



Two Rivers Traffic Management Plan

A Strategy for Sharing Melbourne's Rivers and Bays

Prepared for
Parks Victoria

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1. *Executive Summary*

Purpose

The Yarra and Maribyrnong Rivers and Port Phillip are a major focus of commercial and recreational activity in Melbourne. Australia's busiest container port, commercial tourist operators, private motorised boats and recreational rowing shells share use of a finite area of water. Activity on the water is forecast to increase 50 to 70 % for most traffic types by 2015. The two rivers have limited capacities to accommodate more traffic due to their narrowness and existing levels of use. The challenge for traffic management is to balance the competing interests of users of this limited resource, while maintaining the many commercial, social and environmental values of the waterways.

The Yarra River Waterways Committee (Parks Victoria, Melbourne City Council, Marine Safety Victoria, Port of Melbourne Corporation and VicUrban) has responded to this challenge by commissioning the Two Rivers Traffic Management Plan. The plan makes recommendations for planning and managing traffic for the Yarra River from Dights Falls to Port Phillip, the Maribyrnong River from Canning Street Bridge to the Port of Melbourne, and Port Phillip from the mouth of the Yarra River to Fawkner Beacon.

The Two Rivers Traffic Management Plan has the following aims:

1. Determine the capacity of the Yarra and Maribyrnong Rivers and Port Phillip to meet the growing demands of increased vessel movements;
2. Identify management systems and infrastructure that may be required to control vessel and ship traffic in a safe and sustainable manner for the benefit of all river users;
3. Develop a management strategy for the control of recreational and small commercial river traffic for the study area;
4. Identify performance measures for river traffic as a trigger for implementing management systems or infrastructure required to control river traffic; and
5. Optimise river usage while maintaining a sustainable physical and user-friendly environment.

Study method and outputs

The Two Rivers Traffic Management Plan consists of four main components:

1. *Inventory*
A detailed inventory of the physical characteristics of the waterways. Geographic data and locations of all major facilities were recorded and mapped in Geographic Information System (GIS).

A preliminary assessment of erosion risk of the banks was conducted. Existing reports and river traffic survey data were reviewed.

2. *Management and User Group Interviews*

Various management organisations and user groups were interviewed in detail to obtain their views on river traffic management and the issues important to them. Feedback from interviews was used in the following ways:

- a. To formulate management recommendations;
- b. As an input to the simulation scenarios in the form of estimates of future traffic volumes and potential new future facilities;
- c. As an input to the simulation scenarios in the form of alternative management actions to be tested.

3. *Level of Sustainable Activity Workshop and Interviews*

The Level of Sustainable Activity (LSA) component firstly used the statistics and information collected in the inventory component to formulate a series of possible traffic levels for each of the zones of the rivers. Table (i) shows the relationship between quality of service, LSA levels and boat density for rowers and paddlers and motorised vessels.

Level of Sustainable Activity	Rowers/Paddlers		Motorised Commercial and Recreational		Quality of Service
	Area/Boat	Boats/Ha	Area/Boat	Boats/Ha	
A	10,000 m ²	1	10,000 m ²	1	Highest
B	5,000 m ²	2	5,000 m ²	2	
C	2,500 m ²	4	2,500 m ²	4	
D	769 m ²	13	1,250 m ²	8	
E	625 m ²	16	714 m ²	14	Lowest

Table (i) Level of Sustainable Activity vessel density definitions for Rowers/Canoeists and Motorised vessels. LSA level A is the lowest density and the highest quality of service. LSA level E is the highest density and lowest quality of service.

LSA focus group workshops then collected the preferences and views of the main user groups of the waterways about existing and future traffic levels and river facilities. The LSA workshops asked river users to rate existing peak and maximum tolerable traffic levels on the water. The LSA component results were used to:

- a. Formulate management recommendations
- b. Analyse and evaluate the results of the simulations to determine if and when the river reached capacity in terms of users perceptions of safety and experience.

4.

Simulation

The fourth component of the Two Rivers Traffic Management Plan involved building a series of simulations of existing and forecast future traffic levels. The outputs of the simulations gave a spatial view of the changes in traffic densities and volumes from 2005 to 2010 and 2015. The Level of Sustainable Activity results were a crucial input to evaluating the simulations.

Key issues addressed by the study

Results of this study have shown that for the Active Recreation Zone and the Commercial Zone on the Yarra River, users are already of the view that the river traffic is at or nearing capacity at peak periods of use. Results of interviews and the pattern of use generated through traffic simulation show that users have been adapting their pattern of use to reduce conflicts by separating themselves in time or space. However as the river reaches capacity these self-management techniques are beginning to fail as is evidenced by conflicts between commercial operators and rowers.

Simulations of projected use for the next 5 and 10-year periods have shown that there will be a dramatic increase in peak period traffic, both in volume and duration. In many cases use of the river by different groups will coincide much more both spatially and temporally. The results of the simulation show that traffic volumes will more than triple in the next 5 years with motorised recreation emerging as the dominant use across the entire system.

The following is a brief summary of the key issues in the report:

- A common theme from the workshops was the lack of understanding and compliance with vessel operating and zoning rules by users. The perception by stakeholders is that there is no enforcement of the vessel operating rules on the waterways.
- Improved communication between the various user groups and the waterway manager is required to avoid frustration between groups.
- Incidents (eg near misses and collisions) are not being reported to Marine Safety Victoria by both commercial and recreational. This is an important source of information for the management of the waterways.
- Balancing the growing demand for water based events on both rivers and within Victoria Harbour is required with the increase in users and risk management requirements.
- Developments adjoining the waterways rarely consider the impact on river traffic capacity. It is important to ensure that the river traffic model is used to assess these impacts.
- The current patterns of river use mirror the desires of the users. As capacity reaches its limits it is likely that a schedule will need to be developed to ensure equity of access particularly for rowers.

- Deployment of floating infrastructure on the waterways requires consultation with waterway users.
- The development of the “river traffic model” provides a tool to understand the impact of future development on river capacity. The currency and quality of the data that the model draws upon is critical to its relevance in the future. Monitoring data is required to validate and calibrate the model.
- The current simulation model is limited in its application; issues such as the interaction between individual vessels have not been modelled. This leaves a gap in its capability to assess the impacts of changes to navigation rules, or the effect of blockages in the system.

Summary of key recommendations

The report contains recommendations in relation to sections (zones) of the waterways as well as recommendations that apply in general to river traffic management. The following is a summary of the recommendations.

General Recommendations

1. *Yarra River Waterways Committee to undertake traffic monitoring and reporting;*
2. *Yarra River Waterways Committee to further refine, calibrate and develop river monitoring and management tools;*
3. *Yarra River Waterways Committee in consultation with the Victorian Water Police to develop a comprehensive compliance plan for the Two Rivers;*
4. *Parks Victoria to develop Users Forums for the Yarra River and the Maribyrnong River;*
5. *Marine Safety Victoria to lead improvement to the incident reporting process;*
6. *Parks Victoria to require use of its Event Management Framework to inform decision making regarding the type of waterway closure required;*
7. *Parks Victoria to work with local government and other government agencies to review development proposals and their impact on waterway use;*
8. *Rowing Victoria to coordinate rowing club and school training schedules;*
9. *Parks Victoria to provide information about changes to the litter trap locations and other temporary facilities placed in the waterways.*

Port Zone Recommendations (Yarra River downstream of Bolte Bridge, Maribyrnong River downstream of Shepherds Bridge to the mouth of the Yarra River)

1. *Parks Victoria to monitor the effect of the speed limit changes within the Port zone;*
2. *Port of Melbourne Corporation to review the signage within the Port;*
3. *Parks Victoria and Port of Melbourne Corporation to improve monitoring and recording of ships and other vessels within the Port.*

Marina / Transit Zone Recommendations (Yarra River between Bolte Bridge and Charles Grimes Bridge including Victoria Harbour)

1. *Maintain access for elite rowing in the Marina Transit Zone on the Yarra River;*
2. *VicUrban and Parks Victoria to monitor river traffic to determine the number and pattern of use of private motorised trips generated by new berths;*
3. *Parks Victoria in consultation with VicRoads to investigate opportunities to improve lighting under Charles Grimes Bridge.*

Commercial Tourist Zone Recommendations (Yarra River between Charles Grimes Bridge and Princes Bridge)

1. *Parks Victoria in consultation with commercial vessel operators to undertake a review of the vessel operating rules that apply to the Commercial Tourist Zone in light of the projected increase in river traffic;*
2. *Parks Victoria to develop a system to monitor traffic at commercial berths.*

Active Recreation Zone Recommendations (Yarra River between Princes Bridge and Herring Island)

1. *Rowing Victoria to improve certification and training of rowing coaches supported by Parks Victoria;*
2. *Rowing Victoria to improve the management of partial river closures supported by Parks Victoria;*
3. *Parks Victoria to work with Rowing Victoria to phase out the use of megaphones by rowing coaches;*
4. *Parks Victoria and Local Government to encourage future expansion of rowing activity away from the Active Recreation Zone;*
5. *Parks Victoria and Melbourne City Council to investigate an upgrade of the Jeffries Parade staging to a contemporary standard;*
6. *Parks Victoria to review vessel operating rules and monitor river use to determine if and when active management is required;*
7. *Melbourne Water to continue the implementation of the Lower Yarra River Waterway Management Activity Plan.*

Passive Recreation Zone Recommendations (Yarra River between Herring Island and Dights Falls)

1. *Limit the development of destinations within this zone to manage use by private and commercial motorised vessels.*
2. *Parks Victoria with the assistance of Local Government to undertake a review of the river traffic capacity within this zone;*
3. *Parks Victoria to work with Rowing Victoria to phase out the use of megaphones by rowing coaches;*
4. *Rowing Victoria to improve certification and training of rowing coaches supported by Parks Victoria;*
5. *Melbourne Water to continue the implementation of the Lower Yarra River - Waterway Management Activity Plan.*

Maribyrnong Zone Recommendations (Shepherds Bridge to Canning Street Bridge)

1. *Parks Victoria in consultation with Maribyrnong Council to investigate the need for expanding the rowing facilities in Footscray Park;*
2. *Initiate a River User's Forum to formulate the appropriate levels and types of traffic for the Maribyrnong Zone;*
3. *Melbourne Water to continue of development of a Waterway Management Activity Plan for the Lower Maribyrnong River and implement.*

Bay Zone Recommendations (Mouth of the Yarra River to Fawkner Beacon, including Hobsons Bay)

1. *Parks Victoria to implement scheduled berthing at Gem Pier Williamstown;*
2. *Port of Melbourne Corporation to improve communication with recreational vessel operators regarding the vessel operating rules pertaining to the channel.*

2. Introduction

The Yarra and Maribyrnong Rivers and Port Phillip are a major focus of commercial and recreational activity in Melbourne. Australia's busiest container port, commercial tourist operators, private motorised boats and recreational rowing shells share use of a finite area of water. Activity on the water is forecast to increase 50 to 70 % for most traffic types by 2015. The bay and, in particular, the two rivers have limited capacities to accommodate more traffic due to their narrowness and existing levels of use. The challenge for traffic management is to balance the competing interests of users of this limited resource, while maintaining the many commercial, social and environmental values of the waterways.

The Yarra River Waterways Committee (Parks Victoria, Melbourne City Council, Marine Safety Victoria, Port of Melbourne Corporation and VicUrban) has responded by commissioning GeoDimensions to prepare the Two Rivers Traffic Management Plan. The plan makes recommendations for planning and managing traffic for the Yarra River from Dights Falls to Port Phillip Bay, The Maribyrnong River from Canning Street Bridge to the Port of Melbourne and Port Phillip Bay from the mouth of the Yarra River to Fawkner Beacon, as shown in Figure 1 below.

The Two Rivers Traffic Management Plan has the following aims:

1. To determine the capacity of the Yarra and Maribyrnong Rivers and Port Phillip Bay to meet the growing demands of increased vessel movements.
2. Identify management systems and infrastructure that may be required to control vessel and ship traffic in a safe and sustainable manner for the benefit of all river users.
3. Develop a management strategy for the control of recreational and small commercial river traffic for the study area.
4. Identify performance measures for river traffic as a trigger for implementing management systems or infrastructure required to control river traffic.
5. Optimise river usage whilst maintaining a sustainable physical and user-friendly environment.



Figure 1: The Two Rivers Traffic Management Plan Study Area

A number of reports have previously been completed as components of The Two Rivers Traffic Management Plan:

Reports

Stakeholder Consultation Plan

Identifies the major stakeholders and outlines the methods used to contact and obtain feedback from stakeholders.

Facility and Bank Inventory

Data collection and storage strategy for field and research based collection of information about existing facilities including Geographic Information.

River Traffic Surveys 2004

A system wide detailed river traffic count undertaken by Australasian Traffic Surveys.

Peak Hour Capacity Analysis – Southgate Berths

A detailed queuing based study of the capacity of the commercial berths at Southgate.

Commercial Berth Study – Analysis of Service Times

A detailed analysis of the waiting times for shared commercial berths at Southgate.

Summary of Commercial Operator Interviews

Report of the collated information obtained from telephone-based interviews with commercial operators conducted in early 2005.

Summary of Rowing Club Interviews

Report of the collated information obtained from telephone based interviews with rowing club contacts conducted in early 2005.

Level of Sustainable Activity (LSA)

A Decision Making Framework for Sharing the Two Rivers

Definition of a decision-making framework for evaluating traffic volumes and river capacity from a user's perspective.

Assessment of Boat Traffic Impacts on Bank Stability

An erosion risk evaluation for the river banks within the study area.

Simulation Scenario Results

Results of two additional simulation scenarios constructed to test two possible management options:

- Proposed changes in speed limits in the Two Rivers Study area – Port Zone.
- Closure of the river upstream of Princes Bridge to motorised traffic during peak rowing times.

Refer to the technical appendix for these background reports.

3. *Study Methodology*

The Yarra, Maribyrnong and Port Phillip waterways are complex environments. Located in an urban environment, their physical characteristics are diverse. Large shipping docks, commercial tourist berths, boat launching ramps and active recreation clubs support a diverse range of river traffic from cargo ships to commercial tourist operators, private motorised craft and rowers. These users share use of a restricted area of water and naturally have their own, sometimes-divergent views about how they and others they share the river with should be managed.

River traffic management must:

- Balance the competing demand of a diverse set of different types of users
- Maintain and enhance the significant commercial values of the water in terms of the operation of the Port of Melbourne and commercial tourist operators who operate throughout the study area
- Consider the safety and quality of experience of the many recreational users of the water
- Consult and incorporate the views of the many users and groups of the two rivers and bay.
- Consult and incorporate the views of the many organisations involved in managing traffic on the two rivers and bays.

A multi-faceted approach is required to meet these requirements. Figure 2 below describes the approach taken in the Two Rivers Traffic Management Plan.

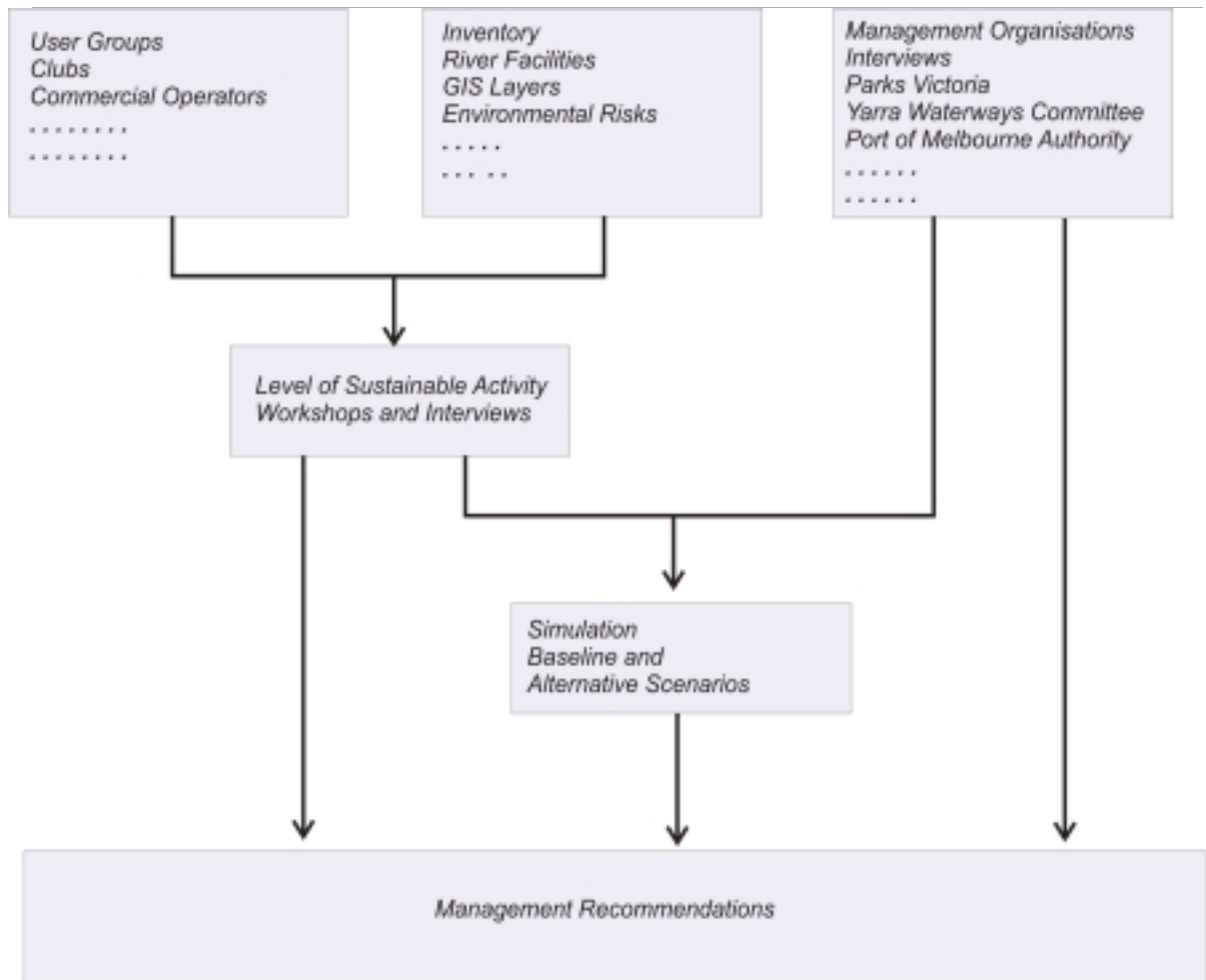


Figure 2 Overview of the Two Rivers Management Plan Methodology

The Two Rivers Traffic Management Plan consists of four main components:

1. *Inventory*
A detailed inventory of the physical characteristics of the waterways. Geographic data and locations of all major facilities was recorded and mapped in Geographic Information System (GIS). The inventory conducted a preliminary assessment of erosion risk of the banks.
2. *Management and User Group Interviews*
Various management organisations and User groups were interviewed in detail to obtain their views on river traffic management and the issues important to them. Feedback from interviews was used in the following ways:
 - a. To formulate management recommendations;
 - b. As an input to the simulation scenarios in the form of estimates of future traffic volumes and potential new future facilities;

- c. As an input to the simulation scenarios in the form of alternative management actions to be tested.

3. *Level of Sustainable Activity Workshop and Interviews*

The Level of Sustainable Activity (LSA) component firstly used the statistics and information collected in the inventory component to formulate a series of possible traffic levels for each of the zones of the river. Table 1 shows the relationship between quality of service, LSA levels and boat density for rowers and paddlers and motorised vessels. LSA A is the lowest density and the highest quality of service and LSA E is the highest density and the lowest quality of service.

Level of Sustainable Activity	Rowers/Paddlers		Motorised Commercial and Recreational		Quality of Service
	Area/Boat	Boats/Ha	Area/Boat	Boats/Ha	
A	10,000 m ²	1	10,000 m ²	1	Highest
B	5,000 m ²	2	5,000 m ²	2	
C	2,500 m ²	4	2,500 m ²	4	
D	769 m ²	13	1,250 m ²	8	
E	625 m ²	16	714 m ²	14	Lowest

Table 1 Level of Sustainable Activity vessel density definitions for Rowers/Canoeists and Motorised vessels. LSA level A is the lowest density and the highest quality of service. LSA level E is the highest density and lowest quality of service.

LSA focus group workshops then collected the preferences and views of the main user groups of the waterways about existing and future traffic levels and river facilities. The LSA workshops asked river users to rate existing peak and maximum tolerable traffic levels on the water. The LSA component results were used to

- a. Formulate management recommendations
- b. The Level of Sustainable Activity results were the primary means by which the results of the simulations were analysed and evaluated. The Level of Sustainable Activity results were used to interpret the results of the simulations to determine if and when the river reached capacity in terms of users perceptions of safety and experience.

4. *Simulation*

The fourth component of the Two Rivers Traffic Management Plan involved building a series of simulations of existing and forecast future traffic levels. The outputs of the simulations gave a spatial view of the changes in traffic densities and volumes from 2005 to 2010 and 2015. The Level of Sustainable Activity results were a crucial input to evaluating the simulations. Two alternative management options of river closures and speed limit changes were tested in the simulation process. The simulation methodology is described in further detail in Two Rivers Traffic Management Plan Appendix.

4. Management Zones and Results

4.1 Introduction



As traffic conditions, vessel types and facilities vary widely across the study area it has been divided into seven management zones as shown above in Figure 3.

- Port Zone
- Maribyrnong Zone
- Marina/Transit Zone
- Commercial Tourist Zone
- Active Recreation Zone
- Passive Recreation Zone.
- Bay Zone

Following are descriptions of the results for each of the seven zones. The results were used to formulate the management recommendations contained in Chapter Four.

Each zone section is organised into the following sections:

- A table that describes the most significant physical features of the zone
- Level of Sustainable Activity results
- Simulation results and
- Discussion of results including their management implications including the risks posed by traffic levels to user safety, user satisfaction and the impacts of river traffic on bank erosion and noise levels.
- Recommendations for the Zone

Simulation Results

The simulation results section describes the results and implications for management of the three simulation scenarios for the zone. Three simulations for 2005, 2010 and 2015 were generated based on the assumptions of growth in each sector described in the previous section. All three runs use the same network and assume the traffic is travelling at speeds observed in early 2005. Simulations for each time period were replicated 10 times and results averaged. Each simulation produced detailed information about the location and time of each vessel as it enters and exits each river zone. This information is summarised to characterise the number of vessels in each river zone on an hourly basis through the simulation day as well as density measured in vessels per hectare.

The information was then compared to the user-based evaluations of desired densities as found in the Level of Service workshops to find:

- If, where and when the traffic on the waterways is reaching capacity?
- What management actions are available to manage traffic where capacity is currently or will be exceeded in the future?

4.2 Port Zone



Port Phillip Bay to Bolte Bridge

<i>Description</i>	<i>Value</i>
River Width in Zone	125-260m
Zone Length	6.1 km
Area of Navigable Water	205 ha
Bank Erosion Risk Rating	Low
Major Features	Westgate Bridge Footscray Wharf Riverside Business Park (Banco and Lonely Planet) Scienceworks Museum Warmies Boat Ramp Pier 35 Marina Village Port of Melbourne Westgate Park Westgate Punt Port of Melbourne Control Tower Duke and Orr Slipway Swinging Basins at: <ul style="list-style-type: none"> • Appleton Dock • Swanston Dock • Holden Dock

Table 3 Port Zone Characteristics

The Port Zone is important as a connector for vessels travelling into the Yarra from the Bay and the Maribyrnong River. It hosts the greatest diversity of traffic. The increasing volume of commercial and recreational traffic from Southgate and the Docklands to Williamstown and Port Phillip Bay is putting pressure on the shipping operations during peak periods. Level of Sustainable Activity (LSA) evaluations were not implemented for the Port Zone since the large area of the port made user evaluations of density problematic. However a major effort was made to forecast the pattern of use generated by the Docklands. The speed limit in the majority of the Port Zone is 5 knots the exception being a 10 knot zone between Westgate Bridge and the mouth of the Yarra River.

Port Zone Simulation Results

Table 4 shows total hourly traffic for the peak use day simulated over a 5 and 10-year period for the Port Zone. Traffic volumes more than double for most of the day by 2010 and continue to increase in the period up to 2015. The heavy traffic volumes are developing earlier in the morning and continuing later into the evening. This pattern is mainly due to the new recreational and commercial traffic generated by the development at Docklands. Traffic densities increase at a corresponding rate but never exceed 1 boat per hectare.

<i>Hour</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2005 Density</i>	<i>2010 Density</i>	<i>2015 Density</i>
6:00	3	3	6	0.02	0.02	0.03
7:00	10	20	23	0.08	0.10	0.16
8:00	19	39	44	0.15	0.19	0.31
9:00	27	78	92	0.21	0.38	0.62
10:00	37	87	107	0.29	0.42	0.69
11:00	38	93	121	0.30	0.45	0.74
12:00	43	112	135	0.34	0.54	0.89
13:00	47	110	129	0.37	0.54	0.88
14:00	43	117	133	0.34	0.57	0.93
15:00	35	100	124	0.28	0.49	0.79
16:00	49	117	131	0.39	0.57	0.93
17:00	32	87	108	0.25	0.42	0.69
18:00	33	88	110	0.26	0.43	0.70
19:00	49	117	129	0.39	0.57	0.93
20:00	34	94	115	0.27	0.46	0.75
21:00	21	81	92	0.17	0.40	0.65
22:00	8	69	81	0.06	0.33	0.54
23:00	6	46	54	0.04	0.22	0.36

Table 4 Hourly traffic volumes and densities for the Port Zone with projections for 2010 and 2015. Densities are vessels per hectare.

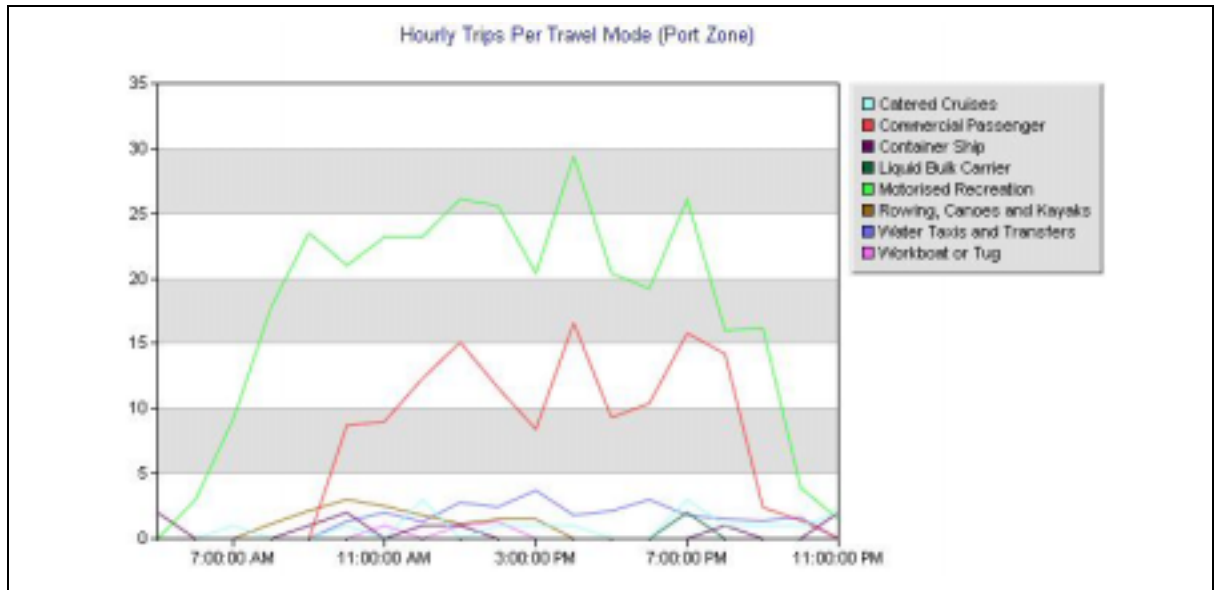


Figure 5 2005 hourly traffic for the Port Zone by Travel Mode

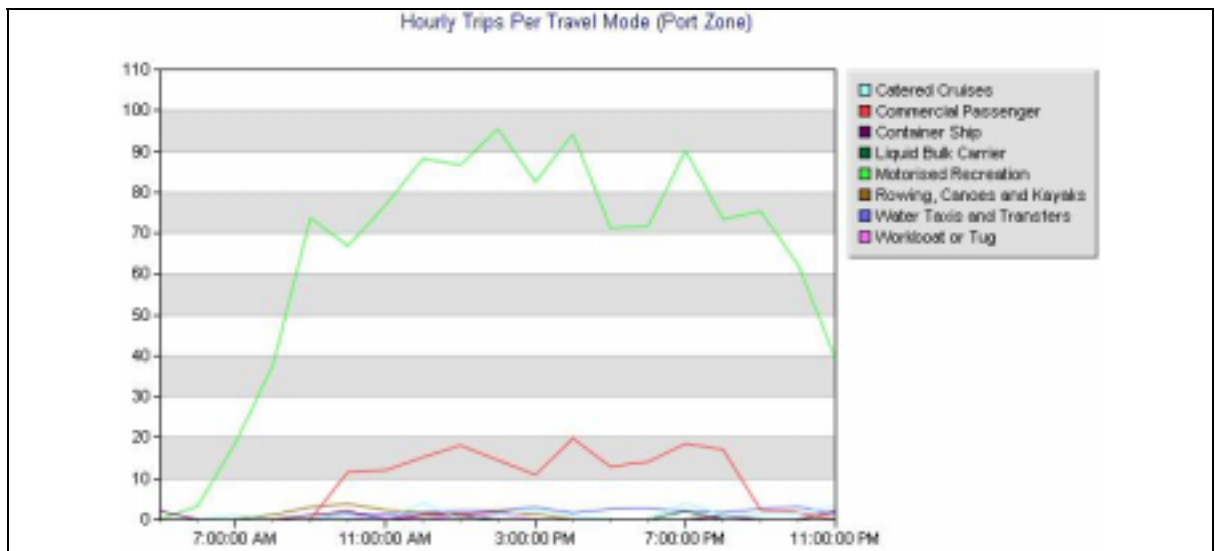


Figure 6 2010 hourly traffic for the Port Zone by Travel Mode

Figure 5 shows most of the current traffic during the day is motorised recreation and commercial passenger vessels.

Figure 6 shows a rapid increase in motorised recreation, generated by the new Docklands berths. Note peak volumes more than triple from 2005 to 2010 and heavy traffic (due primarily to increased motorised recreation vessels) extends earlier in the morning and later into the evening.

Figure 7 shows that in 2015 the pattern of use established in 2010 continuing. Motorised recreation and commercial passenger services are the main contributors to traffic over the day. The magnitude of increase from 2010 to 2015 is less than that from 2005 to 2010 as the Docklands residential and public berths finish coming on line and reach capacity limits.

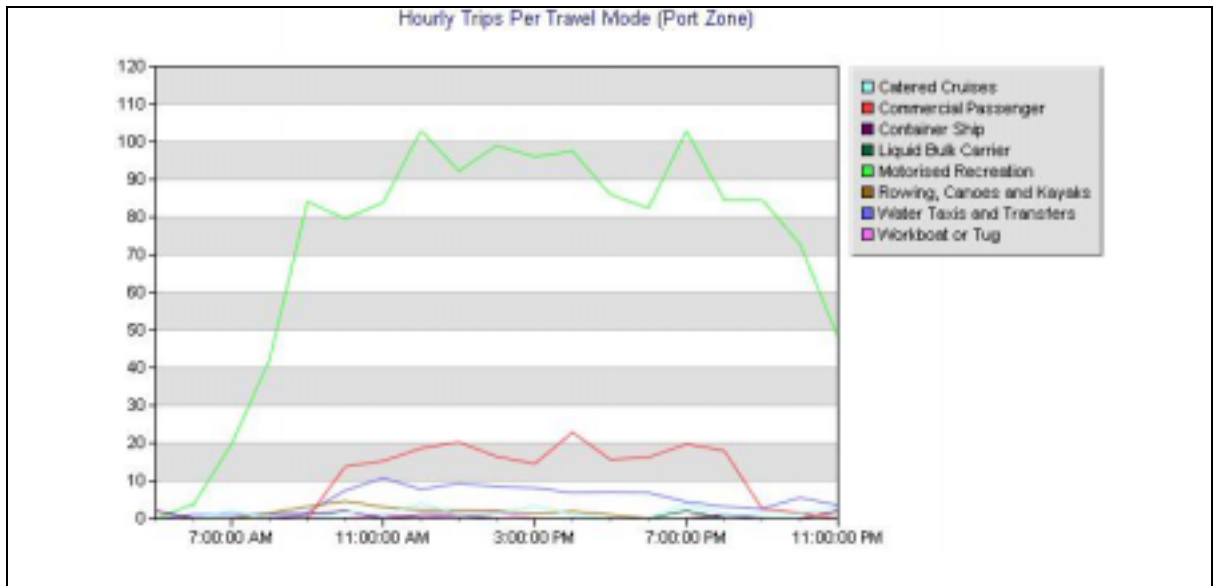


Figure 7 - 2015 hourly traffic for the Port Zone by Travel Mode

Speed Zone Simulation Scenario

The recommendations regarding changes to the speed limit in the port zone have been implemented. A copy of the summary of the modelling can be obtained from Parks Victoria on request.

Port Zone Traffic Management Issues

The large increase in commercial passenger and motorised recreation traffic in the Port Zone represent a major change from the current pattern of use. Without shipping movements in the Port, the projected use levels for 2010 and 2015 are still within acceptable levels for commercial passenger and recreational vessels in terms of navigational safety. However with ship movements in the port zone, projected traffic volumes for the Port Zone represent a potentially large impact on safety.

Increasing volumes of motorised recreational traffic is potentially problematic for the Port of Melbourne. Simulations for the next 5 and 10 years, suggest future traffic densities at levels where there is an increased risk of near misses, and collisions.

Remembering that these projections are based on best-educated guesses about the pattern of use generated by the Docklands development, it is imperative that Port Zone traffic be monitored systematically over the next 5 years. The monitoring program needs to give priority to the study of patterns of use for recreational motorised vessels originating from the Docklands and the Bay. The monitoring program should also examine the impact of increasing traffic volumes on commercial passenger services and commercial shipping.

New rules to ensure safe navigation of rowing boats through the port and improved navigation lighting are examples of the response to changing safety requirements as traffic in the Port Zone has increased in volume and new users enter the traffic mix. In addition to continuing this incremental approach to traffic management, the large increases in traffic volumes suggested by the simulation indicate that a more pro-active approach may be required in the future. For instance, strategies for traffic separation during shipping

movements should be considered. However the timing and detail of these strategies need to be based on better information than is available at present. A program of monitoring traffic coupled with consultation with river users will provide the basis for making proactive decisions for improving traffic management in the Port Zone.

Recreational users new to the area are likely to be unfamiliar with navigation rules in the Port Zone. A detailed communications strategy should be developed for the Port Zone to inform and educate the boating community about safety, exclusion zones, and navigational rules within the Port Zone.

Excessive wash from passing vessels at Pier 35 has reportedly caused damage to boats in the marina. With the large increase in motorised traffic in the Port Zone, compliance with speed limits and navigation rules is especially important. A comprehensive compliance plan including, improved educational material, signs and patrolling by authorised officers is essential to changing the current culture of non-compliance with speed limits and navigational rules.

The Port Zone has low erosion risk from bank erosion because of the highly constructed nature of the banks. All banks are either lined with concrete or large rocks.

Port Zone Recommendations

1. *Parks Victoria to monitor the effect of the speed limit changes within the Port zone.*
Marine Safety Victoria has approved a 5-knot increase in the speed limit for the waters between Westgate Bridge and channel marks 23 and 24. The impact of the increased speed limit needs to be monitored to assess the impacts on safety and reported back to the Yarra River Waterways Committee for information and action.

2. *Port of Melbourne Corporation to review the signage within the Port*
This review should consider the currency of information, location, legibility and graphic image. Many new recreational users will not necessarily know where the Port of Melbourne begins and ends or that there are special rules and regulations that apply to the Port Zone.

3. *Parks Victoria and Port of Melbourne Corporation to improve monitoring and recording of ships and other vessels within the Port*
While simulation has identified that predicted traffic volumes for the Port Zone may cause problems and require intervention, the only means of determining the actual magnitude and pattern of traffic in the Port Zone is to establish a monitoring program. The monitoring program should gather accurate information on:

- changes in traffic volume;
- peak periods of use;
- potential conflicts and traffic hazards;
- compliance to rules and regulations.

The Port of Melbourne Corporation has a detailed shipping management database that records all shipping movements from Port Phillip Heads into the Port Zone, however there

is no complementary system for recording movements of other vessels in the Port Zone. New monitoring efforts should be coordinated between the Port of Melbourne Corporation and Parks Victoria to ensure data compatibility and information required for a variety of purposes is collected in a coordinated fashion. Monitoring should be targeted during the peak season of use (summer months) if continuous monitoring is not possible. The Yarra River Waterways Committee should develop a coordinated river monitoring program that would not only track traffic volumes but also monitor speeds, and traffic conflicts especially during peak periods and when there are shipping movements in the Port Zone. This information can then be used to further refine and calibrate the simulation model and define more detailed management actions as the new berths in the Docklands development come on-line.

4.3 Marina / Transit Zone

Bolte Bridge to Charles Grimes Bridge



Description	Value
Typical Width	100-120m
Zone Length	1.4 km
Area of Navigable Water	59 ha
Bank Erosion Risk Rating	Low
Major Facilities	<ul style="list-style-type: none"> Bolte Bridge Telstra Dome Central Pier Commercial Berths MAB Docklands including private marina and public berths Victoria Harbour including commercial, private marina and public berths Yarra's Edge including private marina and public berths Spencer Street Station

Table 5 Marina Transit Zone Characteristics

The Marina Transit Zone contains the Docklands development and will provide as many as 1000 new berths by 2015. With the residential development will come a variety of restaurants, retail shopping, tourist businesses and entertainment venues. The Marina Transit Zone therefore will become a major generator of river traffic from its marinas as well as a key destination for boaters coming to the Docklands and mooring at the public berths.

Marina /Transit Zone Level of Sustainable Activity Results

Commercial passenger operators and rowers evaluated LSA levels for the Marina/Transit zone. There were good levels of agreement between the participants for each group. From December to February daily peak period of use for the commercial operators is from

11:00am until 3:00pm. Friday and Saturday evenings in December leading up to Christmas and Sundays from 12:00pm to 2:00pm are also particularly busy. Table 6 shows the results of the commercial operators evaluating LSA levels during their peak period of use. The table reflects the commercial operator's view that peak hour traffic is currently at or exceeding maximum tolerable densities. They also have very low tolerance of rowers in the Marina/Transit Zone during their peak periods of use, with the exception of elite rowers who have the experience to travel safely in mixed traffic.

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Commercial	B-C	B+	At Capacity
Rowers	A-B	(A)	Low tolerance during peak periods

Table 6 Results of LSA focus group workshop with Commercial Operators evaluating the Marina/Transit Zone

Table 7 shows the results of the LSA focus groups for rowers evaluating traffic during their peak period of use, from 6:00am until 10:00am. The Marina / Transit zone is used primarily by elite rowers who are generally accompanied by motorised boats. Rowers also use the zone as they transit to the Maribyrnong River or to Victoria Harbour. Rowers generally felt that there was excess capacity available in the Marina / Transit Zone. They thought there is little conflict at present with commercial boating since commercial trips generally do not start until near the end of the early morning training sessions. The marina manager at Yarra's Edge reported that residents enjoy seeing the activity of rowers in the zone and given the relatively wide width of the Yarra in this zone, capacity exists for additional elite rowing in the future.

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Rowers	A-B	B	Opportunity for Managed Use
Motorised	A-B	B+	Elite Rowers Only

Table 7 Results of LSA focus group workshop: Rowers evaluating the Marina/ Transit Zone

Marina /Transit Zone Simulation Results

<i>Hour</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2005 Density</i>	<i>2010 Density</i>	<i>2015 Density</i>
6:00	2	4	7	0.04	0.07	0.12
7:00	12	21	23	0.20	0.36	0.38
8:00	24	34	41	0.40	0.58	0.69
9:00	22	50	61	0.37	0.84	1.03
10:00	25	55	70	0.42	0.93	1.18
11:00	20	53	72	0.34	0.89	1.22
12:00	18	58	68	0.31	0.98	1.15
13:00	28	63	65	0.48	1.06	1.10
14:00	24	59	67	0.41	1.00	1.14
15:00	17	50	52	0.29	0.85	0.88
16:00	17	43	50	0.29	0.73	0.84
17:00	18	36	46	0.31	0.61	0.77
18:00	18	41	46	0.30	0.69	0.78
19:00	16	41	43	0.28	0.70	0.73
20:00	18	37	41	0.30	0.62	0.69
21:00	6	28	27	0.10	0.46	0.46
22:00	7	25	25	0.11	0.41	0.42
23:00	1	14	15	0.02	0.24	0.25

Table 8 Hourly traffic volumes and densities for the Marina/Transit Zone with projections for 2010 and 2015. Densities are vessels per hectare.

Table 8 shows total hourly traffic for the peak use day simulated over a 5 and 10 year period for the Marina/Transit zone. Figure 8 shows the 2005 traffic in this zone changes from elite rowing in the morning hours to commercial and motorised traffic from mid-morning into the afternoon. By 2010 the traffic volume is more than double the 2005 levels for most of the day. Note the large increase in motorised recreation. This trend continues into 2015, but at a slower rate due to the smaller increase in Docklands berths coming online from 2010 to 2015. More traffic however is easily accommodated in Marina/Transit Zone because of the relatively large area of 59.34 hectares. In 2005 the densities are well within LSA A, and in 2010 only LSA B is reached at mid-day from 1:00pm up to 3:00pm. In 2015 traffic level is rated as being LSA B class from 9:00am up to 2:00pm.

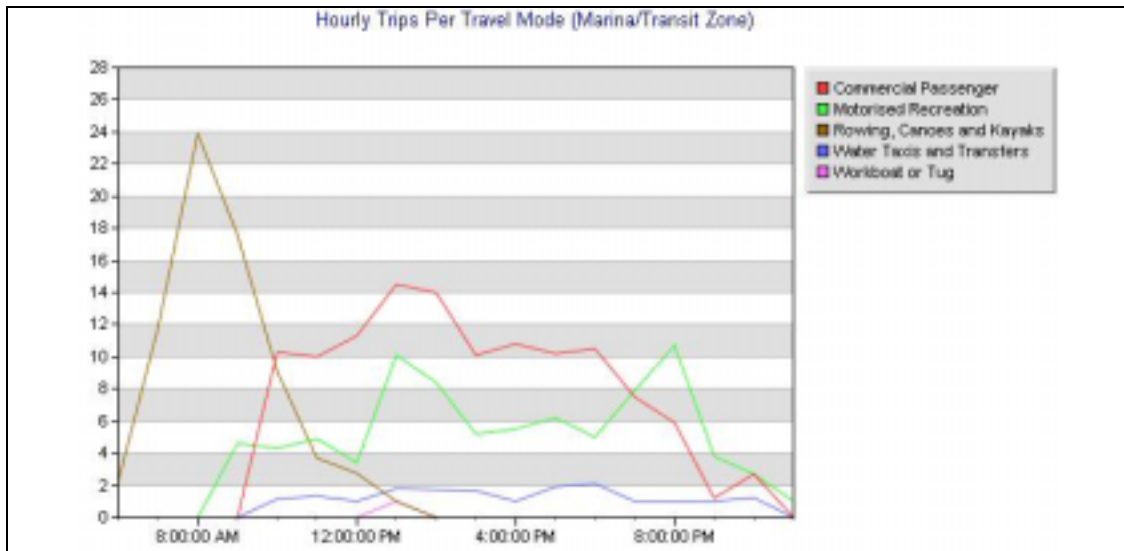


Figure 8 2005 hourly traffic for Marina/Transit Zone by Travel Mode

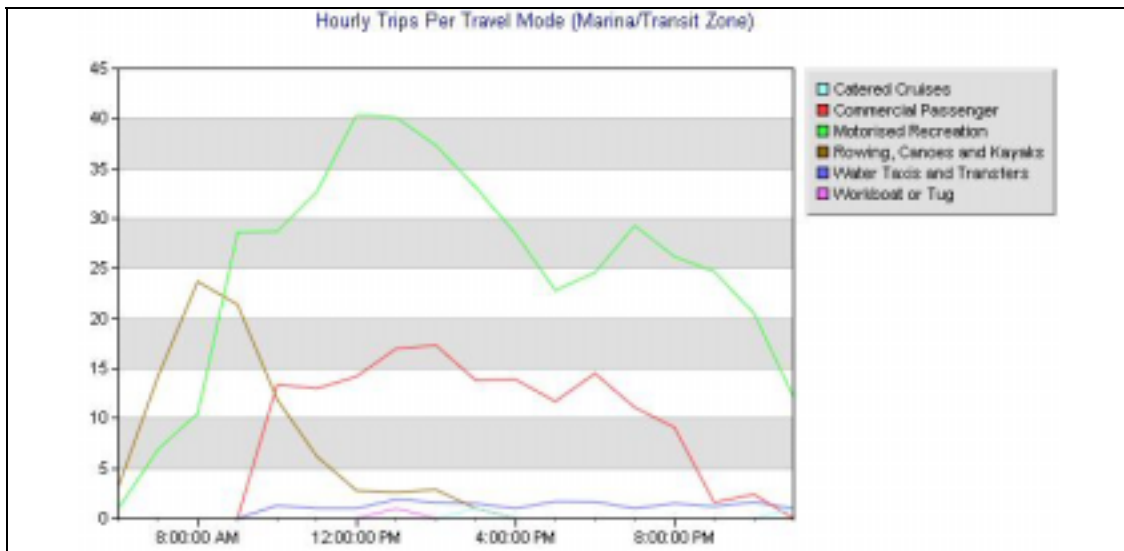


Figure 9 2010 hourly traffic for Marina/Transit Zone by Travel Mode

Figure 9 shows that by 2010 there is a big shift in use, with motorised recreation dominating use in the Marina/Transit Zone. This major trend is due primarily to the increase of local traffic from the Docklands Marinas to destinations upstream as far as Herring Island.

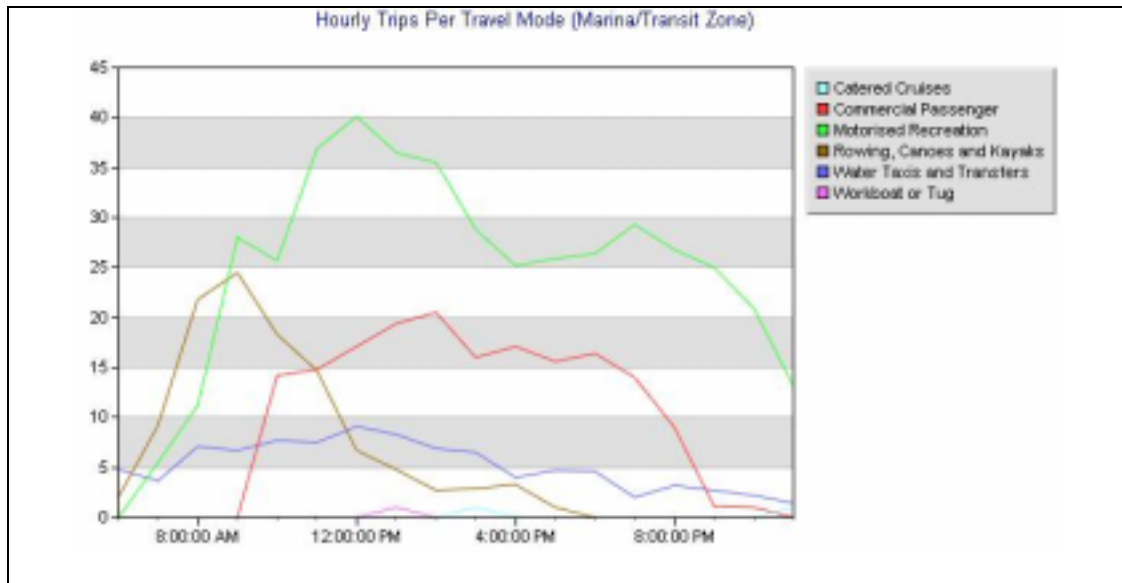


Figure 10 2015 hourly traffic for Marina/Transit Zone by Travel Mode

Figure 10 shows that by 2015 the pattern of use established in 2010 continues. Motorised recreation vessels compete with rowers and commercial vessels across the entire day.

Marina / Transit Zone Traffic Management Issues

The biggest issue arising from this data is the dramatic change in the mix of traffic from predominately rowing and commercial passenger vessels to motorised recreation. Rowers dominate current use in the early morning hours from 6:00am to 10:00am and commercial passenger services from 10:00am into the evening. The projected densities show that there is enough capacity to safely accommodate this increase. In the vicinity of Charles Grimes Bridge and Yarra's Edge potential congestion problems exist due to traffic in and out of Yarra's Edge and restrictions in traffic flow due to Charles Grimes Bridge.

The increase in numbers of motorised recreation vessels will have the greatest impact on rowers. Rowers may be displaced if motorised recreation traffic becomes too busy, especially in the morning hours. Speed restrictions will require strict enforcement in this zone in order to avoid excessive wake, especially for rowers sharing use of the zone.

Commercial Operators also reported poor visibility at night at Charles Grimes Bridge. Lighting beneath the bridge should be improved.

Docklands residents would like to see an increase in activity levels especially more rowing taking place around Yarra's Edge.

Bank Erosion in this zone is a low risk because virtually all banks are lined or protected with sea walls.

Marina / Transit Zone Recommendations

1. *Maintain access for elite rowing in the Marina Transit Zone on the Yarra River*

The stretch of the Yarra River between Charles Grimes Bridge and Bolte Bridge provides an ideal stretch of river for training for elite rowers as it provides one of the few straight stretches of river over a kilometre long. Elite rowers currently use this stretch of river in the morning hours from 6:00am until 10:00am. At present there is no conflict with other traffic during these hours. As the day progresses, traffic increases and wind conditions often become unfavourable for rowing. This pattern of use should be maintained with efforts made to ensure that future developments along the north bank of the Yarra River in the Marina/Transit Zone and traffic conditions generally, do not displace this use.

The simulations show the greatest threat to maintaining conditions suitable for rowing is motorised recreation traffic. This traffic will mostly transit through the zone, but the frequency of this traffic may lower the quality of service for rowers. The width of the river in this zone averages over 100 metres, which means there is sufficient width to accommodate both types of use. Parks Victoria, Rowing Victoria, Victorian Institute of Sport and Vic Urban should work jointly to ensure a long-term solution for the maintenance of rowing within the zone.

2. *VicUrban and Parks Victoria to monitor river traffic to determine the number and pattern of use of private motorised trips generated by new berths*

The projected use for 2010 and 2015, while certain to eventuate, is still highly speculative in terms of the exact volume and pattern of use. Given the significance that private motorised boating will contribute to overall river traffic, it is imperative that this use is monitored to more accurately determine the volume, timing and typical trips to and from the Docklands berths. This data should be collected on a regular basis during the peak summer use period to allow more accurate projections of overall pattern of use. This can have a significant impact on the direction and timing of management actions. Parks Victoria should coordinate this effort as part of an overall monitoring strategy for the two rivers (see section 4).

3. *Parks Victoria in consultation with VicRoads to investigate opportunities to improve lighting under Charles Grimes Bridge*

Commercial Operators have highlighted the need for better lighting under Charles Grimes Bridge. This will improve night time visibility and counteract the effects of glare from surrounding land uses.

4.4 Commercial Tourist Zone



Charles Grimes Bridge to Princes Bridge

<i>Description</i>	<i>Value</i>
Typical River Width in Zone	75-100 m
Zone Length	1.9 km
Area of Navigable Water	16 ha
Bank Erosion Risk Rating	Low
Major Features / Destinations	South Wharf Function Centre Polly Woodside / Melbourne Maritime Museum Melbourne Convention Centre Melbourne Exhibition Centre Crown Casino and Entertainment Complex Melbourne Aquarium Southgate and Commercial Tourist Berths Flinders Street Station Flinders Walk Landing Banana Alley Wharf Enterprise Wharves Princes Bridge

Table 9 Commercial Zone Characteristics

The Commercial Tourist Zone hosts a high level of traffic volumes mostly due to the high intensity tourist-oriented business along the south bank of the Yarra River and the high levels of pedestrian traffic generated by the zone's proximity to Melbourne's CBD. Many commercial passenger services originate or terminate in this zone. The zone also acts as a transit corridor for rowers and motorised recreation boats. Rowers in the Active Recreation Zone also turn downstream of Princes Bridge near the Southgate commercial berths causing conflict during the busy tourist season. Bank erosion is low risk in this zone because the banks are fully lined with concrete or stone walls.

Commercial Tourist Zone Level of Sustainable Activity Results

The Commercial Tourist Zone is currently used predominately by commercial passenger services. With many visitor attractions including Southgate, Melbourne Aquarium, Crown Casino, the Melbourne Exhibition Centre and Polly Woodside, this zone currently has a high level of pedestrian use and provides a strong market for commercial operations. The zone has heavy traffic not only because of the demand, but also because the zone is relatively small. Even if current traffic levels are within acceptable levels for users, the restricted navigable area means that there is little excess capacity.

Table 10 shows the results of the LSA focus group with commercial operators. It shows this group has low tolerance for mixed traffic with rowers and that the zone is nearing maximum capacity.

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Commercial	C+	C-D	Near Capacity
Rowers	A+	(A+)	Low tolerance to rowers

Table 10 Results of LSA focus group evaluations by Commercial Operators

Commercial operators also noted problems with poor night lighting at Spencer Street Bridge and on river bends. Also of concern was the training for new vessel captains. With the complexities of tidal effects, night conditions, river flows, flooding and competing river traffic it can take a year to “learn the ropes”.

Conflicts with other river users include “unpredictable behaviour” and speeding by motorised recreation vessels, unexpected turning by rowers, “verbal abuse” by rowers and coaches and rowing instructors often being unaware of safety issues with mixed traffic. However commercial operators generally agreed that all users have legitimate use of the river.

Commercial Tourist Zone Simulation Results

Table 11 shows total hourly traffic for the peak use day simulated for 2005, 2010 and 2015 within the Commercial Tourist Zone. Traffic volumes more than double between 2005 and 2010 and then level off approaching 2015 as marina capacities are reached. Densities of vessels increase rapidly in this zone because of its small area (16.27 Hectares). By 2010 densities typically reach LSA Level B at 11am and by 2015 LSA Level C is reached. In reality peak LSA levels are likely to be higher than those shown by the simulations. Areas with commercial berths and many bridges would be likely to be associated with localised traffic congestion making the LSA levels higher.

<i>Hour</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2005 Density</i>	<i>2010 Density</i>	<i>2015 Density</i>
6:00	2	3	5	0.12	0.19	0.28
7:00	6	10	14	0.37	0.65	0.84
8:00	8	20	26	0.52	1.22	1.58
9:00	11	29	38	0.70	1.79	2.35
10:00	16	34	48	1.01	2.07	2.98
11:00	18	46	52	1.10	2.81	3.18
12:00	15	38	43	0.93	2.30	2.64
13:00	19	39	43	1.20	2.39	2.64
14:00	19	40	43	1.16	2.47	2.65
15:00	11	26	32	0.69	1.61	1.97
16:00	13	29	35	0.82	1.78	2.15
17:00	20	33	34	1.20	2.01	2.09
18:00	17	31	32	1.06	1.88	1.94
19:00	12	24	28	0.75	1.45	1.70
20:00	11	22	26	0.65	1.33	1.62
21:00	5	18	22	0.33	1.09	1.32
22:00	8	19	19	0.51	1.17	1.17

Table 11: Hourly traffic volumes and densities for the Commercial Tourist Zone with projections for 2010 and 2015. Densities are vessels per hectare.

Figure 11 shows the pattern of use by travel mode. The early morning traffic is primarily elite rowers passing through the area to train between Charles Grimes Bridge and Bolte Bridge. Later in the morning the dominant traffic becomes commercial passenger and motorised recreation vessels. Commercial traffic declines sharply in the mid-afternoon, increases in the after-work hours and gradually declines into the evening.

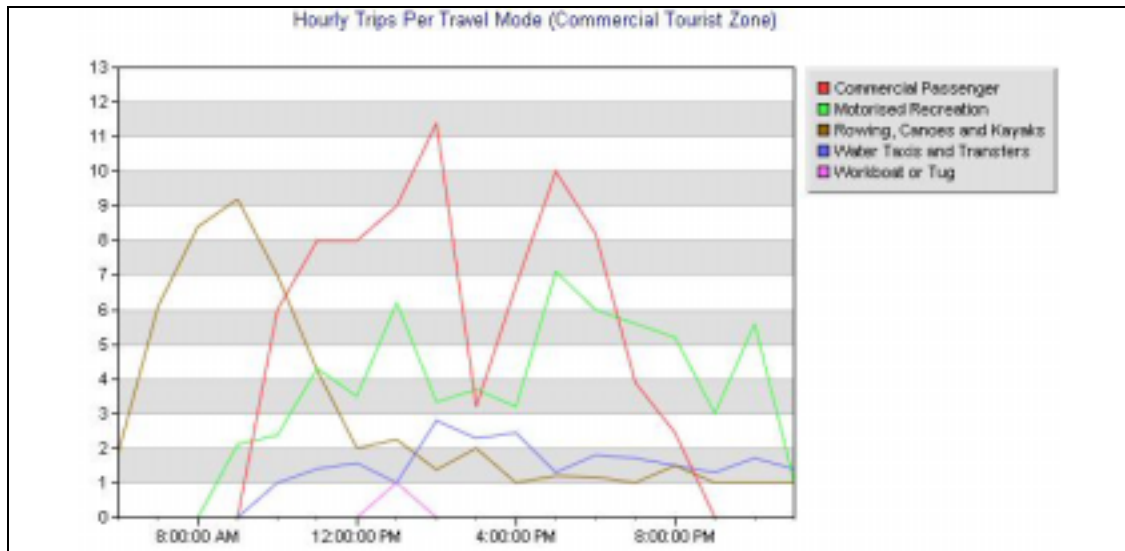


Figure 11 2005 hourly traffic for Commercial Tourist Zone by Travel Mode

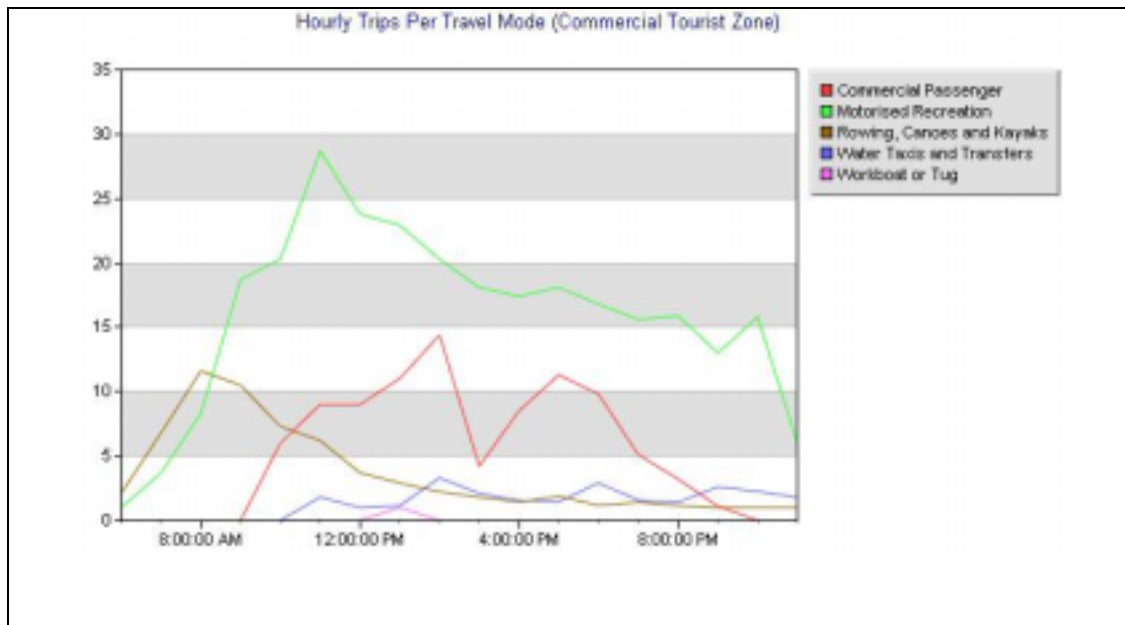


Figure 12 2010 hourly traffic for Commercial Tourist Zone by Travel Mode

Figure 12 shows that by 2010 motorised recreational traffic is the dominant use in the Commercial Tourist Zone due to the large number of Docklands berths now available.

Increased motorised traffic in 2010 will impact upon rowing.

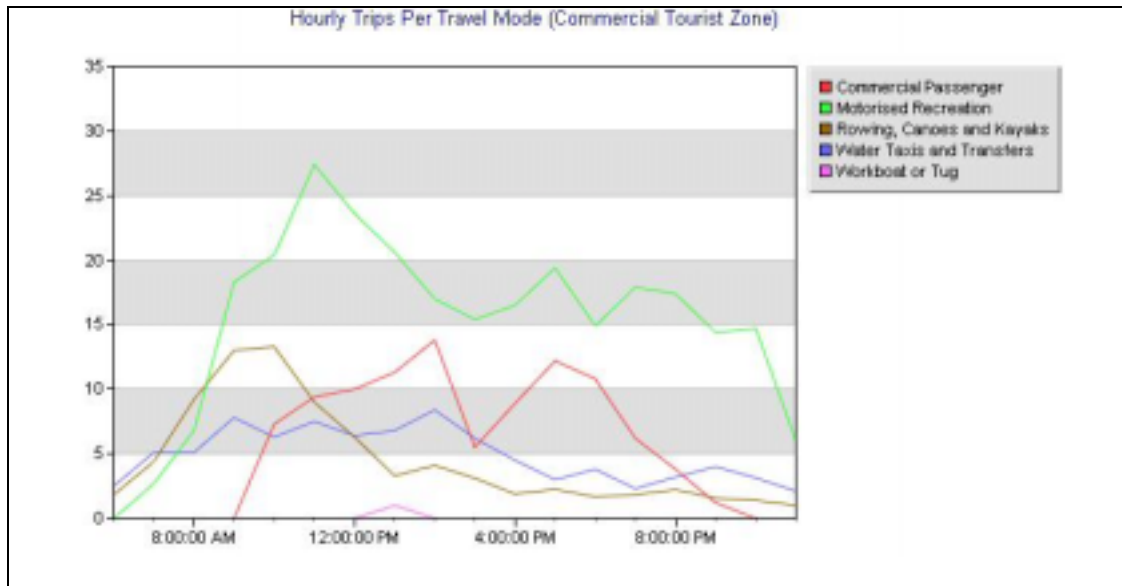


Figure 13 2015 hourly traffic for Commercial Tourist Zone by Travel Mode

Figure 13 shows the 2015 traffic pattern of use that was established in 2010 continuing. Again morning rowing extends later into the morning and motorised recreation and commercial passenger services show steady increases in volume.

Commercial Tourist Zone Traffic Management Issues

Motorised recreation is the biggest challenge for traffic management in the Commercial Tourist Zone. The high variability in the skills and experience of recreational boaters, the narrowness of the channel, and the complex movement patterns of commercial passenger vessels transiting to and from berths increase the risk of near misses and collisions. Commercial operators in this zone reported that there would be a lowering in quality of service for passengers in the form of delays and waiting times and higher stress on captains of vessels due to the often-unpredictable behaviour of recreational boaters if current peak period LSA levels are exceeded.

Options for management include improving user education, compliance with navigation and speed rules, or limiting motorised recreation traffic by restricting access during peak hours of commercial use. Other mechanisms include instituting a “no overtaking” rule in this zone. This would have the affect of generating single file traffic, minimising the number of manoeuvres that would generate cross traffic and near misses.

Given that the current peak periods exceed the LSA, river traffic in this zone needs to be monitored carefully over the next few years including regular consultation with key user groups. The monitoring is to be targeted at identifying key high risk behaviours. In consultation with the commercial operators and other peak user groups develop vessel operating and zoning rules to reduce the likelihood and consequences of an incident occurring.

Commercial Tourist Zone Recommendations

1. *Parks Victoria in consultation with commercial vessel operators to undertake a review of the vessel operating rules that apply to the Commercial Tourist Zone in light of the projected increase in river traffic.*

The key commercial berthing locations for the river are within this zone. The bridges that cross it reduce the navigable width of the river. As traffic volumes increase, including a significant increase in private motorised recreation, there is a concurrent increasing risk of near misses and collisions. Commercial vessels pulling in and out of berths combined with the often-unpredictable behaviour of recreational traffic create this risky environment. To meet the changing patterns of use in this zone and to ensure safety of all vessels a review of the current operating rules is required. For example in busy areas, such as near commercial berths, it may be necessary to designate queuing areas if the increasing numbers of commercial trips exceed the capacity of berths. It may also be necessary to create a “no overtaking” rule to generate a single file of traffic. Ensuring compliance with the 5 knot speed limit will assist in reducing risk.

2. *Parks Victoria to develop a system to monitor traffic at commercial berths*
Detailed information on arrivals and departures at commercial berths should be collected to assist in understanding the service times and capacity limits of existing and proposed berthing arrangements (refer to technical appendix for reports on Southgate Service Times at Commercial Berths and Peak Hourly Capacity Analysis at Southgate Commercial Berths).

4.5 Active Recreation Zone

Princes Bridge to Herring Island



<i>Description</i>	<i>Value</i>
Typical River Width in Zone	46-55 m
Zone Length	3.9 km
Area of Navigable Water	19 ha
Erosion Risk Rating	Medium
Major Facilities / Attractions	Jeffries Parade Rowing Staging Jeffries Parade Rowing and Canoe Clubs Federation Square and Princes Wharf Melbourne Park - Tennis Centre Birrarung Marr Park Royal Botanic Gardens Melbourne Botanic Garden Landing Punt Road and Caroline Street Landings Kings Domain / Swan Street Landing Henley Landing Herring Island Como Landing Burnley Wharf and Harbour

Table 12 Active Recreation Zone Characteristics

The Active Recreation Zone is aptly named for the heavy use by rowers, dragon boaters and canoeists. Rowing in Melbourne is a very popular activity and its popularity is increasing. The rowing programs at clubs, schools and the Victorian Institute of Sport provide well-developed infrastructure for the development of the sport. Commercial passenger services including floating restaurants, water taxis, ferry service and tours also use the zone and provide services to destinations such as Federation Square, Melbourne Park, Royal Botanic Gardens and Herring Island.

In addition to these major tourist destinations, the riverbanks in the zone provide opportunities for picnicking, cycling, walking and as a venue for many events (for example Moomba and rowing regattas).

Mapping in the early 1990s showed that the river banks on both sides were almost fully lined from the river mouth to Herring Island, having a vertical constructed edge, bluestone pitching or large rock beaching (Brizga et al. 1996). The Active Recreation Zone has high risk of increased bank erosion due to a combination of poor maintenance of bank lining, increased traffic pressure and erosion due to periodic flooding. Although the banks are extensively lined or in localised areas protected by vegetative measures, deterioration and failure of existing lining is increasing bank vulnerability to erosion. The river banks near the Burnley tunnel appear to be affected by subsidence, particularly the southern bank, resulting in bank erosion above the top of the lining, which is now more frequently exposed to high flow currents and boat wake.

The high erosion risk can be mitigated by repair or replacement of protective works. Vegetative measures may be a suitable and more environmentally friendly option in some areas, but rock lining is likely to be necessary if high value assets are threatened. Increased boat traffic pressures would lead to increased stress on the banks, resulting in a need for more substantial protective measures and greater maintenance requirements.

Active Recreation Zone Level of Sustainable Activity Results

Table 13 shows the results of the LSA focus groups with rowers. Peak use season is October to April. During peak season the main rowing sessions are from 6:00am to 10:00am and from 4:00pm to 6:00pm. The morning training sessions are busiest with school rowers and elite rowers launching every 5 to 10 minutes from the Jeffries Parade club houses.

During the morning training period rowers feel the river is at full capacity. They rated both the existing traffic density and maximum tolerable density as Level D in the Level of Sustainable Activity workshops.

The rowers' ratings for motorised traffic during their peak period shows that although there is little conflict at present, any increase of motorised traffic volume is unacceptable.

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Rowers	D	D	At Max Capacity
Motorised	A	A	High Intolerance

Table 13 Non Motorised Vessels in Active Recreation Zone Level of Sustainable Activity

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Commercial	C	C	At Capacity
Rowers	C	C	At Capacity

Table 14 Motorised Vessels in Active Recreation Zone Level of Sustainable Activity

The peak period of use for commercial operators is from 11:00am to 3:00pm on weekdays and weekends. During the lead up to Christmas, Friday and Saturday evenings are also busy with commercial operators hosting Christmas parties.

Table 14 shows the commercial operator's LSA evaluation during their peak use period. They feel that current levels of use have reached or are near the maximum tolerable LSA level.

Both rowers and commercial operators reported conflicts with their counterparts in the Active Recreation Zone. Rowers believe that some commercial operators underestimate their impact upon rowers, particularly the effect of their speed as they are passing rowing shells. Commercial Operators, on the other hand, find conflicts with rowers moving downstream in the Active Recreation Zone, turning downstream of Princes Bridge. They expressed concern about safety hazards due to erratic behaviour, especially by inexperienced rowers. Commercial operators also noted that some rowing coaches put rowers at risk by failing to acknowledge safety considerations with competing motorised traffic. Conflicts arise between the rowers and commercial users over excessive speed and can often result in verbal exchanges that are unpleasant for those involved and passengers of commercial vessels.

Active Recreation Zone Simulation Results

<i>Hour</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2005 Density</i>	<i>2010 Density</i>	<i>2015 Density</i>
5:00	9	9	9	0.47	0.47	0.47
6:00	149	167	174	7.69	8.63	8.97
7:00	89	121	149	4.59	6.26	7.69
8:00	64	80	69	3.31	4.12	3.59
9:00	80	102	94	4.11	5.28	4.89
10:00	81	132	150	4.19	6.80	7.77
11:00	61	123	153	3.13	6.34	7.93
12:00	50	109	116	2.59	5.62	5.97
13:00	48	94	100	2.50	4.86	5.17
14:00	40	92	104	2.09	4.75	5.39
15:00	42	76	82	2.16	3.91	4.27
16:00	38	62	81	1.95	3.22	4.16
17:00	25	51	56	1.30	2.62	2.90
18:00	23	40	46	1.17	2.06	2.37
19:00	29	43	54	1.51	2.24	2.82
20:00	28	46	57	1.43	2.37	2.93
21:00	14	29	38	0.74	1.52	1.96
22:00	3	16	23	0.16	0.84	1.17
23:00	3	10	14	0.15	0.50	0.74

Table 15 Hourly traffic volumes and densities for the Active Recreation Zone with projections for 2010 and 2015. Densities are vessels per hectare

Table 15 shows total hourly traffic for the peak use day simulated over a 5 and 10-year period for the Active Recreation Zone. The typical use patterns change from rowers in the early morning hours from 6:00am to 10:00am to mixed commercial passenger and rowing from 10:00am until 10:00pm in the Active Recreation Zone.

Figure 14 shows a similar pattern of use in 2005. Note that the simulated peak use day combines the busy weekday and weekend traffic patterns, so the simulation combines the heavy weekday school rowing with the weekend recreational rowing patterns which extend the busy rowing period into the mid-day. The first peak in Figure 14, from 6:00am to 7:00am for the rowers consists of weekday school and elite rowing. The second peak around 10:00am is the weekend rowing and canoeing trips. The graph shows how the pattern of use has evolved where the busiest rowing is in the early morning hours when motorised traffic is light. The weekend rowing trips mask the period from 3:00pm until

5:00pm when the afternoon school rowers are on the river during weekdays. However, even though the simulation does not clearly show the afternoon weekday peak school rowing, the after school rowers still need to be considered carefully. They are a higher safety risk with their high variability of skill and their high level of use during this period.

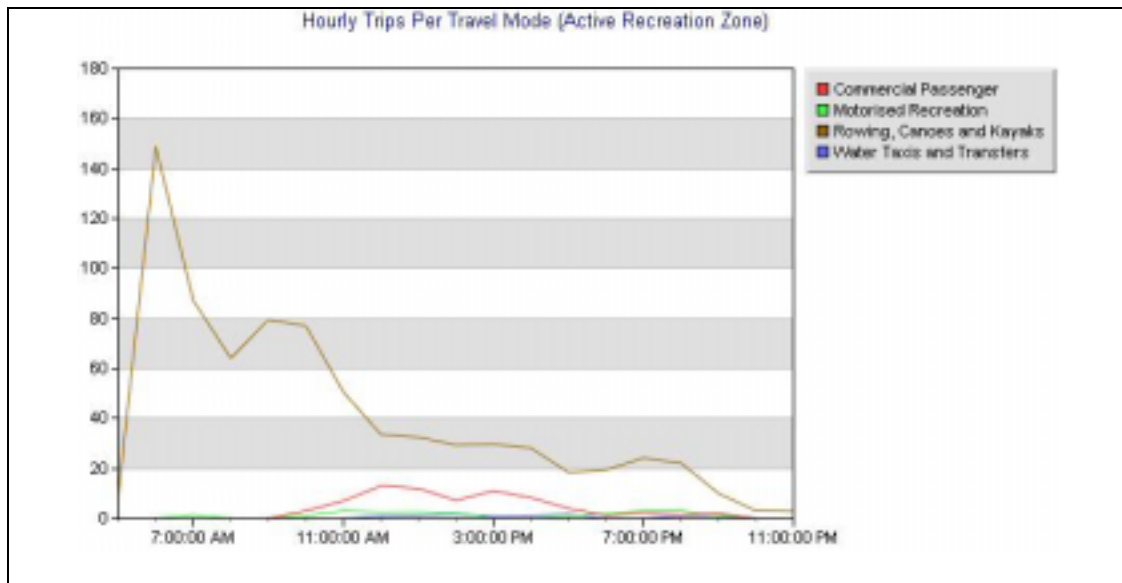


Figure 14 2005 hourly traffic for Active Recreation Zone by Travel Mode

Figure 15 shows that in 2010 rowing is still the dominant use in this zone. A significant increase in motorised recreation occurs primarily due to the large increase in public and private berths in the Docklands. The peak rowing period extends later into the morning as rowers queue at launch sites. Commercial use has also increased.

The biggest potential conflict in 2010 is between motorised recreational vessels and rowers. Motorised recreational vessels start using the zone earlier in the morning and their time of use significantly coincides with the busiest rowing period.

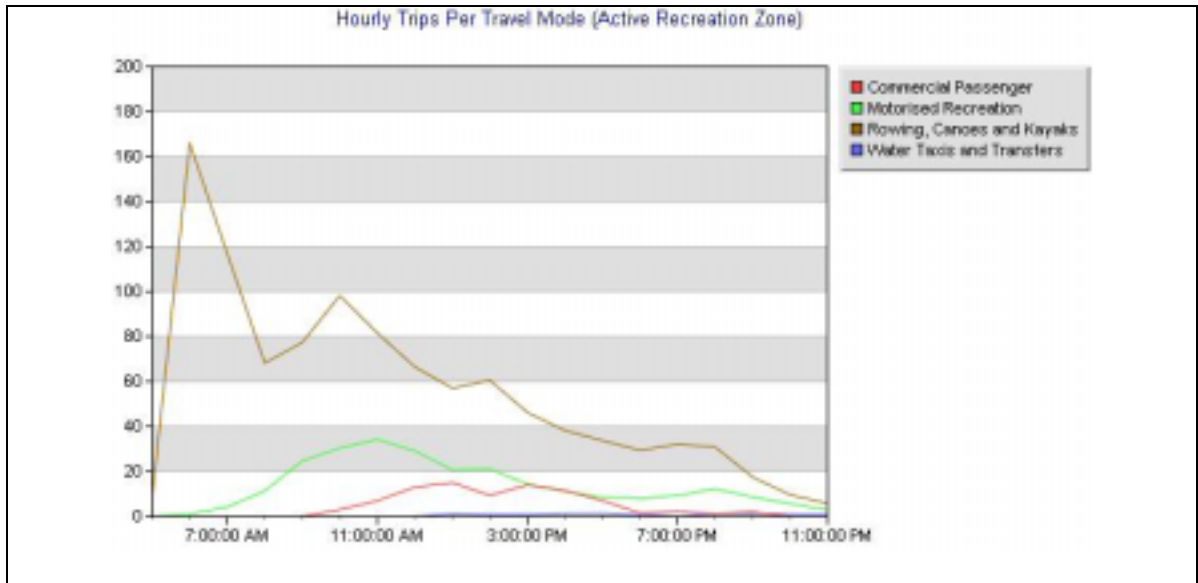


Figure 15 2010 hourly traffic for Active Recreation Zone by Travel Mode

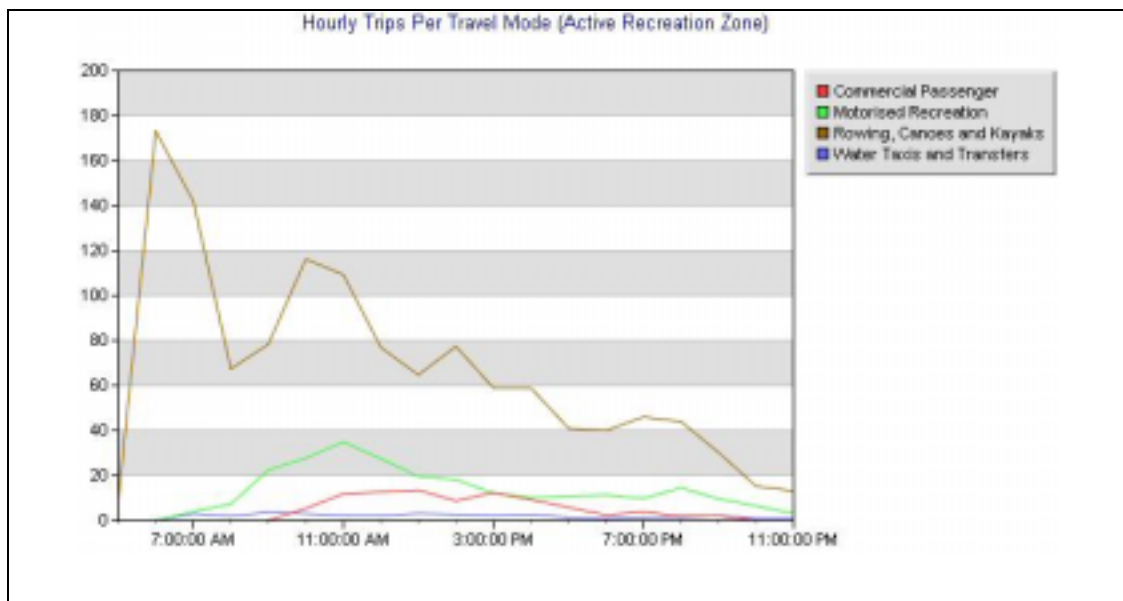


Figure 16 2015 hourly traffic for Active Recreation Zone by Travel Mode

Figure 16 shows the pattern of use established in 2010 continues to 2015. Morning rowing extends later into the morning. Motorised recreation and commercial passenger services show modest increases by 2015.

Simulation Scenario: River closure upstream of Princes Bridge during Peak Time rowing use

The results of the Level of Sustainable Activity analysis and the questionnaires from key users show that a natural separation in space and time has evolved between peak periods of use for Rowers and motorized traffic on the Yarra. School rowing is of key concern as there are many rowers of differing levels of ability on the river at the same time.

Most school rowing occurs early in the morning from 5:30am to 8:30am and in the afternoon from 3:00pm to 5:00pm. There is rowing outside of these hours but the total amount of rowing traffic is much lower.

Presently there is little conflict between rowers and motorized vessels during the morning hours since most commercial operations do not start up until 10:00am. However there is no guarantee that this separation in time will continue in the future. The afternoon school rowing is more problematic since it overlaps with the period of commercial use. However the peak period of commercial use on the Yarra is from 11:00am to 3:00pm so the degree of risk is lower.

One option is to close the river to motorized traffic upstream of Princes Bridge during the peak hours of use during the school year. This will ensure that the current low risk environment for school rowers is secured into the future and by introducing this restriction on motorized vessels during these periods now, there will be less motivation for opportunistic commercial operators to initiate new services during these periods. The simulation scenario is based on the proposal to restrict motorized traffic moving upstream from Princes Bridge during the school year from 5:30am to 9:00am and from 3:00pm to 5:00pm. To investigate the impact of this closure on other traffic, simulation data from the baseline simulation is examined to determine the amount and kind of traffic that is displaced during these hours.

The baseline simulation was used to examine the impact of river closures on various river users. A point upstream of Princes Bridge was taken just downstream of Morell Bridge. All traffic passing this point either upstream or downstream was counted for each hour of the day. This is not the number of vessels on the river during each hour, but the number of times vessels of each type pass that point. For instance rowers typically row back and forth several times between Morell Bridge and Princes Bridge therefore a single rowing boat may be counted 2 or 3 times in a single hour.

Hourly Traffic Upstream of Princes Bridge

Hour	Commercial Passenger	Motorised Recreation	Rowing Skull
5:00	0	0	144
6:00	0	0	2178
7:00	0	1	870
8:00	0	0	84
9:00	0	0	74
10:00	3	0	59
11:00	7	1	68
12:00	11	3	36
13:00	9	1	22
14:00	9	2	26
15:00	10	1	31
16:00	6	0	34
17:00	7	0	27
18:00	1	2	4
19:00	1	2	1
20:00	1	3	1
21:00	1	1	1

Table 16 Hourly Traffic upstream of Princes Bridge during a Peak Use Summer Day.

Table 16 shows traffic use during a typical peak use day. The hours highlighted are the peak use period for school rowers. The analysis shows that there is little impact of closing the river to commercial passenger vessels and recreation vessels during the morning hours from 5:00am to 9:00am with only 1 motorised recreation vessel recorded during the 5 hour morning period.

The afternoon period from 3:00pm to 5:00pm indicates a minor conflict with motorized recreation however there is a conflict with Commercial Passenger Services with 16 trips disrupted.

However, as the number of school rowers is much less in the afternoon period it may be worth considering moving the boundary of the closure to Herring Island to encourage afternoon school rowers to train further upstream lowering the disruption to commercial passenger services.

Conclusions and Recommendations

Given the sensitivity of rowers to motorised traffic, and the predominance of rowers in the early mornings and mid-afternoon, the safety and quality of service for this user group needs to be protected during these periods. Whereas the conflicts with motorised traffic are minimal at present this situation cannot be guaranteed into the future. This is particularly true with the uncertain impacts of motorised recreation flowing into this zone from the Docklands Marinas. The analysis shows that it would have little impact on commercial and recreational motorized traffic to give rowers exclusive use of the Yarra River upstream of Princes Bridge before 9:00 or 10:00 in the morning.

The afternoon period shows greater conflicts between motorized traffic and rowers so this issue must be examined more carefully. An option would be to move the closure upstream of Herring Island. This would allow commercial and recreational motorized traffic access to the National Tennis Centre and maintain the existing routes for commercial services. This would displace school rowers to upstream of Herring Island, consultation with the affected groups will be necessary to determine workable solutions.

Active Recreation Zone Traffic Management Issues

Activity in the Active Recreation Zone has evolved over time as rowers and commercial passenger services have self-managed the use of the river. Rowers tend to train in the early morning hours before commercial services have commenced and later in the afternoon after most commercial services have finished. This adaptation in the use patterns of the river has minimised conflicts between user groups. However, even though self-management has been remarkably effective, there is no guarantee that self-management by users will be successful in the future. This is largely due to the following factors:

- During peak use periods for rowers and commercial users, maximum tolerable LSA levels have already been reached.
- There is a high level of incompatibility between motorised use and rowing and canoeing especially when school rowers are on the river.
- The large increase in motorised recreation traffic projected for the next 10 years is significantly different to the historic balance of traffic in the Active Recreation Zone. The change in the mix and volume of traffic could result in a significant deterioration in the quality of service for rowers and canoeists.
- Rowers will be forced to extend their morning launch schedules to accommodate projected growth rates in rowing pushing their training times later in the morning to potentially increasing conflicts with commercial traffic.

Animosity between rowers and commercial operators exists. A lack of communication and traffic levels reaching capacity limit are creating tension between users. Clearly all users want better compliance with existing speed limits and navigation rules. . The current self-management regime, which has naturally separated use, may be less effective in the future as demand increases and new motorised recreation traffic is added. Another option is to manage use by capping the storage capacity in the rowing sheds and limiting the number of berths for recreational and commercial vessels.

An issue raised in the LSA workshops was the management of partial river closures by rowing officials and their impact on commercial operators. Reliance on self management for many of the smaller regattas needs to be reviewed to ensure equity of access and safety of participants.

Parks Victoria also receives many complaints regarding the use of megaphones by rowing coaches early in the morning. With the predicted growth in rowing this issue is likely to become a significant.

Active Recreation Zone Recommendations

1. *Rowing Victoria to improve certification and training of rowing coaches supported by Parks Victoria*

Existing training and certification of rowing coaches is rudimentary. Given the risks associated with taking novice rowers on a busy river like the Yarra River a more detailed and stringent training and certification system is needed for rowing coaches. The training program should include detailed training of river rules, hazards and safety risks associated with the river. Many rowing crews, particularly those from schools are very inexperienced. The existing Level 1 coaching certification is inadequate and requires redrafting. More formal training and certification of rowing coaches is recommended. Rowing Victoria is currently revising its guidelines for coaches, and the inclusion of safety training for this group is encouraged.

2. *Rowing Victoria to improve the management of partial river closures supported by Parks Victoria*

The practice of partial closures during rowing regattas where commercial traffic is “flagged through” by race officials has been a source of conflict. To reduce conflict the marshals require better training to understand the impact on both commercial operators and the success of the event.

3. *Parks Victoria to work with Rowing Victoria to phase out the use of megaphones by rowing coaches*

The traditional practice of using megaphones by rowing coaches should be phased out in favour of the use of transmitters and speakers in the boats. Current regulations prohibit the use of any device to generate or amplify sounds in a way that may disturb other people. The noise level created by coaches during training during the early morning hours is a problem for adjacent residential areas and will only increase as school rowing programs continue to expand.

4. *Parks Victoria and Local Government to encourage future expansion of rowing activity away from the Active Recreation Zone.*

A strategic plan to accommodate the anticipated demand of rowing in the Active Recreation zone needs to be developed. Consideration should be given to expanding facilities in other zones or considering expansion of rowing facilities in the Maribyrnong River in consultation with Local Government (Melbourne, Maribyrnong, Moonee Valley, Stonnington, Yarra and Boroondara councils).

5. *Parks Victoria and Melbourne City Council to investigate an upgrade of the Jeffries Parade staging to a contemporary standard*

The existing rowing staging at Jeffries Parade is causing congestion on the river. Rowing crews have to wait on the river during peak times when the staging is being used at full capacity. The traffic waiting on the river causes congestion around Princes Bridge and creates potential conflict with commercial operators.

6. *Parks Victoria to review vessel operating rules and monitor river use to determine if and when active management is required*

The current LSA and the future LSA indicate that this zone is close to reaching capacity at peak times. Parks Victoria may need to implement navigation rules, such as marking lanes between Princes Bridge and Herring Island and/or establishing exclusive use times, to actively manage use and capacity within this zone. The most appropriate type of management intervention and timing require more investigation as part of process leading to an amendment to the vessel operating and zoning rules applied to this zone. Initially a code of conduct should be developed for this section of the river in consultation with peak user groups.

7. *Melbourne Water to continue the implementation of the Lower Yarra River Waterway Management Activity Plan*

Erosion risk in this zone is high. Melbourne Water in consultation with other government agencies and local communities has prepared the Lower Yarra River - Waterway Management Activity Plan in 2002. The plan identifies locations where bank stabilisation and improvement works are required and establishes a long term program of works to improve the overall environmental condition of the river and its banks. Ongoing investigation of the requirement for bank works and the determination of the most appropriate mitigation measure need to be undertaken.

4.6 Passive Recreation Zone



Herring Island to Dights Falls

<i>Description</i>	<i>Value</i>
Typical River Width in Zone	17-35 m
Zone Length	8.5 km
Area of Navigable Water	22 ha
Erosion Risk Rating	High
Major Facilities / Attractions	St Kevins School Scotch College Burnley Park Como Park Leonda Landing and Function Centre Private Jetties and Moorings Melbourne Girls College Collingwood Children's Farm Abbotsford Convent Dights Falls Yarra Bend Park Alma Wharf Boardwalk Richmond Landing Hawthorn and Xavier Rowing Clubs Wesley and Powerhouse Rowing Clubs and Landing

Table 17 Passive Recreation Zone Characteristics

The Passive Recreation Zone contains a much narrower more winding channel compared to the other zones. It is mainly flanked by residential land use and parkland. The narrow channel, 5 knot speed limit and distance from the main activity in the Commercial Transit Zone, limit the amount of commercial tourist traffic. The predominant users are rowers,

canoeists and motorised recreation vessels. Even with reduced traffic volumes the narrow channel means that localised traffic densities may be relatively high, especially at launching points near rowing clubs.

At least one and often both banks between Herring Island and Wallen Road Bridge are lined with bluestone pitchers or rock beaching. From Wallen Road Bridge to Dights Falls, there is only intermittent lining, most of it on the outside banks of bends. Between the Collingwood Children's Farm and Gardiners Creek, many bank failures were evident during a site inspection undertaken in late 2004. Fast currents were evident in places where channel the confined (e.g. under Wallen Road bridge).

The bank failures appeared to be related to the preceding flow event and there is little mention of erosion in a Waterway Management Activity Plan completed three years ago (Thompson Berrill Landscape Design 2002). Water levels in this area were about 0.5 to 1 m above usual low flow water levels at the time of the site inspection for the present study, so the full extent of erosion resulting from the flood was not evident. A subsequent flow event in early 2005 is likely to have further exacerbated erosion. The eroded banks in this part of the river are now highly susceptible to further erosion by boat wake, which would retard natural re-vegetation and recovery processes.

From Gardiners Creek to the Princes Bridge conspicuous changes since the 1995-96 study include apparent expansion of large point bars at Loys Paddock and in the old course at Herring Island. Reed beds (phragmites) have become more extensive along some parts of the shoreline, particularly at Herring Island. The growth of these depositional features has been enabled by a significant reduction in dredging. Only limited dredging for navigation has occurred since the mid 1990s, primarily to maintain channel depth and access at key destinations. The reed beds would offer some erosion protection to adjacent bank areas by dissipating wave energy.

Passive Recreation Zone Level of Sustainable Activity Results

There was only one participant in the LSA evaluations for the Passive Recreation Zone, which means that the results may not be as reliable as LSA ratings for other zones. However the results are reported here because they are informative of the difference river geometry can have on river traffic densities.

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Rowers	C	E	Below capacity
Motorised	A	B	Lower impact from Commercial

Table 18: Passive Recreation Zone - LSA Evaluation for Rowers.

The narrow width of the river has a major impact on traffic flows within the zone since there are only 2 "lanes" of traffic possible. The narrow width enforces more orderly traffic flows and slower speeds for motorised boats. The peak period of use for rowers in this zone is in the afternoon from 3:00 to 6:00 with school rowers dominating weekday use. The higher densities for rowers shown in *Table 18* are again, attributed to the narrow width of the river.

Simulation results show much lower densities however, primarily because of the 8.5 km length of this zone.

Passive Recreation Zone Simulation Results

<i>Hour</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2005 Density</i>	<i>2010 Density</i>	<i>2015 Density</i>
7:00	14	15	19	0.64	0.70	0.88
8:00	13	15	19	0.59	0.70	0.91
9:00	9	9	16	0.42	0.43	0.76
10:00	14	16	23	0.65	0.74	1.10
11:00	18	20	26	0.84	0.92	1.20
12:00	17	20	25	0.79	0.92	1.17
13:00	13	17	24	0.59	0.80	1.12
14:00	13	17	20	0.60	0.78	0.96
15:00	37	40	49	1.75	1.89	2.32
16:00	28	37	42	1.32	1.75	1.96
17:00	27	30	36	1.25	1.42	1.67
18:00	21	22	28	0.97	1.04	1.30
19:00	12	17	20	0.57	0.81	0.96
20:00	12	19	21	0.56	0.89	0.98
21:00	11	16	17	0.50	0.73	0.80
22:00	8	12	14	0.40	0.54	0.68
23:00	7	10	15	0.33	0.46	0.72

Table 19 Hourly traffic volumes and densities for the Passive Recreation Zone with projections for 2010 and 2015. Densities are vessels per hectare.

Table 19 shows total hourly traffic for the peak use day simulated over a 5 and 10 year period for the Passive Recreation Zone. Traffic in this zone is characterised primarily by rowing and canoeing with infrequent trips by recreational and commercial motorised boats. Figure 18 clearly shows the dominant use is rowing throughout the day with a 3:00pm peak due primarily to afternoon school rowers departing from this zone and travelling both upstream and downstream. By 2010 and 2015 afternoon traffic density increases significantly in relationship to the projected number of vessels because of the narrow width of the river. By 2015 a secondary peak emerges in the morning due largely to overflow traffic from the Active Recreation Zone.

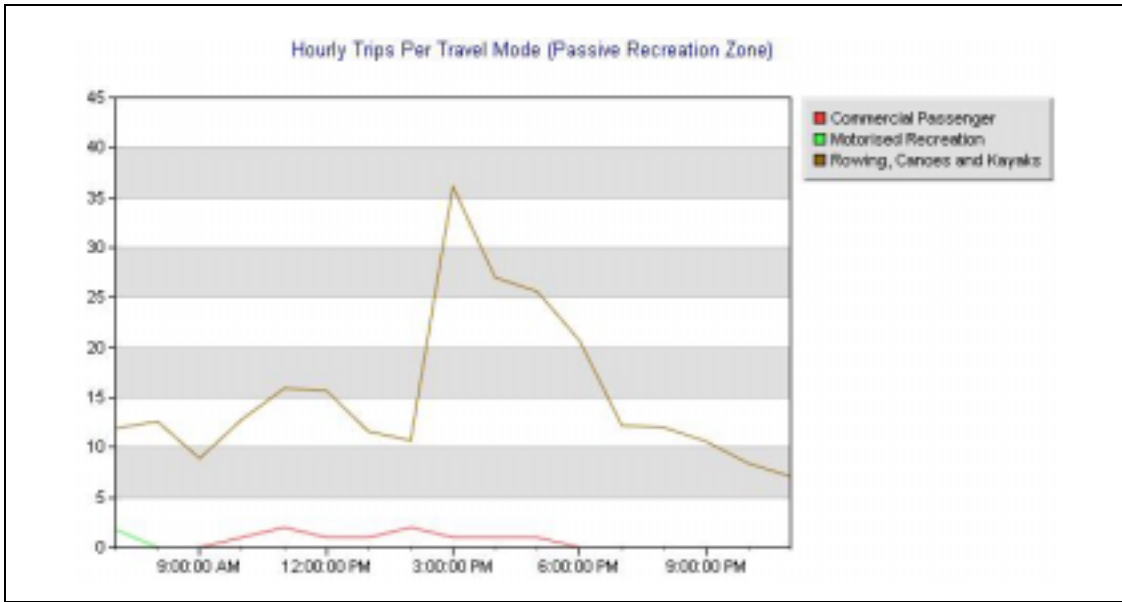


Figure 17 2005 hourly traffic for the Passive Recreation Zone by Travel Mode

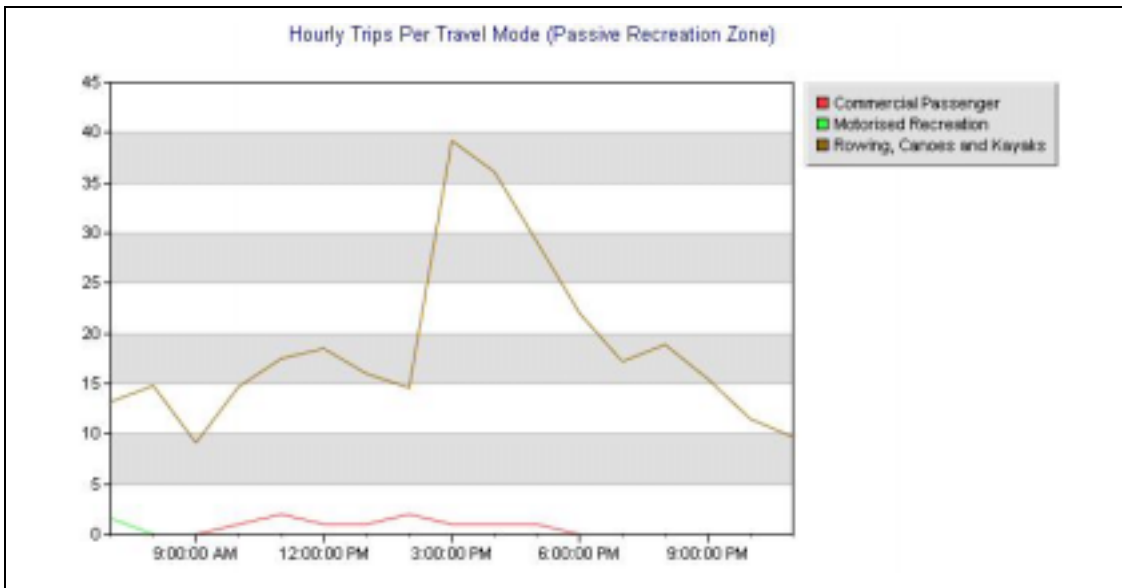


Figure 18 2010 hourly traffic for the Passive Recreation Zone by Travel Mode

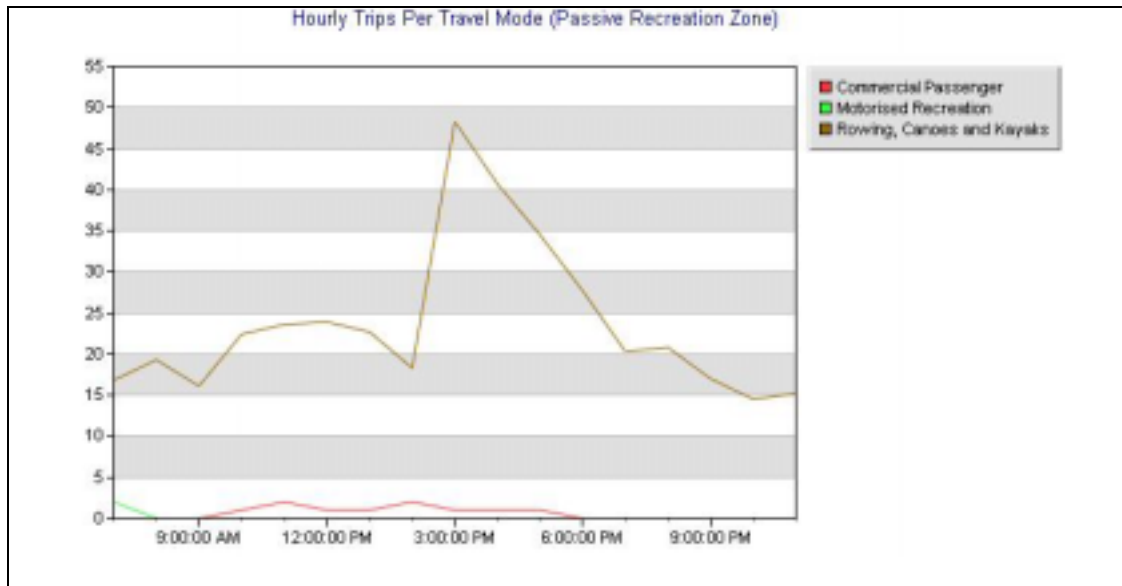


Figure 19 2015 hourly traffic for the Passive Recreation Zone by Travel Mode

Figure 18 and Figure 19 show similar patterns of use in 2010 and 2015 to 2005 with an increase in rowing, canoeing and kayaking. This simulation may be underestimating the impact of motorised recreation in the zone as trips from this group were assumed to terminate at Herring Island. The limited river count data obtained during this study in this zone showed little motorised traffic going upstream from Herring Island.

Passive Recreation Zone Traffic Management Issues

The Passive Recreation zone has much lower use than the Active Recreation Zone due to its narrow width and lower number of boating clubs. Commercial use is much less here as well. The 5 knot speed limit and the large distances involved make regular trips from Southgate to the Passive Recreation zone less desirable for commercial operators.

The Passive Recreation Zone currently has few traffic management problems. There are a small number of motorised traffic trips compared to the Active Recreation Zone. The projected use for 2010 and 2015 shows rowing use increasing at 4% per annum. Commercial use does not increase significantly.

There is however a wildcard that needs to be considered. The projected use for the next 5 and 10-year period assumes that motorised recreation traffic will not proceed upstream from Herring Island. Since motorised recreation is the fastest growing segment of use traffic into the area, traffic should be monitored to determine if formal action needs to be taken. Because of the narrow channel in the Passive Recreation Zone, a large increase in motorised recreation would create conflicts with rowers and canoeists.

The main problems currently, like the Active Recreation Zone relate to noise from the megaphones used by rowing instructors and problems of siltation, particularly at river bends and landings.

Passive Recreation Zone Recommendations

1. *Limit the development of destinations within this zone to manage use by private and commercial motorised vessels.*

The high erosion potential, coupled with the narrow width of the river and adjacent recreational and residential use, and conflicts with rowing and paddling users make this stretch of river incompatible with increased traffic by motorised recreation. Motorised recreation should be discouraged from entering this zone, especially from downstream.

2. *Parks Victoria with the assistance of Local Government to undertake a review of the river traffic capacity within this zone*

The LSA workshop for this zone was not well attended and as such the information gathered is not representative of the actual and future use of the zone. The pressures for more rowing facilities and the lack of capacity in the Active Recreation Zone will place increased pressure for the development of more rowing facilities on this zone. To ensure that the values and river capacity is managed Parks Victoria will undertake a further study into the LSA for this zone, a key objective being to establish the actual capacity and the relationship between the number of storage facilities and river capacity.

3. *Parks Victoria to work with Rowing Victoria to phase out the use of megaphones by rowing coaches*

The traditional practice of using megaphones by rowing coaches should be phased out in favour of the use of transmitters and speakers in the boats. Current regulations prohibit the use of any device to generate or amplify sounds in a way that may disturb other people. The noise level created by coaches during training during the early morning hours is a problem for adjacent residential areas and will only increase as school rowing programs continue to expand.

4. *Rowing Victoria to improve certification and training of rowing coaches supported by Parks Victoria*

Existing training and certification of rowing coaches is rudimentary. Given the risks associated with taking novice rowers on a busy river like the Yarra River a more detailed and stringent training and certification system is needed for rowing coaches. The training program should include detailed training of river rules, hazards and safety risks associated with the river. Many rowing crews, particularly those from schools are very inexperienced. The existing Level 1 coaching certification is inadequate and requires redrafting. More formal training and certification of rowing coaches is recommended. Rowing Victoria is currently revising its guidelines for coaches, and the inclusion of safety training for this group is encouraged.

5. *Melbourne Water to continue the implementation of the Lower Yarra River - Waterway Management Activity Plan*

Erosion risk in this zone is high. Melbourne Water in consultation with other government agencies and local communities has prepared the Lower Yarra River - Waterway Management Activity Plan in 2002. The plan identifies locations where bank stabilisation and improvement works are required and establishes a long term program of works to improve the overall environmental condition of the river and its banks. Ongoing investigation of the requirement for bank works and the determination of the most appropriate mitigation measure need to be undertaken.

4.7 Maribyrnong Zone

*Footscray Road to
Canning Street Bridge*



<i>Description</i>	<i>Value</i>
Typical River Width in Zone	26 – 51 m
Zone Length	11 km
Area of Navigable Water	41 ha
Erosion Risk Rating	High
Major Facilities / Attractions	<ul style="list-style-type: none"> Henderson House and Landing Old Footscray Wharves Blackbird River Cruises Lynch's Bridge Landing Footscray Park Footscray Boat Club Flemington Race Course Edgewater Lake and Marina Living Museum of the West / Pipemakers Park and Landing Anglers Tavern Essendon Rowing Club Riverside Park Canning Street Reserve and Tea Gardens

Table 20 Maribyrnong Zone Characteristics

The Maribyrnong has traditionally a lower usage than the Yarra River. This situation could change in the future. Motorised recreation traffic generated from the Edgewater development and new Docklands residential berths could change the traffic mix substantially in the future.

Other than the lower section of the Maribyrnong River estuary, which is categorised as being at medium risk of increased bank erosion, the majority of the Maribyrnong Zone is categorised as being at high risk of increased bank erosion if boat traffic volumes increase. Even in areas where the banks are lined with stone, there are already signs of bank erosion due to the poor condition of the lining, slippage of the lining and wave/current action.

Increased boat traffic would only worsen this situation. Any increase in wave size generated by boat wake (e.g. due to change in travel speed or vessel size/type) and/or increase in boat traffic (resulting in increased frequency of wave action created by boat wakes) would increase erosion rates on banks that are already eroding, and increase the risk of initiation of erosion along sections of bank that currently appear to be stable. Melbourne Water is currently assessing the condition of the banks of the Maribyrnong River as part of its Waterway Management Activity Plan. This Plan will recommend works in priority areas and design of works will need to give consideration to increased boat traffic. The Plan is targeted to be completed toward the end of 2007.

Maribyrnong Zone Level of Sustainable Activity Results

The Maribyrnong Zone is 11 kilometres in length. It is the longest zone in the Two Rivers study area. The zone is used much less on average than other zones. The main issues raised by users in the LSA focus group for rowers were:

- lack of compliance with speed limits
- The poor communication with commercial operators who are “disrespectful” of the hazard their wake causes to rowers, and
- The lack of understanding of navigational rules especially speeding and “staying to the right” by motorised recreational boaters.

Peak period of use tends to be on weekend mornings from 8:00am to 12:00pm. As Table 21 shows, rowers on the Maribyrnong River enjoy low LSA levels, and want to keep it that way. They also have a low tolerance of motorised traffic, citing speeding and the hazard of their wakes as reasons.

<i>Vessel Type</i>	<i>Current LSA at peak periods</i>	<i>Maximum tolerable LSA</i>	<i>Management Implications</i>
Rowers	B-	B	Close to Capacity
Motorised	A-	A-	High Intolerance

Table 21 Maribyrnong Rowers Level of Sustainable Activity evaluation for the Maribyrnong Zone

Maribyrnong Zone Simulation Results

Maribyrnong Zone Simulation Results / Hour	2005	2010	2015	2005 Density	2010 Density	2015 Density
8:00	7	12	17	0.17	0.28	0.41
9:00	18	35	41	0.44	0.83	0.97
10:00	44	71	82	1.06	1.71	1.98
11:00	37	62	63	0.88	1.48	1.51
12:00	26	47	58	0.63	1.13	1.39
13:00	27	50	57	0.64	1.19	1.37
14:00	25	50	57	0.59	1.19	1.37
15:00	13	45	53	0.30	1.08	1.27
16:00	14	38	50	0.34	0.92	1.19
17:00	13	29	38	0.31	0.69	0.91
18:00	3	14	14	0.07	0.34	0.34
19:00	2	19	17	0.05	0.46	0.41
20:00	1	22	22	0.02	0.52	0.52
21:00	2	25	24	0.05	0.59	0.56

Table 22 Hourly traffic volumes and densities for the Maribyrnong Zone with projections for 2010 and 2015. Densities are vessels per hectare.

Table 22 shows total hourly traffic for the peak use day simulated over a 5 and 10-year period for the Maribyrnong Zone. In comparison to the Yarra River Active and Passive Recreation Zones, the Maribyrnong Zone has much less traffic.

Use starts later in the morning and peaks at a much lower level compared to the Yarra River. Busiest traffic in 2005 is on weekend mornings. Rowing and canoeing is the dominant use as shown in Figure 20.

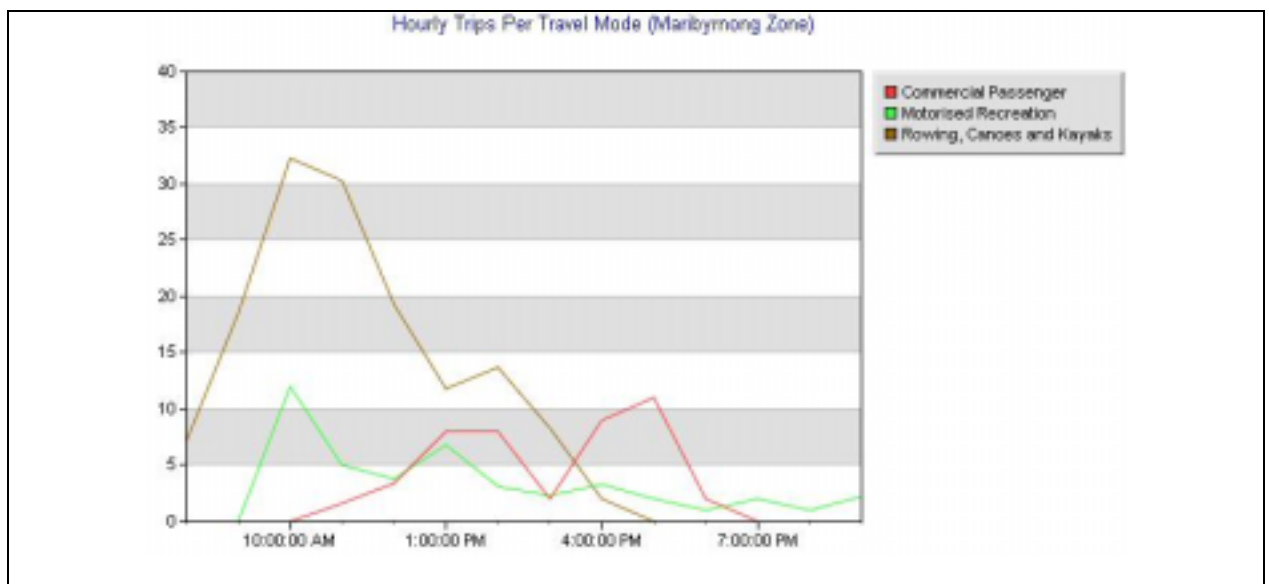


Figure 20 2005 hourly traffic for the Maribyrnong Zone by Travel Mode

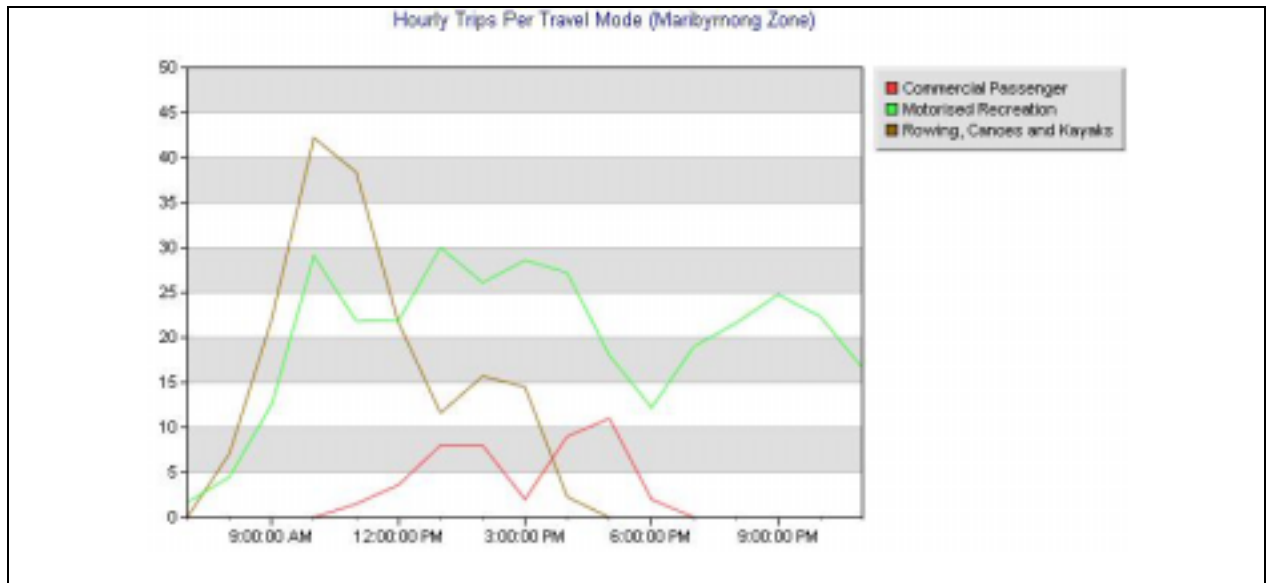


Figure 21 2010 hourly traffic for the Maribyrnong Zone by Travel Mode

Figure 21 shows that by 2010 rowing is still the dominant use on the Maribyrnong during the morning hours. There is a considerable increase in motorised recreation traffic coming from the Docklands berths. This new traffic is highly speculative within the simulations, since this emerging pattern of use can only be estimated. Even though the simulations estimate this traffic there certainly will be an increase of this class of vessels, pointing to the need for ongoing monitoring to determine the volume and behaviour of this traffic.

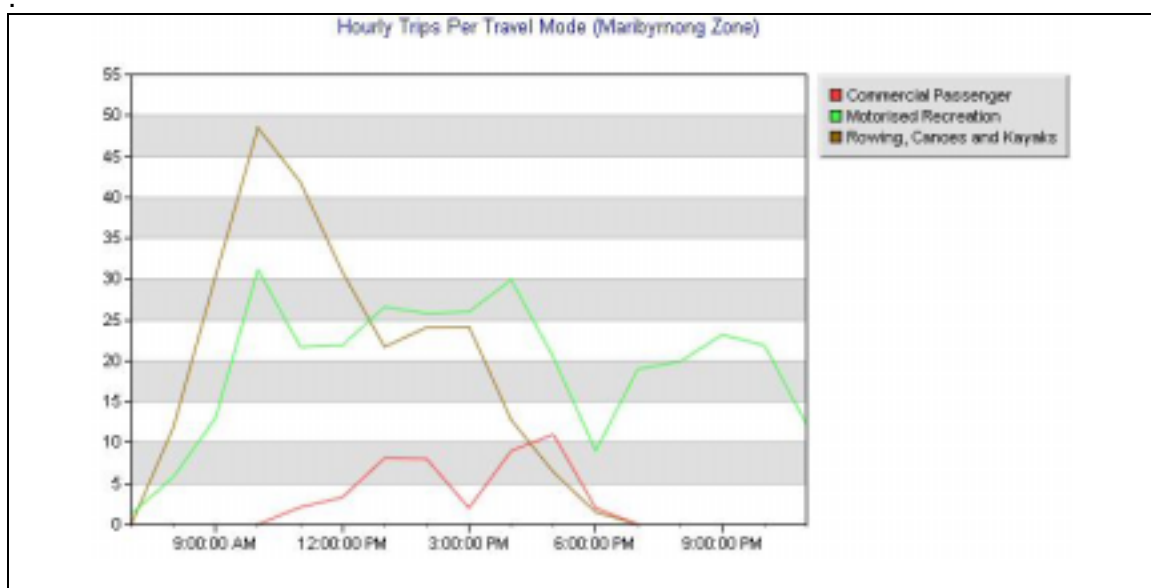


Figure 22 2015 hourly traffic for the Maribyrnong Zone by Travel Mode

Figure 22 shows that by 2015 the pattern of use established in 2010 continues with increased use by all travel modes.

Maribyrnong Zone Traffic Management Issues

In the simulations, the actual amount of motorised recreation traffic coming into the Maribyrnong River is highly uncertain. As the pattern of use has not been established assumptions were made about how much traffic the new berths at Docklands and Edgewater would generate. If the projected use, especially motorised recreation, is realised, there are significant implications on erosion risk and conflicts with rowers and canoeists.

The Level of Sustainable Activity workshop for rowers using the Maribyrnong River showed they were highly sensitive to increases in motorised craft. Even small changes in traffic volumes are likely to lead to conflicts with existing users.

As with other river zones, the issue of speeding and compliance with rules is important from the viewpoint of safety, reducing conflicts between users, and to minimise the impacts of wake on bank erosion.

Maribyrnong Zone Recommendations

1. *Parks Victoria in consultation with Maribyrnong Council to investigate the need for expanding the rowing facilities in Footscray Park.*

Demand for rowing facilities across Melbourne is growing rapidly. Capacity on the Yarra River is being reached in the Active Recreation Zone. The capacity within the Passive Recreation Zone on the Yarra River is limited due to a lack of suitable landside locations for facilities. The Maribyrnong River has both capacity on river and open space adjoining the river, which may be able to facilitate growth in rowing on the Maribyrnong River.

2. *Initiate a River User's Forum to formulate the appropriate levels and types of traffic for the Maribyrnong Zone*

Given the current low level use, the rapidly changing environment, and the apparent sensitivity of users to changes in traffic levels, it is an appropriate time to define the mix and volume of traffic for the next 5 to 10 years. There is a growing demand for more capacity for rowing as the Yarra River reaches its full capacity.

3. *Melbourne Water to continue development a Waterway Management Activity Plan for the Lower Maribyrnong River and implement*

Erosion risk in this zone is high. Melbourne Water in consultation with other government agencies and local communities is preparing a Waterway Management Activity Plan for the Lower Maribyrnong River which is due for completion in 2007. The plan will identify locations where bank stabilisation and improvement works are required and establishes a long term program of works to improve the overall environmental condition of the river and its banks. Ongoing investigation of the requirement for bank works and the determination of the most appropriate mitigation measure need to be undertaken.

4.8 Bay Zone

*Fawkner Beacon to
Mouth of Yarra River*



<i>Description</i>	<i>Value</i>
Major Facilities	Port of Melbourne Shipping Channels Webb Dock Gem Pier – Public and commercial tourist berths Ferguson St. Pier Station Pier Princess Pier Sandringham Yacht Club Warmies public boat launching ramp Altona public boat launching ramp Royal Melbourne Yacht Squadron, St Kilda Royal Yacht Club of Victoria, Williamstown Royal Victorian Motor Yacht Club Williamstown Sailing Club St Kilda Pier and St Kilda Marina Cruising Yacht Club of Melbourne Hobsons Bay Yacht Club Savages Marina Parsons Marina Williamstown / Nelson Place Williamstown Boat Buildings / Repairers Williamstown Shipyards Water Police Depot Williamstown

Table 23 Bay Zone Characteristics

Apart from data for commercial shipping, detailed information about traffic movements in Port Phillip Bay was not available for this study. The Two Rivers Traffic Management Plan therefore does not make a detailed analysis of current or future traffic patterns. Data was not collected for this study due to the cost and difficulty in monitoring traffic over such a

large area. With the lack of data the simulation of bay traffic is incomplete and is not reported here.

There is detailed information on shipping movements from the Heads into the Port Zone maintained by the Port of Melbourne Corporation. There are 21 ship movements per day on average with up to 40 movements per day on extremely busy days with ships moving into the shipping channel at Fawkner Beacon and proceeding either to anchorages in the bay or berths at Station Pier, Breakwater Pier, Webb Dock, Holden Dock, South Wharf, Appleton Dock, Swanson Dock or Berths at Yarraville and in the Maribyrnong. Traffic in the shipping channel is strictly monitored with records of near misses and collisions recorded and investigated. Sailing clubs in the bay typically cross the shipping channel during regattas, but there is close coordination with Port of Melbourne on the location of channel crossings and the control tower is informed of all planned events.

Bay Zone Traffic Management Issues

Even without detailed traffic counts interviews with the Port of Melbourne Corporation, Victorian Water Police, and the various bay yacht clubs have provided insight into the nature of traffic in the bay. The interviews identified a number of issues arising out of increasing commercial and recreational boating traffic volumes.

There are records of near misses between commercial passenger vessels and ships due to noise and distractions created by passengers on board.

Boats illegally anchoring in the shipping channel to fish present a collision risk for commercial container ships entering and exiting the Port of Melbourne.

Interviewees reported incidents of personal watercraft and motorised boats breaking speed limits near shore.

Congestion at Gem Pier was reported as a problem. Commercial and private motorised boats are reported to be waiting long periods to berth and the area is seen to be overcrowded with boats.

Commercial traffic between Williamstown and the Yarra River crosses recreational traffic from the Williamstown boat clubs. The large areas of moored boats in Hobson's Bay contribute to poor visibility and represent a collision risk as boats transit to and from Gem Pier. Further congestion problems are reported during sailing regattas when motorised traffic must yield to yachts under sail.

Bay Zone Recommendations

1. *Parks Victoria to implement scheduled berthing at Gem Pier Williamstown*

Clearly from user feedback congestion at Gem Pier is an issue. Based on the successful implementation of scheduled berthing at Southgate, Parks Victoria will implement scheduled berthing at Gem Pier to manage congestion.

2. *Port of Melbourne Corporation to improve communication with recreational vessel operators regarding the vessel operating rules pertaining to the channel*

Specific issues to be addressed include the use of the channel around Fawkner Beacon by recreational anglers, anchoring in the channel, and interaction between ships and recreational vessels in the channel.

5. *Recommendations and Conclusion*

5.1 Introduction

Recommendations specific to zones are made in Chapter 3. In cases where recommendations apply across all zone, they are presented here.

1. *Yarra River Waterways Committee to undertake traffic monitoring and reporting*

A key to the success of management of river traffic is the establishment of a carefully designed system for monitoring traffic, especially during the peak summer-use period. The rapid changes in traffic generated by the Docklands development and the rapid growth above existing use levels forecast in the study will have a significant impact upon traditional users and shipping operations in the Yarra River. It is imperative that the emerging patterns of use are monitored. Monitoring will provide the information that is needed to identify problems as they emerge and to improve analysis of the emerging and complex traffic patterns. Monitoring data will improve the results of the modelling undertaken in this study by allowing the analytical tools to be validated and calibrated.

Systematic river counts need to be made in a coordinated fashion so a system-wide understanding of traffic behaviour can be established. As well, information about the pattern of use for the major user groups needs to be collected at a level of detail that supports management decisions. This effort needs to be coordinated with other reporting processes, such as the annual reports of trips by commercial operators. A systematic review of these valuable sources of information should be made with an effort made to standardise reporting formats and ensure information is summarised and properly catalogued in a data management system.

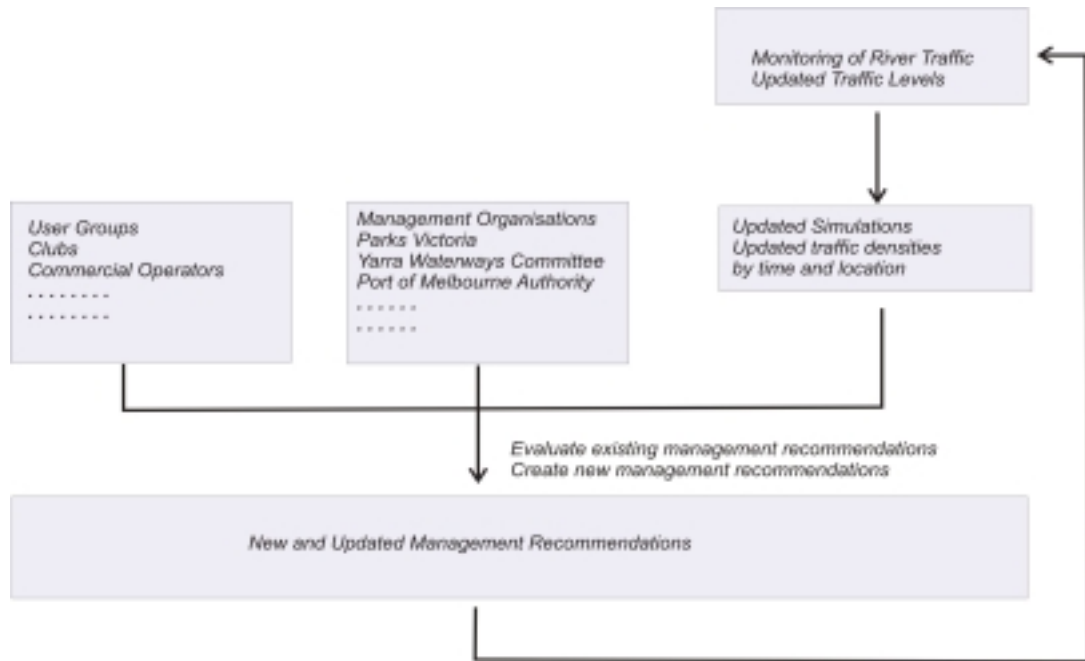


Figure 22 Monitoring Strategy with the Two River Traffic Management Plan Methodology

2. *Yarra River Waterways Committee to further refine, calibrate and develop river monitoring and management tools*

The simulation built for this study has been of significant value in understanding and evaluating the pattern of use in the study area. Even with incomplete and sometimes speculative nature of the traffic trends for the river, the simulation aids in understanding the dynamics of traffic flows. With continued monitoring and improvement of traffic data, the river simulation can provide more accurate information on evaluating changes in management options and traffic patterns.

The simulation developed for the management plan is in the form of a deterministic model where trip itineraries are prescribed. An enhancement of this type of simulation model can be implemented by modifying the simulation into a rule-based simulation. This would allow evaluation of a wider range of management strategies and interactions between different travel modes. For example in the current simulation commercial and recreational vessels do not respond to the movement of ships in the Port Zone. A rule based simulation would allow individual vessels to respond to changing conditions in the simulation such as when stopping traffic during swinging movements in the turning basins or automatically modifying their trip itineraries due to river closures. Developing a rule-based simulation goes hand in hand with better monitoring data and requires the participation of users to define rules of behaviour for different anticipated events.

3. *Yarra River Waterways Committee in consultation with the Victorian Water Police to develop a comprehensive compliance plan for the Two Rivers*

There are many variables of change on the rivers and bay. Increasing traffic volumes including many new users make water traffic management highly dynamic. The vessel operating rules and zones for the waterways change regularly. In this dynamic environment communication, education and enforcement become high priority issues. Current users have noted problems with existing communication systems between management authorities and users and between user groups. These problems will be exacerbated by projected increases in traffic volume and predicted patterns of use.

The compliance plan is to focus on developing an information, education and enforcement package. Some of the key issues to be addressed include:

- Availability of information on the Port Zone
- Clarification of navigation rules

One source of animosity between users is the confusion over what rules apply to different users on the river, for example rowers and canoeists and their training punts routinely break the 5 knot speed limit.

- Improve Lighting and Signage

A signage and lighting review is required. The review should assess the currency of information on existing signs and should determine the most effective size, location and design of signs aimed at new and infrequent visitors to the Bay, Port and Rivers.

- Website information

Currently information about the rivers and management is scattered across many different locations. Consideration should be given to development of a single web portal where all information about rules, regulations, events, current conditions and river closures can be easily accessed.

- Improve education

Commercial Operators and motorised recreation vessels tend to underestimate the level of risk speeding and boat wake present to rowers, especially novice rowers. Education about the nature of these risks needs to be shared with all users to encourage responsible handling of vessels when sharing the river with rowers.

- Enforcement of Speed Limits and Navigation Rules

An almost universal complaint from users is the lack of enforcement of speed limits and navigation rules. This not only presents problems of safety, but also is a major source of animosity between users as “self-enforcement” often takes the form of shouting matches and verbal abuse. This is clearly the joint responsibility of Parks Victoria and the Victoria Water Police. However enforcement poses a problem given the large extent of the water area to be covered and slow response times caused by the low speed limit.

The lack of enforcement leads to a culture of non-compliance, and with the large increase in motorised recreation use projected in this study, the problem will become even more severe. Parks Victoria and the Victorian Water Police need to develop a joint strategy for enforcement that is coupled with a public education program.

4. *Parks Victoria to develop Users Forums for the Yarra River and the Maribyrnong River*

A river user's forum should be established to routinely review emerging problems and conflicts for each of the rivers. This will alleviate many of the frustrations between users and provide a forum for users to inform decision makers about safety and navigational issues as they emerge.

5. *Marine Safety Victoria to lead improvement to the incident reporting process*

One of the findings from the LSA focus group is that both commercial and recreational users tend not to report incidents such as near misses and collisions. This failure creates a major break in the feedback loop to Marine Safety Victoria, which monitors safety issues and recommends actions on the basis of incident and accident reports. Users need to be encouraged to report incidents and accidents and information should be shared with user groups and managing agencies.

A formal system for reporting incidents between vessels should be developed and implemented. Parks Victoria and Marine Safety Victoria should review the reporting regularly. An option for anonymous / no fault reporting to encourage all incidents to be reported should be allowed. A requirement on rowing clubs would be to appoint a safety officer who is responsible for reporting incidents. Incident reporting should be centralised and administered by a central authority.

6. *Parks Victoria to require use of its Event Management Framework to inform decision making regarding the type of waterway closure required*

Waterway based events are managed by a number of methods for example, partial closures, exclusion zones or open river. The Event Management Framework, in particular the risk assessment process, assists Parks Victoria in determining the appropriate waterway management technique to apply to a particular event.

This process requires consideration of the impact of the event on other waterway users and aims to minimise the impact. It is important that the type of waterway management methodology deployed to a particular event is undertaken in a professional manner.

7. *Parks Victoria to work with local government and other government agencies to review development proposals and their impact on waterway use*

The Level of Sustainable Activity workshops and the simulated use projections for the next 10 years show that most of Yarra River Zones have reached, or will do so in the near future, their maximum capacity. Usually recreation management solves this problem by increasing capacity with additional facilities. It is impossible however to increase the area of open water on the river. Approval of additional private berths, rowing facilities, and commercial berthing will need to be based upon careful consideration of the limited capacity of the river to accommodate more traffic.

A coherent strategy that coordinates additional facilities within the capacity limits of the river is required.

8. *Rowing Victoria to coordinate rowing club and school training schedules*

Rowing clubs and schools may need to coordinate launch schedules to maximise the number of rowers, while minimising the crowding that reduces the quality of service.

9. *Parks Victoria to provide information about changes to the litter trap locations and other temporary facilities placed in the waterways*

Parks Victoria needs to inform waterway users of changes to the locations of litter traps and infrastructure when they occur.

5.2 Conclusion

This study has established methods for defining the capacity of the Yarra and Maribyrnong Rivers by using a Level of Sustainable Activity (LSA) framework for defining the relationship between traffic densities and the safety, satisfaction of users and the impact on bank erosion. Results of this study have shown that for the Active Recreation Zone and the Commercial Zone, users are already feeling that the river traffic is at or nearing capacity at peak periods of use. Results of interviews and the pattern of use generated through traffic simulation show that users have been adapting their pattern of use to reduce conflicts by separating themselves in time or space. However as the river reaches capacity these self-management techniques are beginning to fail as is evidenced by the animosity that is expressed between commercial operators and rowers. There is a clear need to address the issues identified throughout the report especially in light of the predicted increase in use.

Simulations of projected use for the next 5 and 10-year periods have shown that there will be a dramatic increase in peak period traffic - both in volume and duration. In many cases use of the river by different groups will coincide much more both spatially and temporally. The results of the simulation show that traffic volumes will more than triple in the next 5 years with motorised recreation emerging as the dominant use across the entire system.

The impact of this growth is significant and given that the busiest river zones are already at or nearing capacity, urgent action needs to be taken to ensure a quality of service and a continued safe environment for all river users.

The magnitude of the impact of new traffic projected in the next five years suggests the need for urgent action. The recommendations in this study need to be developed in more detail in consultation with river users and management organisations, prioritised and costed.

A coordinated effort among the parties represented on the Yarra Waterways Committee as well as state and local governments and key user groups is required to ensure sustainable use into the future.

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