

Draft Port Phillip Bay Environmental Management Plan 2017–2027

Seeking your input on the draft Plan

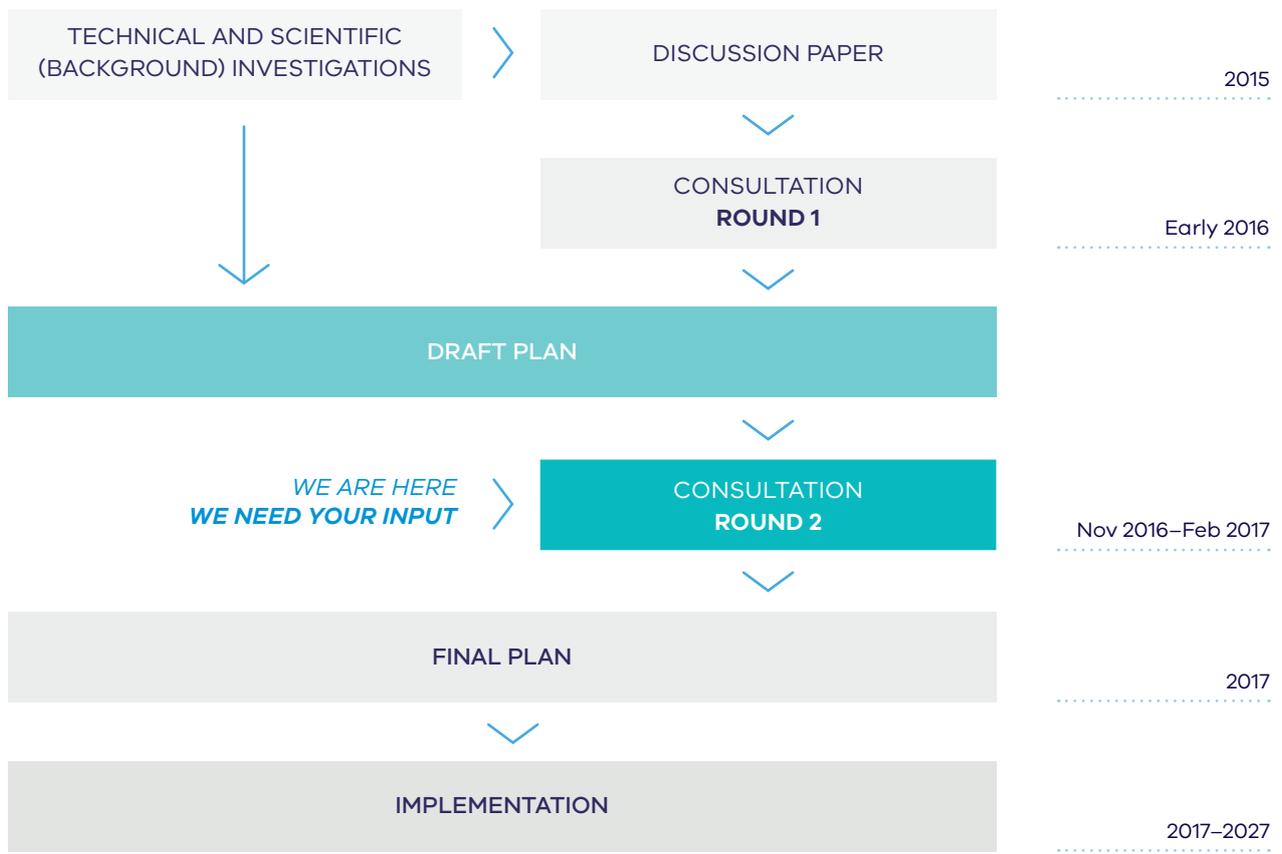


November 2016



Environment,
Land, Water
and Planning

How the Plan is being developed



Have your say

The Victorian Government welcomes and encourages the involvement of all Victorians in helping shape the new Environmental Management Plan for Port Phillip Bay. Your ideas and input will help to inform the final plan, so that together we can take the right actions in the right places to achieve our vision for the Bay.

Public consultation on the draft Plan will be open until **10 February 2017**.

Have your say

Have your say on the draft Environmental Management Plan for Port Phillip Bay

Answer survey questions or make a submission

Register to attend a community workshop

Visit haveyoursay.delwp.vic.gov.au/healthofthebay

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Acknowledgement of Aboriginal Victorians

The Victorian Government proudly acknowledges Victoria's Aboriginal communities and their rich culture, and pays respect to their Elders past and present.

We acknowledge Aboriginal people as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely.

We recognise the intrinsic connection of the Kulin nation people to Port Phillip Bay and its catchment, and we value their contribution in the management of land, water and the natural landscape.

We support the need for genuine partnerships with Aboriginal people and communities, to understand their culture and connections to Country, and to better manage the Bay and its catchment.

We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

Foreword

Victorians have a strong connection with Port Phillip Bay. It is an incredible natural asset with a rich and diverse marine life and spectacular scenery.

The Bay supports a wide range of community uses, a rich and diverse marine life, spectacular scenery, and provides significant benefits for local businesses and the Victorian economy.

The first Environmental Management Plan for the Bay was released in 2001 and drove significant action and investment to reduce nutrient loads to the Bay by improving the quality of stormwater and wastewater inflows, and helping to reduce the risk of marine pest introduction and spread. Ongoing investment by government, industry and the community has helped to conserve and improve the health of the Bay.

While the Bay is currently in good condition, we cannot take its health for granted. Melbourne's population will almost double in the next 35 years, and significant growth will occur in Geelong and other regional centres. Combined with the additional pressures of climate change, it will be a challenge to ensure the Bay remains healthy.

This new Port Phillip Bay Environmental Management Plan will build on the good work that has already been done, and provides a framework for government, industry and community groups to work together in managing the Bay and its catchment. This will help to address the most pressing challenges facing our Bay, so that it can be enjoyed by future generations.

Development of this draft Plan has been informed by a number of scientific investigations; the input of government, industry and community experts; and public consultation.

The project team invites you to help finalise the Plan, by reading and making comment on this draft.



Australian Fur Seal. Photo – Parks Victoria



Introduction



Port Phillip Bay Environmental Management Plan

This draft Plan recognises the environmental, social and economic values of Port Phillip Bay, and builds on current programs and investment to protect these values.

Port Phillip Bay and its catchment

Port Phillip Bay is the largest marine embayment in Victoria (Figure 1). Freshwater flows into the Bay from the surrounding catchment via rivers, creeks, wastewater outlets and stormwater drains. The entrance at the southern end of the Bay controls the exchange with the oceanic waters of Bass Strait.



Figure 1 Port Phillip Bay and catchment

Port Phillip Bay: fast facts

COASTLINE	>	333 kilometres
AVERAGE DEPTH	>	13 metres (almost half of the Bay is less than 8 metres deep)
MAXIMUM BASIN DEPTH	>	24 metres (depth at the heads is almost 100 metres)
VOLUME	>	26.3 billion cubic metres
TOTAL BAY AREA	>	1,930 square kilometres
TOTAL CATCHMENT AREA	>	9,694 square kilometres
CATCHMENT POPULATION	>	More than 4 million people (includes Melbourne and Geelong)



Jawbone Marine Sanctuary. Photo – Parks Victoria

Purpose and scope of this Plan

Healthy coasts, marine areas and waterways are vital to the livelihood of Victorians by supporting biodiversity, public health, business, tourism and recreation. As part of its commitment to conserve and enhance the health of Victoria’s marine and coastal environments, the government is developing a new Environmental Management Plan for Port Phillip Bay (this ‘Plan’).

This Plan is required under the *State Environment Protection Policy (Waters of Victoria) – Schedule F6 Waters of Port Phillip Bay (1997)*. This Plan applies to ‘all the waters of Port Phillip Bay bounded by the high water mark, a line drawn between Point Lonsdale and Point Nepean and a line across the mouth of the Yarra River’. *Schedule F6* sets out what the environmental management plan must achieve. These requirements include:

- determining the priority management issues
- outlining actions that respond to priority issues
- identifying management responsibility for particular issues
- coordinating the management for protection of the Bay’s beneficial uses and values
- identifying specific management actions for nutrients, suspended solids, pathogens, litter and marine pests
- providing a process for reviewing and reporting progress to the community.

Background investigations (Table 1) have established current scientific understanding, and have helped to identify this Plan’s priority issues.

A broad range of issues have been evaluated against the risk they pose to Bay health; the need and the opportunity to improve their management and coordination; their existing management controls (legislation, policy, regulation); the community’s level of concern; and the ability to achieve a positive and significant outcome in the ten year life of this Plan. Priority goals and actions in this Plan have been derived from these assessments and investigations.

There are many issues and activities which are therefore not featured in this Plan, but which are still acknowledged to be significant in the eyes of the government and the community. Issues such as dredging, commercial and recreational fishing, coastal erosion and inundation, and shipping/boating pollution were not identified as priorities for this Plan. These issues are all managed through other mechanisms, regulation and legislation.

This Plan will be delivered over ten years, with annual reporting on progress and major evaluation at five-yearly intervals. It is consistent with the approach and principles of international standard *ISO 14001:2015* for environmental management systems. Implementation of this Plan will include an iterative process for achieving continuous improvement and adaptive management.

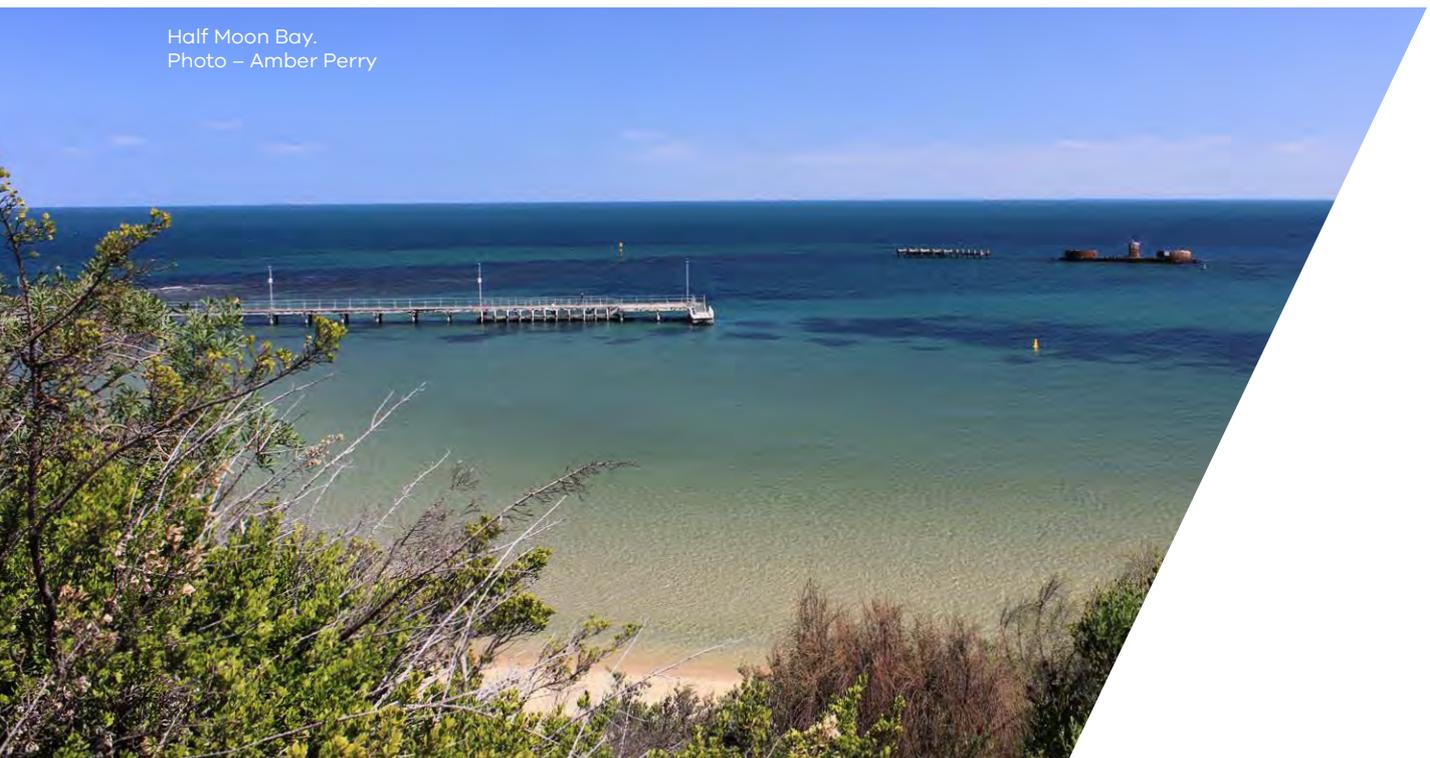
This Plan is the result of a coordinated effort from the Department of Environment, Land, Water and Planning (DELWP) in partnership with Melbourne Water and the Environment Protection Authority (EPA) Victoria. It recognises that collective action from government, industry and community will be required to achieve our vision and goals.

Table 1 EMP supporting documents

This Plan is supported by the following explanatory and technical documents:

1	Port Phillip Bay Environmental Management Plan 2017–2027: Supporting Document Provides greater detail of how the Plan was developed, how priorities were set and, more explicitly, how the priorities will be addressed in the implementation of this Plan.
2	Desktop Review of Victoria's Marine Values Identifies and collates information on values in Victoria's marine environment including Port Phillip Bay.
3	Prioritising Environmental Issues Identifies pressures and stressors that pose the greatest risk to Bay values, and prioritises these risks.
4	Scientific Knowledge Synthesis Provides current scientific knowledge on the status of nitrogen cycling, marine pests and pollutants in the Bay as a basis for developing potential management actions.
5	Catchment to Bay Modelling Provides estimates of nutrient, sediment and pathogen loads under future scenarios, allowing for climate change and population growth, and the impact of these loads on water quality in the Bay.
6	Community and Stakeholder Consultation Provides a snapshot of community and stakeholders' values, views on the biggest challenges for Bay health, and a vision for the Plan.

Half Moon Bay.
Photo – Amber Perry



History of the Bay and its Traditional Owners

We know that Aboriginal people have inhabited the land and catchment of Port Phillip Bay for more than 30,000 years.

Some 16,000 years ago, before the end of the last Ice Age, the land mass of Victoria was still connected to Tasmania. At this time, the Yarra and Werribee rivers meandered through a great plain of woodlands, grasslands and saltbush, before flowing through a gorge at the Heads. People of the Kulin nation lived, hunted and gathered on this great plain, which we now know as Port Phillip Bay.

Until about 8-10,000 years ago, the Bay entrance that we know today was blocked with sand and silt, cutting it off from Bass Strait.

When the ocean finally penetrated the entrance to the Bay, it would have filled rapidly. This dramatic environmental event is consistent with Aboriginal oral histories that describe the flooding of the plains where Kulin nation people had lived.

One of these histories has been told by Boon Wurrung elder, Carolyn Briggs, and published in *Nyernila – Listen Continuously* (Victorian Aboriginal Corporation for Languages, 2014). The story is reproduced here, with thanks, and with acknowledgement that each of the Kulin nation tribes tells their own version of this history.

Aboriginal people have continued to live around the Bay since the great flooding. Almost 600 archaeological sites have been found which provide evidence of their ancestors past activities.

Boon Wurrung's Creation story of Port Phillip Bay

Many years ago the biik (land) we now call greater Melbourne extended right out to the warreeny (sea). Nairm (Port Phillip Bay) was then a large flat grassy plain. The Yarra River, as it is known today, flowed out across this flat plain into the warreeny.

This large plain was covered in buath (grass) and tarrang biik (woodlands) on which the Boon Wurrung men hunted guyeem (kangaroo) and barramaeel (emu). The bagurk (women) cultivated the murrnong (yam daisy). They collected food from the wurneet (creek) and the warreeny and harvested the iilk (eels) that migrated through there every year.

One day – many, many years ago – there came a time of chaos and crisis. The Boon Wurrung and the other Kulin nations were in conflict. They argued and fought. They neglected their biik. The murrnong was neglected. The animals were over killed and not always eaten. The gurnbak (fish) were caught during their spawning season. The iilk were not harvested.

As this chaos grew, the warreeny became angry and began to rise. The wurneet became flooded and eventually the whole flat plain was covered in baany (water).

It threatened to flood their whole barerarerungar (country). The people became frightened and went to Bundjil, their creator and spiritual leader. They asked Bundjil to stop the warreeny from rising.

Bundjil was angry with his people, and he told them that they would have to change their ways if they wanted to save their land. The people thought about what they had been doing and made a promise to follow Bundjil.

Bundjil walked out to the warreeny, raised his tjeera (spear) and directed the warreeny to stop rising. Bundjil then made the Boon Wurrung promise that they would respect the laws.

The baany never subsided but stayed to create a large bay that the Boon Wurrung called Nairm. Today it is known as Port Phillip Bay. The warreeny took away much of the biik of the Boon Wurrung and much of their barerarerungar was reduced to a narrow strip of coastline.

The Boon Wurrung learnt from their mistakes. They returned to their old values and the laws of Bundjil. They took greater care of the biik of Bundjil and the bubup (child) of Bundjil.



Bunjil's eggs at Half Moon Bay.
Photo - Amber Perry



Ricketts Point Marine Sanctuary. Photo – Parks Victoria

Current environmental management of the Bay



Management of the Bay involves a network of community organisations, businesses and government agencies. The health of the Bay relies on integrated management of marine, coastal and catchment-based pressures.

The Department of Environment, Land, Water and Planning (DELWP) is responsible for leading and coordinating environmental management of the Bay, and other roles including wildlife protection, incident response, planning and issuing of permits.

Shared management responsibilities

DELWP holds the leading role, but many other organisations and agencies have management responsibilities in the Bay and within its catchment.

Melbourne Water and the Corangamite Catchment Management Authority (CMA) have waterway management functions for designated waterways within their districts under the *Water Act 1989*. They develop plans and carry out works and activities which will improve water quality and ecosystem health for waterways.

The Port Phillip and Westernport CMA also plays an important role in catchment management, improving biodiversity and helping to address issues that affect the health of the Bay.

The Environment Protection Authority (EPA) Victoria is the environmental regulator and has responsibility for independent assessment, licensing, reporting and advice regarding environmental health issues affecting waterways and the Bay. The EPA is also responsible for administering and enforcing the *State Environment Protection Policy (Waters of Victoria)*.

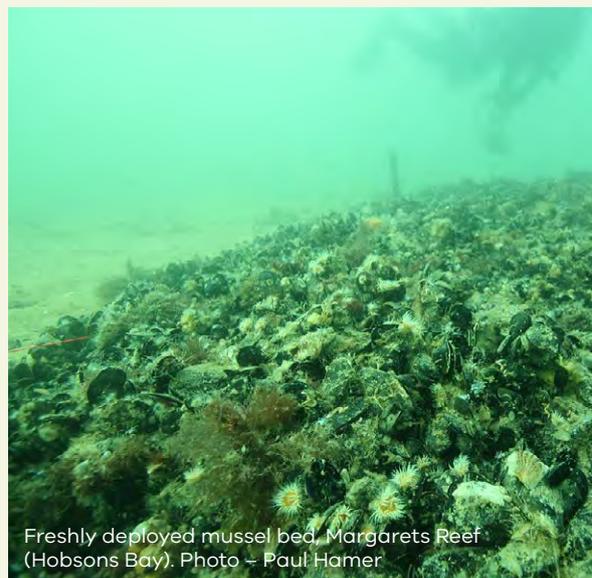
Parks Victoria manages the Bay's marine national parks and marine sanctuaries, which help to safeguard Victoria's unique and diverse marine plants and animals and their habitats. Parks Victoria holds responsibility for navigable waterways and is the designated local port manager and waterway manager under the *Port Management Act 1995* and the *Maritime Safety Act 2010*.

CASE STUDY 1

Improving habitats with shellfish reef restoration

Shellfish reefs are the most threatened marine habitat on earth. Globally, 85% of oyster reefs have been completely lost and there are signs that these reefs are 'functionally extinct' in many areas of Australia. Oysters are important as they can improve water quality by filtering algae and nutrients from the water column. Oyster shells also provide a habitat for a range of marine animals, such as crabs, sea squirts, snails and sponges.

In partnership with the Victorian Government and the Albert Park Yachting and Angling Club, The Nature Conservancy is restoring shellfish reefs in Port Phillip Bay. As part of the reef restoration project, native flat oysters raised at the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) Queenscliff hatchery are being used to re-establish reefs at Geelong, Hobsons Bay and Chelsea.



Freshly deployed mussel bed, Margarets Reef (Hobsons Bay). Photo – Paul Hamer



Beach goers, Port Phillip Bay.
Photo - Parks Victoria

The Bay's commercial ports and channels are managed by the Port of Melbourne Corporation (Port of Melbourne) and the Victorian Regional Channels Authority (Port of Geelong). Responsibilities of these commercial port operators include shipping control, channel management, the provision of navigation aids, and the development and implementation of safety and environment management plans (SEMP).

Other agencies with a role in conserving and caring for the Bay and its catchment include:

- Committees of management
- Department of Economic Development, Jobs, Transport and Resources (which includes Agriculture, Biosecurity, Fisheries and Tourism)
- Department of Health and Human Services
- Local government (including local councils, Municipal Association of Victoria, and Association of Bayside Municipalities)
- Office of the Commissioner for Environmental Sustainability
- Sustainability Victoria
- Transport Safety Victoria
- Victorian Coastal Council and Central Coastal Board

- Victorian Planning Authority
- Water corporations (Barwon Water, Central Highlands Water, City West Water, South East Water, Southern Rural Water, Western Water, and Yarra Valley Water)
- Zoos Victoria.

Policy setting

Management of the Bay occurs within a framework of federal, state, regional and local strategies, plans and policies. The state's *Environment Protection Act 1970* and the federal *Environment Protection and Biodiversity Conservation Act 1999* provide overarching legislation that defines core conservation and management principles. Preparation of an environmental management plan for the Bay is a requirement of the *State Environment Protection Policy (Waters of Victoria) – Schedule F6 Waters of Port Phillip Bay (1997)*. Activities such as shipping, fishing and dredging are guided by their own legislation and policies that include requirements for environmental management. There are also a number of new state policies, or revisions of existing ones, that will impact on future environmental management of the Bay. Further detail on these new policies and initiatives is provided in Appendix 1.

Previous studies and initiatives

The Victorian Government and its agencies have led a number of initiatives to improve understanding of the Bay and to inform management actions over the past 20 years. These initiatives, including the 2001 Plan, are summarised in Figure 2.

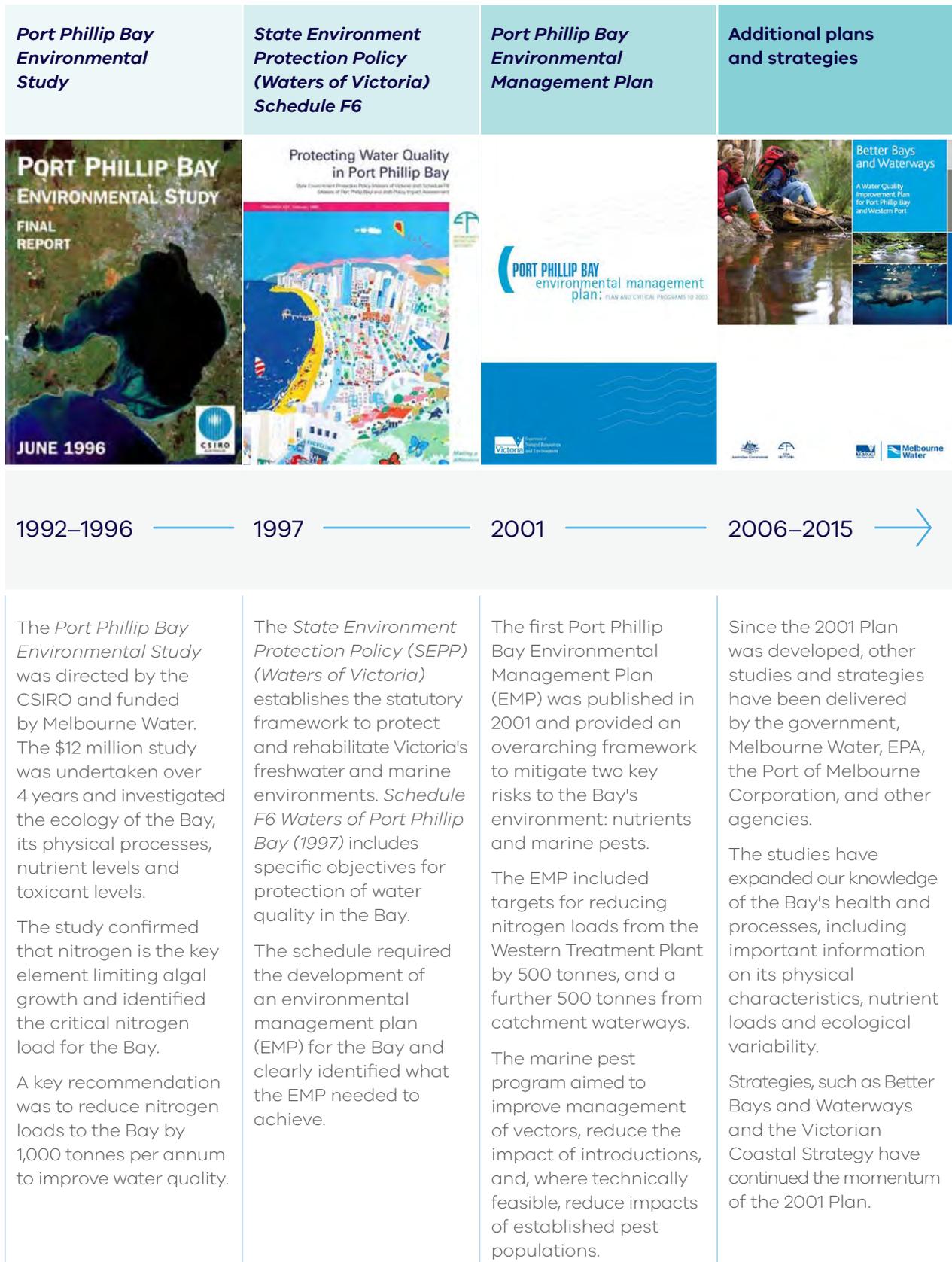


Figure 2 Summary of past studies, policies and plans for managing Port Phillip Bay

Achievements to date

The first environmental management plan for the Bay was released in 2001 and specified a set of environmental objectives to manage two priority risks to the Bay: nutrients (specifically nitrogen) and marine pests. Figure 3 provides a summary of activities and achievements which have helped to protect the Bay since the 2001 EMP was published.

Nutrient inputs were considered a key risk because they are one of the main causes of algal blooms and they can threaten environmental health.

One of the major objectives of the 2001 Plan was to reduce the annual nitrogen load to the Bay by 1,000 tonnes through upgrades to the Western Treatment Plant and improved stormwater management in the catchments. Monitoring data and modelling results show that this target has been achieved.

Marine pests were considered a key risk because they can compete with native species, alter habitats and may disrupt nitrogen cycling processes.

The objectives of the marine pest program were to continue to improve the management of vectors that lead to the introduction of marine pests, and to reduce the impact of pests. Initiatives of this program included release of the EPA *Waste Management Policy (Ships Ballast Water)* in 2004 and the *Environment Protection (Ships Ballast Water) Regulations* in 2006. These regulations ensure that high-risk ballast water is not discharged into Victorian ports or coastal waters. Engagement and communications programs with small boat operators were also undertaken to help improve awareness and understanding of how to avoid spreading marine pests.

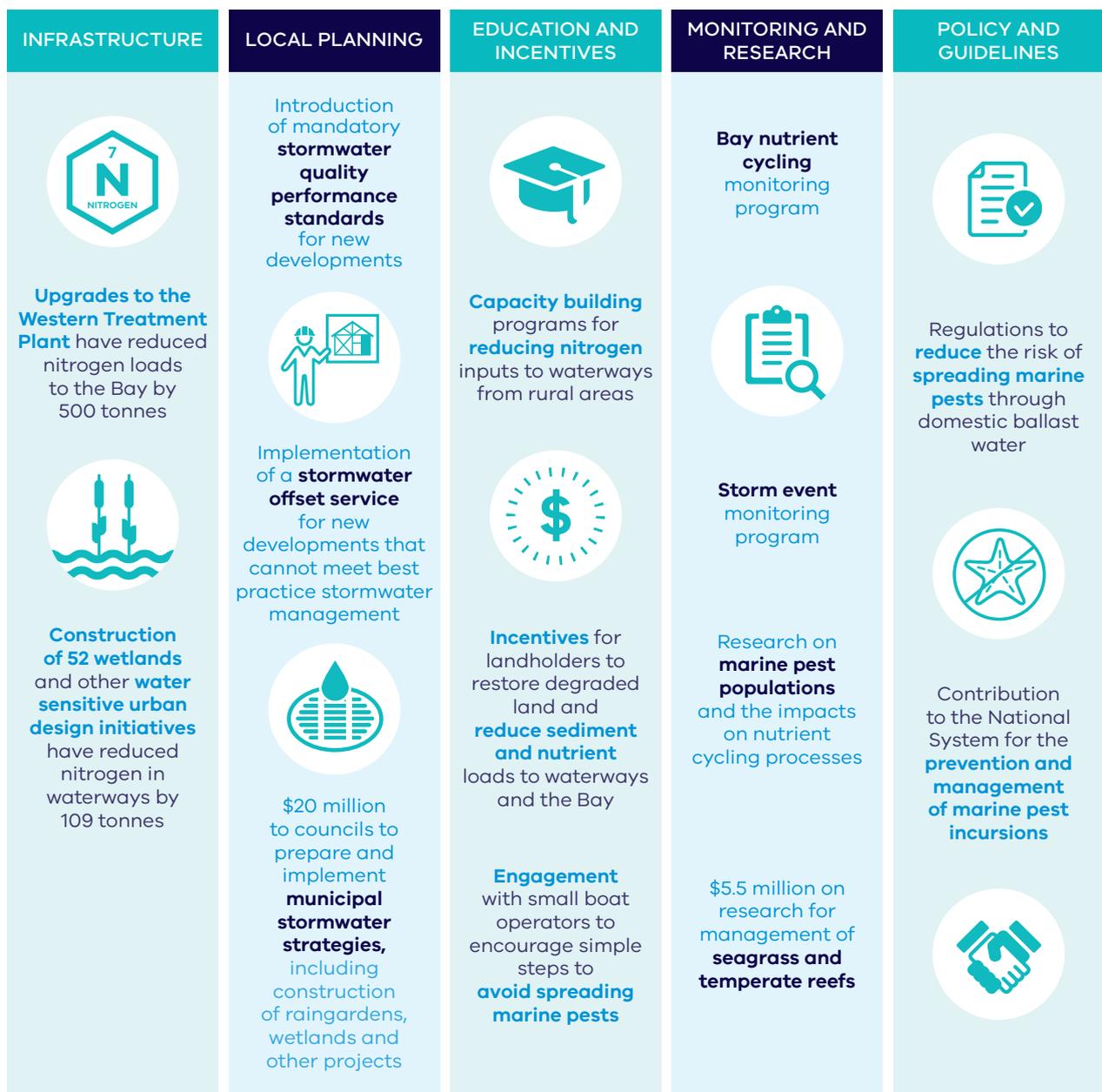


Figure 3 Summary of achievements since 2001



Decorator Crab. Photo – Ray Lewis

Values and challenges



Port Phillip Bay is a complex and diverse ecosystem that provides a broad range of economic, social and environmental benefits to our community. Future population growth and climate change pose significant challenges to maintaining water quality and biodiversity in the Bay.

The Bay's values, along with broader benefits towards which they contribute (Figure 4), were identified through a literature review and community consultation. An environmental risk assessment of these values was used to identify priority areas of focus for this Plan.



Figure 4 Summary of Bay values

Environmental values

The Bay is home to a diverse variety of marine plants and animals, many of which are found nowhere else. This includes hundreds of species of fish, molluscs, crustaceans, marine worms, cnidarians (e.g. jellyfish and sea anemones), algae (seaweeds) and sponges. The Bay also supports populations of marine mammals, including seals and dolphins.

The Bay supports diverse and extensive habitats (Figure 5). Along the foreshore are sandy beaches, rocky intertidal reefs, mud flats, mangroves and saltmarshes. Habitats within the Bay include seagrass meadows, rocky reefs, sponge gardens, and un-vegetated soft sediments (sands and silt). Seagrasses provide nurseries for many fish species.

Rocky reefs provide hard substrate for hundreds of species of seaweed to grow on. Un-vegetated soft sediments on the seafloor are home to a diverse array of invertebrates and micro-organisms that are critical in processing nitrogen and other nutrients.

The Port Phillip Bay (western shoreline) and Bellarine Peninsula Ramsar site, and the Edithvale-Seaford Wetlands Ramsar site, are internationally recognised for the quality of their wetlands and the large numbers of Australian and migratory birds that utilise them. There are also four protected areas in the Bay: the Port Phillip Heads Marine National Park, and Point Cooke, Jawbone and Ricketts Point Marine Sanctuaries.

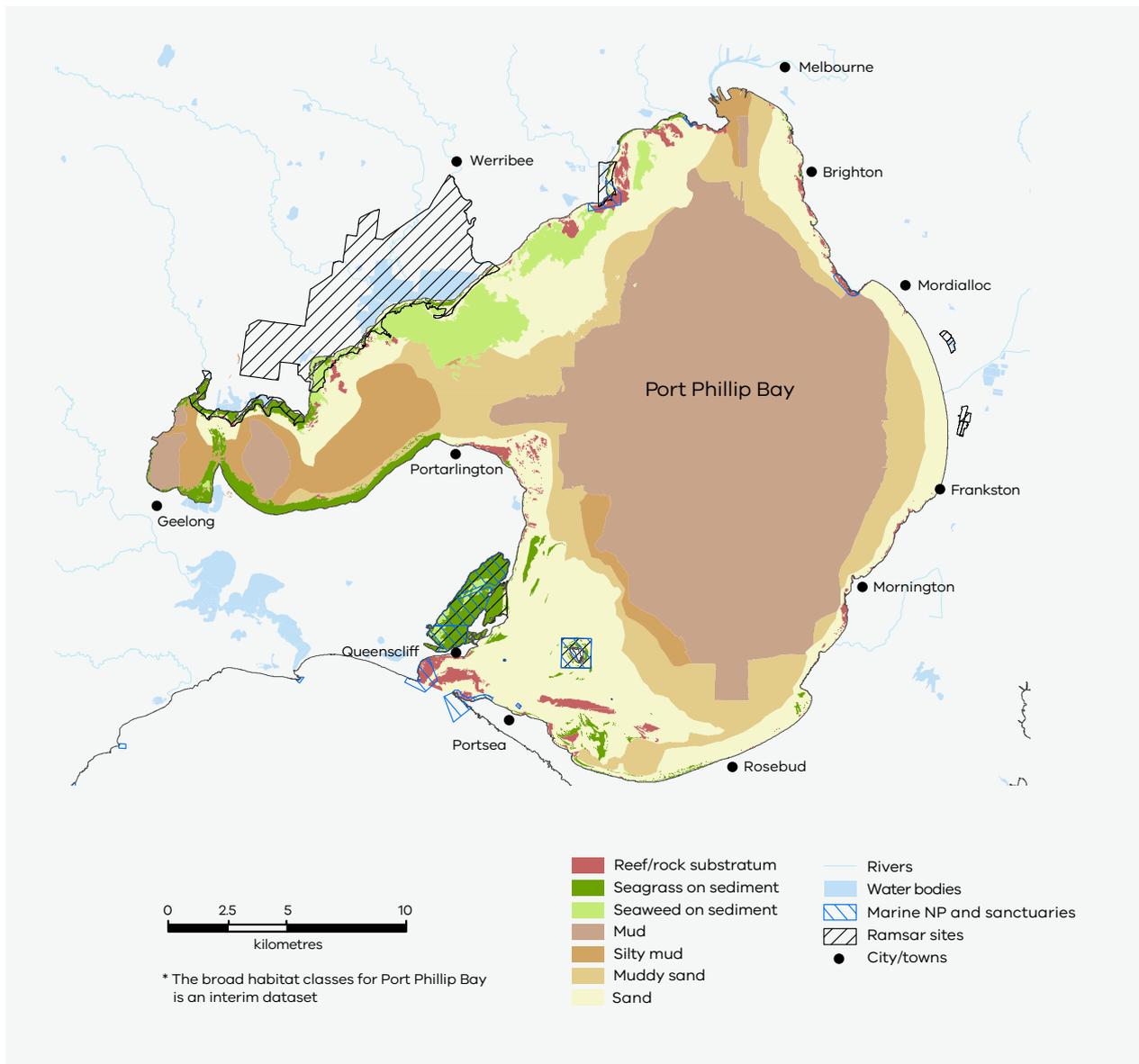


Figure 5 Bay habitats and protected areas

Social and cultural values

Port Phillip Bay is one of Victoria's most popular recreational destinations and contributes significantly to Melbourne's liveability. It is popular with local, regional, national and international visitors, with over fifty million people visiting the Bay each year. The Bay is also appreciated from afar, providing visual and other amenity benefits to visitors and nearby residents.

The Bay and its beaches support a range of activities including swimming, snorkelling, kite-surfing, scuba diving, fishing, sailing and boating as well as sand-play, walking, relaxing and socialising.

There are 135 beaches in the Bay, some of which are patrolled by community volunteer lifesaving clubs. Popular dive sites are located in marine parks and sanctuaries and include Popes Eye and Portsea Hole.

The Bay has landscapes and sites of historical and cultural significance. Aboriginal tribes that live on and around the Bay include the Wathaurung, the Bunurong/Boon Wurrung, and the Wurundjeri. These tribes are part of the Kulin nation. Through their cultural traditions, Aboriginal people maintain their connection to their ancestral lands and waters. It is important that this connection to Country is maintained and that the Aboriginal values and interests in the Bay are recognised.

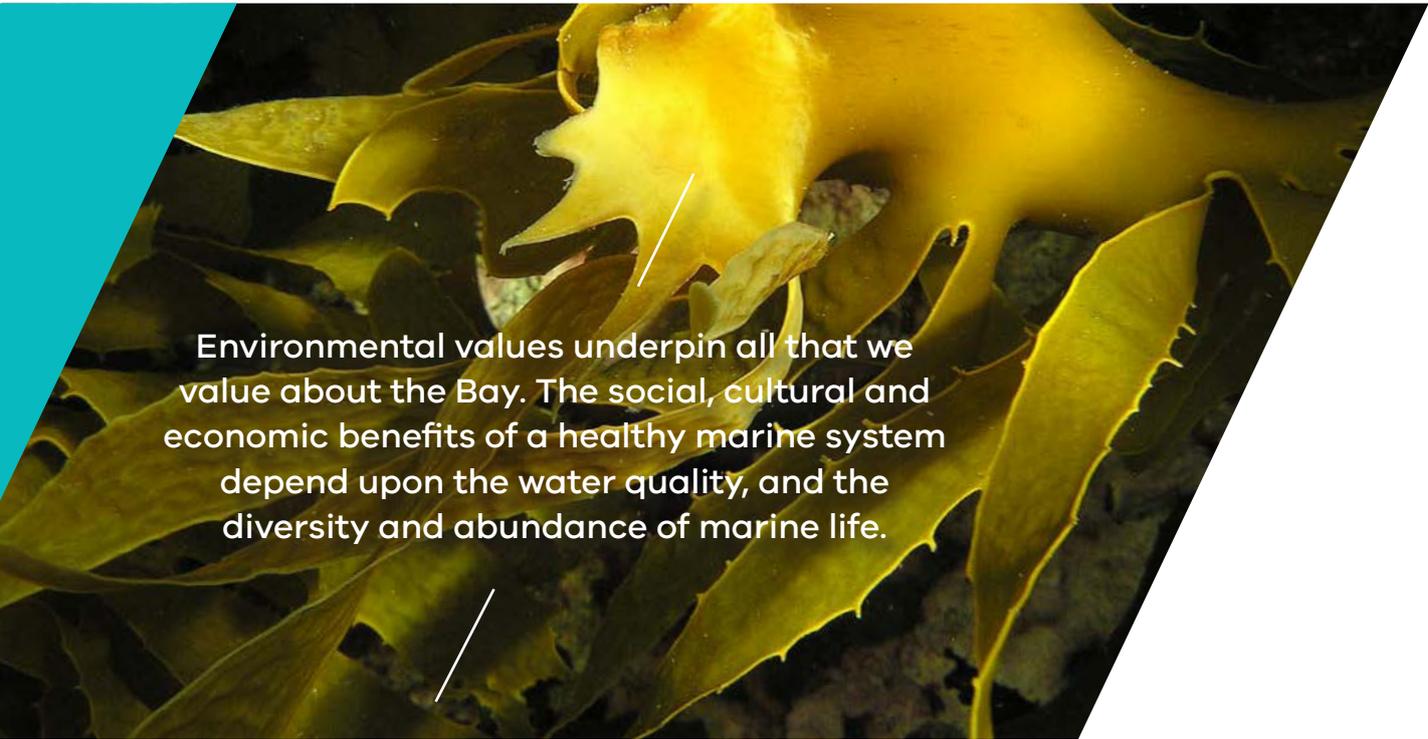
Victoria's first European settlement was established in 1803 at Sullivan Bay, near Sorrento, 30 years before Melbourne was founded. There are also 175 heritage sites around the Bay, mostly associated with maritime history.

Economic values

The Bay is home to Victoria's largest commercial ports. The Port of Melbourne is Australia's busiest container port, handling more than a third of national container trade, with over 3,000 ship visits per year. The Port of Geelong is Victoria's largest regional port and its most important bulk commodities port, with over 600 ship visits per year.

Commercial fisheries and aquaculture also operate in the Bay. Annual production of finfish has averaged around 1,200 tonnes per year, with a market value of about \$3.5 million. These production levels will be reduced with the phasing out of netting by 2022 and buy-back of commercial licences. Aquaculture and commercial diving for scallop, abalone and sea urchins also take place in the Bay. Aquaculture is a potential growth area for the seafood industry. Farming of Blue mussels is the predominant aquaculture activity, with seven aquaculture fisheries reserves located in the Bay. Production of mussels is around 900 tonnes per year. Recreational fishing is a major contributor to the Victorian economy, with an estimated economic value of over \$420 million per year.

The Bay's natural features, and the recreational opportunities they provide, are significant drawcards for tourists and holiday-makers. Bay tourism and associated industries make a significant contribution of over \$320 million per year to the Victorian economy. Commercially operated boat tourism includes wildlife watching (dolphins, seals and penguins) and recreational diving.



Environmental values underpin all that we value about the Bay. The social, cultural and economic benefits of a healthy marine system depend upon the water quality, and the diversity and abundance of marine life.

Challenges

While much is being done to conserve the health of the Bay, population growth and climate change are putting increased pressure on its environmental assets.

Climate change will exacerbate some existing problems and create new ones. Water temperatures will increase, leading to a change in species composition, and changing patterns of underwater and coastal plant and animal communities. Sea levels will rise and storm surges will become more frequent, exposing the coastline to erosion and inundation, and squeezing coastal habitat between the sea and urban development. Under a changing climate there will be less rainfall, but more intense rainfall events, causing flooding, erosion in the catchment, and transportation of higher sediment and nutrient loads to the Bay.

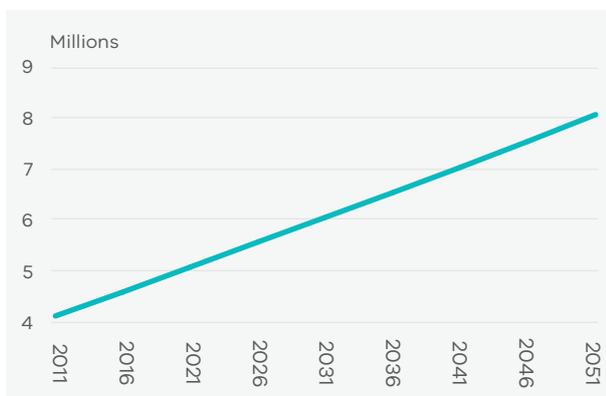


Figure 6 Predicted population of greater Melbourne
Source: Victoria in Future, 2016

Over four million people live within the Bay's catchment. The area incorporates two major cities: Melbourne and Geelong. *Victoria in Future 2016* predicts that Greater Melbourne's population will almost double over the next 35 years, from around four million to more than eight million people (Figure 6).

This growth presents challenges to maintaining Bay health. More people will be using and enjoying the Bay. There will be more boats, more fishers, and more people on the beaches. There will be more litter, more microplastics, more sewage, and more cars and trucks in the catchment. Urbanisation (building more houses, roads, footpaths, shops, etc.) will increase the hard or impervious surfaces within the Bay's catchment. Where water can't soak into the ground, increased stormwater runoff will flow to the Bay.

Greater volumes of stormwater and sewage will result in an increase in nutrients, litter and other pollutants draining to the Bay. Increasing nutrients and pollutants will cause more algal blooms and poor water quality during wet periods, potentially resulting in closures of popular beaches when this occurs.

Increasing water temperatures, changing nutrient levels and higher boat traffic increases the risk of marine pest introductions and spread. Marine pests can compete with native species, alter habitats, reduce important fish stocks, and potentially disrupt nitrogen cycling processes.

CASE STUDY 2

Understanding microplastics in the Bay

Microplastics are any small pieces of plastic, less than 5mm in diameter. They include 'nurdles' (small plastic pellets used to manufacture a range of plastic products), 'microbeads' (from cosmetics), and the breakdown products of plastic litter.

There is growing community concern about microplastics, and a need for greater understanding of their sources and their impacts on the marine environment.

Several programs are already in place to increase our understanding of microplastics and their impacts in the Bay's catchment. RMIT University and EPA Victoria have started research and monitoring into the impact of microplastics; Sustainability Victoria is leading a collaborative research program to understand the sources and impacts of microplastics; and the Victorian

Government has funded initiatives such as Operation Clean Sweep (led by Tangaroa Blue) to educate industry on the improved management of plastics at manufacturing sites.





Snorkelling Beaumaris. Photo - David Reinhard

The new draft Plan



A healthy Port Phillip Bay that is valued and cared for by all Victorians

This new draft Plan establishes a framework and identifies actions to manage future challenges in maintaining the health and resilience of the Bay. The 21 actions over seven priority areas deliver on three goals: improved stewardship of the Bay, water quality, and marine biodiversity.

This draft Plan has been developed with an understanding that its implementation will be a collaborative effort between government, industry and the community.

A shared vision for the Bay

The vision statement describes the long-term aspirations for environmental management of the Bay. The vision has been informed by input and advice from government agencies, stakeholder groups and the community, and is based on Bay values, and the threats to these values.

Our collective vision is represented pictorially in Figure 8, with some of the personal visions provided during the consultation process.

The vision also reflects the government's commitment to conserve the values of the Bay, in accordance with the *State Environment Protection Policy (Waters of Victoria) - Schedule F6 Waters of Port Phillip Bay (1997)*.

The vision and goals are considered to be long-term aspirations, and will be progressively worked towards over time. This draft plan outlines 21 actions, across seven priority areas, which will be delivered over the next ten years.



OUR COLLECTIVE VISION FOR THE BAY IS:

A healthy Port Phillip Bay that is valued and cared for by all Victorians



The Bay continues to support a wide range of community uses, diverse and abundant marine life, and the Victorian economy.

All Victorians care deeply for the Bay, enjoying the benefits that it provides, and being actively and enthusiastically engaged in ensuring the Bay and its marine life are thriving.

Government, business and the community work collaboratively to ensure that all contributions to maintaining a healthy Bay are complementary and aligned.

Management of the Bay responds to the pressures of population growth and climate change.

Goals, priority areas and actions

Three goals have been developed based on input and advice from key agencies and stakeholder groups and feedback from the community, to achieve the long-term vision for the health of the Bay. These goals are consistent and aligned with the intent of the Port Phillip Bay Schedule of the *SEPP (Waters of Victoria)*, to conserve the values of the Bay by minimising adverse impacts associated with human activity and the use of the Bay and its catchment. The goals are also consistent with other Victorian Government environmental policies.



GOAL 1

Stewardship of the Bay is fostered across community, industry and government

This goal aims to enhance Victorians' appreciation for the Bay and support the development of partnerships between government, community and industry to improve the health of the Bay.

GOAL 2

Health and community enjoyment of the Bay is enhanced by best practice water quality management

This goal aims to ensure that the Bay continues to have good environmental and recreational water quality to support healthy and diverse ecosystems and the wide variety of human uses of the Bay, including swimming, boating and fishing.

GOAL 3

The Bay's habitats and marine life are thriving

This goal aims to support the health of the Bay's marine life and habitats, including preventing the introduction and spread of exotic marine pests.

Priority areas and **strategies** have been identified under each goal. **Actions** outline what needs to be done to achieve the goals. More information on the rationale for each action, and the types of activities to be undertaken, is included in the *Port Phillip Bay Environmental Management Plan 2017–2027: Supporting Document*.

Potential partner organisations for undertaking actions have been listed in alphabetical order.



Left: Feather Star. Photo - Parks Victoria
Sunset at Ricketts Point. Photo - Karen White

CASE STUDY 3

> Community groups improving the health of the Bay

Community groups and community-agency partnerships play an important role in keeping the Bay healthy and vibrant. The award-winning 'Port Phillip Baykeeper', run by the Port Phillip EcoCentre, is one example of a successful community program. The Baykeeper brings together community and stakeholders, and facilitates projects to improve the health of the Bay.

Baykeeper activities for schools, community and corporate groups include plastic pollution clean-ups and audits on streets and beaches, shoreline shell surveys, live mollusc surveys, monitoring beach erosion, and coastal revegetation for seabird habitats.



Port Phillip EcoCentre Life Support for the Bay. Photo - Chris Cossar

The Victorian Government is committed to conserve and enhance the health of the state's marine and coastal environments. The *Port Phillip Bay Environmental Management Plan 2017–2027* is an important step towards achieving this goal.

Port Phillip Bay is a unique natural asset, supporting a wide range of community uses, rich and diverse marine life, spectacular scenery, and providing significant benefits for local businesses and the Victorian economy.

This draft Plan builds on the good work that is already being done to maintain the health of the Bay. It aligns government, industry and community groups on actions that will address challenges resulting from population growth, urbanisation and climate change.

Understanding this Plan framework

This framework focuses action and investment on priority issues affecting Bay health. Priorities were identified through background investigations, and community and agency consultation.

Goals, priority areas and actions in this framework are based on:

- what the science has identified as key threats to the health of the Bay
- what stakeholders and the broader community want action on
- which issues need more attention or coordination
- which actions will have the most impact on protecting long-term Bay health.

Following public consultation on this draft Plan, the final Plan will include a more detailed list of sub-actions, with clearly identified lead organisations. Actions will be implemented over the next ten years, and where possible, will follow an adaptive management approach. Specific interventions and activities will be aligned to, and in some cases delivered by, broader state or regional plans and strategies (such as whole of catchment planning or integrated water cycle management).

VISION	A healthy Port Phillip Bay that is valued	
GOALS	Stewardship of the Bay is fostered across community, industry and government	
PRIORITY AREAS	Connect and inspire	Empower action (work together)
STRATEGIES	Improve appreciation and understanding of Bay values	Improve collaboration and partnerships across community, industry and government
		
PRIORITY ACTIONS	<p>1.1 Work with Aboriginal groups to improve understanding of Aboriginal cultural values and interests in the Bay and support connections to Country</p> <p>1.2 Develop and deliver programs to inspire greater appreciation of the Bay's values</p> <p>1.3 Build understanding of management responsibilities and programs for the Bay and its catchment</p>	<p>2.1 Build capacity and collaborations within community and industry networks</p> <p>2.2 Empower the broader community to get more actively involved in caring for the Bay</p> <p>2.3 Support stronger partnerships across community, industry and government to ensure aims and outcomes are aligned</p>

and cared for by all Victorians

Health and community enjoyment of the Bay is enhanced by best practice water quality management			The Bay's habitats and marine life are thriving	
Nutrients and pollutants	Litter	Pathogens (human health)	Habitat and marine life	Marine biosecurity
Nutrient and sediment loads do not exceed current levels and pollutant loads are reduced where practicable	Reduce litter loads to the Bay	Minimise risks to human health from pathogens	Conserve and restore habitats and marine life	Manage risks from marine pests
				
3.1 Effectively maintain existing stormwater infrastructure and programs to mitigate loads to the Bay, or secure via equivalent means	4.1 Establish baseline estimate of the volume of litter entering the Bay and its impact, including accumulation points	5.1 Improve understanding of links between pathogen concentrations and human health for swimming and consumption of shellfish	6.1 Monitor Bay habitats at priority locations and improve habitat mapping tools	7.1 Prevent introduction and dispersal of marine pests
3.2 Prevent increases in nutrient loads from wastewater systems and where practicable reduce loads of other pollutants	4.2 Support capability and capacity building programs that target litter prevention, including reduction of microplastics	5.2 Adopt a risk-based approach to mitigate sources of pathogens found in the Bay	6.2 Improve understanding of ecological processes, threats and pressures	7.2 Monitor priority locations for early detection of marine pest introductions
3.3 Ensure all urban and rural land use effectively controls impacts from stormwater and runoff, and that controls are in place to manage increases in loads	4.3 Identify and prioritise litter hotspots around the Bay and undertake prevention and on-ground stormwater management actions to address sources	5.3 Improve monitoring and reporting to better detect and communicate human health risks from pathogens	6.3 Improve overall extent and condition of the Bay's natural ecosystems	7.3 Respond rapidly to new introductions of marine pests

Monitoring, Evaluation, Reporting and Improvement





Connect and inspire

Improve appreciation and understanding of Bay values

Consultation in early 2016 highlighted a sense that the biodiversity and cultural heritage of the Bay is underappreciated. It is important to foster deeper community understanding and connections to the Bay and its management challenges.

ACTION 1.1

Work with Aboriginal groups to improve understanding of Aboriginal cultural values and interests in the Bay and support connections to Country

This will provide greater acknowledgement of the importance of Aboriginal values and contributions to managing the health of the Bay and commits to working with the region's Aboriginal groups in delivering the new Plan. Activities include:

- Support Kulin people to lead on assessments of Aboriginal cultural values and interests (past and present) across different regions of the Bay
- Support opportunities for the Aboriginal community to reconnect with their cultural values
- Develop opportunities to educate government, industry and the broader community.

Delivery of this action could be linked to similar activities across the region for improving our understanding of Aboriginal values.

Potential partner organisations: Registered Aboriginal Parties and other Aboriginal groups

ACTION 1.2

Develop and deliver programs to inspire greater appreciation of the Bay's values

This will improve understanding and appreciation of the Bay's values across government, industry and the community. While the social benefits of the Bay are well regarded by many, the economic and environmental values (i.e. its diverse marine life) are often underappreciated. This will inspire greater environmental stewardship toward the Bay and help the community understand the impact of their actions on the Bay's health, and provide motivation for them to act to conserve it. Activities include:

- Conduct social and economic research on community values and gaps in knowledge
- Identify and promote the type of programs that are required, including approaches for connecting to nature and inspiring environmental stewardship
- Build on existing awareness and education programs around the Bay and its waterways to align with the goals of this Plan (e.g. i sea i care, Baykeeper, Coastcare).

Potential partner organisations: CMAs, community groups, councils, DELWP, educational and research organisations, EPA, Melbourne Water, Parks Vic, private businesses, Zoos Victoria

ACTION 1.3

Build understanding of management responsibilities and programs for the Bay and its catchment

This will improve communication of key responsibilities for Bay management to the community. It will improve the visibility of active management, provide confidence that the Bay is well managed and increase the ease of reporting incidents. Activities include:

- Develop a plan to communicate roles and responsibilities for key issues, gaps and overlaps that create confusion
- Provide clear information on who to contact if there's a problem via consistent beachside signage and online information, and digital tools
- Develop catchment-based maps and other communication tools to explain where various programs and projects are occurring and how they relate.

Potential partner organisations: CMAs, councils, DELWP, EPA, Melbourne Water, Parks Vic, Registered Aboriginal Parties and other Aboriginal groups, and broader government, industry and community organisations



Empower action

Improve collaboration and partnerships across community, industry and government

Strong partnerships and collaboration are crucial for successful environmental management programs. With these, innovation flourishes, resources are maximised, learnings are shared and build long-term social capital – leading to better outcomes for the environment. Consultation around the Bay in early 2016 highlighted a strong desire for improvements in this area, recognising that there is a strong foundation to build upon.

<p>ACTION 2.1</p> <p>Build capacity and collaborations within community and industry networks</p>	<p>This will improve the ability of community and industry to contribute to managing the health of the Bay. Well-designed capacity building programs will provide community and industry organisations with the knowledge, skills, guidelines and tools needed to implement the goals of this Plan. Activities include:</p> <ul style="list-style-type: none"> • Establish region-wide and catchment-based frameworks for supporting citizen science programs and local community groups, including consideration of regional support hubs • Support existing community and industry capacity building programs (such as Clearwater, Waterwatch coordinators, Coastcare coordinators) • Develop innovative new tools to support citizen science and on-ground community action. <p>Potential partner organisations: CMAs, DELWP, EPA, Melbourne Water, Museum Victoria, non-government environment organisations, Parks Vic, peak industry bodies, Registered Aboriginal Parties and other Aboriginal groups, research institutes</p>
<p>ACTION 2.2</p> <p>Empower the broader community to get more actively involved in caring for the Bay</p>	<p>This will encourage involvement in on-ground activities and everyday actions that help reduce impacts on the Bay. Activities include:</p> <ul style="list-style-type: none"> • Identify needs and gaps in existing communication materials and strategies • Develop and clarify information on how to get involved in conserving the Bay, building on existing programs and campaigns • Communicate achievements of community actions more widely to attract interest and inspire action. <p>Potential partner organisations: CMAs, community groups, councils, DELWP, educational and research organisations, EPA, Melbourne Water, Parks Vic, private businesses, Zoos Victoria.</p>
<p>ACTION 2.3</p> <p>Support stronger partnerships across community, industry and government to ensure aims and outcomes are aligned</p>	<p>This will support the many initiatives being undertaken by a range of groups and result in a more coordinated approach to achieve better management outcomes for the Bay. Activities include:</p> <ul style="list-style-type: none"> • Identify mechanisms for ensuring strong collaboration between community, industry and government organisations • Improve mechanisms to ensure greater representation of Aboriginal groups • Identify opportunities for data capture and sharing. <p>Potential partner organisations: CMAs, councils, DELWP, EPA, Melbourne Water, Parks Vic, Registered Aboriginal Parties and other Aboriginal groups, and broader government, industry and community organisations</p>



Nutrients and pollutants

Nutrient and sediment loads do not exceed current levels and pollutant loads are reduced where practicable

Research shows nutrients, sediment and other pollutants flowing into the Bay from the surrounding catchment are the main contributors to poor water quality. Without careful management of our stormwater and wastewater, pollution into the Bay will significantly increase as our population expands and our cities and towns become more urbanised.

ACTION 3.1

Effectively maintain existing stormwater infrastructure and programs to mitigate loads to the Bay, or secure via equivalent means

This will ensure that the reductions in nutrient, sediment and pollutant loads to the Bay, achieved via stormwater improvement programs and infrastructure built since the previous Plan, are sustained. This includes the 52 constructed wetlands built by Melbourne Water to mitigate 100 tonnes of nitrogen per year and other stormwater assets built by developers and local councils (such as wetlands, raingardens and stormwater harvesting schemes). Alternative approaches will be explored to achieve more cost-effective solutions with equivalent outcomes (such as alternative assets or programs that mitigate the same volume of nitrogen and sediment loads as the design of the original stormwater asset or program).

Potential partner organisations: Councils, DELWP, EPA, Melbourne Water, other asset owners

ACTION 3.2

Prevent increases in nutrients loads from wastewater systems and where practicable reduce loads of other pollutants

This will address the challenges of urban growth and forecast increases in the volume of wastewater (from sewage), especially in growth areas. Water corporations will operate wastewater systems to ensure their annual nitrogen load discharges do not exceed current levels and the loads of other pollutants are reduced where practicable. This may require improvements at the Western Treatment Plant, local wastewater treatment plants and areas serviced by septic tanks.

Potential partner organisations: Councils, DELWP, EPA, Melbourne Water, other water corporations

ACTION 2.3

Ensure all urban and rural land use effectively controls impacts from stormwater and runoff and that controls are in place to manage increases in loads

This will investigate current planning, building and other control mechanisms, to improve effectiveness in stormwater management across all land uses within the catchment.

It will identify and resolve deficiencies in current stormwater management. New and innovative ideas will be explored to minimise any increase in stormwater flows (and pollutant, nutrient and sediment loads) resulting from increasing urbanisation and more intense rainfall events. This will address stormwater improvement opportunities in existing urban areas, as well as growth and re-development areas.

This will also ensure that programs are put in place to limit nutrients, sediments and pollutants in stormwater flowing to the Bay from rural sources.

Potential partner organisations: CMAs, councils, DELWP, Melbourne Water



Litter

Reduce litter loads to the Bay

Litter has negative impacts on community enjoyment and marine life, and evidence is growing on the impacts of microplastics. Litter in the Bay comes from a range of sources but most flows in from the surrounding drains and waterways. Litter loads to the Bay will significantly increase with our growing urban population.

ACTION 4.1

Establish baseline estimate of the volume of litter entering the Bay and its impact, including accumulation points

This will map litter sources and volumes of litter entering the Bay. This data is important to identify locations where litter accumulates (hotspots) and develop suitable responses. It will also provide a baseline against which to measure and evaluate improvements in litter prevention and clean-up activities. There is also a need to understand what impacts different forms of litter have on Bay values. This knowledge will assist in prioritising activities and will provide a reference point to measure outcomes.

Potential partner organisations: Community groups, councils, DELWP, EPA, Melbourne Water, Parks Victoria, Sustainability Victoria, VLAA

ACTION 4.2

Support capability and capacity building programs that target litter prevention, including reduction of microplastics

This will support capability and capacity building programs that will lead to a reduction in litter and littering that impacts the Bay. It will adopt the Victorian Litter Action Alliance best practice model for litter prevention, which recognises a multi-faceted approach combining education, infrastructure and enforcement. It will include developing and aligning with existing programs, such as the government's Community and Business Waste Education Strategy 2015–2020. There will also be a research program to address key knowledge gaps in our understanding of the ecological impact of litter, specifically microplastics.

Potential partner organisations: Community groups, councils, DELWP, EPA, Melbourne Water, other water corporations, Parks Victoria, Sustainability Victoria, VLAA

ACTION 4.3

Identify and prioritise litter hotspots around the Bay and undertake prevention and on-ground stormwater management actions to address sources

This will continue the clean-up of Bay beaches. Although the government is committed to preventing litter, behaviour change may not occur instantly. In the interim, it is important that beaches are kept clean. This action will support local government, businesses and community partnership projects to prevent litter from hotspots entering the Bay. This will involve Melbourne Water working in partnership with councils to manage litter in waterways and drains identified as major contributors to litter on beaches. This will also help in understanding where significant volumes of litter are deposited, key sources, and behavioural change to reduce littering at these hotspots.

Potential partner organisations: Community groups, councils, EPA, Melbourne Water, Parks Victoria, Sustainability Victoria, VLAA



Left: Western Treatment Plant Lagoons.
Photo – Melbourne Water



Right: Beach Clean Up.
Photo – Melbourne Water



Pathogens (human health)

Minimise risks to human health from pathogens

Pathogens in the water affect our ability to safely swim in the Bay, often causing beach closures or caution notices during and immediately following wet weather. They also impact on the operations of our aquaculture industry. Research has shown they mainly enter the Bay from stormwater drains and waterways but can also come from other sources. Targeting the key sources of pathogens and good public communication are known to be powerful tools for minimising risks to human health.

ACTION 5.1

Improve understanding of links between pathogen concentrations and human health risks for swimming and consumption of shellfish

This will quantify the risk relationship between pathogen concentrations and human health from swimming and consumption of shellfish. This knowledge will inform priorities for investment by water corporations, and inform state and local government in actions to control pathogen sources.

Studies may include sanitary inspections to identify contributing factors, quantitative microbial risk assessments (QMRAs) and epidemiological studies.

Potential partner organisations: Councils, DELWP, DHHS, EPA, Melbourne Water, research organisations, water corporations

ACTION 5.2

Adopt a risk-based approach to mitigate sources of pathogens found in the Bay

This will involve developing a toolkit for modelling and source-tracking high-risk faecal sources. Once sources are understood, targeted mitigation will reduce risks to human health.

Potential partner organisations: Councils, DHHS, EPA, Melbourne Water, research organisations, water corporations

ACTION 5.3

Improve monitoring and reporting to better detect and communicate human health risks from pathogens

This will improve the Beach Report program by using latest methods and technologies to improve the accuracy of forecasting for water quality, and to improve the response and management of contamination. This will encourage citizen science programs that address pathogen risks, and will provide a strong foundation for behaviour change.

Potential partner organisations: Councils, DHHS, EPA, Melbourne Water, research organisations, water corporations

Left: Altona dog beach. Photo – James Tori
Right: Elwood stormwater drain. Photo - Rob Molloy





Rosebud Pier. Photo – David Reinhard



Habitat and marine life

Conserve and restore habitats and marine life

The habitats and marine life of Port Phillip Bay are an important value to conserve for future generations. Research has identified significant risks to the health of the Bay's habitat and marine life from water quality pollution, litter and climate change. Tackling these issues and direct habitat conservation and restoration efforts will improve marine life in the Bay.

ACTION 6.1

Monitor Bay habitats at priority locations and improve habitat mapping tools

This will improve understanding of what and where habitats occur in the Bay, and will inform understanding of changes to critical habitats that require management action.

Citizen science will directly support the implementation of this action, including working with and supporting non-government organisations and community groups to undertake monitoring programs.

Potential partner organisations: Community and industry groups, DEDJTR, DELWP, EPA, Parks Victoria, research organisations

ACTION 6.2

Improve understanding of ecological processes, threats and pressures

This will increase understanding of how ecosystem processes are affected by key threats and pressures. Issues highlighted for investigation include:

- consequences of changes in nutrient regimes on ecosystem structure and function, including further examination of nutrient sources (e.g. groundwater)
- impacts of climate change on key ecosystem structure and function, including intertidal reefs and low-lying coastal areas.

Potential partner organisations: DEDJTR, DELWP, EPA, Parks Victoria, research organisations

ACTION 6.3

Improve overall extent and condition of the Bay's natural ecosystems

This will protect, build resilience in and restore natural ecosystems across prioritised locations. Priority areas for further consideration include:

- Restoring degraded habitats, for example The Nature Conservancy's reef restoration project
- Developing and piloting approaches to manage marine life issues; for example, selective removal of over-abundant species
- Identifying and implementing eco-engineering techniques; for example establishment of habitat on marine infrastructure.

Potential partner organisations: Community and industry groups, DEDJTR, DELWP, EPA, Parks Victoria, research organisations

Left: Mangroves at Jawbone marine sanctuary.

Photo - Parks Victoria

Right: Gannet, Pope's Eye.

Photo - Parks Victoria





Marine biosecurity

Manage risks from marine pests

Risk assessments have indicated marine pests as a significant risk to the water quality and ecosystems of the Bay. Without prevention measures, increased boat traffic in the Bay will mean that new marine pests are likely to establish themselves in the Bay and spread elsewhere.

ACTION 7.1

Prevent introduction and dispersal of marine pests

This will reduce the risk of marine pests being introduced into and spreading from the Bay, continuing the work commenced through the 2001 Plan. It will focus on biofouling and transport of aquaculture equipment (noting that regulation of ballast water is transitioning to the Commonwealth Government). Activities include:

- Work with the Commonwealth Government to develop programs to improve management of biofouling on large vessels
- Improve awareness of small boat users about the risks of spread of marine pests from biofouling and ways to reduce this
- Ensure that aquaculture guidelines, protocols and management plans are current.

Potential partner organisations: Commonwealth Government, DEDJTR, DELWP, EPA, Parks Victoria, community and industry groups

ACTION 7.2

Monitor priority locations for early detection of marine pest introductions

This will recognise the importance of early detection of marine pest introductions for effective management. It supports a risk-based approach to research and ongoing monitoring and surveillance of key causes (vectors) for transfer and spread of marine pests into and out of the Bay, including ballast water and biofouling.

Priority locations are likely to be those that are high risk for primary introductions to the Bay (e.g. Ports of Melbourne and Geelong) or spread (e.g. marine parks and sanctuaries). This action may include piloting new rapid assessment tools (e.g. eDNA sampling, settlement plates) and exploring opportunities to use citizen science to assist in monitoring for marine pest introductions.

Potential partner organisations: Commonwealth Government, DEDJTR, DELWP, EPA, Parks Victoria, community and industry groups

ACTION 7.3

Respond rapidly to new introductions of marine pests

This will focus on emergency management through rapid response to new introduction and developing an operational manual to build capacity and preparedness to respond to introductions of marine pests.

Potential partner organisations: Commonwealth Government, DEDJTR, DELWP, EPA, Parks Victoria



Ricketts Point education session. Photo - Parks Victoria

Appendices



Appendix 1:

Policy setting for the new Plan

The Victorian Government is currently undertaking a comprehensive review of marine, coastal and waterway policy and legislation. Alongside existing legislation and policy, the following reviews have been considered during preparation of this draft Plan.

SEPP (Waters of Victoria) sets a framework for conservation of the state's fresh and marine water environments. The goal of *Schedule F6* is specifically to 'protect the beneficial uses of Port Phillip Bay by minimising the adverse impacts of waste discharge and other impacts associated with human activity and resource use of the Bay and its catchment'. *Schedule F6* also states the requirement to implement an Environmental Management Plan for the Bay. The new SEPP (Waters), currently in preparation, is planned to more comprehensively cover surface water, groundwater and marine water.

The *State of the Bays* report is scheduled for delivery in late 2016. This report will provide a scientifically rigorous baseline report on the health of Port Phillip Bay and Western Port against which future reporting can be compared. The *State of the Bays* report will consider existing research and data, identify knowledge gaps, propose new data collection and monitoring priorities, and develop indicators for future reporting on the *State of the Bays*. Having an updated condition status for the Bay will provide a baseline for evaluating the effectiveness of this Plan. *State of the Bays* will also be an important part of the monitoring and reporting framework of this Plan.

The *Water for Victoria* plan was released in October 2016, and will guide strategic investment in water and wastewater planning across the state. It is focused on nine key water themes: climate change; waterway and catchment health; agriculture; recreational values; Aboriginal values; resilient and liveable cities and towns; water entitlements and planning potential of water grid and water markets; jobs, economy and innovation.

The *Yarra River Protection Ministerial Advisory Committee* has been established and makes recommendations to the government on the future management and protection arrangements for the river.

In July 2016, the Committee released *Protecting the Yarra River (Birrarung) Discussion Paper* for public consultation.

Plan Melbourne is undergoing a refresh to the city's long-term plan and builds on the values that have seen Melbourne voted the world's most liveable city. The refresh focuses on the areas of housing affordability and diversity, climate change and energy efficiency, and updating transport priorities.

Protecting Victoria's Environment – Biodiversity 2036 is a long-term plan being developed for halting the overall decline of our native plants and animals, ensuring all Victorians can enjoy the benefits of a healthy natural environment now and into the future.

The Flora and Fauna Guarantee Act 1988 is a key piece of legislation that is designed to conserve Victoria's native plants and animals. It is currently being refreshed to be modern and more effective. The new Act will support the government's draft biodiversity plan and include key tools for conservation of threatened species and communities, and for management of threatening processes.

The proposed new *Marine and Coastal Act* will see coastal and marine management better integrated. It is proposed to replace the *Coastal Management Act 1995*, and will guide future revisions of marine and coastal strategies. It will support the vision of a healthy coast and marine environment in the face of future, long-term challenges.

Victorian Government Aboriginal Inclusion Framework helps ensure services are accessible and inclusive for Aboriginal Victorians and provides for increased employment opportunities. The framework outlines the objective to provide policy makers, program managers and service providers with a structure for reviewing their practice and reforming the way they engage with and address the needs of Aboriginal people in Victoria.

Port Phillip Bay Fund use some of the proceeds from the Port of Melbourne lease to support projects that protect and preserve the Bay; including water quality improvement, dune stability, amenity upgrades and wetlands improvements.

Appendix 2: Glossary of terms and abbreviations

Ballast water is water carried by ships to improve their stability and balance. It is taken up or discharged when cargo is unloaded or loaded, or when a ship needs extra stability in bad weather. Ballast water can be a means for the spread of marine pests.

Best practice means the best combination of techniques, processes or technology used in an industry or activity that minimise the environmental impact of that industry or activity.

Biodiversity is a measure of the number and variety of plants, animals and other living things (including micro-organisms) across our land, rivers, coast and ocean. It includes the diversity of their genetic information, the habitats and ecosystems within which they live, and their connections with other life forms and the natural world. Reduced biodiversity is considered a negative impact on the health of an ecosystem, such as the Bay.

Biofouling refers to the attachment of marine organisms to any part of a vessel hull or any equipment attached to or on-board the vessel (including mooring devices, anchor wells, cargo spaces, bilges etc.). Prevention of biofouling is an important part of management strategies to reduce the risk of marine pest transfer.

Citizen science aims to facilitate partnerships between scientists and enthusiastic community members to foster the input of the wider community in building scientific knowledge. Citizens can contribute through collection or processing of scientific data. They can also assist in the design, analysis and/or communication of projects and key findings, and can be important ambassadors to lead awareness campaigns.

Liveability reflects the wellbeing of a community and comprises the many characteristics that make a location a place where people want to live now and in future. For example, increasing public access to waterways and beaches and reducing impacts of pollution can improve the liveability value of an area.

Marine pests are plants or animals that can rapidly increase in abundance and have the potential to change the local ecosystem and adversely affect marine industries or human health. Most of the marine pests in the Bay have been introduced through transfer from ships and other marine vessels that have travelled here from overseas. Marine pests can attach themselves to boat hulls, anchor chains, fishing gear, recreational equipment and internal boat compartments or travel in any seawater system on a boat including inside pipes and in bilge and ballast water.

Microplastics are pieces of plastic with a diameter less than 5 mm. Sources of microplastics include granules (microbeads) used in cosmetic and personal care products, nurdles, by-products from sandblasting with microplastic particles, plastic packaging that has disintegrated, and fibres from washing water used to clean synthetic clothes. Microplastics are of a size that allows them to be ingested by animals.

Nurdles are plastic pre-production pellets used in the manufacturing of plastic products. They are a sub-category of microplastics.

Nutrients promote plant and algal growth and in the context of this Plan are defined as nitrogen and phosphorus. In high concentrations, nutrients can contribute to nuisance plant growth and potentially toxic algal blooms. The death and decay of algal blooms can also reduce the amount of dissolved oxygen available to support aquatic life, which can lead to fish kills.

Pathogens are microorganisms that cause infection or disease; they include viruses, bacteria and protozoa. Sewage is a major source of pathogens. Pathogens affect recreational water quality and can make water unsafe for swimming and other recreational activities.

Appendix 2: Glossary of terms and abbreviations (continued)

Planning mechanisms is a collective term for the state and metropolitan strategies, legislation (*Planning and Environment Act 1987*), regulation (*Planning and Environment Regulations 2005*), state provisions (*Victorian Planning Provisions*), Ministerial Directions, and planning schemes which are used to manage land use across Victoria. Planning schemes for each municipality incorporate both policy (which provides guidance for planning decision) and controls (zones, overlays and local provisions). These mechanisms can be used to provide local area, or state-wide, guidance and controls on issues such as stormwater management.

Stewardship refers to a commitment to conserve and enhance the value of environmental assets within the Bay, such as marine plants and animals and ecosystem services. This will ensure the Bay can continue to provide value for current and future generations.

Stormwater is rainfall that runs off roofs, roads and other surfaces into gutters, drains, creeks and rivers, and eventually into the Bay. This water can carry contaminants such as sediments, litter, oils, detergents, heavy metals, nutrients, pathogens and other toxicants.

Sediments are generated from the erosion of waterways, together with runoff from roads, urban, agricultural and forested lands. High levels of sediments in water can reduce the amount of light available for plants, smother bottom dwelling (benthic) plants and animals, block estuaries and river mouths and have detrimental impacts on the suitability of water for recreational activities and aquaculture. The concentration of sediments in stormwater is used as an indicator of potential contamination by toxicants.

Toxicants are chemical compounds that can have a negative effect on organisms.

Vectors are carriers or transporters of pests, pathogens or disease. They can include boats, ships, imported soil, animals and plant material.

Abbreviation	Definition
CMA	Catchment Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DHHS	Department of Health and Human Services
EMP	Environmental Management Plan
EPA	Environment Protection Authority
ISO	International Organization for Standardization
SEMP	Safety and environment management plan
SEPP or SEPP (Waters of Victoria)	State Environment Protection Policy (Waters of Victoria) <i>Existing regulations</i>
SEPP (Waters)	State Environment Protection Policy (Waters) <i>New regulations, currently being developed</i>
VLAA	Victorian Litter Action Alliance

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