill, Kiara, Lockridge				1.1	0.6	0.3			

Perth resident's postcodes (%)						Key:	5-10%	10-15%	15%+
Postcode	Suburb	Round 1	Round 2	Round 3	Round 7	Round 8	Total		
6055	Caversham, Guildford, Hazelmere, Henley Brook, South Guildford, West Swan		1.0	2.1		0.6	0.8		
6056	Baskerville, Bellevue, Boya, Greenmount, Helena Valley, Herne Hill, Jane Brook, Koongamia, Middle Swan, Midland, Midvale, Millendon, Red Hill, Stratton, Swan View, Viveash, Woodbridge		2.9	1.4		0.6	0.9		
6057	High Wycombe, Maida Vale	3.1	1.0	1.4	1.1		1.3		
6058	Forrestfield					0.6	0.2		
6059	Dianella	2.3	2.9			1.2	1.3		
6060	Joondanna, Tuart Hill, Yokine	1.5	1.9	2.1	1.1	1.2	1.6		
6061	Balga, Mirrabooka, Nollamara, Westminster	0.8		0.7		1.2	0.6		
6062	Embleton, Morley, Noranda		1.9		1.1		0.5		
6063	Beechboro	0.8				0.6	0.3		
6064	Alexander Heights, Girrawheen, Koondoola, Marangaroo	0.8		0.7	2.3		0.6		
6065	Ashby, Darch, Gnangara, Hocking, Jandabup, Landsdale, Lexia, Madeley, Mariginiup, Melaleuca, Pearsall, Pinjar, Sinagra, Tapping, Wangara, Wanneroo	1.5	1.0	0.7	1.1	0.6	0.9		
6066	Ballajura		1.0	1.4			0.5		
6069	Aveley, Belhus, Brigadoonm Ellenbrook, The Vines, Upper Swan					1.8	0.5		
6070	Darlington		1.0				0.2		
6071	Glen Forrest, Hovea	0.8	1.0	0.7	1.1		0.6		
6072	Mahogany Creek		1.0				0.2		
6076	Bickley, Carmel, Gooseberry Hill, Hacketts Gully, Kalamunda, Lesmurdie, Paulls Valley, Pickering Brook, Piesse Brook, Reservoir, Walliston	2.3	1.0	2.1		1.2	1.4		
6077	Gnangara, Jandabup					0.6	0.2		
6081	Parkerville, Stoneville			0.7			0.2		
6082	Bailup, Mount Helena			0.7			0.2		
6100	Burswood, Lathlain, Victoria Park	6.1	5.8	4.9	4.5	6.0	5.5		
6101	Carlisle, East Victoria Park	0.8	1.0	2.1	4.5	2.4	2.1		
6102	Bentley, St James		1.0	2.1	3.4	1.2	1.4		
6103	Rivervale	0.8	1.0		2.3	0.6	0.8		
6104	Ascot, Belmont, Redcliffe	3.1		1.4	2.3	0.6	1.4		
6105	Cloverdale, Kewdale, Perth Airport			2.1	2.3	2.4	1.4		

Perth resident's postcodes (%)						Key:	5-10%	10-15%	15%+
Postcode	Suburb	Round 1	Round 2	Round 3	Round 7	Round 8	Total		
6107	Beckenham, Cannington, Kenwick, Queens Park, Wattle Grove, Wilson	3.1		2.8	1.1	3.6	2.4		
6108	Thornlie	0.8		1.4	1.1		0.6		
6109	Maddington, Orange Grove		1.0				0.2		
6110	Gosnells, Huntingdale, Martin, Southern River	0.8		1.4	3.4	1.8	1.4		
6111	Ashendon, Canning Mills, Champion Lakes, Karragullen, Kelmscott, Lesley, Roleystone, Westfield	0.8	1.0	2.8	1.1	0.6	1.3		
6112	Armadale, Bedfordale, Brookdale, Forrestdale, Harrisdale, Haynes, Hilbert, Mount Nasura, Mount Richon, Piara Waters, Seville Grove, Wungong			0.7	1.1	0.6	0.5		
6121	Oakford, Oldbury					0.6	0.2		
6122	Byford, Cardup, Darling Downs, Karrakup				1.1		0.2		
6123	Mundijong, Whitby		1.0				0.2		
6126	Keysbrook				1.1		0.2		
6147	Langford, Lynwood, Parkwood	1.5	1.9			0.6	0.8		
6148	Ferndale, Riverton, Rossmoyne, Shelley	3.1	1.9	2.1	2.3	1.2	2.1		
6149	Bull Creek, Leeming	2.3		1.4		2.4	1.4		
6150	Bateman, Murdoch, Winthrop	0.8				0.6	0.3		
6151	Kensington, South Perth	9.2	7.7	5.6	2.3	9.6	7.3		
6152	Como, Karawara, Manning, Salter Point, Waterford	3.8	1.9	3.5		5.4	3.3		
6153	Applecross, Ardross, Brentwood, Mount Pleasant	0.8	1.0	2.8	2.3		1.3		
6154	Alfred Cove, Booragoon, Myaree	0.8				0.6	0.3		
6155	Canning Vale, Willetton	0.8	2.9	1.4		1.8	1.4		
6156	Attadale, Melville, Willagee	1.5				0.6	0.5		
6157	Bicton, Palmyra	3.1	1.0	0.7	1.1		1.1		
6162	Beaconsfield, South Fremantle, White Gum Valley	0.8	1.0			0.6	0.5		
6163	Bibra Lake, Coolbellup, Hamilton Hill, Hilton, Kardinya, North Coogee, North Lake, O Connor, Samson, Spearwood	2.3	1.0	1.4			0.9		
6164	Atwell, Aubin Grove, Banjup, Beeliar, Cockburn Central, Hammond Park, Jandakot, South Lake, Success, Yangebup			0.7	2.3	1.2	0.8		
6166	Coogee, Henderson, Munster, Wattleup		1.0				0.2		

Perth resident's postcodes (%)						Key:	5-10%	10-15%	15%+
Postcode	Suburb	Round 1	Round 2	Round 3	Round 7	Round 8	Total		
6168	Cooloongup, East Rockingham, Garden Island, Hillman, Peron, Rockingham	2.3					0.5		
6171	Baldivis					1.2	0.3		
6210	Coodanup, Dudley Park, Erskine, Falcon, Greenfields, Halls Head, Madora Bay, Mandurah, Mandurah East, Mandurah North, Meadow Springs, San Remo, Silver Sands, Wannanup			0.7	2.3		0.5		
6230	Bunbury, Carey Park, College Grove, Dalyellup, Davenport, East Bunbury, Gelorup, Glen Iris, Pelician Point, South Bunbury, Usher, Vittoria, Withers			0.7			0.2		
6333	Bow Bridge, Denmark, Hay, Hazelvale, Kentdale, Kordabup, Mount Lindesay, Mount Romance, Nornalup, Ocean Beach, Parryville, Peaceful Bay, Scotsdale, Shadforth, Tingleddale, Trent, William Bay			0.7			0.2		
6620	Perenjori, Rothsay					0.6	0.2		

11.3 APPENDIX C – COUNTRY INTERNATIONAL RESPONDENTS FROM (%)

Country of origin	Respondents' Country of Origin (%)					Total
	Round 1	Round 2	Round 3	Round 7	Round 8	
Belgium	3	2	0	0	2	1
Brazil	7	0	0	0	0	2
Canada	16	0	3	0	0	3
China	0	10	3	0	0	3
Colombia	3	0	0	0	0	1
Czech Republic	7	0	0	0	0	1
Denmark	3	2	0	0	0	1
Egypt	3	0	0	0	0	1
Finland	0	0	3	0	0	1
France	3	0	3	5	6	3
Germany	0	17	11	10	2	8
Holland	0	0	3	10	2	2
Indonesia	0	0	6	0	0	1
Ireland	0	0	11	0	4	3
Italy	0	0	3	0	8	3
Japan	10	2	0	0	0	2
Korea	3	0	0	0	2	1
Malaysia	0	5	0	5	6	3
New Zealand	10	5	0	19	9	8
Norway	0	2	0	0	2	1
Philippines	0	0	3	0	2	1
Russia	3	0	0	0	0	1
Singapore	3	0	11	10	0	4
South Africa	3	0	0	0	0	1
Sweden	0	5	6	0	2	3
Switzerland	0	7	3	0	6	4
Taiwan	3	2	3	0	15	6
United Arab Emirates	0	0	3	0	0	1
United Kingdom	16	32	11	19	6	16
USA	3	7	17	10	19	12
Qatar	0	0	0	5	0	1
Ethiopia	0	0	0	5	0	1
Ukraine	0	0	0	5	0	1
Poland	0	0	0	0	2	1
Hong Kong	0	0	0	0	2	1
Estonia	0	0	0	0	4	1
Kazakhstan	0	0	0	0	2	1

11.4 APPENDIX D – OTHER ACTIVITIES UNDERTAKEN BY SURVEY ROUND

Other activities undertaken by survey round	
Survey round	'Other' specified by respondent
Round 1	Fishing Kayaking Lunch, relax, meditate Parking Passing time Quiet Rollerblading Walking Working
Round 2	Bird watching For exercise Kayaking Parking Scouts To Herrison Island visiting the kangaroos Wheelchair Work
Round 3	Car park Canoeing Enjoying time with grandchildren Frisbee Looking Walking dog
Round 7	Came to see kangaroos on Heirisson Island. Exercise, stress relief (lunch break) Sat on picnic blanket Walking to a meeting
Round 8	Finding a water station Kayaking Stretching my body Talking Talking and enjoying the silence. Visiting East Perth

11.5 APPENDIX E – ‘OTHER’ QUALITY OF FEATURES SPECIFIED BY SURVEY ROUND

'Other' quality of features specified by survey round	
Survey round	'Other' specified by respondent
Round 1	Cleanliness - at points its great but near the causeway underpass it is quite dirty
Round 2	<p>Bike hire should be more prominent so people could find it. Wetlands full of slime (mosquitoes)?</p> <p>Bike Hire was closed</p> <p>Cyclists are too fast, no respect for walkers (no respect for walkers, dangerous). Separate path for cyclists.</p> <p>Don't know</p> <p>Don't like the grasses</p> <p>I wish for more barbeques, including Langley Park</p> <p>More cafe facilities</p>
Round 3	<p>Access from one type of cycling track to another plus appropriate signage; very poor</p> <p>Herison Island</p>
Round 7	<p>cycling / walking / physical activity level</p> <p>Drinking fountains</p> <p>Dual use paths dangerous</p> <p>Lights broken</p>
Round 8	<p>Bike and walkers interface.</p> <p>Bins - very poor</p>

11.6 APPENDIX F – ‘OTHER’ AVAILABILITY OF FEATURES SPECIFIED BY SURVEY ROUND

'Other' availability of features specified by survey round	
Survey round	'Other' specified by respondent
Round 1	Car park
Round 2	Barbecues, including Langley Park Bikes - fast bikes should not be here
Round 3	BBQ please by Langley Park, toilet block and playground Bikes should be separated from walkers Car park Require lighting for summer evenings Signage - mark distance for joggers
Round 7	Exercise
Round 8	Another water fountain Coffee shop Prepaid parking

11.7 APPENDIX G – SUGGESTIONS ON HOW TO IMPROVE POINT FRASER BY SURVEY ROUND

Survey round	Suggestions on how to improve Point Fraser
Round 1	<p>A little more signage would be nice for those visiting WA for the first time.</p> <p>About right</p> <p>Access from Adelaide Terrace is poor.</p> <p>Access. To far. Fix carpark pay m/c.</p> <p>Advertisment of the area, why build such a beautiful area and not advertise it. Bring people to it.</p> <p>Allow access to other side using quad cycle. Move signs on paths in bushes.</p> <p>Better and more toilets</p> <p>Better lighting when its dark!</p> <p>Better signage RE; walking and riding protocols</p> <p>Big paths to accommodate cyclists</p> <p>Bike hire is in the wrong spot to attract visitors - too out of the way</p> <p>Bike parks</p> <p>Bring new walkway to Point Fraser</p> <p>Cafe to have snacks at, gym equipment.</p> <p>Cafe! A good toilet.</p> <p>Coffee cart, cafe</p> <p>Concerned about concerts on Herrison Island and the impact it has on the environment and wildlife.</p> <p>Cutting down the bushes which are unwanted. Maintaining the toilet facilities nice and clean.</p> <p>Providing a sign board for the toilets.</p> <p>Enjoy as is</p> <p>Fine for me to exercise</p> <p>Gym equipment (outdoor)</p> <p>Haven't been here long enough or often enough to offer any suggestions</p> <p>Interactive booth for visitors to get info on facilities and maps.</p> <p>It will be great when the coffee cafe and the toilets are built.</p> <p>Keep it as natural as possible - no additional development. It is so refreshing to have a place in the middle of the city to spend quiet time.</p> <p>Lycra (professional) bike riders - a lot of their bikes are illegal and have no bells. They show huge disregard for other riders and pedestrians. Does not help that the pathways are too narrow.</p> <p>Make sure bikes and pedestrians apart</p> <p>Make the trails friendlier to rollerbladers eg, get rid of dividing rocks, bumps, rough patches etc.</p> <p>There's more than just bikers who want to use this</p> <p>Maybe have a kiosk handy for coffee!</p> <p>Maybe some more info about past, present and future of this place.</p> <p>More advertising in papers, school tours etc - so the public knows about the park.</p> <p>More BBQ facilities, toilets</p> <p>More education in the city</p> <p>More promotion about the area</p> <p>More publicity on the established drainage/ecosystem - via local newspapers / community radio</p> <p>More shade facilities. A disabled toilet (toilets sometimes flooded)</p> <p>More shade trees! Use decidious to allow winter sun.</p> <p>More signage points</p> <p>More toilet stops and shelter stops for rain in the winter</p> <p>More toilets</p> <p>More toilets (clean)</p>

More toilets and jelly fish education..?
 More toilets BBQ's and benches please.
 More toilets, somewhere for refreshments
 More washing points, cleaner toilets
 More, cleaner toilets
 My first time here and I don't use the amenities but it looked like there were plenty.
 Need more disabled parking closer to bike hire
 Nice
 No
 No charge parking on weekends
 No idea
 None
 None as yet
 Not really - I really enjoy running down here.
 Perfect
 Plant many trees on both sides of the aile ie. wouldn't be so hot!
 Play equipment usually wet from reticulation. Could aim it away from playground or use drip retic.
 Proper toilet block
 Provide mor BBQ facilities. Too far on the way now.
 Put more fish in river : -)
 Safe walk tracks across to other ...? (can't read)
 Seems perfect to me.
 Shelter for rain and perhaps more toilets
 Toilets
 Toilets - proper toilet block. Free parking - free on weekends.
 Walking trails - not enough signs to keep people left.
 What you have done is very good. Keep planning to make things better.
 Whats here is fine, enjoyable. Keep it simple.
 When Pt Fraser was redeveloped 8 or so years ago the car park was expanded at the expense of the park and trees. Get rid of the car park!
 Wider bike paths
 Would be great once paths are completed
 Yes, I think that metal seating is crazy - too cold to sit on in cool weather and too hot to sit on in warm sunny weather. Otherwise, its lovely here.

Round 2 - October 2010	<p>No - other than to suggest that there should be more areas like this along the river, particularly those which provide by wildlife and.....? I would rather see this as a flora and fauna sanctuary with only slight encouragement for people beyond present faculties</p> <p>? (Cant read), Natural. Environment.</p> <p>A very small inobtrusive coffee shop and cafe</p> <p>As told on the previous page</p> <p>Availability of wheelchair accessible toilets. Picnic areas.</p> <p>Awesome!!</p> <p>Better trails and bike tracks, seating and toilets.</p> <p>Build a cafe</p> <p>Build more carpark without paying fee</p> <p>Build toilet areas, more seating</p> <p>Cafe</p> <p>Cafe for coffee!</p> <p>Cafe?</p> <p>Cafe's</p> <p>Clean wheelchair accessible toilets</p>
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Coffee shop
 Coffee shop/ ice cream
 Covered seating (against sun and wind), wooden seating
 Explain the cafe sign - where's the closest
 Explanation on the directions and about the animals and plants are not quite sufficient.
 Extend walkway near playground so you don't have to go through parking lot
 flys
 Free hot chocolate
 Install walkway at west end of parking lot so we don't have to walk down path with bikes
 Leave it as it is
 Love it!
 Make it a bit more attractive, special events, stalls, things that attract people - a bit isolated
 Make the walkway pass available and secure at night time as well as lights
 Maybe bicycle signs ? for older people.
 Maybe they could plant more trees and flowers here, and more educational things, such as signage for Point Frasers history.
 More barbeques, free sunscreen and fly repellent
 More BBQ's please! - on Langley Park close to playground.
 More flies?
 More places for refreshments
 More restaurants, gallery, exercise outlet for people who are into fitness, childrens water park.
 More toilets
 More toilets 'permanent'
 More toilets that are accessible for people with disabilities
 More toilets, too many flies
 Night light. Place is not available and secure at nights
 None
 None - I wish we had it in our country
 Not at the moment
 Only just got here
 Picnic tables, improved public transport access, improved shade, improved signage and visibility for About Bike Hire.
 Separate cycle path
 Shade for playground
 Some other facilities
 The spraying of weeds should be cordoned off and ? playground area should be ?
 Toilet and cafe
 Toilet and cafe - I think they are planned?
 Toilets - I didn't see any
 Warnings about cars
 Water is dirty

Round 3 -
 May 2011

A cafe would be good - low key, not a chain cafe. Ambient, music etc.
 A dedicated bike path
 Attract more people - check that the track is not going through secluded spots (for safety).
 BBQ in wrong place, no table? or install around play area.
 BBQ tables and lights for BBQ
 Better entrance, clearer signs
 Better signage RE. dead ends of paths
 Better toilet facilities (not porta). Lighting.
 Better toilet facilities, otherwise its very beautiful
 Bike coming through small area, bikes to fast. Monitor bike speed!

Bike riders are a bit aggressive - expect that they don't have to slow/ make way for anyone. How about some bike riders give way to pedestrians? Where are the dog bags?
 Bikes are really dangerous, uncontrolled. More drinking fountains. Toilet facilities.
 Clean up where bridge
 Confusion with bridges/ improve signs visitors some difficulty
 Connect link along foreshore for cyclists/ walkers
 Construct a jetty/pier into the water to walk out - would be beautiful.
 Covered seating. Signage - where are the toilets? Where are the BBQ? Is there a swimming/splashing area? We arrived late in the afternoon - so need more time to look.
 Cycle path for cyclists separated from main walking pathway. Walking paths widened. Better lit pathway. Weather indicators would be ideal.
 Free beer would be nice.
 Free family events?
 Generally its tidy but some spots rubbish strewn. Maybe a few more bins if there not too obtrusive.
 Improve lighting
 Improve toilet facilities. Apart from that the natural environment is fantastic. Love the bird and wild life.
 Increase lighting areas, more signage, better toilet facilities
 Just about the toilets, try to lock them or make people keep them clean.
 Less car parking space!
 Lighting in the evening could be improved - very important. Toilets - please fix!
 Lights, Toilets.
 Markings on tracks or signs for distance for joggers
 Maybe a different path/track to walk/run around for something different
 Metal seating; to cold in A.M and winter - prefer wooden. Tracks down to the water should have rubbish bins and signage encouraging people to visit them at appropriate places near the water.
 More BBQ's and picnic tables with night lighting for summer and shelters for ? weather
 More BBQ/social facilities
 More cafe's and bars, particularly at the bottom of Coode St (South side) and bottom of Plain St (North side)
 More lighting and tables at the BBQ areas
 More lighting at night
 More lighting at night time
 More lights
 More posted maps. Better signs for where toilets are.
 More signage for cyclists resulting in an easier experience
 More tables
 More toilets
 More toilets closer to the city end of the park
 More trees for shade
 More water facilities
 More water fountains
 My first visit so far. Cleanliness could be improved.
 Needs a good clean!
 No, keep it just as it is please.
 Not at moment
 Not really
 Put more BBQ
 Separate bicycles from pedestrians
 Signage, lighting.
 Table for BBQ near bike area
 Tables and chairs, toilet and shop (coffee)

The path between the Riverside Drive entrance (west) and the steps to the causeway bridge is discontinuous and requires running through some unpaved bush. This area is well trodden and popular and would be best paved.

The toilets are so disgusting and need to have them cleaned more regularly and would suggest to have more toilets!!

Toilets - only realised yesterday that there were demountable toilets. Really need better toilets, especially when walking the bridges, few and far between. Pathway - when travelling towards causeway the path doesn't follow course of the river and just comes to a dead end. Either complete the path or have some signage would be great.

Toilets need upgrading immediately

Urgent upgrade of toilets

Walk signals to cross road

Water fountain on path

Water fountains

Wider walking/bike tracks

Yes - footpaths

Yes - no shoreside/ riverside development for Perth foreshore

Round 7 -
May 2013

A few more toilets, staff around to provide extra security especially for lone females.

A footbridge to Heirsson Island and better signage on the Island towards the kangaroo enclosure. The causeway was too noisy and too many bikes kept us nervously looking behind us as we walked over.

All good.

Artwork / sculptures / inventive lighting - unusual attraction that tourists would be interested in.

Better kayak ramps, more BBQs.

Better maintenance of paths and river bank.

Better signage of toilet facilities and other amenities.

Better toilets and cafe!

Better toilets.

Coffee shop

Couldn't find a toilet. Was there one? Not seen on info Kiosk map.

Extra toilets.

Get rid of the construction.

Improve toilet, cafe facilities.

Improve toilets

It was mostly good except for some building work.

Keep some of the natural features.

Keep the natural side of the site.

Less surveys

Litter along the river cleaned more regularly.

Marking the distance along the path.

More bike paths (only bikes) or signs for bikes to realise peds also have rights not expect us to give way to them.

More colour

More drinking fountains.

More tables.

N/A

No

No building apartments

No dual use pathways.

No its pretty good really.

None

Perfection.

Pretty good as is!
 Reduce the size of car park, it has taken over Point Fraser.
 Separate walkers to bikes.
 Signs as to where restaurants and coffee shops are located.
 Sink western end, boat access.
 Still water - smelly area (near kids play area)
 Toilet facilities, drink availability.

Round 8 -
 October
 2013

Access and signage.

All of the below - a waterfront pub would be excellent.
 Another water fountain please.
 Bar facilities.
 BBQ facility with table, roof and table.
 Better entry points to access the river front for kayaking.
 Better provision of toilets including signage.
 Better signs, maybe map of park.
 Cafe, bridge to Herrison Island be completed quickly.
 Cafes
 Car park should be free.
 Clean the river.
 Clean up shoreline.
 Clear bike paths if development occurs.
 Coffee facility
 Coffee shop
 Coffee shop would be nice.
 Cut the contamination
 Don't develop the cafe restaurant precinct.
 Encourage more people to visit here.
 Fill it with fountains, statues, artwork, something amazing.
 Finish the building.
 Finish the construction. Keep it away from the riverfront, maybe across the road. It is making people avoid the park rather than go through it.
 Free parking for BBQs, walking etc. WE NEED WALK / BIKE BRIDGE city / Herrison Is / South Perth.
 Causeway inadequate.
 Free parking, more designated picnic areas.
 from what seen so far its great, yet to keep looking around.
 Get rid of flies.
 Get rid of obstructive fencing.
 Get rid of the construction area.
 Get rid of the construction at Point Fraser.
 Get rid of the fly's.
 Get some nice fishes to the pond, cut grass around it. Put some water fountains.
 I am very satisfied. Everything is perfect for me :)
 I didn't notice the signs. Maybe more visible to walkers.
 I like everything how it is now. I think its very natural, kind of refuge into nature from tall grey buildings of city, great place to come with kids, do sport.
 I think as a suggestion, building toilets on the Gosnells model would be good.
 Improve connection with riverfront through developments.
 Increase promotion of the area.
 It will improve once construction is finished.
 Keep as a family area.

Keep as it is.
Keep it low key and quiet. There is enough busy places around.
Keep it natural
Keeping it as natural as possible so everyone can enjoy the natural beauty.
Lighting should be better. People do not use the whole foreshore in winter, not light enough to be secure.
Looks good as is.
many of the information signs are illegible.
More BBQ area and toilets will be great. Also more free parking.
More bus.
More public toilets would be better.
More refreshments and interactive activities.
More toilets abd drinking fountains.
More toilets and cleanlinesss (some rubbish in the water) and free car parking.
More view will be great.
More views.
More water drinking facilities and toilets. Cafe would also be nice.
More water points. Better toilets.
More water stations.
No
None
Not at this time more today.
Not too much development, good balance of native and man made alternatives.
Pedestrians access via a separate pedestraian only bridge to Heirisson Island.
Permanent toilets
Remove construction that obstructs walk ways.
Seats sheltered from sun, wind and rain.
Stop development.
Taps to fill up my water bottle.
The coffee shop is taking a long time, would attract a lot more visitors if it was open.
There are many flies that bothers me to exercise.
Toilets
Too many flies.
Unpaid parking, connection with the CAT system.
Use pest control to cut down the flies.
Water should be cleaner and actual habits.
Wide paths, more access to water.
Yes, wider paths so separate bikers / walkers. WIDER PATHS!. DANGERS FOR WALKERS BECAUSE OF BIKES.

11.8 APPENDIX H – WHY OR WHY NOT REPEAT VISITATION

Survey round	Why or why not repeat visitation
Round 1	<p>A good walking circuit from South Perth</p> <p>A place with good scenery</p> <p>Accessible, clean, facilities</p> <p>Accessible. Beautiful. Water and greenery. Access to inner city. Work out stations are great!</p> <p>Always walk home</p> <p>Beautiful</p> <p>Beautiful park and gardens. Good bike track</p> <p>Because I'm from Russia</p> <p>Bike ride and for BBQ and playground</p> <p>Bike ride, work BBQ, relax</p> <p>Bike riding with friends</p> <p>Calming</p> <p>Clean fresh healthy way to enjoy a quality walk</p> <p>Close to home, enjoy the walk</p> <p>Close to home, nice park - good to exercise kids</p> <p>Close to public transport. Safe. Nice view (except those annoying fences). Staff at about Bike Hire need to be more friendly.</p> <p>Cycle (?)</p> <p>Cycling through</p> <p>Didn't really know it was here. But will come back and spend more time here rather than just a ride past</p> <p>Easy access - part of a circuit. Off the road.</p> <p>Easy access away from traffic</p> <p>Enjoy</p> <p>Enjoy the walk through - pleasant to view</p> <p>Exercise</p> <p>Fishing</p> <p>For exercising</p> <p>Fun</p> <p>Good atmosphere/ convenient location</p> <p>Good exercise and relaxation</p> <p>Good walking course</p> <p>Great outdoor area in Perth</p> <p>Great walks</p> <p>I am visiting Perth from South Africa</p> <p>I can feel relaxed</p> <p>I enjoy the ride to Burswood bridge/ Narrows</p> <p>I like beautiful nature. Here is beautiful!</p> <p>I like this beautiful and calmness</p> <p>I like to go for a walk in such nice scenery</p> <p>I love Pt Fraser - it is not well known</p> <p>I really like the beauty of the place. The scenery is amazing</p> <p>It is very pleasant and well loved</p> <p>It makes a good walk around</p> <p>It's quite close by</p> <p>Its a lovely place</p> <p>Its a nice environment with great cycle paths</p> <p>Its a very nice place and clean</p>

Its fun
 Jog or bike around river 1 or 2 times per week
 Leaving country shortly
 Like to walk from South Perth around the bridges
 Lovely
 Lovely scenery, easy access, close to city, peaceful, fresh air!
 Lovely scenic spot for walking
 May be going to migrate somewhere else
 Morning walk..(can't read)
 My daily run goes through Point Fraser
 Near to the river giving fresh air. No traffic or signals to watch for. Able to walk peacefully
 Near to where I'm staying - it's a nice area for running, just - ?
 Need to spend more time
 Nice and quiet
 Nice and quiet away from traffic
 Nice bike track and water proximity
 Nice place to relax and enjoy a walk
 Nice run along river
 Nice spot
 Nice to relax after a busy day in the city. Easily accessible and beautiful scenery
 Nice walk around bridges
 Nice, quiet, peaceful place to exercise away from the city
 On exercise paths
 Parking only. Ive rented kayaks here but they are way too expensive.
 Part of my walk
 Part of the route I take
 Pass through
 Passing through
 Passing through on walk around river, good toilet stop, scenic, clean
 Passing time on walks
 Pleasant place to exercise.....? (cant read)
 Relaxing
 Rent a bike
 Ride around the river
 Run through and toilet
 Scenery
 Scenic and enjoyable walkway
 Scenic to pass through, as opposed to traffic
 Scenic, beautiful
 Scenic, cleanliness, bike hire
 So relaxing
 Such a beautiful area (Perth in general)
 Too far from dropping off from the bus stop have a distance
 Very enjoyable
 Very peaceful, quiet
 Very scenic park - lovely walks
 Visit at least twice a week, walk from work for lunch, exercise, relax. Its a great spot.
 Walk around the river
 Walking around river
 We come on average 3 times per week
 We enjoy our walk along here every week
 We very much enjoyed the adventure
 Would definitely visit this area if I come back to visit Perth in the future. It's beautiful,
 very well kept and established.

Round 2

A little haven near the city
Beautiful
Beautiful place
Because it is a lovely, clean and beautiful place
Because we walk around the bridges - walk every Saturday
Close to home, wheelchair accessible long path
Close to hotel, great view
Cycle path
Daily parking
Do bridge to bridge 10km loop Saturdays and Sundays
Easy access through the city, nice and quiet
Easy access, attractive, exercise
Exercise
Exercise. Good to see new sites even though I have lived in Perth 40 years - not been this way.
First visit in 10 years. Very pleasant.
For exercise
For work to take clients for exercise
From USA, would love to visit again
Good area to walk through
Good place to hang out, beautiful place
Good walking distance from East Perth and pleasant environment
I am full of praise for overall management of these parklands. I do my bit to keep them that way especially picking up any broken bottles.
I live 12000 milies away in England. I have so many other places to visit in Australia and the world
I love it and commend whoever is responsible for environmental (?)
I love the 'bushland' experience
I will keep bringing clients here but we really need proper toilet facilities for the disabled - shaded seating would also be great
if more facilities would stay longer
It is a lovely setting for exercise
It is on my weekly walks
Its ? place and close to my place
Its a place for people to relax and exercise, and I can spend time with friends and walk
Its convenient to visit and have a good time
Its nice and enjoyable
Like to go around the river
Like to run along the river
Live close by
Love walking through and seeing the beauty of nature. You think you are on another world
Moving to Darwin
Nice and quiet, lots of room for the children
Nice place
Nice place to exercise
Nice place, clean and hopefully safe for anybody
Nice walk
Parking
Plan to go kayaking
Plan to jog around here
Pleasant, good cycle tracks, good coffee.
Regular walk
Regularly walk through this area

Reside in Melbourne
 Scouting, Air Race, proximity to it.
 Something to do
 This is my 'backyard'
 Walking weekly with friends for exercise
 Walking, bringing visitors, Australia Day
 We are leaving Perth tomorrow but if we would have stayed longer we would come back
 We cycle past here most weekends and will use About Bike Hire for kayaking
 Weekly exercise

Round 3	<p>Access good Beautiful and enjoyment place Beautiful healthy place to spend time with friends and family Beautiful place Beautiful scenery Beautiful trip, beautiful area. Relaxation, walk, nature Beautiful, scenic, great for a run Because it is where I walk Because we walk here every week Bike riding along the river But not by myself - safety at my age (71 years) Car park Circular walk of the river Narrows - causeway Close to my apartment, nice walkthrough to east perth or city Convenient route for exercise Daily route Daily walk routine Enjoy riding through restored foreshore area Exercise Exercise every day Exercise in the morning Exercising For reasons detailed above, should we return to Perth Go elsewhere, or holiday Good spot Good venue for walking Great access and pleasant scenery Great access from city. Scenic. Great experience to visit such a beautiful environment Great to have this kind of natural space, beautifully kept, in the ? of the city, close to public transport I regularly hire bicycles from 'About Bike Hire' I walk through everyday on my way to work I walk through with a friend every Saturday morning at 7am for 16 years I walk to the city often and pass through the park I won't be in Perth, I'm just visiting If we return to Perth It is a beautiful area that is let down by inadequate toilet facilities for the large number of family and disabled groups that use the area Its a beautiful place Its a beautiful place and allows me to fully relax Its a beautiful place to come and experience the river Its a good place, nice for walks Its a nice place Its a nice walk</p>
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Its a nice, well kept park and I'm often in Perth with little else to do
 Its beautiful and easy to access
 Its close to Kensington and the city, ample parking, will probably visit again if we can.
 Its lovely for a picnic
 Its on the walk around the bridges
 Its very pretty and scenic and a nice place for walks
 Just for walking
 Live locally and walk most days
 Local area for lunchtime walk
 Love natural environment
 More exercise
 Natural beauty, good walking trail
 Need more lights along river - too dark.
 Need to explore the entire area
 Nice area to walk around and bring family
 Nice scenic view for walking
 Nice to walk through
 Nice view and breeze after sunset
 Nice walk
 Nice waterfront walk. Rubbish could be cleared from the reedy waterfront section
 Not here long enough
 Only here for a week
 Part of exercise route
 Part of weekly route
 Passing through
 Passing through on walk
 Passing through on way to work
 Perth has lovely parks and friendly people
 Pleasant, close to the river and my home
 Relaxing, quiet place in the city
 time will tell
 To bike ride and walk
 To bring the grandchildren
 Unique place for exercising, unique scenery, near city centre.
 Very beautiful
 Very picturesque, natural, access to the river
 Walk regularly around the river
 Walking around river
 Weekly exercise
 Weekly run
 Weekly walk
 Would like to bring overseas visitors here

Round 7

Access in great and not too busy.
 Beautiful way to get outdoors in winter.
 Because we only had one hour but would like to see the area again.
 Bring kids to the playground.
 Close to city, clean, great walking and cycling experience.
 Close to home.
 Close to where I live and a nice place to run through.
 Cycle through 4 - 5 times per week.
 Enjoy walking through the facilities.
 Exercise
 Far away from Sydney
 Feels good, clears the head.

First time here but looks like a good place to return to with the kids.
 Has a nice view.
 I enjoy it so far.
 I enjoy the walking paths, atmosphere and beauty. Its a calming experience.
 It is a pleasant walk around the foreshore.
 It is the heart of Perth and good place to exercise.
 Its a nice peaceful area to walk / sit around and relax! Kids can also play around.
 Its a place.
 Its scenic, clean and enjoyable.
 Like it will be running hero again
 Like the ambient.
 Lovely comfortable walk - scenic. Beautiful kept grounds.
 Lovely walk from bridge to bridge.
 Nature, scenic
 Nice place along riverside.
 Nice place to relax after a bicycle ride.
 Only if not built up!
 Parking, walk at lunch time
 Peaceful and nature reserve close to city (and work relief)
 Perth is a long way from Sydney.
 Quiet relaxing area close to the city
 Regular walkers and runners.
 Section of my regular walk along the river to E Perth and back to Perth (I live in Perth CBD).
 This is beautiful scenery.
 To exercise and look at scenery.
 To see development
 To see more of the facilities.
 Too far away.
 Unfortunately I will be leaving for the UK tomorrow. If I was staying I would definitely aim to walk through the park daily.
 Very scenic view and easily accessible by bike.
 Walk regularly through Pt Fraser
 Walking access
 We live in Sydney, we will be rarely in Perth.
 Will visit again with family.
 Will visit with family.
 Will walk or ride through again.

Round 8	10km circuit around bridges for exercise. A weekly routine. Always, part of routine. As above Beautiful Beautiful day out, easy to get to. Beautiful fresh safe walk Beautiful place. Because I always exercise every morning. And this place is good to walk and stretch my body. Because it's the best place to jog so far. Building worker. Close to the city, unique and not many people. Come each weekend. Convenient. Cycling
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Cycling, family outings
 Depends if I am down this way.
 Dog walking
 Enjoy running through, away from traffic.
 Enjoy the area.
 Exercise
 Exercise and beauty.
 Exercise location after work.
 For exercise
 For kangaroos.
 Good place
 Good place to exercise, nice scenery.
 Good walking terrain, part of walking circuit.
 Great cycle paths.
 Great experience with family and beautiful scene.
 Habit / fun
 I enjoy walking through this area.
 I live in Sydney.
 I pass through on my rides around the river.
 I run through here everyday and its quiet in areas.
 I run through here regularly.
 I run/walk through here everyday. I love the development and importance given to the natural environment.
 I walk around the bridges every Sat morning.
 I will stay in the city on visits to Perth. This is close.
 I would visit again because I really like to be here :)
 I'm leaving, back home today.
 If I come back too Australia.
 If I have time
 It is a good exercising spot
 It is nice and good.
 It is so beautiful. Did not know there were so many things to do and learn. Will come again.
 It is very attractive.
 It is well laid out and beautifully set up.
 Its beautiful.
 Its my way walking around the river.
 Its pretty and location is very good.
 like the ride through.
 Live here.
 Living close by.
 Lovely walk near the river.
 More exercise
 Nice area.
 Nice hangout for the weekend.
 Nice place for lunchtime walks.
 Nice place to walk around.
 Nice place to workout with friends.
 Nice place.
 Nice pleasant environment
 On holiday from NZ.
 On my next visit to Perth I will likely go for a walk.
 On the way to East Perth.
 Part of regular walks along the river to E Perth and then back to city.

Pleasant way to spend sometime.
Prefer balance of relaxation and beauty.
Pretty - quiet - clean
Regular bike circuit.
Regular cycling.
Regular exercise.
Relaxing
Relaxing lunch walk.
Ride through occasionally
Scenery is awesome but transportation didn't go through here. For tourists, I think its better to have a stop.
Scenic view
Such a beautiful place
To be honest, I will cycle thru here but it definitely adds to the beauty and the experience.
To kayak again.
Too many flies.
Travelling from interstate.
Very clean and beautiful place.
Visited as part of the 10km walk. Will do again, now I know it is here. I like the wetlands.
Visiting from UK, will bring wife next time.
Walk
Walking along the river is particularly nice
We are moving around a lot.
We cycle Nedlands to East Perth regularly.
We live nearby and this is a very pleasant place to visit.
We live nearby.
Weekly exercise.
When passing by.
Yes, have to pass by.

11.9 APPENDIX I – COMMENT ON NEW FACILITIES AND AFFECT ON EXPERIENCE

Survey round	Comment on how the new facilities will affect the visitor experience of Point Fraser
Round 7	<p>A good facility for this area as there is not much else like it around here (balances Northbridge to a certain extent).</p> <p>About time WA started to utilise the river as other states do and give the community an outlet to act as a community.</p> <p>About time.</p> <p>As long as minimise impact on river.</p> <p>Boat traffic. Rubbish from upstream. Great for restaurants after a walk around park.</p> <p>Both positive (good socially) and negative (bad for environment)</p> <p>Can't wait.</p> <p>Detract from natural setting</p> <p>Development of this scale would spoil this beautiful public open space.</p> <p>Don't know not here often.</p> <p>Don't too over build, it may spoil the scenery.</p> <p>Encourage spending more time in area.</p> <p>Good and bad with every project. Can develop the area but keep the actual waterfront / path area free from big buildings ie. keep the view when walking unrestricted over the river.</p> <p>Good views, no apartments.</p> <p>Great - can't wait</p> <p>Great to enjoy a meal and at our beautiful river and wildlife.</p> <p>I agree with the in general.</p> <p>I don't feel they are necessary. I more value preservation of the natural environment in the city centre.</p> <p>I don't mind, I'm just a tourist.</p> <p>I don't think it would be used by our family and friends.</p> <p>I like to have an uninterrupted route to run and cycle around the river everyday. Often these waterfront developments don't consider this and create unpleasant and awkward diversions.</p> <p>I love the solitude!!</p> <p>I think it will be a positive development as it will attract more people to the area.</p> <p>I think some development will allow access for working people.</p> <p>I think this will induce more people to the area. It is a fabulous site that will be enjoyed by many.</p> <p>I will probably use it more for recreational activities rather than just exercising.</p> <p>It will ruin the foreshore.</p> <p>It's fantastic as it is!</p> <p>Keep it the way it is.</p> <p>Like the open natural space as they are.</p> <p>Maybe more people</p> <p>More adult recreation facilities</p> <p>More diversity for lunch, walk / relax</p> <p>Nice to have a change</p> <p>No walk through</p> <p>Not necessarily. We need to have a natural environment near city area.</p> <p>Prefer preservation of natural setting.</p> <p>Return to Malaysia.</p> <p>Sometimes its good especially cafes for a break and a drink.</p> <p>Sound exciting! And we will see the outcome</p> <p>The beauty of the park is its rural feel / appearance within the city. This looks like the city encroaching into the park.</p> <p>The place will be dirty and nosier.</p> <p>This is first time.</p>

Too busy, parking will be more expensive, area will be more crowded - less serene.
 Too many people
 Too many people.
 Unsure, hope it doesn't destroy the beauty of the area. Will be good to have shops, coffee lounge etc.
 We are interstate visitors. Visiting family always a pleasant walk.
 We have enough coffee and yuppy places.
 Will be a great benefit to the area.
 Will disturb ambience.
 Will take away from the natural beauty / peace of the area.
 With balance still kept with wildlife natural habitats and plenty parking.
 With no parking, I wouldn't visit. Not an idea location though.
 Would like to be to continue walking along foreshore.
 Would prefer it to remain more natural. Sick of the commodification of everything.

Round 8

A big town needs places with only nature to enjoy and relax.
 A cafe / restaurant would be good. Retail outlets would be awful! There are plenty of retail outlets in Perth. Late night supper? If done it fit in to the landscape now loud or noisy or bright / plastic / neon.
 Adds more features to Perth - tourist attractions. always good to go somewhere now. More jobs created.
 As long as bike/family access to secluded spaces remain available.
 Attract more people and create a better atmosphere.
 Attract more people, create a more family friendly environment, but also has negative aspects of the destruction of the natural wildlife.
 Because of proximity to new Elizabeth Quay I don't feel it necessary for extra activities.
 Bring more people to the area.
 Cafe to stop at would be very good.
 Cafes are everywhere, would be a wasted opportunity if not.
 Cannot offer an opinion, after development would be able to comment.
 Cool
 Detriment to the ambience.
 Did not realise any substantial change.
 Don't know, could be positive.
 Don't like buildings near waterfront.
 Environmental and scenic disaster!
 Get it done timely so it is not an eye sore years on end.
 Give you more reasons to come back.
 Good
 Good idea, good for people. Should not be a museum.
 Good view.
 have free parking after 5pm.
 I can't see why there is a need for a commercial development in a place like this.
 I don't like it absolutely! I think its only place where you can enjoy silence of nature, voices of birds, fishing, relax mentally. Bringing cafes, restaurants will ruin it's pureness, please don't change anything.
 I enjoy it most for the natural attributes. I can get a beer down the road!
 I enjoy the nature and scenery as well as pubs and cafes.
 I enjoy the tranquillity of the area, though an addition to parts of the foreshore for entertainment is good.
 I prefer the natural look.
 I still want to be able to walk okay and see the river.
 I think that the parkland should be left naturally for the people not for businesses. Afraid of pollution in the river from the facilities.
 I'm mixed, it will make more people access but negatively affect beautiful environment. Free parking.
 If doesn't affect the wildlife its fine, however it can be too noisy.
 If it is done correctly.

If managed correctly - environment impact a concern.
 Entice more people into the area - get people more down this end of Perth.
 It looks like good to being take - away facilities.
 it will bring more people and great spot to have lunch or coffee.
 It will detract from the natural beauty of the park.
 It would be too crowded, not naturally anymore.
 It'll liven up the area at night and good for WA economy provided not too much natural environment is damaged to accomplish this.
 It'll ruin the view and atmosphere, unnecessary for area.
 Its pretty big.
 Just get on with it, refer to above.
 Kills the serenity.
 Leave as natural as possible.
 Lisa Scaffidi is detracting from other developments, ruining the natural aesthetic. Elizabeth Quay Riverside development are urban, why change something so natural?
 Looks fantastic, great location.
 Looks so unnatural and too commercialised, only for high incomes.
 Lose the wilderness feel about the area.
 Losing 'wildlife' aspect.
 Loss of rare natural landscape.
 Make it busier with less natural beauty.
 may detract from the peacefulness.
 More exercise equipment.
 More facilities is always good in my opinion.
 More toilets.
 More visitors and better view.
 Negative as it will take away from the natural beauty but positive that access will be easier for everyone and no construction site anymore.
 New place to go out close to home.
 Nice for tourism.
 No alcohol.
 Not a fan of alcohol near public spaces.
 Not opposed to minor commercial well managed development by the river.
 On one hand nice to see the waterfront more utilised but South Perth would have been better.
 The development will ruin the natural beauty of the area.
 Open up more social aspects.
 Other areas of Perth are being built up for all the above activities. In my opinion, it is very sad that every inch of the river needs to be commercialised. Why can't we leave some pockets for a quiet retreat and for wild life to find a spot.
 Please deal with the flies.
 Point Fraser is an oasis in the city, this will ruin it.
 Positive in terms of bringing people to enjoy it and being able to eat here and watch the river.
 Negative in terms of the increased volume of people and their associated rubbish.
 Positive more attractions, entertainment. Negative, bit more people, noise, pollution.
 Retail is poor in WA. Cafes are going under all over the place - do we need anymore.
 See above (16) - more refreshments and interactive activities.
 Some good some bad
 Sufficient of these facilities in the city and East Perth. Its nice the way it is.
 The beauty of Point Fraser is its natural environment. Further development will ruin its charm and the reason people visit.
 There will be good and bad things as a result - hopefully the changes are managed in a good way - maybe they should note of EQ development for how to best manage with low to no impact. Areas change, if done well should be ok but if not done well will be bad.
 This is all about providing tourist type facilities for the rich - Elizabeth Quay, Rottnest, Crown, new footy oval location for Colin, Packer and their mates.
 This is not the right place for this type of development. Will bring too much traffic.
 Too much development in sensitive areas.

Totally destroy the intention of the area (ie example of Swan River wetlands from pre development area).

Unnecessary addition.

Unsure on the change based on picture.

Very positive.

We walk around the river on a weekly basis and will stop here for coffee, lunch etc instead of other places.

Will detract from natural beauty and add crowds!

Will be good to have a place to eat after kayaking.

Will destruct / disrupt quiet location / environment.

Will detract from relaxed feeling you get when you wander through - will become more a tourist attraction.

Will improve interaction with water.

Will stop.

Will take from natural beauty. Facilities a good idea but not in this area.

Yes

Yes it would be great.

11.10 APPENDIX J – COMMENT ON NEW FACILITIES AND IF THEY FIT THE PLACE AND SPACE OF POINT FRASER.

Survey round	Comment on if the new facilities fit with the place and space of Point Fraser
Round 7	<p>As it will not effect the view, and still provide education facilities.</p> <p>As the majority of the area is nice and natural</p> <p>Can't do any harm. Presumably will provide additional activities and use of river which seems lacking at moment.</p> <p>Currently a quiet, natural space. Development will disturb that.</p> <p>Detracts from the natural beauty there are other waterside developments within walking distance.</p> <p>Development needs to happen and if it is done sympathetically to the environment then it can be a space that will be utilised and enjoyed by many.</p> <p>Don't know the plans.</p> <p>Enough room for both.</p> <p>Gorgeous.</p> <p>Great to showcase this great city to the world and us!</p> <p>I don't know.</p> <p>Infrastructure is being added to nature reserve.</p> <p>It fits with the development of the waterfront and will be important for the growth and improvement of Perth.</p> <p>It was once a park, it has been overtaken by car park and development.</p> <p>Its a great area.</p> <p>Leave it as it is</p> <p>Make sure it would co-existing with the</p> <p>Nature - not building</p> <p>Not sure</p> <p>Not sure.</p> <p>Parking in adequate.</p> <p>Probably not. But as long as it is managed well with ample parking, security and maintenance of the grounds and rubbish in the area, it should be a wonderful venue.</p> <p>See above.</p> <p>Sort of.</p> <p>The city is growing so I expect more development however if its low impact on the area, that's ok. A cafe is a good idea as it would let you stop and enjoy the area rather than just walking through.</p> <p>This is a natural place where the environment takes precedence. A great big building would completely change the ambience.</p> <p>This seems like a more 'natural' park of the Perth foreshore and development will put an end to this.</p> <p>Too much development happening. How can people enjoy the beautiful of Perth with so many buildings going up.</p> <p>Unsure</p> <p>Wait and see</p> <p>Yes and no, maybe the development could be a bit on the large size for the area and take away the 'take away' facilities as they would create too much litter around the place.</p>
Round 8	<p>Already there are other developments in the area.</p> <p>As above - A cafe, yes, the rest no. Centre for information for school parties / tourists but that's it.</p> <p>As above, there are enough facilities for people to purchase items in the way of food, dining, socialising etc.</p> <p>As long as there is space for people to walk, ride around.</p>

As per above.
 Better facilities.
 Better sign design, more wooden seats are more appealing.
 Bush layout not building layout.
 Can stop on our way through for a drink.
 Can't wait for it to be functioning.
 definitely not.
 Depends on what you want it to be.
 Design looks too big and intrusive. Doesn't look like it has been 'built into' the environment sufficiently.
 Don't belong on rivers.
 Don't know enough about the development.
 Don't know well enough to say.
 Don't ruin it too much. More designated picnic areas with shade.
 Enough similar developments in Perth, they are boring and out of place.
 Great location being right on the river - great news.
 Great to have riverside development.
 I am unsure of the alcohol laws that appear. I think this should remain an individual matter.
 I think it should be more about nature, the scenery as I love walking along Point Fraser.
 I think it would be better elsewhere.
 I was not aware until now of the nature of the construction. It will spoil the natural beauty of the area.
 If done carefully.
 If done responsibly so as not to take away from natural beauty.
 If planned and done right.
 If we have to have beer/coffee/food everywhere in the city it does not say much for our idea of variety.
 It is a small location, Herrison Island would be a better location.
 It is needed as I feel the area is not being utilised to its ability.
 It is too far away to have a significant impact.
 It should focus on nature and not shopping. Some development may be needed however this presented above may be too much. It could scare away some animals, birds and fish kinds.
 It would be like a stupid tourist resort for making money.
 It's amazing place. It will be good to improve but also important to take care of the place, about security and nature.
 It's enough places in city to eat and entertain. It's good place for walking, sport, family, kids and just relaxation mentally out of all modern world.
 Learn from China - people do not like development too close to the river, its obstructive for people.
 Like nature as is today.
 Looks great.
 Looks like Hillarys which is cool.
 may make it too commercial.
 Maybe not to this space but a coffee shop and focal point for area.
 Maybe to small place for lots of people coming.
 More people will come here and experience the wider surrounds.
 More people would visit this place.
 More to do at this end of the city.
 Most likely yes!
 Need to draw more people.
 No Elizabeth Quay please.
 Not sustainable, no conservation concept.
 Now this place looks like nature.
 On a limited, modest scale only.

Perth has enough restaurants etc. Natural bush in heart of Perth is a treasure.
Possibly push developments towards Lucky Shag area?
Quite impressed with what have seen so far, looking forward to seeing it when finished!
Reasons stated above.
See above - Losing 'wildlife aspect'.
See above - The beauty of Point Fraser is its natural environment. Further development will its charm and the reason people visit.
See above - too much development in sensitive areas.
See above.
Seems more appropriate as a reserve.
Seems pretty perfect as it is!
Should be more developed.
Smiley face
Terrible idea.
The area towards the city/bell tower are already being seriously developed, is that not enough?
There are already many places like that and not enough of nature.
There are plenty of other bars, restaurants and more on the way, why does the City of Perth want to add more of these types of things but not add more parks.
This is a park and the development seems too big for Point Fraser.
Why do we want to look like Melbourne / QLD?
Will change ambience.
won't know until it happens.
Would hope it does not take away from the natural environment / peaceful appeal of your beautiful location.
Would prefer to keep it as is.
Yes with Elizabeth Quay in development its appropriate for this end to do something too.
Yes. because is next to city.
