Monitoring Evaluation Reporting and Improvement (MERI) 5-yearly Report

Port Phillip Bay Environmental Management Plan 2017-2027

September 2024

VICTORIA
State
Government

Energy,
Environment
and Climate Action

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it.

We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

DEECA is committed to genuinely partnering with Victorian Traditional Owners and Victoria's Aboriginal community to progress their aspirations.

Accessibility

To receive this document in an alternative format, phone the Customer Service Centre on 136 186, email customer.service@delwp.vic.gov.au, or contact National Relay Service on 133 677. Available at DEECA website (www.deeca.vic.gov.au).

Contents

List of Acronyms

DEECA	Department of Energy, Environment and Climate Action (Victoria)
EMP	Port Phillip Bay Environmental Management Plan 2017–2027
EPA	Environment Protection Authority Victoria
ERS	Environment Reference Standard
KEQ	Key evaluation question
KPI	Key Performance Indicator
MACA	*Marine and Coastal Act 2018*
MW	Melbourne Water
MERI	Monitoring, Evaluation, Reporting and Improvement framework
VFA	Victorian Fisheries Authority
WTP	Western Treatment Plant

Introduction

Purpose

This document is the Monitoring, Evaluation, Reporting and Improvement (MERI) 5-yearly report for the Port Phillip Bay Environmental Management Plan 2017-2027 (EMP) (DELWP 2017). The purpose of a MERI report is, after monitoring, to evaluate and report on the performance of a program, in this case the EMP. It is also to refine and improve program design and delivery within an adaptive management model. This report is provided for organisations, individuals and stakeholders that are undertaking actions that contribute to the EMP and enables the Department of Environment, Energy and Climate Action (DEECA) to report on efforts and impacts of the program. The MERI plan (DEECA 2023) outlines the process of evaluation and the link to the EMP program logic.

This report will provide performance assessment against the targets from the MERI plan and set baselines. These will be reassessed using 2027 data, to understand the overall outcomes of the EMP. This 5-year assessment allows us to identify areas to improve or focus efforts on to achieve the EMP vision.

Figure 1. Implementation Program diagram for the Port Phillip Bay EMP

Background of the Port Phillip Bay Environmental Management Plan 2017-2027

The EMP represents the Victorian Government's ongoing commitment to ensuring that Port Phillip Bay remains healthy and resilient in 2017-2027.

In 2017, the EMP was required under the State Environment Protection Plan (SEPP). In 2018, the Marine and Coastal Act 2018 commenced which required a Port Phillip Bay EMP, annual reporting, and five-yearly evaluations. The SEPP was replaced with the Environment Reference Standard (ERS) in 2021, the MERI Plan was developed in alignment with this.

DEECA provides coordination and support functions for the people who make a difference to the health of Port Phillip Bay. Managing Port Phillip Bay is complex, with numerous government

agencies and community organisations involved. Therefore, we have a combined governance structure (Figure 2) to ensure the implementation of the EMP is aligned to and delivered by complementary plans and strategies.
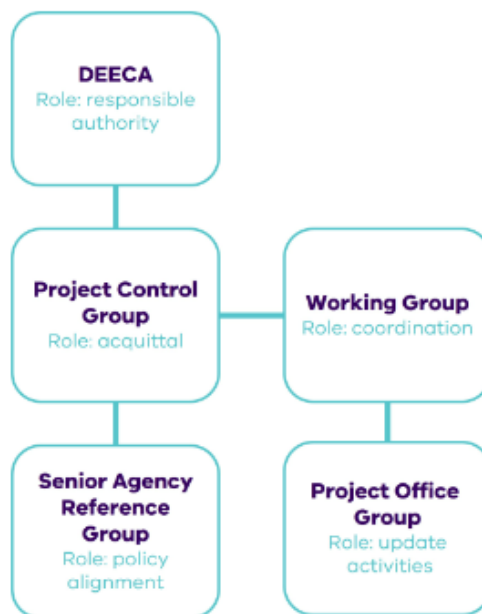
Figure 2: Port Phillip Bay Environmental Management Plan 2017-2027 Governance structure.

Report Card Indices

The EMP framework (Figure 3) describes the relationships between the EMP goals, strategies, and priority actions. This framework was published in 2017 without setting outcome based KPIs and targets, with the exception of maintaining the Bay's water quality targets for total nitrogen and suspended solids loads which were set by the Environment Reference Standard 2021 (ERS) of the Environment *Protection Act 2017*. As no outcome-based KPIs, baselines and targets were published with the formalisation of the EMP, we addressed this challenge by adopting Good Environmental Status (GES) outcome descriptors to align to the framework, develop statistical control charts for the Report Cards and undertake evaluation with the stakeholders.

Designing the future MERI of the EMP first required aligning the framework with an internationally recognised marine ecosystem reporting standard, adopting GES outcome descriptors as required by Policy 2.4 of *Victoria's Marine and Coastal Policy 2020* (Appendix 3).

Indices were created for relevant GES descriptors to support the annual reporting and evaluation of the EMP. Since 2020, DEECA has developed and published 9 report card indices for the EMP using data from existing monitoring activities across the Bay:

- Water Quality Index, reporting on marine water quality parameters at fixed sites against the ERS for Port Phillip Bay (EPA since 1984).
- Long-term microbial water quality, reporting on pathogens relevant to human health (EPA since 2018).
- Index of Estuarine Condition, which establishes a baseline of estuarine condition for future assessment (2021).
- Marine and Coastal Stewardship Index, reporting on the stewardship goal (2020).
- Marine Biodiversity Index, reporting on the habitat and marine life (2022).
- Marine Biosecurity Index, reporting on arrival of non-indigenous species and key biosecurity species in Victoria (2023).
- Eutrophication Index, reporting on effects of nutrient enrichment (2023).
- Litter Index, reporting on the state of litter and its impact on Port Phillip Bay (2023).

Seafloor Integrity Index, reporting on the condition of soft sediment ecosystems (In Progress) [1].

These indices are a status measure and evaluate trends over time. While further data and monitoring programs are needed to fully encompass the data expectations in the indices, overall statuses are calculated and presented on the EMP website to contribute to telling the story of the health of the Bay.

Annual Reports

The first Annual Report was published 2017-2019 and continued to be an annual deliverable until COVID-19 impacted monitoring and reporting efforts from many stakeholders and partners. The 2021-2022 Annual Report and 2022 Delivery Plan publication was delayed to the start of 2024. The 2022-2023 Annual Report and 2023 Delivery Plan are on track to be published in mid-2024 and will re-start the regular reporting cycle.

Delivery Plan

The Delivery Plan reports on the progress and levels of activities, and their level of investment, to deliver on the priority actions. In 2018, the first Delivery Plan was published. The Delivery Plan includes activities from multiple organisations, who collaboratively work towards the EMP vision of "a healthy Port Phillip Bay that is valued and cared for by all Victorians". Each year, organisations are invited to add new projects to the Delivery Plan, and these are then reported on in the Annual Report. The Port Phillip Bay Fund and Coastcare grant programs provide activity update reporting to the EMP on behalf of groups that receive funding.

VISION	A healthy Port Phillip Bay that is valued and cared for by all Victorians						
GOALS	Stewardship of the Bay is fostered across community, industry and government		Water quality is improved to ensure environmental health and community enjoyment of the Bay				The Bay's habitats and marine life are thriving	
PRIORITY AREAS	Connect and inspire	Empower action (work together)	Nutrients and pollutants	Litter	Pathogens (human health)	Habitat and marine life	Marine biosecurity
STRATEGIES	Improve appreciation and understanding of Bay values and connections to catchment	Improve collaboration and partnerships across community, industry and government	Ensure 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
PRIORITY ACTIONS	**1.1** Work with Aboriginal groups to improve understanding of Aboriginal cultural values and interests in the Bay and support connections to Country	**2.1** Build capacity and knowledge within community and industry networks	**3.1** Effectively maintain existing stormwater infrastructure and programs to mitigate loads to the Bay, or secure via equivalent means	**4.1** Establish a baseline estimate of the volume of litter entering the Bay and support clean up activities	**5.1** Improve understanding of links between pathogen concentrations and human health for swimming and consumption of shellfish	**6.1** Monitor indicator species and key habitats at priority locations	**7.1** Prevent introduction and dispersal of marine pests
	1.2 Develop and deliver programs to inspire greater appreciation of the Bay's values	**2.2** Empower the broader community to get more actively involved in caring for the Bay	**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
	1.3 Build understanding of management responsibilities and programs for the Bay and its catchments	**2.3** Support stronger partnerships across community, industry and government to ensure aims and outcomes are aligned	**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 sources and pathways, and take actions to prevent litter entering the Bay	**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

Figure 3: Port Phillip Bay Environmental Management Plan 2017-2027 Framework.

[1] In February 2022, DEECA instigated a 3-year study into the Seafloor Integrity given that sediment habitats of the Bay are at risk to be exposed to potential impacts caused by anthropogenic activities within the Bay and the coastal environment. The project is the first of its kind since the CSIRO Port Phillip Bay Environmental Study in 1996 and will be publish early 2025.
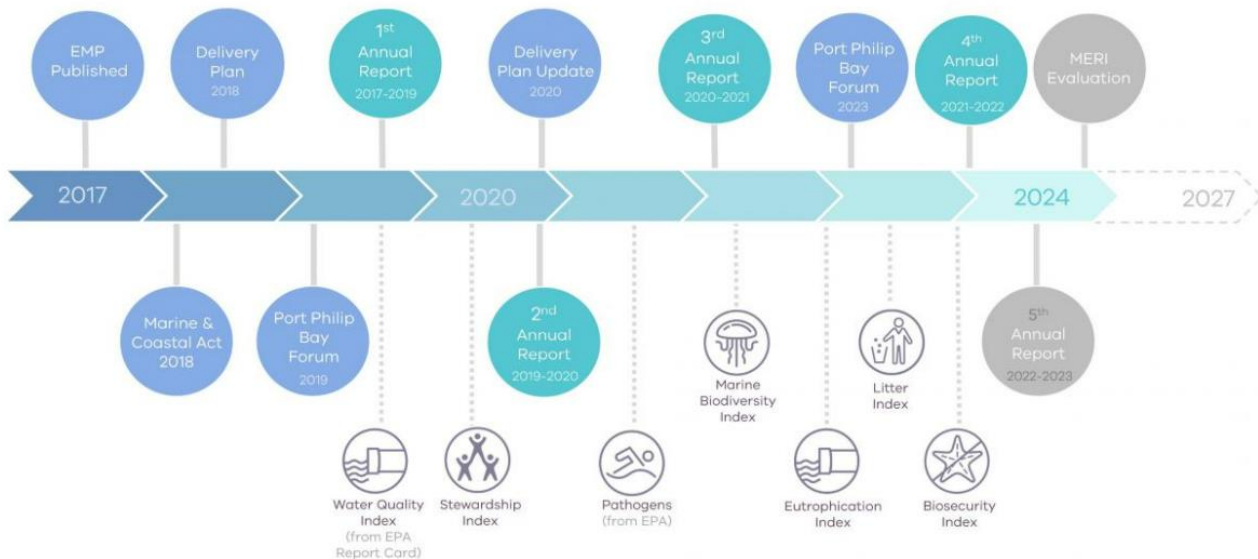
Figure 4: Timeline of the EMP with important events and documents published.

Evaluation Process

This MERI evaluation has 3 distinct components that are reported on:

1. Performance in developing GES Report Cards and results to date,

2. The performance of the Delivery Plan's activities (outputs) and

3. Community Views, Participation and feedback.

These components are reported on in each section of the evaluation and the combination of information provides vital understanding of how the EMP has progressed since the formalisation of the Plan in 2017 to 2023 and how we can continue to improve the health and value of Port Phillip Bay.

The evaluation process started with the collection of data to formulate our first annual report and release of indices. These indices form the basis of our report cards that are updated annually in line with our annual reports. To supplement this quantitative data, qualitative information was gathered at the Port Phillip Bay forum in August 2023 and in April 2024 via an online survey. The full list of the questions in this stakeholder survey is provided in Appendix 1.

Community is integral to the EMP and its effectiveness, their input and ongoing contributions are vital. They provide responses and feedback to assist in understanding the impact of the EMP, what the key improvements have been and areas that require further support, since the release. Community and various organisations dedicate their efforts to undertake monitoring and provide project reporting data. This data informs outcomes of the EMP such as tonnes of litter removed, area rehabilitated or protected and number of research projects as well as many others. These efforts are vital to ensuring the improvement of the health of the Bay is a holistic undertaking, spread across all goals of the EMP and endeavour to target many aspects of improving the condition of the Bay. As community and the many organisations complete this work, it was critically important to capture their feedback and input, on how the Plan is tracking. Being able to capture this information assists in focusing our efforts on areas that need more attention or that can be targeted more appropriately.

The KPIs and targets were developed considering what monitoring efforts already exist and the information that is supplied through EMP annual reporting. Working with MW and EPA, data has

been extrapolated and collated for this evaluation. This initial MERI evaluation is structured around setting baseline information for relevant KPIs and assessing progress against the targets to be achieved by 2027. Some of the KPIs and targets are directly related to other programs, and some are statutory with specific targets. The EMP report cycle uses financial years, therefore this evaluation uses data from the release of the first annual report in 2019 to 30 June 2023.

The MERI plan includes 2 key evaluation questions derived from the program logic outcomes of the EMP. The key evaluation questions (KEQ) establish the direction and focus of the evaluation:

1. Effectiveness - to what extent were the EMP/goals actions and activities achieved?
2. Efficiency - has the goal progressed adequately or been met given available resources?

Under these KEQ, is another level of evaluation questions or KPIs that provide more detailed information to answer the KEQ. This allows us to address the MERI objectives and track the progress of the EMP to provide detailed feedback and constructive thinking of the delivery of the Plan.

The performance against targets is presented (Appendix 2) using a traffic light system (Table 1) to indicate if we are meeting the targets/are well on track to meet them by 2027, or if there is some risk to meeting the targets or we are off track/not meeting the targets. As the purpose of this 5-yearly evaluation is to set baselines where specific targets are not identified, this will also be part of the performance identification.

Performance	
	Meeting target/on track to meet target by 2027.
	Some risk to meeting target.
	Not meeting the target/off track to meet targets by 2027.
	Data not provided or assessed.
	Baseline set.

Table 1: Identifying traffic light performance system measuring KPI targets.

Evaluation Summary

Out of 24 KPIs, 11 targets are being met. The area that needs the most improvement is Water Quality, as it was the only goal that had a target which was not met, however the other Water Quality targets are either meeting/on track to meeting targets or baselines were set. Habitats and Marine Life was the goal that is meeting/on track to meeting most of their targets with only one KPI not having available data to assess. Stewardship and the overall program evaluation were able to set baselines and meet at least one target however Stewardship has 4 targets that data has not been provided for and due to KPI adjustments, the overall program evaluation had 3 targets that data was not assessed. These target results align with other quantitative data and the EMP stakeholder survey responses to the health of the Bay and stakeholder opinions on how the Bay health has evolved since 2017, which is further explored in the respective sections.

Traditional Owner input was sought via engagement meetings to produce the evaluation plan for Priority Action 1.1 in the EMP framework (Figure 3). Due to the strong alignment between the EMP's Priority Action 1.1 and the Port Phillip and Western Port Regional Catchment Strategy (PPWP RCS), Traditional Owners and Aboriginal Victorians theme, MW and DEECA will collaboratively collect data to evaluate the performance of both the EMP's Priority Action 1.1 and the PPWP RCS Traditional Owners and Aboriginal Victorians theme. As Priority Action 1.1 is within the Stewardship goal, the KPIs and targets are presented in this section. PPWP RCS is conducting surveys and

collating data in 2024 and therefore, Stewardship requires survey answers from the Port Phillip and Western Port Regional Catchment Strategy to set baseline information for 4 KPIs. For the other 4 Stewardship KPIs, 3 KPIs are on track to meeting their targets by 2027 and was able to set a baseline for the final KPI.
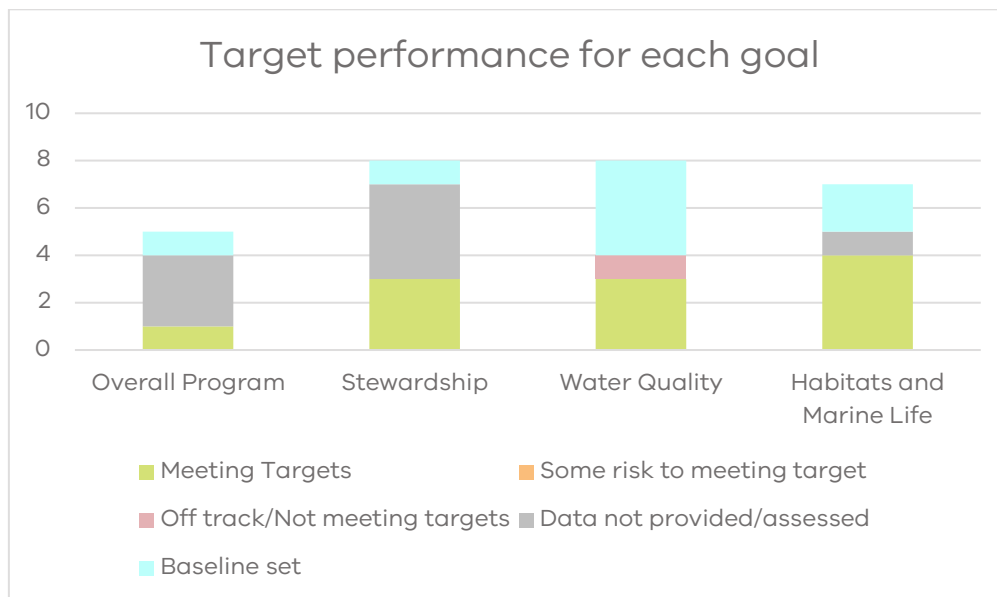
Graph 1: Bar graph of target performance within each goal and overall program evaluation.

The EMP stakeholder survey provided insight to how the EMP is tracking. The survey had 19 detailed responses from various stakeholders including, volunteers, government organisations and local groups around the Bay. The majority of responses to the EMP Stakeholder survey identified that Stewardship has been the most improved Goal since 2017. Stakeholders also identified that Habitats and Marine Life and Nutrients and Pollutants are the key strategies that require extra attention. Respondents specifically identified the need for more education and monitoring for marine pests, strengthening people's stewardship of the Bay through connection to inspire protection, and litter management through managing stormwater pollution or litter catches throughout the Bay and catchments. Almost 60% identify that more than one key priority is required to improve the Bay and conditions. However, given the size of the Bay and the complex environment that exists within and around it, we need to measure over long periods to truly understand the environmental impacts affecting the Bay and its health. The indices can assist in simplifying the complex research and reporting data that comes in, however it needs to be presented in a logical and clear manner. These measures are for a point in time of the Bay and to build a full picture of the Bays health longer-term monitoring is required.

There were 5 activities that had to be cancelled or deferred due to lack of funding or resources. For some of these activities, they were cancelled before any reporting was completed however for those that had submitted a report to provide data to the Delivery Plan, these outcomes have been included in evaluation data for KPIs.

This evaluation includes a significant amount of data from over 130 groups and 310 activities; however, we assume we have not included every activity, group, or monitoring program in EMP reporting, including this evaluation. Reporting into the EMP has remained consistent and all groups have largely maintained reporting standards such as providing reports within the designated timeframe or fulfilled all information required. The widespread report updates have provided valuable insight to the programs and their priority actions being undertaken on-ground. Receiving the reports from community about on-ground actions furthers the awareness of activities that help to achieve their goals and work towards the overall EMP vision.

Overall, the survey respondents identified that while there is significant progress being made across all 3 Goals and the EMP has very good overarching goals, there is more work to be done in

transparently sharing the activities that are occurring for each priority action and how they link back to the program vision. The continual investment, of cash and volunteer hours demonstrates the community commitment to ensuring the health of the Bay.

Overall Program Evaluation

The overall program evaluation targets are being excelled. This suggests that activities are successfully achieving all their objectives within budgets and timeframes. Even through a global pandemic, the community and stakeholders have remained committed to improving the health of the Bay.

Overview

The overall program evaluation questions relate to all the goals and priority actions listed in the EMP framework. The overall evaluation targets are on track to meet all targets by 2027. However, during the data collation for this evaluation, it was realised that 3 of the KPIs could be changed to be a better representation of the overall evaluation of the EMP without potential negative connotations of the results of the targets. Therefore, 3 of the KPIs (and relevant targets) have been changed to better measure the performance of the EMP. It has been confirmed that the data for the changed KPIs is available to collect from the appropriate reporting sources and while this information was not available to be collated for this evaluation, it will be completed for the final evaluation in 2027. One of the 5 KPIs are meeting their target in 2022-23.

As a large percentage of the completed activities have been funded by Port Phillip Bay Fund or Coastcare, the high achievement of these KPIs could be due to the effective management and administration of these programs and their funding agreements. The Port Phillip Bay Fund has aligned their guidelines with the EMP framework which assists for ease of reporting on the priority actions and therefore KPIs directly associated. Both programs have strong connections to the community groups and organisations that receive funding and as such, are always looking to adapt their programs to provide the best possible experience.

Survey respondents believe that the EMP is a great program helping to protect the Bay. There has been significant progress made against all the indices including the reporting against them. Respondents also identified that improving the health of Port Phillip Bay, is a complex undertaking and that focusing on a combination of all 7 strategies in the EMP framework is required to achieve a healthy and valued Bay.

Overall, the progress of the EMP has been effective in reporting on combined efforts around the Bay. It has clearly communicated the statuses of the various goals and where there needs to be further action for priority works. While there is yet to be further data collected to complete the understanding of the program evaluation, systems are in place to collect and communicate this. The success of the EMP implementation is due to the community and stakeholders providing updated reports and information which in turn allows us to track the condition within and around the Bay and its environment.

KEQ 1: To what extent were EMP activities and long-term outcomes achieved?

This KEQ relates to achieving the activity objectives and overall goal targets.

Community groups set expectations around how their activity will contribute to EMP outcome delivery. Summing these activity outcomes measures their collective contribution to delivering EMP goals. Understanding outcomes that are being delivered around the Bay, allow us to reflect

and identify if there are particular outcomes which require more attention or those that are contributing a large number of resources or efforts.

It is important to track whether activities are on or off track as it helps us investigate reasons for what is happening on ground and may be impacting the delivery. As the EMP activities are combined and reported through priority actions, it is valuable to know if situations are occurring that impact numerous groups of activities or individual outcomes.

While the percentage of overall goal targets (Appendix 2) for this EMP evaluation has not achieved the 80% target, it is important to note that it does not mean this KPI is not effective, or the results have not been effective.

Some targets within this KEQ have a performance of either data not provided/assessed, or baselines set. As some of this information has not been collected since the formalisation of the EMP in 2017, it is important to set these baselines for the final evaluation in 2027 to comprehend the performance of the targets and essentially the EMP over this time. Information required for some KPIs within this evaluation and specifically this KEQ, is not currently collected through annual reports and therefore while it does exist, the EMP reporting intake and requests need to adapt to capture this information.

The EMP activities and long-term outcomes are consistently being progressing each year. The data to improve understanding of the Bay, contributions, species, impacts are all being collected and reported to better direct our activities and outcomes so efforts can be appropriately targeted.

KEQ 2: Were the EMP actions and activities delivered on time, within cost and to the quality expected?

Both KPIs answering this KEQ currently do not have data assessed. However, in understanding the usefulness of these KPIs and targets is important to achieving efficiency. The majority, if not all, EMP activities complete a contract or agreement before starting their activities. Having a tight budget and scheduling allows EMP activities to be properly scheduled before time so organisers are aware of their commitments and can ensure all priorities of the project are completed. Nonetheless, it is understood that things happen to impact delivery and there needs to be a variation at times. Knowing when a variation occurs or what causes this, can help understand the environment activities are being completed in and what external factors are impacting them. While these variations may be for minor things such as change in lead contact, there are others such as variation for budget or timeframe that can impact the overall quality and completeness of the project. This is important to the EMP to know when situations occur and if situations repeatedly occur, it can be vital to recognise the broader environment and context activities are occurring in.

This is also largely dependent on receiving reporting of these activities on time. As the EMP itself does operate within a legislative context, it is required to complete annual reports. As many programs that operate within or in line with the EMP, receiving reporting on time is a fundamental aspect to delivering this Plan and many other projects. Receiving reporting on time, allows us to understand any on-ground situations that may impact delivery or require priority efforts to be reported on.

Of the 310 activities that have been reported to the EMP, only 5 have not completed (3 cancelled and 2 deferred). This speaks to the commitment of groups and organisations to improving the health of the Bay. This suggests that EMP stakeholders are invested and interested in the timely tracking of Bay health and are committed to the Plan. This overall program is continually striving to adapt and understand how it can unite others to achieving efforts for bettering the Bay. This is an ongoing undertaking that looks to respond to changes within the EMP community and achieve a holistic performance of activities to care for the Bay.

Picture 1: People whale watching on a beach.

Goal 1: Stewardship evaluation

Stewardship is on-track to achieve all targets. The Stewardship goal has the most activities listed and the highest volunteer contribution valued at $5.1 M. There are well established intra-community relationships however more inter-group connections need to be fostered.

Overview

The two strategies under this goal focus on fostering a deeper community understanding of the values in the Bay and its management challenges. Building stronger partnerships across the Bay's foundation of community networks involves volunteers, researchers, agencies, local government, and industries. Three of the 8 KPIs have met their 2022 performance targets, one KPI set a baseline. Four KPIs reporting on Priority Action 1.1 do not have data.

The Victorian Government has changed their approach to working with Traditional Owners since the formalisation of the EMP. In 2019, DEECA developed a Traditional Owner and Aboriginal Engagement Framework and was based on principles of empowerment and self-determination. Before this, there was not a consistent policy or approach to engaging with Traditional Owners by Government. In 2020, DEECA established the Statewide Caring for Country Partnership Forum in partnership with Parks Victoria and the 11 formally recognised Traditional Owner Corporations under the TOC Caucus. This is a Traditional-Owner led mechanism to hold DEECA accountable for the implementation of Pupangarli Marnmarnepu, DEECA's commitment to systemic and structural reform and the Victorian Governments Self-Determination Reform Framework.

Strategy 1 includes Priority Action 1.1 'Work with Aboriginal groups to improve understanding of Aboriginal cultural values and interests in the Bay and support connection to Country'. This has aligned KPIs and targets with the Port Phillip Western Port Regional Catchment Strategy (PPWP RCS), and Melbourne Water will undertake targeted surveys. These surveys and data inputs are still underway, so data has not been provided. As these KPIs and targets are aligned with the PPWP RCS, there are no EMP KEQ assigned and when data has been provided, a separate section will be created to respond separately to these targets. The KEQ results below therefore do not reference any actions or outcomes from Priority Action 1.1.

When the community was asked which priority areas to have improved the most since 2017, both Stewardship priority areas were rated most highly. There have been 168 Stewardship activities undertaken since 2017. While stakeholders rated it the most improved, there was also specific feedback that connections between groups and across disciplines are still lacking and respondents are wanting this gap bridged. Half the respondents mentioned a strong sense of community when undertaking Stewardship activities and that "there is a well-established network with community organisations". The majority of Stewardship activities listed are undertaken by community and have one of the highest in-kind volunteer hours, 296,414 hours since 2017.

Overall, Stewardship has grown immensely and while there are still ways to achieve and foster closer relationships around the Bay, since the start of the EMP it is the goal that has grown the most.

KEQ 1: To what extent were the goals action and activities achieved?

The Marine and Coastal Stewardship Index was developed to represent the concentration of effort and interest in marine and coastal environments and to track changes over time. The MCSI is based on four categories of Stewardship. These range from Supporting activities that develop skills and knowledge vital for effective Stewardship to Comprehensive activities that are highly targeted and deliver protection enhancement and restoration of the marine and coastal environment. The target is aimed at increasing Focused and Comprehensive activities as these are currently the most underrepresented Stewardship activities and have the long-term environmental impact and achieve measured environmental outcomes. While the Stewardship index aims for a holistic spread, to date there has been a large percentage of Enterprising and Supporting activities, therefore, to achieve a holistic goal, we need to bolster the Focused and Comprehensive activities.

Category	Definition
Comprehensive	Activity is highly targeted and delivers protection, enhancement and restoration of the marine and coastal environment
Focused	Activity contributes to the protection, enhancement and restoration of the marine and coastal environment
Enterprising	Untargeted on-ground activity is occurring, but its contribution to the protection, enhancement and restoration of the marine and coastal environment is small or unknown
Supporting	Activity develops skills and knowledge vital for effective stewardship

Table 2: Stewardship activity categories definition.

Supporting activities develop skills and knowledge vital for effective stewardship and ensure the spread of Stewardship across the Bay can be undertaken by various groups and organisations. There has been an increase since 2017, in Focused and Comprehensive activities, from 2% to 21%. However, as 50% of completed Stewardship activities are in the Supporting category, further work is required to increase the percentage of Focused and Comprehensive activities.

There has been a clear increase specifically in Focused activities since 2017 which actively contribute to the protection, enhancement, and restoration of the marine and coastal environment. Stewardship is being delivered effectively and we are continually seeing improvements which we expect to continue.
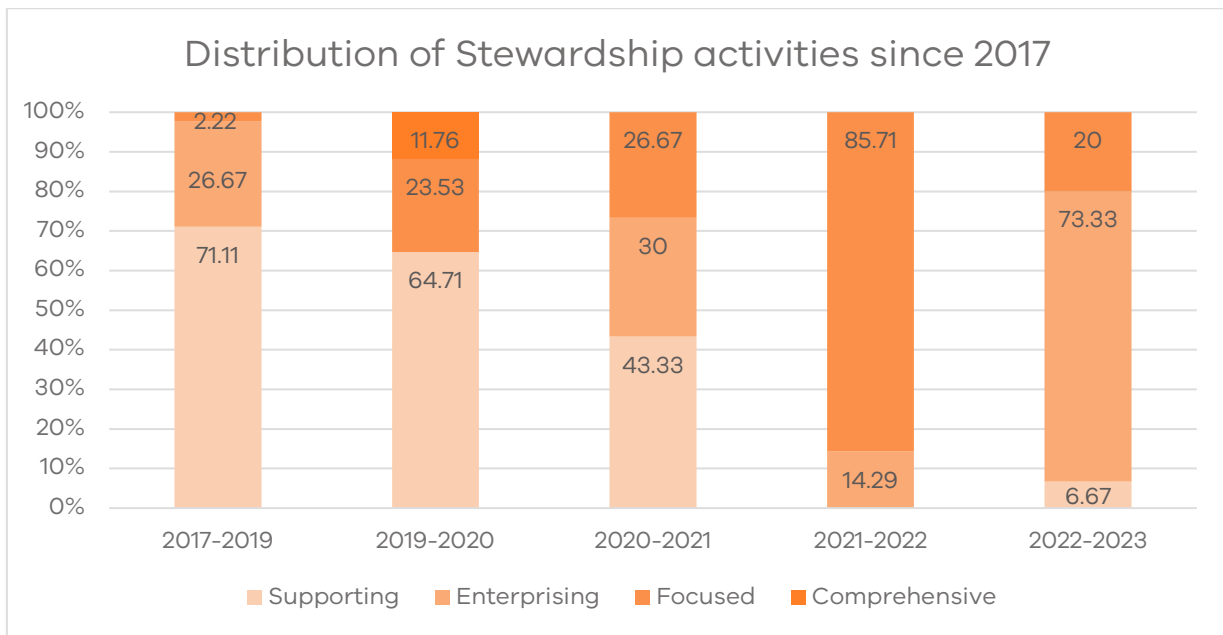
Graph 2: Spread of Stewardship activity categories since 2017.

The number of groups and organisations contributing to achieving the EMP has steadily increased since 2017. The types of groups vary across community organisations, volunteer groups, universities, local government, and state government. There has consistently been a variety in groups completing activities since the formalisation of the EMP. This is ideal and allows for the aim of a holistic spread of categories to be achievable and meaningful in impacting Stewardship around the Bay.

The extent that the goals action and activities were achieved are to a high standard. We continue to build and foster strong relationships around the Bay. Stewardship is being delivered effectively and continually seeing improvements from 2017 which is expected to continue.

KEQ 2: Has the goal progressed adequately or been met given available resources?

The number of participants in training and events has increased since the first annual report by 33,968 participants. This is remarkable considering this includes the impacts of COVID. While participation evolved to online interactions, there were also numerous projects that were paused due to distancing rules. These training events vary from litter audits to better understanding biodiversity and species around the Bay.
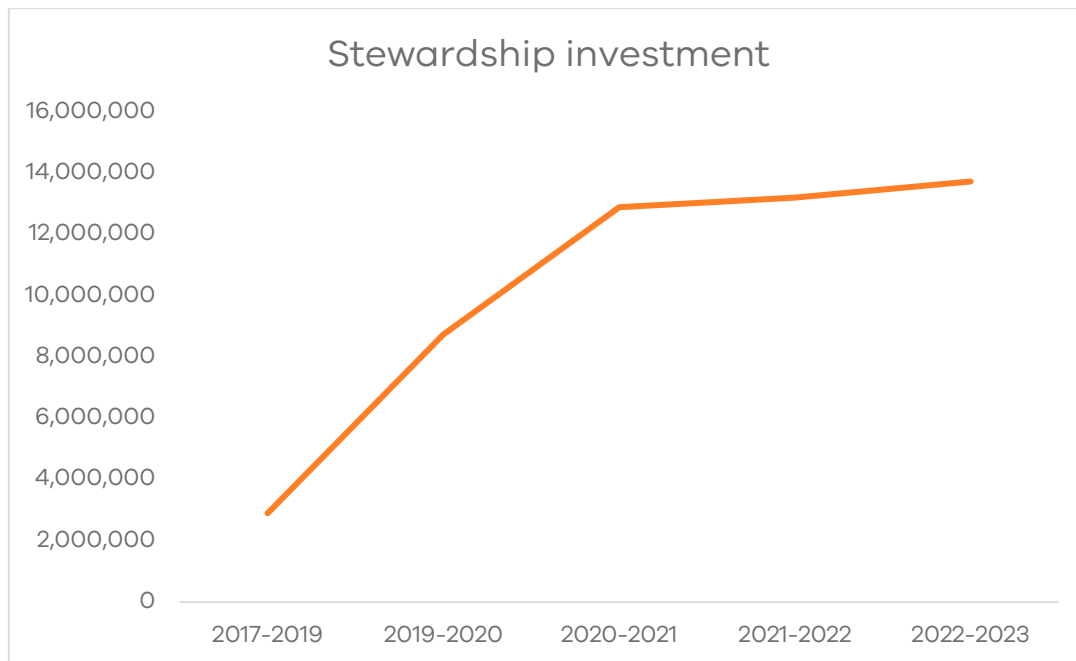
Graph 3: Stewardship cumulative investment since 2017.

Since the first annual report in 2017-19, investment in Stewardship activities has increased by over $10.3 million from $2,889,757 to $13,825,299. The biggest contribution has been from volunteer time of $5.2M, compared to $5.1M of other investment. Stewardship is the only goal to have more volunteer time than investment. This further highlights the all-around sense of commitment to bettering the health of the Bay.

Given the high level of involvement and resources, we can be confident that the Stewardship goal is progressing adequately.

Goal 2: Water Quality evaluation

Water Quality has been greatly impacted by continuous years of La Niña events which has seen delivery of a target classified as off track and baselines set to track targets in the next evaluation. The Water Quality goal has the highest level of activity/investment within the EMP of over $130 Million.

Overview

Since 2017, Water Quality has been one of the most challenging goals to achieve in the EMP. There have been 3 La Niña events in 5 years bringing increased rainfall and significant flooding events. This has impacted water quality, and long-term microbial water quality. Monitoring results are critical when understanding the health of the Bay. Three out of 8 KPIs are meeting the performance targets.

The MERI has utilised targets (Appendix 2) from the EPA Strategic Plan 2022-2027 and also aligns with the Healthy Waterways Strategy. DEECA continues to partner with Melbourne Water and EPA to better understand the water quality of the Bay including sharing data from monitoring programs. The EMP monitors and reports on multiple aspects of water quality which cover the 3 Priority Areas (Figure 3) of Nutrients and Pollutants, Litter and Pathogens (human health). This includes data and information from the EPA Report Card, long-term microbial water quality monitoring (or Pathogens as listed in the EMP), nutrients through the Eutrophication Index and the

Litter Index. The Nutrients and Pollutants strategy is to 'ensure nutrient and sediment loads do not exceed current [2017] levels and pollutants loads are reduced where practicable'. The EMP's nutrient and sediment load targets are to maintain at or below the current ERS marine pollutant load objectives (Appendix 4: Table 5.21). These benchmarks were originally stated in the former State Environment Protection Policy (Waters) which were replaced by the *Environment Protection Act 2017* General Environmental Duty and ERS in 2021. The EMP is working towards establishing an improved reporting framework to monitor how loads are being reduced, where practicable, and ensuring that nutrient and sediment loads are reduced or maintained to levels that are needed to protect beneficial uses in Port Phillip Bay and surrounding catchments.

Current available information to report on nutrient and sediment loads against the ERS is limited to nutrient loads from the Western Treatment Plant (WTP). The ERS sets a 3-year rolling average limit of 3,100 tonnes per annum of total nitrogen (TN) that can be discharged to Port Phillip Bay (Appendix 4: Table 5.21). As population grows and climate changes, further investment will be required to build additional resilience and continue to manage increased nitrogen loads from the WTP.

Litter awareness and education has greatly increased around the Bay. It was identified as the 3rd highest EMP priority area that has improved since 2017. From data provided by LitterWatch and reports from our grant program partners, there are more efforts to not only participate in litter surveys but to also identify the types of litter and to report on specific types such as microplastics that are becoming more abundant. The Victorian Government introduced the single-use plastic bag ban and the container deposit scheme after 2017 to reduce litter loads.

Some stakeholder survey responses identified an increase in their awareness of the monitoring of water quality through the EPA Beach Report and signage in the areas in and around the Bay and a slight improvement of the visible water quality. Other respondents commented that there is more information and research needed on another aspect of water quality monitoring, in the biological cycling processes and there is a key information gap around the contaminants in the Bay and their real impacts. Stakeholders stated there needs to be stronger measures for anthropogenic pollution via stormwater drains and catchments on the Yarra River to reduce inputs to the Bay. While there has been an increase in monitoring and reporting on litter, there will continue to be a need to identify microplastics and reduce them entering the Bay.

There are a variety of activities influencing the improvement of the Water Quality Goal (Figure 3) which include stormwater management, reduction in litter and minimising risks to human health from pathogens. There is numerous research, monitoring and survey efforts continually being undertaken to further our knowledge of progress towards this Goal including consistent reporting efforts. While Water Quality has not met a target and has been greatly impacted by the climate, organisations retain their strong commitments to monitoring and understanding the water quality drivers within Port Phillip Bay. Litter research and monitoring programs continue to grow and be a strong focus to how community members can drive activities that have an immediate impact.

KEQ 1: To what extent were the goals action and activities achieved?

Water Quality monitoring is carried out by EPA (Port Phillip Bay) and MW (Yarra, Maribyrnong, Werribee and Dandenong catchments), and targets assigned to some KPIs are from the ERS.

Melbourne Water currently has 96 long-term water quality monitoring sites in the Port Phillip catchment. Some sites are sampled monthly (12 samples/year), and others are sampled on a bi-monthly basis (6 samples/year). The percentage of sites monitored for water quality meeting the minimum sampling frequency per year has met the ERS target.

EPA currently has 36 beach sites for long-term microbial water quality. The percentage of monitoring sites that meet long-term microbial water quality standards both on the Yarra and Port Phillip beaches have not met targets. During the 2018-2023 reporting period, less beaches met dry weather standards than previous reporting periods and Warrandyte was the only reach that

was most suitable for primary contact recreation. This reporting period has seen 3 La Niña events occur across Australia which increased the likelihood of extreme rainfall and caused significant flooding events which has had extended impacts.

DEECA has developed a new Eutrophication Index from the water quality monitoring sites since 2022-23. The Eutrophication Index is a nested, hierarchical index which focuses specifically on the effects of nutrient enrichment by reporting on the status, trends, and condition of key ecosystem components. The Eutrophication Index examines indicators that may contribute to a eutrophication event occurring in Port Phillip Bay. The indicators selected for analysis include (where available): dissolved inorganic nitrogen, dissolved inorganic phosphorus, total nitrogen, total phosphorous, chlorophyll-a and dissolved oxygen (surface). The analysis of long-term trend data assists in highlighting necessary improvements or abatement measures and supports the prioritisation of management investment. The current status of eutrophication in Port Phillip Bay is Fair with a Declining trend observed in financial year 2022-2023. The Eutrophication Index status target has a baseline set which we aim to achieve in 2027 by increasing more than 2/6 sites achieving a Good or Very Good trend. Corio Bay and Hobsons Bay are the 2 marine monitoring sites that return a Good status within the Eutrophication Index. 3 other sites return Fair with Long Reef returning a Poor status. In Port Phillip Bay the mitigation of eutrophication is a management priority and an indicator of the overall condition of Port Phillip Bay.

MW report on TN discharge from the Western Treatment Plant. As of 30 June 2024, MW's 3-year rolling average TN discharge was 3,448 tonnes per annum and EPA was informed of this exceedance of the 3,100-tonne limit. Recent TN discharge loads are mostly attributable to extreme wet weather events in 2022 and growth in sewerage catchment.

Nitrogen discharge levels are a known issue that will be improved with the planned and current capital works which are underway. A new nutrient removal plant is under construction to remove nitrogen from the treatment process further and is expected to be operational by mid-2025, with benefits set to be seen by 2025-2026.

Year ends June	3-year rolling average
2017	2893
2018	3048
2019	3242
2020	3445
2021	3516
2022	3439
2023	3553
2024	3448

Table 3. Western Treatment Plan 3-year rolling average total nitrogen discharge loads (tonnes per annum)

This KEQ has been able to set baselines or use data to inform all KPIs. Although the information does not present a positive outcome, it is important to note that we have monitoring and research processes in place to be able to receive appropriate data to continue tracking and reporting on water quality. All data collected, will be communicated to those necessary for further actions and awareness.

KEQ 2: Has the goal progressed adequately or been met given available resources?

The number of litter initiatives around the Bay has increased since the formalisation of the EMP. Litter initiatives can be included in activities that are achieving the Stewardship or Water Quality goals.

Litter initiatives bring community members together, can increase education and awareness and also remove litter from the environment. Through these litter initiatives, over 1,260 tonnes have been removed from in and around the Bay. Litter activities remain an ongoing priority for community groups around the Bay. While the litter density in the Bay is currently Very Poor, due to the amount of items per m^2, litter remains an important priority and efforts continue to improve this condition. The litter status presented in the report card calculates the density and composition together and therefore most likely will show a different status.
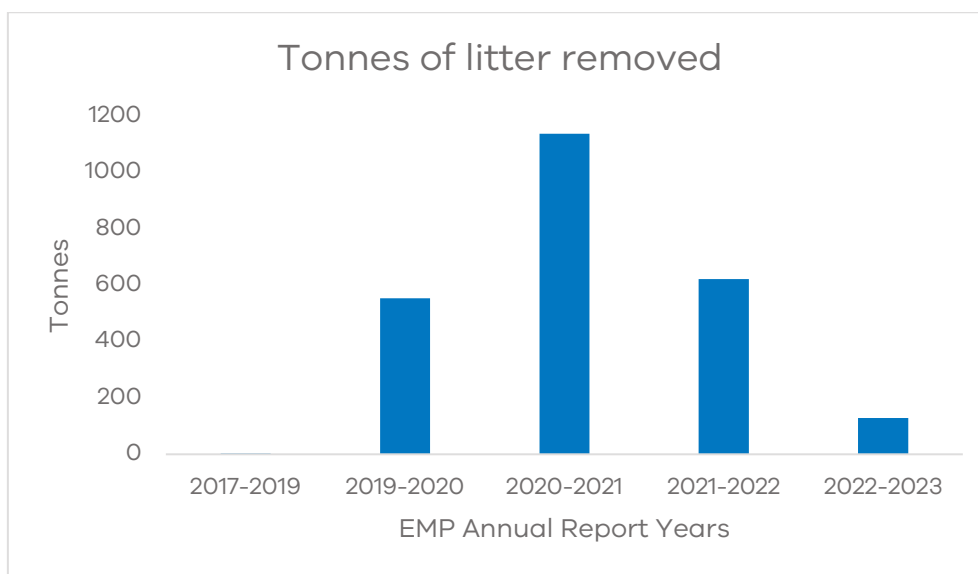
Graph 4: Tonnes of litter removed reported in each EMP Annual Report.

Water Quality activities are spread across the 3 Priority Areas of Nutrients and Pollutants, Litter, and Pathogens. These Priority Areas are quite broad and include activities from litter surveys to stormwater management and WTP improvement works. Most of the larger scale water quality activities are undertaken by Melbourne Water, EPA and DEECA rather than community groups or other organisations. There has been an increase of 40 Water Quality activities since the first Annual Report was published in 2019.

The investment in the Water Quality goal is largely attributed to the WTP improvement works with a cumulative total amount in the Water Quality goal, of over $142 million being invested. There have been numerous research reports about the state of water quality in the Bay to strengthen understanding and focus projects accordingly. Water Quality and Litter activities demonstrate a progress towards better understanding of the Bays health, condition and a different understanding of more organisations taking part in working together for a better Bay. Water Quality activities are helping us to understand the current impacts on the Bay health but also what information we need to seek to further improve the condition of the Bay.

Goal 3: Habitat and Marine Life evaluation

> Habitat and Marine Life has improved since the Plan commencement with the introduction of both Marine Biodiversity and Marine Biosecurity indices. These allow data simplification easement and provides high-level evidence to highlight and direct future efforts towards priority areas of the marine ecosystem. The coverage of species being assessed through the Marine Biodiversity Index has increased. Habitats and Marine Life has met the greatest number of targets in this evaluation.

Overview

The activities under this goal are varied around the Bay. From monitoring and educational sessions about marine pests, to increasing area protected or rehabilitated. When asked about the progress of the Habitat and Marine Life goal, most survey respondents wanted more understanding and education about marine biosecurity issues. While there have not been new marine pest introductions since 2021, the pest abundance has spread throughout Port Phillip Bay (AgVic 2024). Five of 7 KPIs are meeting their performance targets, one KPI does not have data yet.

Habitats and Marine Life was the highest rated strategy from survey respondents for the key priority that needs more attention. Activities such as those undertaken by EarthCare St Kilda and Port Phillip EcoCentre to identify and remove marine pests like the Northern Pacific seastar have involved the community. They assist in creating more awareness and the participation helps improve the health of the Bay by removing these marine pests. Survey respondents can see that progress has been in better understanding indicator species in the Bay, marine pests and their abundance and better protection of the Bay habitats. Feedback from the survey and Port Phillip Bay Forum suggest there needs to be longer term monitoring and researching approaches applied when considering the interconnectedness of life in and around the Bay.

The Marine Biodiversity Index has grown to cover multiple species across various groups such as birds, invertebrates, mammals, and fish. The species covered under the index are indicators to how the health of the Bay is tracking. Some like dolphin species are iconic and capture the attention of tourists around the Bay. Migratory shorebirds can tell us more about the environment around the Bay as they rely on their specific habitats of terrestrial and coastal wetlands to replenish to migrate and breed successfully. Some, if not all, species within the groups we report on provide vital information to various areas of the Bay. These can provide an insight into processes that are happening in the Bay that we may not normally see. There continue to be explorations into more species that can be covered by the index that provide further representation of the species and habitats that contribute to Bay health and are indicative of species groups. The inclusion of species in the index relies on long term monitoring efforts to build towards a time series. A long-term series means we can account for regular life cycle fluctuations and can also suggest species interactions and where there are more urgent priority needs for organisms.

Habitats and Marine Life strategy reporting continues to grow as we look to understand the Bay through its conditions of habitats and species. We have partnered with 9 research organisations so far to further recognise the diverse species and habitats contributing to Bay health. The EMP has been able to report on and provide the status for species that are Poor or Very Poor and/or with a declining trend. The EMP communicates this with respective organisations to raise awareness. This assists in focusing efforts or collecting data to accurately report the most up to date status from information. We understand there needs to be more efforts for longer term monitoring programs across a wider range of species to realise impacts of climate change and other conditions that are driving changes in and around the Bay.

KEQ 1: To what extent were the goals action and activities achieved?

Relationships with partner universities and groups undertaking research within the Bay allows for continual growth of knowledge of the relationship species, species and their environment in the Bay. The number of species covered by the Marine Biodiversity Index (MBI) has increased since it has been published, with the most recent inclusion of the Spider Crab. The status of these species has varied over time since 2017, within each of the species' groups, the biggest fluctuations have been abalone, migratory and resident shorebirds, snapper, and seals (emergencies). Our relationships with reporting partners have allowed the consistent and up to date information to be readily available and can lead to improved monitoring efforts.

Marine pests are a critical theme when identifying the health of the Bay in relation to the biodiversity. Marine pests threaten and outcompete native species which reduces the native's species population and can alter the ecosystem and natural processes occurring within the Bay. While the key marine pests that have arrived in Port Phillip Bay have been identified, there is further data required to be able to assess their status through the Marine Biosecurity Index (MBSI). Nominating a group of subject matter experts is required as their expert elicitation is required to determine ranks for each indicator component and support the evaluation of Non-Indigenous Species (NIS). Furthermore, implementing a monitoring program to capture all required data for the MBSI to calculate a status of the priority marine pests is still required. The number of arrivals since the EMP started has been 2 which have been diligently tracked. As reported in the MBSI, the Asian Shore Crab was reported as arriving to Port Phillip Bay in at least 2018. There are some reports that indicate this may have been earlier however it has been unable to be confirmed. The crab has the high potential to displace native crabs, fish, and shellfish either by outcompeting or direct predation. The Lightbulb Sea Squirt is the more recent NIS arrival in 2021. Both species threaten native species and habitats which is why understanding their life cycle and spread is critical to understanding the Bay health.

The increase of 4,325.2ha of habitat restored, protected or conserved since 2017 has been incredible. This includes areas of revegetation, protection or rehabilitation, area protected by fencing, of land protected under reserve system and are of threatened habitat under protection. This can also be linked to activities such as shellfish reef restoration, kelp beds that have been planted or protected from urchins and land areas around the Bay that has been restored. While it is understood that further mapping of the seabed needs to be undertaken, some activities are occurring to map species such as Golden Kelp and their distribution. Weed removal from surrounding environment also contributes to restoring land and planting native species can protect this same area from erosion. There have been over 105,000 plantings to date reported to the EMP.

KEQ 2: Has the goal progressed adequately or been met given available resources?

Given the understanding needed for species, and the time series information required, a KPI that assists in best representing the efficiency of progressing Habitats and Marine Life goal is related to the amount of research being undertaken to better understand species within the Bay. This is due to the impact that indicator species have on understanding the overall health and condition of the Bay which can provide in-depth understanding of this complex ecosystem. The relationship of species, between species and between the environment can suggest impacts that are not identified until triggered. There have been a reported 60 research projects completed within the past 5 years. These research projects provide multiple years of information. Partnerships with universities and reporting back to grant programs about identified priorities allows further habitats and species to be targeted for research and funding purposes. Once these initial activities are completed, there is an opportunity for an ongoing relationship to be built which ensures data is continually built upon and provided to EMP reporting.

The value of investment in Habitats and Marine Life, has the largest goal 'other in-kind' contribution of $3.6M. This includes valued staff time which can suggest a relationship between the research projects and monitoring efforts that is put in to collecting the data required for time series data. The combined investment value has steadily grown since 2017 and as further information about the state of the Bay and awareness of areas that need to have more focus increases, we can see that this goal's investment will still rise over the coming years.
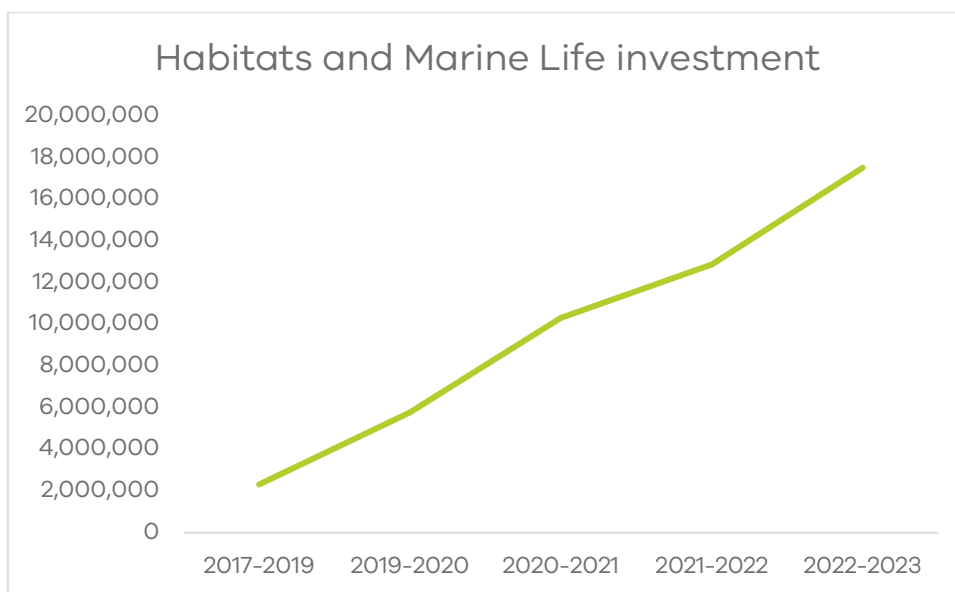
Graph 5: Habitats and Marine Life cumulative investment since 2017.

Habitats and Marine Life goal has activities that are some of the most visible due to their interaction with species in the Bay. As species relationships can assist in understanding the complex nature of the Bay more than point in time research data, it is vital to have long-term monitoring and research programs to be able to track natural fluctuations and fluctuations due to anthropogenic impacts. This Goal has been vital in understanding the living organisms and environment that is crucial to achieving a valued and healthy Bay and has continued to grow and adapt since the formalisation of the EMP. With new indices being published and projects to better understand the surrounding environments, Habitats and Marine Life has expanded to include 15 species, the Index of Estuarine Condition and reporting on the seafloor integrity. This overall Goal has been the most successful in meeting targets for this evaluation and continues to have priority actions undertaken to advance knowledge.

Limitations

The context of this evaluation needs to recognise that there were impacts from the COVID-19 pandemic on the EMP implementation in terms of reduced research and monitoring around the Bay during that period. This included limitations with being able to access field data and complete monitoring efforts, to delays in being able to report. This resulted in extending project timelines to enable completion of projects.

We also acknowledge that activities promoting, improving, and valuing the Bay occurred long before the start of this plan in 2017 however there was no coordinated Bay focussed reporting, especially across the priority actions in this plan. Monitoring of the Bay health for these activities and others occurring around the Bay started prior to the formalisation of the EMP.

The MERI plan and this evaluation report has been limited in collecting data from already existing monitoring programs and data sources. It is acknowledged that the conceptualisation of the MERI was constrained to time limitations and utilised the best information through existing programs.

Furthermore, we acknowledge that, as we receive reporting from multiple organisations and grant programs with established reporting styles and inputs, there are limitations to the reporting information we receive. There are also groups and volunteers positively impacting their communities and environments whose efforts are not reported on.

Reporting on the EMP is a collaborative effort of numerous groups, organisations, and government agencies. Due to this, this report may suggest ways to improve the EMP or recommendations that may be made to see an improvement however it will not impose or force recommendations on other agencies that contribute to our reporting. This MERI report was completed at a point in time and the health of the Bay is an ongoing effort. The undertaking of this effort is complex and across multiple agencies that complete various aspects to reporting and monitoring.

Conclusions and recommendations

This halfway point MERI evaluation of the Port Phillip Bay Environmental Management Plan has successfully set baseline targets for KPIs. Where KPIs have specific targets, they have been answered via reporting processes. Given the recent climatic conditions, the Water Quality goal had the only KPI with a target not met however the most specific targets to assess against.

The overall program evaluation KPIs suggest the EMP continues to be a Plan with growth and adaptability to priority reporting. In line with growing and adapting to priority reporting, through the examination of data inputs for this MERI report, it was identified that 3 overall program evaluation KPIs could be changed to be more representative of the progress of the EMP.

The change of the KPIs presents information that is able to be explored further and with no potential negative connotations if it is not achieved. It continues to be in line with the expectations of the MERI data collection and that no new monitoring or research programs need to be created.

Only the KPI of percentage of monitoring sites (beaches) that meet long-term microbial water quality standards for primary contact recreation during dry weather did not meet its target. This was due to water quality being impacted by the La Nina weather patterns and significant flooding events in 2022-2023.

To better achieve Stewardship around the Bay, the EMP is mindful of working towards connecting groups, whether that be mediated through DEECA or meaningful introductions. Understanding the spread of activity categories around the Bay, is also reported back to our grant programs to better understand the areas that can be more focused on. We can see improvements through this as already the increase in Focused and Comprehensive activities since the first annual report. The EMP is mindful of trying to create and foster stronger connections so that communities around the Bay feel empowered to undertake activities for years to come. Working towards a holistic spread of the Stewardship categories will ensure that groups, no matter the size or contribution are working towards a Bay that is valued and cared for by all Victorians.

Using data collected from Litterwatch to understand the litter density in the Bay, the EMP can start to track whether the single-use plastic bag ban and container deposit scheme are having an impact and reducing these litter types around the Bay. The EMP coordinator will continue to seek groups to connect with, to ensure training is provided so that the confidence metric when calculating the litter index can be as strong as possible. The Litter programs so far in and around the Bay have been successful in seeing results. Litter initiatives are generally undertaken by community groups and have provided numerous surveys and audits to contribute to the removal of 1,267 tonnes being removed. There have been activities to place litter catches on rivers and areas of the Bay to understand litter composition and where it's originating from. This has been crucial in reducing litter flow into the Bay itself and is a way to bring community together to have a sense of contribution.

There have been multiple reports since the start of the EMP to better understand water quality and nutrient cycling in the Bay. A seafloor integrity project has been funded through DEECA to

better understand the Bay. The project is to examine the Bay for physical, chemical and biological characteristics of the seafloor. These characteristics delineate the structure and functioning of marine ecosystems, especially for species and communities living on the seafloor which are termed benthic biotopes. The project is intended to ensure that human activities and pressures on the seabed do not hinder the ecosystem components from retaining their natural diversity, productivity and ecological processes. Results are expected to be available in 2025. Several reports such as a Port Phillip Bay Nutrient Modelling using Bayesian Networks (Pearson et al. 2021) improve understanding of water quality and increase information about nutrient cycling in the Bay. Nitrogen discharge levels are a known issue which Melbourne Water are aiming to improve in 2025 with the commissioning of 5 West Nitrogen Reduction Plant at the WTP. This will help to maintain a healthy marine ecosystem by supporting to reduce the nitrogen loads discharged to the Bay. The EMP seeks to further understand how water quality can be bettered and feed this to partner agencies for their information and awareness.

As mentioned, there has been an increase in species reported through the Marine Biodiversity Index. Through this and the growth in research projects and partnerships with universities or organisations undertaking these feats, increases the information gathered about the habitats and species time series information which contribute to a more thorough understanding of the health of the Bay.

As the qualitative information collection commenced at the Port Phillip Bay forum, we have partnered to already implemented changes. Feedback such as longer grant periods to allow for more robust science and monitoring to occur has seen a change in the 2024 Port Phillip Bay Fund grant rounds by extending grant periods to 3 years and ability for a larger grant funding money pot.

When stakeholders were asked about the key priority in contributing to improving the health of Port Phillip Bay, almost 60% of responses listed more than one priority area. It strengthens the knowledge we know of the Bay that to achieve a healthy Port Phillip Bay that is valued and cared for by all Victorians, we can't tackle just one issue or aim for one solution but a combination of all.

While this MERI cycle is an official point of understanding, recognising, and suggesting improvements to the Plan, throughout the life cycle already, we have implemented changes to advance the EMP and best represent the current state of the Bay. We take on feedback and enter further discussions about priorities. Through this, we have changed the annual reporting from PDF to online reports and to systems more compatible with data display that ensures it is easily communicated to the public. We respond to feedback from partners and community stakeholders to ensure the data and information we present can be clearly understood and disseminated.

Post this MERI evaluation, feedback will be provided to the relevant partners and organisations. The EMP continues to welcome feedback at any stage for continuous improvement and ensuring the information and format it is provided in is most useful. The Annual Reports and Delivery Plans are now back on track to be published each year and we continue to invite new groups and organisations to participate in reporting so we can aim to capture data on all EMP goals at diverse locations. At this point of the Plan, the EMP does have a better understanding of the health of the Bay. From this evaluation and the responses provided, we can see that we are working towards a healthier Bay that is valued and cared for by all Victorians and that care will continue.

Future Steps – Towards the next EMP in 2027

This MERI evaluation provides insights to the progress of the PPB EMP since 2017, and over the next two years further review is required to prepare for the next PPB EMP post 2027. The next EMP should be co-designed with Traditional Owners, and involve consultation with a wide range of stakeholders, including local communities, industries, and environmental organizations. A collaborative approach will ensure the next PPB EMP reflects contemporary and diverse perspectives to address the socio-economic dimensions of the Bay's marine and coastal

environment.

Report cards and quality assurance

The development of 9 report cards under the structure of the PPB EMP's framework and relevant Environmental Reference Standards (ERS) has been central to modernizing environmental monitoring and reporting on the health of the Bay. These report cards are critical for transparent Annual Reporting and transitioning to outcome-based reporting using GES descriptors. Future steps should include:

- Reassessment of the adequacy of the existing data sources that contribute to the report cards, and opportunities for improvement.

- Prioritisation of threats to the Bay and linking indicators to priority threats and actions in specific geographical segments of the Bay.

- Coordination of indicators and reporting from complementary plans (below).

Seafloor Integrity and nitrogen recycling

The health of the Bay is fundamentally dependent on the integrity of its seafloor biota which processes the bulk of nitrogen inputs from catchments, rivers and discharges. Early results from the Seafloor Integrity Program indicates parts of the Bay's exhibit sediment eutrophication which risks its ability to process current nitrogen loads.

Current nitrogen and sediment load targets set by the PPB ERS are based on the CSIRO Port Phillip Bay Environmental Study in the 1990s. Reporting for 2022-2023 showed total nitrogen in PPB as 'Poor' with a trend of 'Declining'. Population growth and urbanisation also places pressure on the health of Port Philip Bay. As the population expands, urban runoff increases, carrying pollutants and litter into the bay. This runoff can degrade water quality and disrupt marine ecosystems. There has been no appreciable improvement to the Bay's health since this baseline, other than denitrification processing has been maintained. The Bay's reef ecosystems in the northern regions have appreciably declined due to severe grazing of overabundant Purple Urchins (*Heliocidaris erythrogramma*). This has led to kelp forest and macroalgae habitats being replaced by urchin barrens, which appear as areas of bare rock, devoid of much marine life except a high abundance of urchins.

The historic Nutrient Cycling Monitoring Program ceased in 2017 due to a lack of funding. Monitoring is crucial to assess denitrification efficiency, noting a tipping point occurs where current nitrogen load targets will not be sustainably processed. The effects will be most evident in the northern and western areas of PPB that will exhibit frequent eutrophication events (noting algae blooms emit foul smells, blocked sunlight, release of toxins, fish kills, and impacts to other marine life, human recreation and health). Targeted monitoring is required to investigate the catchment loads entering the Bay and assessing the impact of these loads on the seafloor to inform the most appropriate adaptive management actions.

Ongoing attention to physical disturbance is also required. This would involve, amongst other things, the development of modernised dredging guidelines and protocols for consents and licences, and updated monitoring protocols aligned to assessing consequences (if any) to biogenic habitat and protecting the most important denitrification processing areas from disturbance.

The results from the Seafloor Integrity Project will be published in December 2024.

Coordinated Planning and Management

Improved integration with Victoria's complementary planning documents is crucial for the success of the next EMP in 2027. The coordinated implementation of complementary plans and strategies is essential to managing the health of Port Phillip Bay. The co-ordinated co-creation and delivery of these planning documents in 2027 and 2028 should take due regard to the national *Framework for Marine and Estuarine Water Quality Protection (2018)* is also important to improve integration and identify priorities for action and investment. The complementary plans and strategies include:

- *Healthy Waterways Strategy 2018-2028* - provides a single framework for addressing community expectations and the obligations for waterway management in the Bay's catchments. For each of the five major catchments within the Port Phillip and Westernport region (Werribee, Maribyrnong, Yarra, Dandenong and Westernport), this Strategy provides detailed, catchment-specific visions, goals, long-term targets (10 to 50 years), and 10-year performance objectives. However, the HWS does not set targets or priority actions specifically for reducing sediment and nutrient loads to the Bay.

- *Regional Catchment Strategies* (Corangamite and Port Phillip & Western Port) - set the direction for catchment management authorities (CMAs), and explain how a catchment's land, water and biodiversity will be managed. The regional catchment strategies outcomes framework supports a consistent approach for regional catchment strategy outcomes in relation to monitoring, evaluation and reporting. A key requirement for this framework is to improve catchment impacts on marine environments through water quality of coastal rivers and estuaries.

- *Integrated Water Management (IWM) Framework for Victoria* - considers how the delivery of water, wastewater and stormwater services can contribute to water security, public and environmental health and urban amenity. It fundamentally shifts the way water, land use planning and urban development opportunities are understood and undertaken in Victoria. A review of strategies and actions in relevant IWM plans is required to target reduced sediment and nutrient loads into the Bay. This will involve linking of specific actions to reduce loads across priority catchment segments that most influence the Bay (i.e., Werribee sub-catchment, Yarra-Maribyrnong Rivers to Hobsons Bay; Western Treatment Plant to adjacent Bay region; and Dandenong Creek to Bay region off Patterson River).

- *EPA Strategic Plan 2022-2027* - defines EPAs purpose and the outcomes they want to see in this period. The plan describes the strategic choices and what they aim to achieve and how they will measure their performance. The Environment Protection Act 2017 introduced new environmental protections for all Victorians, including improved obligations and protections for the community. The general environmental duty (GED) also makes it clear that businesses have a responsibility to reduce risk to human health and the environment by understanding and assessing the risks their activities may pose and eliminate or reduce those risks. EPA's focus has shifted from managing the consequences of pollution to preventing harm to human health and the environment from pollution and waste. Improved reporting and permissions notification conditions for businesses introduced under the new Environment Protection Act 2017 also require businesses to notify EPA of any breach or non – compliance in relation to discharges or spills that give rise to, or may give rise to, actual or potential harm to human health or the environment. EPA will use these new reporting and notification requirements to monitor and assess duty holder performance, and to identify new strategies and areas for improvement, or enforcement action.

- *Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan (2018)* - sits within a framework for the management of aquatic ecosystems in Australia and Victoria with the objective of maintaining the ecological character and promote wise use of the site under the *Victorian Waterway Management Strategy 2013* (currently under review in 2024). The management of this site is located on the western shoreline of Port Phillip Bay between the major cities of Melbourne and Geelong and on the Bellarine Peninsula.

- *The Yarra Strategic Plan – Burndap Birrarung durndap umarkoo 2022-2032* – puts the interests of the river and its lands at the heart of future land use planning and decision-making. The Plan brings to life the 50-year community vision for the Yarra and deliver on the Birrarung Water Policy, *Nhanbu narrun ba ngargunintwarn Birrarung – Ancient Spirit and Lore of the Yarra* articulated by the Wurundjeri Woi-wurrung people. Melbourne Water

is the lead agency, working in partnership with Traditional Owner and 14 responsible public entities to form the Yarra Collaboration Committee to implement the Plan. Burndap Birrarung burndap umarkoo brings statutory planning and land and waterway management together setting out directions for future land use and development for the entire river corridor. The Plan identifies actions for the river corridor, enables long-term collaborative management between agencies and Traditional Owners, and guides local planning.

Towards a new framework post 2027

The current EMP, while comprehensive, sets goals and priority actions for an extensive area of marine waters, which poses significant challenges for effective implementation and monitoring. This broad approach has led to resource allocation issues, where critical areas of the Bay and its sub-catchments do not receive the focused attention they require. Additionally, the diverse ecological characteristics and varying human activities across such a large area make it difficult to address specific local needs and threats adequately.

Revising the EMP to incorporate spatial planning and segmenting the Bay into more manageable units will greatly enhance its effectiveness. By dividing the Bay into smaller, ecologically and socio-economically relevant segments, management efforts can be more precisely tailored to the unique conditions and challenges of each segment. This approach allows for targeted conservation measures, better stakeholder engagement, and more efficient use of resources. Ultimately, spatial planning ensures that the management plan is more adaptive and responsive to the dynamic nature of marine environments, leading to improved outcomes for Bay's biodiversity and sustainable use of marine resources.

The next EMP will also need to consider the evolving ecological conditions and the impacts of climate change. The *Port Phillip Bay Coastal Hazard Assessment (2023)* has investigated the likely extent of sea level rise inundation, erosion and groundwater change for the Bay under different climate scenarios and how these changes may affect areas around the Bay. The Bay's productivity and denitrification efficiency are driven by prevailing climatic environmental variables (temperature, salinity, hydrodynamic movement, oxygen, debouchment of nitrogen and sediment). Understanding climate changes in sea level rise, sea-surface temperature, and erosion, coupled with changes in annual rainfall and the frequency of episodic extreme rainfall events will be crucial for identifying actions to protect the Bay into the future.

As set out, a collaborative approach is required to ensure the next PPB EMP reflects contemporary and diverse perspectives to address the socio-economic dimensions of the Bay's marine and coastal environment.

References

Agriculture Victoria (2024) Marine Pests in Victoria. The State of Victoria. (https://agriculture.vic.gov.au/biosecurity/marine-pests/marine-pests-in-victoria).

DEECA (2023) Port Phillip Bay Environmental Management Plan 2017-2027 – Monitoring, Evaluation, Reporting and Improvement Plan. The State of Victoria Department of Energy, Environment and Climate Action 2023.

DELWP (2017) Port Phillip Bay Environmental Management Plan 2017-2027. The State of Victoria Department of Environment, Land, Water and Planning 2017.

DNRE (2002) Port Phillip Bay Environmental Management Plan: Plan and Critical Programs to 2003. The State of Victoria, Department of Natural Resources and Environment, 2002.

Pearson, R., Bolton, M., Mascaro, S., Nicholson, A., Raven, R. (2021). *Port Phillip Bay Nutrient Modelling using Bayesian Networks: An exploration of the usefulness of Artificial Intelligence to address complex public problems*. Monash University Report.

Rohmana, Q. A., Fischer, A. and Gemmill, J. (2023*). National Outfall Database: Outfall ranking based on 2020/2021 nutrient loads discharge*. Report to the National Environmental Science Program. Clean Ocean Foundation and University of Tasmania.

Appendix 1.

Survey questions circulated via online survey.

1. What do you think is a key priority in Port Phillip Bay that requires extra attention?
2. What significant actions could be undertaken to address the key problem?
3. What do you think is a key priority in Port Phillip Bay that has improved since 2017?
4. Have you actively contributed to an EMP goal?
5. Do you think the EMP is effectively achieving its vision?
6. How effective are current activities in Port Phillip Bay achieving the first goal of Stewardship?
7. How effective are current activities in Port Phillip Bay achieving the second goal of Water Quality?
8. How effective are current activities in Port Phillip Bay achieving the third goal of Habitats and Marine Life?
9. How geographically diverse do you think all the EMP activities are spread within the EMP boundaries?
10. How effective do you find the text in explaining the 5 indices presented online?
11. Do you have any other information you would like to share about the EMP and progress around Port Phillip Bay?

Appendix 2.

Table of complete KPIs and targets.

Program Evaluation KEQ			
Evaluation Question	**KPI**	**Target**	**2022 Performance (Green/Orange/Red)**
Effectiveness – to what extent were EMP activities achieved?	% of completed EMP activities that have achieved objectives	90% of EMP activities	Data not assessed
	% of in-progress EMP activities that are on-track	90% of EMP activities	95%
Effectiveness – to what extent were the long-term outcomes of the EMP achieved?	% of overall goal targets met	80% of all targets met	46%
Efficiency – were the EMP actions and activities delivered on time, within cost and to the quality expected?	% of EMP activities completed without a variation	60% of EMP activities	Data not assessed
	% of EMP activities provided reporting on time	80% of EMP activities	Data not assessed

Stewardship KEQ			
Evaluation Question	**KPI**	**Target**	**2022 Performance (Green/Yellow/Red)**
Effectiveness – to what extent were the goals actions and activities achieved?	Percentage of Supporting, Enterprising, Focused and Comprehensive activities.	Higher percentage/increase in focused and comprehensive activities	2.22% (2019) 21% (2023)
	Number of groups and organisations actively developing programs to improve the Bay.	Increase or maintain	131 groups/organisations (2023)
Efficiency – Has the goal progressed adequately or been met given available resources?	Percentage of participants engaged in training events.	Increase	75,190 (2019) 109,299 (2023)
	Value of investment, volunteer time, other in-kind and cash.	Increase	$2,899,757 (2019) $13,835,299 (2023)

Stewardship – Priority Action 1.1 KEQ			
KPI	**Targets**	**Alignment of the EMP with the Regional Catchment Strategy targets for 2028**	**2022 Performance**
Survey results addressing the indicator support Traditional Owners as the 'voice' for waterways and Country	TBD following 2024 PPWP RCS survey results	The role of Traditional Owners as the voice for Country is respected and they have significant influence in planning, decision making and action across the region in land, biodiversity and water management. The value of traditional ecological knowledge held by the region's Traditional Owners is respected and becoming increasingly influential in decisions and practices. This RCS target align with the EMP by developing opportunities to educate government, industry and the broader community about Aboriginal cultural values and interests in the bay	Data not yet assessed
Number of formally registered cultural heritage sites in the region	TBD following 2024 PPWP RCS survey results e.g. an increase	The number of cultural heritage sites in the region that are formally registered has increased above 9,200 and intact sites are effectively protected. Traditional Owners are increasingly involved in the care and preservation of key sites. This RCS target align with the EMP by supporting opportunities for Traditional Owners to strengthen connections with their cultural values.	
Survey results addressing the indicator support Indigenous representation in natural resource management	TBD following 2024 PPWP RCS survey results	Traditional Owners are well represented in relevant organisational Boards. All major natural resource management forums and planning processes in this region include Indigenous representation. This RCS target aligns with the EMP by supporting opportunities for Traditional Owner groups to lead on assessments of Aboriginal cultural values and interests (past and present) across different regions of the Bay.	

Survey results addressing the indicator increase Indigenous employment in natural resource management	TBD Following 2024 PPWP RCS survey results. e.g., increased Indigenous employment in NRM	Organisations with major roles in natural resource management in this region collectively have a level of Indigenous employment that is above the public sector average and growing. This RCS target aligns with the EMP by supporting opportunities for Traditional Owner groups to lead on assessments of Aboriginal cultural values and interests (past and present) across different regions of the Bay.	

Water Quality KEQ			
Evaluation Q	**KPI**	**Target**	**2022 Performance (Green/Red/Yellow)**
Effectiveness – to what extent were the goals actions and activities achieved?	Percentage of sites monitored for water quality meeting the minimum sampling frequency per year as per the Environment Reference Standard (ERS).	73%	EPA – 90.9% MW – 77.3%
	Percentage of sites monitored for eutrophication returning Eutrophication Index status of Good and Very Good or an improving trend.	Increase or maintain	2/6 sites Good or Very Good status (2023)
	Tonnes of nitrogen (TN) discharged to PPB from the Western Treatment Plant.	Maintain or reduce	3,553 tonnes (2023)
	Litter density in catchments surrounding the Bay.	Decrease	Very Poor (2023)
	Percentage of monitoring sites (beaches) that meet long-term microbial water quality standards for primary contact recreation during dry weather.	69%	43%
	Percentage of monitoring sites (Yarra) that meet long-term microbial water quality standards for primary contact recreation during dry weather.	Maintain recreational water quality in key recreation areas	25% (1 site out of 4 suitable)
Efficiency – Has the goal progressed adequately or	Number of litter and water quality initiatives.	Increase or maintain.	30 Water Quality activities (2019) 70 Water Quality activities (2023)

been met given available resources?			1 Litter initiative (2019) 51 Litter initiatives (2023)
	Value of investment, volunteer time, other in-kind and cash.	Increase or maintain	$7,536,874 (2019) $151,704,318 (2023)

Habitats and Marine Life KEQ			
Evaluation Q	KPI	Target	2022 Performance (Green/Red/Yellow)
Effectiveness – to what extent were the goals actions and activities achieved?	Number of key indicator species or habitats included in the Marine Biodiversity Index.	Increase or maintain	15 species, cetacean emergencies, estuarine index and seafloor integrity (2023).
	Status of species or habitats covered by the Marine Biodiversity Index	Increase or maintain	Birds – Fair (2023) Fish – Fair (2023) Invertebrates – Poor (2023) Marine Mammals – Fair (2023)
	Area (ha) of habitat restored, protected or conserved	Increase	589.4ha* (2019) 4,914.6ha* (2023)
	Number of marine pest arrivals.	Decrease or maintain	2 (2020-2025)^
	Status of priority marine pests covered by the Marine Biosecurity Index.	Decrease or maintain	Statuses not assessed
Efficiency – has the goal progressed adequately or been met given available resources?	Number of research projects.	Increase or maintain	17 (2019) 60 (2023)
	Value of investment, volunteer time, other in-kind and cash.	Increase or maintain	$2,319,570 (2019) $17,493,439 (2023)

*This number is an accumulation of area of revegetation, area of protection or rehabilitation, area protected by fencing, area of land protected under reserve system and area of threatened habitat under protection.

^Period of years as used in the Marine Biosecurity Index.

Appendix 3

Good Environmental Status (GES) Descriptors

GES is required by the *Marine and Coastal Policy 2020*. To action this Policy, the *Marine and Coastal Knowledge Framework Strategic Directions 2020-22* has identified eleven descriptors which describe what the environment will look like when GES has been achieved (Table A3.1). Each descriptor contains several criteria and standards for reporting on the achievement of GES. In summary:

- GES involves the understanding of marine ecosystems and their responses to human activities, including climate change.

- Different GES descriptors and indicators may be more relevant to one marine region and coastline, compared to others in different geographic locations.

- Adequate baseline knowledge is required to define GES, and approaches to determine targets or reference conditions for the indicators used in assessing the environmental status can vary between geographic locations and ecosystems.

- The identification, measurement, and weighting of the components of the different indicators are synthesized into a single value or index. What components that are chosen will depend on various factors - For example, one indicator of biodiversity is the distribution range of species. However, the questions on how many species should be considered, whether all species are equally important, whether they should be considered as groups or as species and on a seasonal or annual basis needs to be agreed.

Table A3.1 Qualitative descriptors for determining GES.

Number	Descriptor
1	Biodiversity is maintained
2	Exotic species do not adversely alter the ecosystem
3	The population of commercial and recreational fish species is healthy
4	Elements of food webs ensure long-term abundance and reproduction
5	Eutrophication is minimised
6	The seafloor integrity ensures functioning of the ecosystem
7	Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
8	Concentrations of contaminants give no effects
9	Contaminants in seafood are below safe levels
10	Marine litter does not cause harm
11	Introduction of energy (including underwater noise) does not adversely affect the ecosystem

Descriptor 1: Biological diversity

Target levels are defined as being such that "the quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions". Some deviation from reference conditions, because of human use of the marine environment, is acceptable, providing the terms of the Descriptor are still met.

Descriptor 2: Marine exotic species

Exotic marine organisms can cause adverse effects on environmental quality resulting from changes in biological, chemical, and physical properties of aquatic ecosystems. These changes include, but are not limited to: elimination or extinction of sensitive and/or rare populations; alteration of native communities; algal blooms; modification of substrate conditions and the shore zones; alteration of oxygen and nutrient content, pH and transparency of water; accumulation of synthetic pollutants, etc.

The magnitude of impacts may vary from low to massive and they can be sporadic, short- term or permanent. The degradation gradient in relation to marine exotics is a function of their relative abundances and distribution ranges, which may vary from low abundances in one locality with no measurable adverse effects up to occurrence in high numbers in many localities, causing massive impact on native communities, habitats, and ecosystem functioning.

Descriptor 3: Exploited fish and shellfish

Since there is broad scientific evidence that GES cannot be achieved for all stocks simultaneously, a realistic threshold for the proportion of stocks with GES needs to be established above which the descriptor has achieved GES. GES is achieved for a particular stock only if criteria for all attributes are fulfilled.

Descriptor 4: Food webs

GES should ensure that populations of selected food web components occur at levels that are within acceptable ranges that will secure their long-term viability. GES will therefore be achieved when the indicators describing the various attributes of the descriptor reach the thresholds set for them.

Descriptor 5: Human induced eutrophication

GES has been achieved when the biological community remains well-balanced and retains all necessary functions in the absence of undesirable disturbance associated with eutrophication (e.g. excessive algal blooms, low dissolved oxygen, declines in seagrasses, kills of benthic organisms and/or fish) and/or where there are no nutrient-related impacts on sustainable use of ecosystem goods and services (Figure A3.1).

Figure A3.1: Filamentous green algae (also known as 'drift algae') smothering a biotope habitat in Port Phillip Bay, Victoria. The growth of the algae is a result of human induced eutrophication (image curtesy Adrian Flynn).

Descriptor 6: Seafloor integrity

The standard for GES should reflect the goals for management of the impacts of human activities on the sea floor. It is explicit in the definition of the descriptor that human uses of the ocean, including uses that affect the sea floor, are consistent with relevant policies, as long as those uses are sustainable.

Sustainability is achieved when the pressures associated with all those uses cumulatively do not hinder the ecosystem components to retain their natural diversity, productivity, and dynamic ecological processes. Perturbations due to use must be small enough that recovery is rapid and secure if a use ceases.

Descriptor 7: Hydrographical conditions

Hydrographical conditions are characterized by the physical characteristics of seawater such as temperature, salinity, depth, currents, waves, and turbulence. These characteristics play a crucial role in the dynamics of marine ecosystems and can be altered by human activities, especially in coastal areas. Alterations to hydrographical conditions can occur due o the construction of physical structures (such as wind turbines) or through excavation of navigational channels.

Descriptor 8: Contaminants

Biological effects should be assessed against threshold levels of response that are indicative of significant harm to the organisms concerned. Integration is greatly facilitated by coherent and consistent sets of assessment thresholds.

Descriptor 9: Contaminants in fish and seafood

GES would be achieved if all contaminants are at levels below the levels established for human consumption or showing a downward trend (for the substances for which monitoring is ongoing but for which levels have not yet been set). However, it is generally felt that GES for descriptor 9 must be judged in view of the monitoring of descriptor 8, also dealing with contaminants in marine environment.

Descriptor 10: Litter

Definitions of the acceptable levels of harm and GES must consider impacts as assessed by the amount of litter in different compartments of the marine environment (seabed, sea surface, water column, coastline), ecological effects of the litter such as plastics ingested by marine organisms or entanglement rates (Figure 21); and problems associated with degradation of litter (microparticles) as well as social and economic aspects. Tourism and visitation are strongly negatively affected by the presence of litter. An overriding objective will be a measurable and significant decrease (e.g. 10% per year for litter on coastlines) in the total amount of litter in the environment.

Descriptor 11: Energy and noise

GES occurs when there is no adverse effect of energy inputs on any component of the marine environment. However, such an objective is probably not achievable if, for instance, behavioural disturbance or mortality of plankton (including planktonic larvae) is considered an adverse effect. Such an objective is probably not also measurable for a very large proportion of organisms in the marine environment.
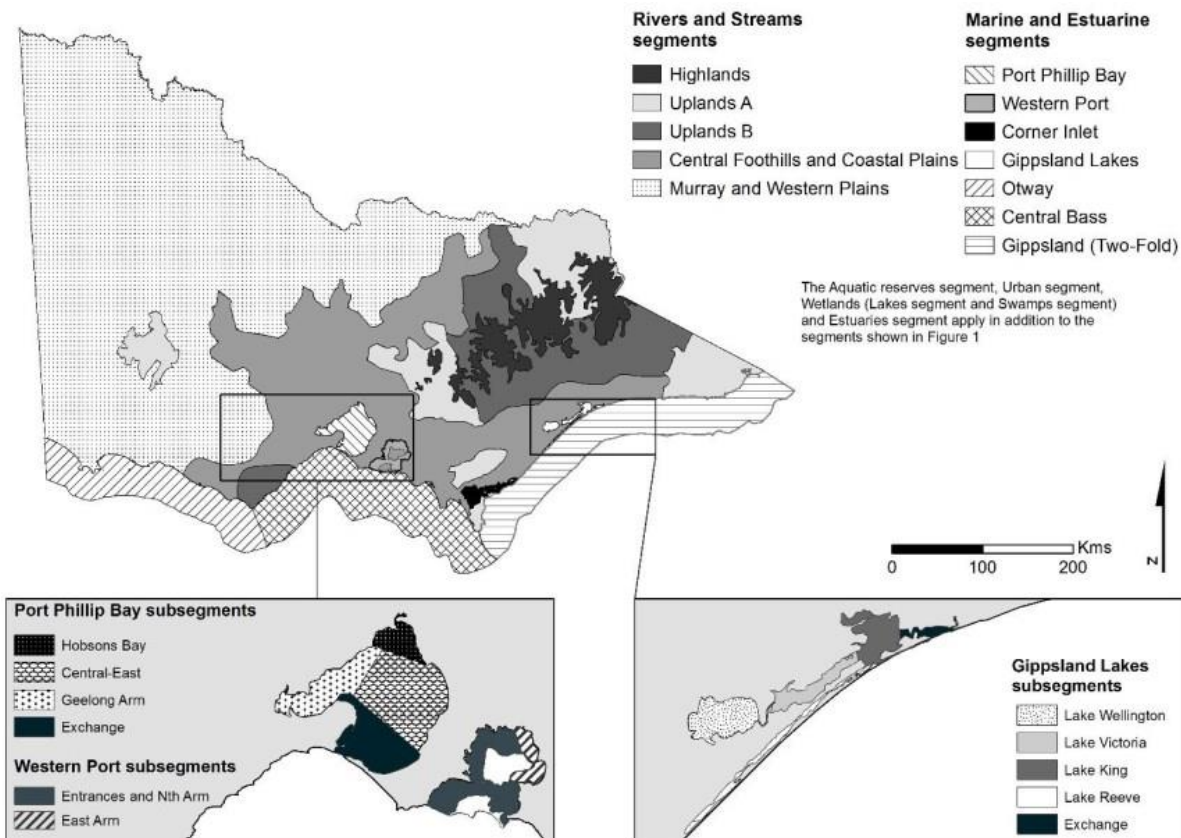
Appendix 4

Environment Reference Standard for Port Phillip Bay

This environment reference standard (ERS) is made under section 93 of the **Environment Protection Act 2017** (the Act). It sets out the environmental values of the ambient air, ambient sound, land and water environments that are sought to be achieved or maintained in Victoria and standards to support those values. Its primary function is to provide an environmental assessment and reporting benchmark. However, the Act specifically requires EPA to consider the environmental values in this ERS when deciding whether or not to issue development, operating and pilot project licences, when reviewing operating licences and when deciding whether or not to issue development and operating licence exemptions and specified prescribed permits.

Division 3—Surface waters

17 Segments

(d) *Marine* comprising—

(i) *Port Phillip Bay segment* comprising the surface water bounded by high water and the Port Phillip Bay heads and comprising the following four subsegments (but not including marine waters within the Aquatic reserves segment)—

(A) *Hobsons Bay* - the surface waters in the northern section of Port Phillip Bay bounded by Point Cook, Ricketts Point and the entrance to the Yarra River, that are directly influenced by outflows from the Yarra River and urban stormwater;

(B) *Central-East* - the surface waters of the central section of Port Phillip Bay extending from Point Cook and Ricketts Point in the north, to Mt Martha and Point Richards in the south;

(C) *Geelong Arm* - the surface waters of the Werribee coastal zone extending 5 kilometres offshore from Point Cook and south to Point Richards and encompassing the Geelong Arm;

(D) *Exchange* - the surface waters of the section of Port Phillip Bay extending south from Point Richards and Mt Martha to Port Phillip Heads;

Rivers and Streams segments
- Highlands
- Uplands A
- Uplands B
- Central Foothills and Coastal Plains
- Murray and Western Plains

Marine and Estuarine segments
- Port Phillip Bay
- Western Port
- Corner Inlet
- Gippsland Lakes
- Otway
- Central Bass
- Gippsland (Two-Fold)

The Aquatic reserves segment, Urban segment, Wetlands (Lakes segment and Swamps segment) and Estuaries segment apply in addition to the segments shown in Figure 1

Port Phillip Bay subsegments
- Hobsons Bay
- Central-East
- Geelong Arm
- Exchange

Western Port subsegments
- Entrances and Nth Arm
- East Arm

Gippsland Lakes subsegments
- Lake Wellington
- Lake Victoria
- Lake King
- Lake Reeve
- Exchange

ERS Table 5.13: Port Phillip Bay—Indicators and objectives

SUBSEGMENT	Surface / Bottom	INDICATOR											
		Total phosphorus (µg/L)	Total nitrogen (µg/L)	Dissolved oxygen (% saturation)	Chlorophyll-a (µg/L)	Dissolved inorganic phosphorus (µg/L)	Dissolved inorganic nitrogen (µg/L)	TSS (mg/L)	Salinity (PSU)	Light attenuation (m^{-1})	pH	Toxicants in water	Toxicants in sediment
		75th percentile	75th percentile	25th percentile - max	75th percentile	75th percentile	75th percentile	75th percentile	25th – 75th percentile	75th percentile	25th – 75th percentile	% protection	
Hobsons Bay	Surface	100	300	95-130	4	70	50	5	34-37	0.5	7.5-8.5	95	DGV
	Bottom	N/A	N/A	80-130	N/A	N/A	N/A	N/A	N/A	N/A	7.5-8.5	95	DGV
Central-East	Surface	70	150	95-130	1.5	50	10	3	35-37	0.3	7.5-8.5	99	DGV
	Bottom	N/A	N/A	80-130	N/A	N/A	N/A	N/A	N/A	N/A	7.5-8.5	99	DGV
Geelong Arm	Surface	100	300	95-130	3	70	20	5	35-38	0.4	7.5-8.5	95	DGV
Exchange	Surface	50	150	N/A	1	30	10	2	35-36	0.3	7.5-8.5	99	DGV

ERS Table 5.21: Marine pollutant load objectives

Port Phillip Bay		
	Total nitrogen from surrounding waterways	1,500 to 2,200 tonnes
	Nitrogen from the Western Treatment Plant	3,100 tonnes (based on a rolling 3 year average)
	Total nitrogen from the Yarra and Maribyrnong Rivers	Contribution of total nitrogen load not to exceed 70 % of total annual average load from all surrounding waterways
	TSS from surrounding waterways	60,000 to 70,000 tonnes
	TSS from the Yarra and Maribyrnong Rivers	Contribution of TSS load not to exceed 70 % of annual average load from all surrounding waterways