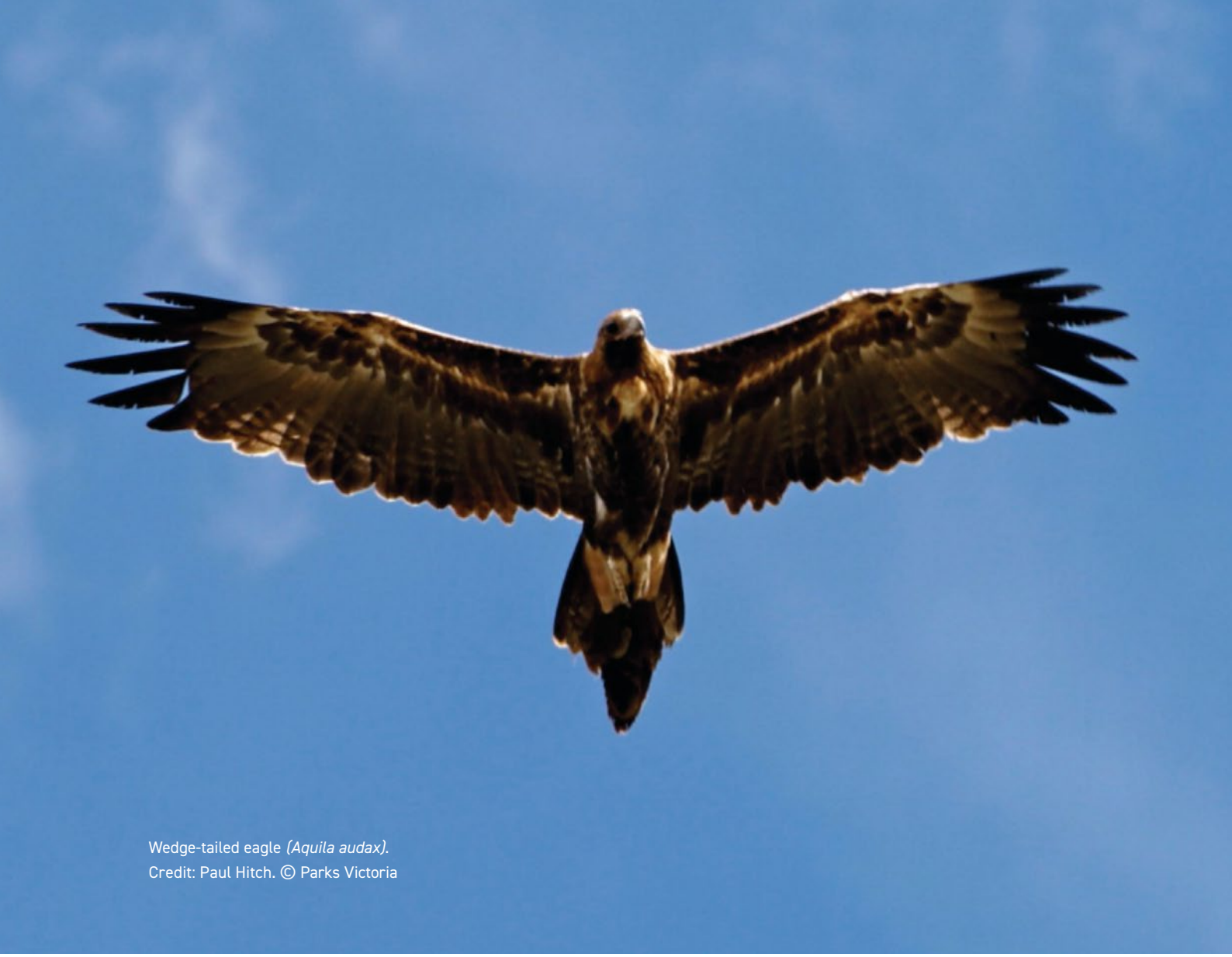
Commissioner *for* Environmental Sustainability Victoria

Victorian State of the Marine and Coastal Environment 2024 Report

Summary Report



VICTORIA State Government



Wedge-tailed eagle *(Aquila audax)*.
Credit: Paul Hitch. © Parks Victoria

Traditional Owners

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

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

Commissioner *for* Environmental Sustainability Victoria

Staircase to the iconic Cape Woolamai Surf Beach on Phillip Island, Victoria, Australia. Credit: FiledIMAGE

Commissioner's foreword

I am pleased to present the Victorian State of the Marine and Coastal Environment 2024 Report (SMCE 2024 Report), a study of the health of Victorian marine and coastal environments. It builds on the inaugural State of the Marine and Coastal Environment 2021 Report (SMCE 2021 Report) and provides an update on the scientific baseline presented in that report. This report recognises the environmental, social and economic values of Victoria's marine and coastal environments, and their importance to our health, happiness and prosperity.

This report is prepared according to the *Marine and Coastal Act 2018* (Vic) that requires the Commissioner for Environmental Sustainability (The Commissioner) to issue a 5-yearly State of the Marine and Coastal Environment Report on:

- the condition of the marine and coastal environment
- the environmental, social and economic benefits of the marine and coastal environment, and
- the threats to the marine and coastal environment.

Where available, this SMCE 2024 Report expands on the geographical scope of the SMCE 2021 Report that exclusively incorporated Port Phillip Bay, Western Port, Corner Inlet and Nooramunga, the Gippsland Lakes, and Victoria's system of marine national parks and sanctuaries. My office is currently developing the State of the Great Ocean Road Coast and Parks Report, which will delve more deeply into issues at a local level, so this area is excluded from the SMCE 2024 Report. The SMCE 2024 compiles scientific and other information from many sources: Commonwealth and Victorian government agencies, local governments, catchment management authorities, universities, citizen scientists and non-government organisations.

The table below provides a high-level overview of the status, trend and confidence assessments for all 82 indicators presented in this report. Some indicators have multiple assessments — for example, for multiple regions — therefore the total number of assessments exceeds the total number of indicators. A total of 228 status assessments, 227 trend assessments and 240 confidence assessments were completed for the 82 indicators.

Proportion of status assessments (%)		Proportion of trend assessments (%)		Proportion of confidence assessments (%)	
Good	23.7	Improving	11.9	High	21.7
Fair	34.6	Stable	28.2	Moderate	37.9
Poor	20.2	Deteriorating	26.4	Low	21.7
Unknown	21.5	Unclear	33.5	Insufficient	18.8

Similar to the inaugural SMCE 2021 Report, this report includes some challenging findings and aims to highlight areas where interventions and practical actions are improving environmental outcomes. For example, and consistent with the findings of the recently released State of the Climate 2024 Report (published in October 2024) and Victoria's Climate Science Report 2024 (published in November 2024), none of the climate and climate change impact indicators in this report were assessed as good, with all trends for that theme rated as deteriorating or unclear.[1, 2]

Nevertheless, this report highlights some areas where interventions are improving the environment. For example, conservation and ecotourism objectives are achieved in parallel at Phillip Island (Millowl). Phillip Island Nature Parks are managed for conservation and ecotourism, with revenue re-invested into conservation, research, ecotourism, and educational initiatives, like eradicating foxes from the Summerland Estate and re-establishing critically endangered Eastern barred bandicoots in the wild while also providing ecotourism employment.[3]

1. Bureau of Meteorology (BoM), Commonwealth Scientific and Industrial Research Organisation (CSIRO) 2024, 'State of the Climate 2024', http://www.bom.gov.au/state-of-the-climate/2024/documents/2024-state-of-the-climate.pdf Accessed 9 December 2024.
2. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Victoria's Climate Science Report 2024', https://www.climatechange.vic.gov.au/victorias-changing-climate/Victorias-Climate-Science-Report-2024.pdf Accessed 9 December 2024.
3. Section 4(1)(m) *Crown Land (Reserves) Act 1978*

Six recommendations are presented in this report. The recommendations aim to help focus effort to achieve better outcomes for Victoria's marine and coastal environment as stated in the current legislative and policy frameworks, including the *Marine and Coastal Act 2018,* the Marine and Coastal Policy, the Marine and Coastal Strategy, Marine Spatial Planning Framework, the Environment Reference Standard, Protecting Victoria's Environment – Biodiversity 2037 and Water for Victoria.

Addressing the six recommendations will likely lead to improved biodiversity outcomes, negating the need for a stand-alone biodiversity recommendation in addition to current practices. It is critical that Victoria maintains a 'catchment to reefs' philosophy, as asserted within the SMCE 2021 Report. Many of the pressures on our coasts, bays, estuaries, lakes and ocean are linked to activities on land, therefore, management and regulatory actions that connect activities in our catchments to benefits for Victoria's marine and coastal environment are critical (Recommendations 3, 4 and 5). So too is the need for strong action to mitigate, adapt and protect our marine and coastal environments and communities against the effects of climate change (Recommendation 1).

The challenge for Victorians is to take full advantage of the potential of the enabling marine and coastal legislation and policy, and to continually strive for a whole-of-system approach to guide action (Recommendation 2). This will require the tools presented by the reform to be coherent and coordinated. They should be applied holistically: integrated water quality and pest management, adaptation to climate change, and conservation and protection priorities. This undertaking is twofold. It requires that commitments be kept, and that the policies established under the legislative and policy framework lead to continuing improvement and protection of our marine and coastal environments.

One area where a holistic and coordinated approach has the potential to improve outcomes is tourism and visitor management. While our spectacular coasts and wonderful nature are a drawcard for visitors and a valuable tourism asset, excessive levels of visitation can have negative environmental and social impacts (Recommendation 6). The Great Ocean Road Strategic Framework Plan, when completed by DEECA, may provide guidance on implementing a systems approach to better balance environmental and tourism outcomes.

The aspirations of Sea Country Traditional Owners and the restoration of traditional knowledge systems into the management of the marine and coastal environment are supported. There is no stand-alone Traditional Owner recommendation in the SMCE 2024. However, the work being undertaken by the Saltwater Council, formed by the six coastal Victorian Registered Aboriginal Party groups, to advise federal, state and local government; and the recent State of the Environment (SoE) 2023 recommendation aimed at collaborating with Traditional Owners on the development of biocultural indicators, will progress Traditional Owner Sea Country aspirations.

It is a privilege to have led the scientific analysis and consultation to deliver this SMCE 2024 Report — a report that has been made possible only by a collaboration of many talented people. My team and I acknowledge and thank everyone who has generously contributed their time and effort to help prepare and review this report.

Also, we thank the dedicated members of the Commissioner's Reference Group, and colleagues from across the Department of Energy, Environment and Climate Action and other agencies, without whom we cannot do our work. Finally, my sincere thanks to my team for their tireless efforts in preparing this report.

The SMCE 2024 Report is available to view and/or download online at www.ces.vic.gov.au/smce-2024.



Helen Vaughan PSM

Commissioner
for Environmental Sustainability, Victoria



Acknowledgements

Sincere thanks to my dedicated team of science writers and contributing authors who, under the skilful guidance of Dr Scott Rawlings, Director of Science and Reporting, and Michael Reid, Director of Office, have worked with me to prepare this State of the Marine and Coastal Environment 2024 Report. I am extremely grateful for your commitment and expertise.

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Commissioner's Reference Group	
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Anthony Boxshall	Victorian Marine and Coastal Council
Brendan Tatham	Victorian Farmers Federation
Cath Jenkins	Vic Catchments
Chris Chesterfield	Birrarung Council and independent water industry expert
Corinne Proske	Trust for Nature (Victoria)
Jonathan La Nauze	Environment Victoria
Kelly Grigsby	Municipal Association of Victoria
Kathryn Arndt	Victorian Local Governance Association
Matthew Ruchel	Victorian National Parks Association
Mellissa Wood	Victorian Environmental Assessment Council
Paul Foreman	Landcare Victoria Incorporated
Tom Bell	First Peoples Self-Determination Division Department of Energy, Environment and Climate Action

Government Stakeholder Technical Advisory Group	
Corangamite Catchment Management Authority	Melbourne Water Corporation
East Gippsland Catchment Management Authority	Municipal Association of Victoria
Glenelg Hopkins Catchment Management Authority	Parks Victoria
West Gippsland Catchment Management Authority	Phillip Island Nature Parks
Colac Otway Shire Council	Ports Victoria
Corangamite Shire Council	Royal Botanic Gardens Victoria
Frankston Council	Southern Rural Water
Kingston Council	Sustainability Victoria
Moyne Shire Council	Trust for Nature (Victoria)
Surf Coast Shire Council	Vic Catchments
Wyndham City Council	Victorian Department of Energy, Environment and Climate Action
Better Boating Victoria	Victorian Department of Health
Bureau of Meteorology	Victorian Department of Jobs, Skills, Industry and Regions
East Gippsland Catchment Management Authority	Victorian Department of Transport and Planning
Environment Protection Authority Victoria	Victorian Environmental Assessment Council
Emergency Management Victoria	Victorian Fisheries Authority
Great Ocean Road Coast and Parks Authority	Victorian Local Government Association
Homes Victoria	Victorian Marine and Coastal Council
Infrastructure Victoria	Victorian Ports Association
Landcare Victoria	Zoos Victoria

Non-government Stakeholder Technical Advisory Group	
BirdLife Australia	Port Phillip EcoCentre
Central Victorian Biolinks Alliance Inc./Landcare Victoria	Royal Society of Victoria
Conservation Ecology Centre/Wildlife Wonders	The Nature Conservancy
Dolphin Research Institute	Victorian Farmers Federation
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Contents

Traditional Owners ..... **ii**
Commissioner's foreword ..... **iii**
Acknowledgements ..... **v**
About this report ..... **viii**
Part 1A. Summary Report **11**
Marine and coastal reporting 12
Key findings 18
Recommendations 36
Recommendations in summary 46
Indicator assessment dashboard 49
Part 1B. Summary Report **89**
Cultural landscapes health and management 90
Marine and coastal policy and legislative context 101
Indicator assessment summaries 108
Abbreviations **225**

Tables

Table 1: Summary of SMCE 2024 recommendations and the challenges addressed, by theme 46
Table 2: Summary of status assessments for SMCE 2024 indicators by theme 50
Table 3: Summary of trend assessments for SMCE 2024 indicators by theme 51
Table 4: Summary of confidence assessments for SMCE 2024 indicators by theme 52
Table 5: Victorian legislation and policies relevant to the SMCE 2024 Report 106

Figures

Figure 1: Objectives and guiding principles of the Victorian Government's marine and coastal legislation and policy, and the role of environmental reporting 12
Figure 2: Marine and Coastal Policy decision pathway aligns with the structure of the SMCE 2024 Report 13
Figure 3: Proportional breakdown of status assessments for SMCE 2024 indicators 50
Figure 4: Proportional breakdown of trend assessments for SMCE 2024 indicators. 51
Figure 5: Proportional breakdown of confidence assessments for SMCE 2024 indicators. 52
Figure 6: Registered Aboriginal Parties in Victoria as of 7 August 2024. 95
Figure 7: Map of coastal catchment management regions in Victoria. 110
Figure 8: Map of biounits across the Victorian coastline 111
Figure 9: Map of Victoria's marine protected areas. 111

About this report

Victoria's *Commissioner for Environmental Sustainability Act 2003* (CES Act) (section 8(da)) and the *Marine and Coastal Act 2018* (section 37(2)(a–c)) require the Commissioner for Environmental Sustainability (the Commissioner) to issue a 5-yearly State of the Marine and Coastal Environment (SMCE) Report on:

- The condition of the marine and coastal environment
- The environmental, social and economic benefits of the marine and coastal environment
- Threats to the marine and coastal environment.[4, 5]

This Victorian State of the Marine and Coastal Environment 2024 Report (SMCE 2024 Report) builds on the findings of the inaugural Victorian State of the Marine and Coastal Environment 2021 Report (SMCE 2021 Report) to provide a considered analysis of the scientific evidence available on the state of Victoria's marine and coastal environment, and the pressures and challenges that lie ahead. The SMCE 2024 Report marks the first time that a comprehensive scientific baseline analysis on Victoria's marine and coastal environment has been carried forward and re-evaluated in consecutive Victorian SMCE reports.

The approach to reporting is authorised through the Framework for the Victorian State of the Environment (SoE) 2023 Report: Science for Sustainable Development (the Framework), tabled in the Parliament of Victoria in June 2020, as required by the CES Act and exercising the authority under the CES Act.[6] The 82 indicators in the SMCE reports were developed during an extensive and iterative co-creation period with stakeholders in 2020.

This evidence base enables the Commissioner to exercise the authority under the CES Act to confidently recommend and prioritise actions to influence and inform the focus, effort and investment by the Victorian Government over the next decade and beyond, with the overarching aim of improving Victoria's environmental condition and outcomes. Six recommendations are made in this report to the Victorian Government to improve outcomes for the communities and environmental health of the state's marine and coastal environment.

The CES Act (section 17(5)) requires that the Minister must, within 12 months of tabling this report in the Parliament of Victoria, cause a statement of the response by the Victorian Government to be laid before each House of the Parliament of Victoria, specifying the action (if any) proposed to be taken by the Victorian Government with respect to the recommendations.[7]



Cuttlefish. Credit: Julian Finn © Museums Victoria

4. State Government of Victoria, '*Commissioner for Environmental Sustainability Act 2003*, section 8'.
5. State Government of Victoria, '*Marine and Coastal Act 2018* (Vic), section 37'.
6. Commissioner for Environmental Sustainability (CES) 2020, 'Framework for the Victorian State of the Environment 2023 Report: Science for Sustainable Development', East Melbourne Victoria.
7. State Government of Victoria, '*Commissioner for Environmental Sustainability Act 2003*', section 17'.

Report structure

The Summary Report contains two parts (Part 1A and Part 1B).

Part 1A includes the legislative and policy context for marine and coastal reporting, provides a summary of key findings, summary graphs and a report card of indicator assessments by theme. Part 1A concludes with the proposal of six recommendations for action that are based on the evidence presented in the Scientific Assessments (Part 2).

Part 1B includes information on the critical role of Traditional Owners in cultural landscape health and management, and more detailed information on the legislative and policy context for marine and coastal management. Part 1B concludes with indicator summaries for all 82 indicators assessed in Part 2, presenting metrics for each indicator, a comment arising from the assessment, summary of status, trend and confidence, the region to which the indicator applies and identification of the data custodian.

The Scientific Assessments are contained in Part 2.

Part 2 is presented as a separate document and contains the scientific assessments for each of the 82 indicators, presented across nine themes:

- Theme 1: Water quality and catchment inputs
- Theme 2: Litter and pollution
- Theme 3: Biodiversity
- Theme 4: Seafloor integrity and health
- Theme 5: Pests and invasive species
- Theme 6: Climate and climate change impacts
- Theme 7: Managing coastal hazard risks
- Theme 8: Communities
- Theme 9: Stewardship and collaborative management.

Each theme commences with an overview and analysis of the key findings. The scientific assessments rely on publicly available scientific data, including reports, journal articles, submissions to parliamentary and government inquiries, citizen science projects and interviews with experts in relevant fields. The data are subsequently assessed and synthesised by the science team supporting the Commissioner.

The assessments have been conducted on a statewide and/or regional scale, based on the localisation of the impacts associated with each indicator and the spatial scale of the available evidence.

The scientific evidence and findings for 'Theme 8: Communities' and 'Theme 9: Stewardship and collaborative management' are presented on a statewide scale.[8] However, where the data enable regional analysis, the disaggregation is provided.

Each indicator's scientific assessment includes:

- metrics used to measure the status and trend
- a comparison with the 2021 assessment (where applicable)
- data custodian (the source of the data)
- region covered by the indicator (statewide or a particular region)
- reason for assessing the indicator
- indicator's performance (status, trend and confidence)
- thresholds for determining the status of each indicator (where available)
- a summary of the 2024 assessment
- an indicator assessment and commentary based on the most recent data available.

8. With one exception, the scale of 'Indicator 74: Stewardship' is Port Phillip Bay only.

Commissioner *for* Environmental Sustainability Victoria

Part 1A. Summary Report

Gannet, Popes Eye, Port Phillip.
Credit: Jarrod Boord © Parks Victoria

Marine and coastal reporting

This SMCE 2024 Report is the first to be formally issued under the *Marine and Coastal Act 2018*, and widens the scope of the interim SMCE 2021 Report.

Figure 1 provides context for the reader, demonstrating how the Victorian Government's marine and coastal legislation and policy — particularly the objectives and guiding principles of the Marine and Coastal Policy — inform a broader adaptive cycle for marine and coastal management.

The emphasis here is on the crucial role of environmental reporting — not only in providing evidence and strengthening the frameworks for marine and coastal knowledge and marine spatial planning (MSP), but also in providing essential information for future iterations of the Marine and Coastal Policy and the Marine and Coastal Strategy.

In turn, the policy and strategy will guide the prioritisation and science focus of future SMCE reports, identifying emerging policy and strategy interventions that require more robust evidence.

More detailed descriptions of the Marine and Coastal Policy and Marine and Coastal Strategy are provided in 'Marine and coastal legislative and policy context — Victorian'.

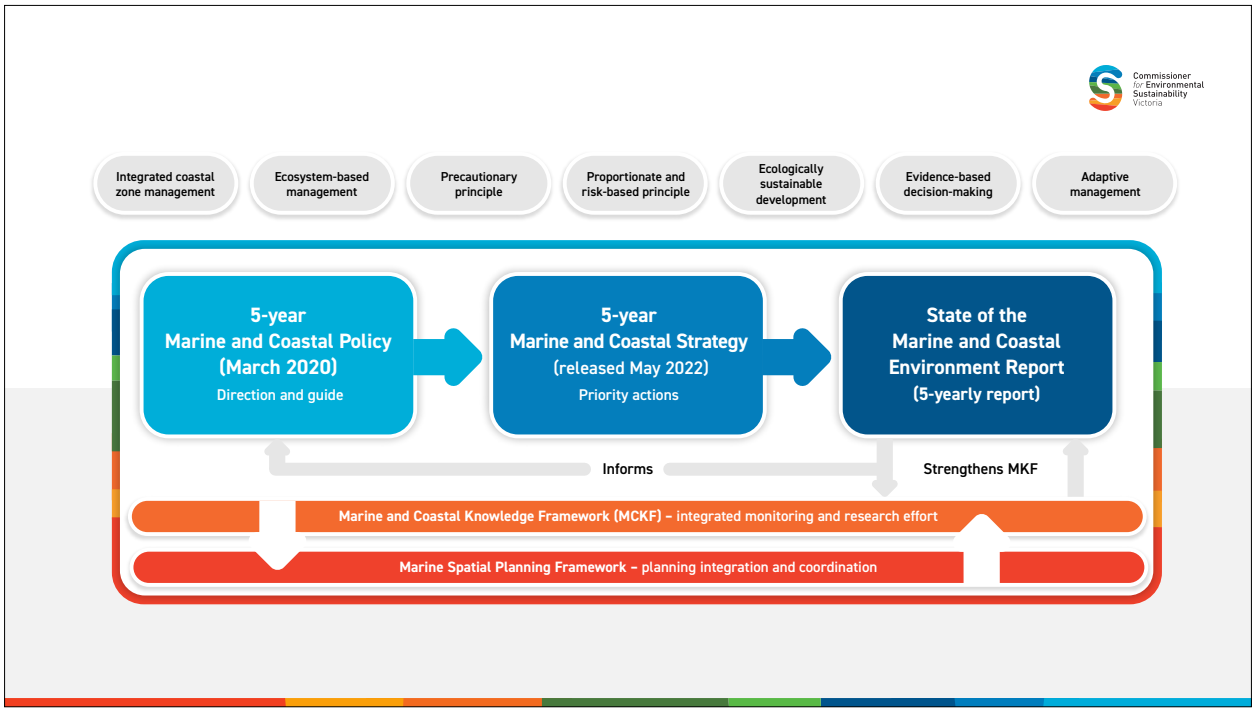


Figure 1: Objectives and guiding principles of the Victorian Government's marine and coastal legislation and policy, and the role of environmental reporting.

Figure 2 maps the Marine and Coastal Policy decision pathway against the structure of this report. This shows how the evidence is presented to support the policy priorities and inform decision makers of the science needed to make informed decisions at each point in the pathway. The themes and accompanying indicators of Part 2 – Scientific Assessments are identified to the right of the complementary policy priorities.

This report has expanded the geographical scope of the interim SMCE 2021 Report to include scientific assessments (where available) beyond Port Phillip Bay, Western Port, Gippsland Lakes, Corner Inlet-Nooramunga and Victoria's system of marine national parks and sanctuaries. Statewide analysis is also presented where appropriate. The analysis of what constitutes 'marine and coastal' conforms with the definition in the *Marine and Coastal Act 2018*.

The marine and coastal environment includes all private and public land and waters between the outer limit of Victorian coastal water and 5 km inland of the high-water mark of the sea, including:

a. the land (whether or not covered by water) to a depth of 200 metres below the surface of that land

b. any water covering the land referred to in sentence (a) above from time to time

c. the biodiversity associated with the land and water referred to in sentences (a) and (b).

The definition includes bays, inlets and estuaries, and the Gippsland Lakes.

This executive summary provides an overview of findings from Part 2 – Scientific Assessments. Each theme in Part 2 is also introduced with a summary section. See Part 2 for a more detailed analysis of the issues presented below.

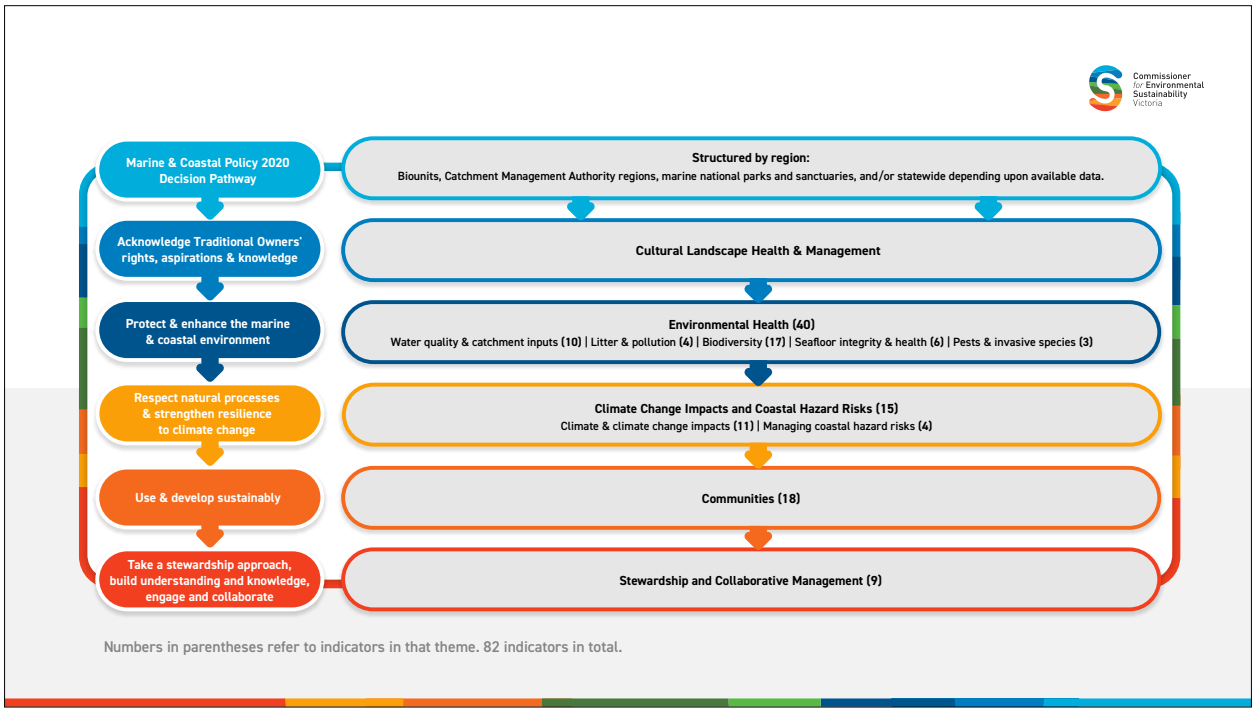


Figure 2: Marine and Coastal Policy decision pathway aligns with the structure of the SMCE 2024 Report.

Regional reporting and initiatives

The Port Phillip Bay Environmental Management Plan (EMP) was published in 2017 and is being implemented over a 10-year period until 2027.[9] In November 2024, DEECA published an evaluation and report on the performance of the EMP.[10] It is an important milestone that this evaluation has been completed and published as it will help refine and improve the design of the EMP and its delivery. While the very recent release of the evaluation report means it has not been incorporated into the indicator assessments and narratives of this SMCE 2024 Report, the evaluation will be a critical tool to guide future decision making by marine and coastal managers across the state. For example, the Port Phillip Bay EMP review can be used to determine whether an EMP may be an appropriate mechanism to maintain and improve the environmental performance of other marine environments along the Victorian coastline.

Prior to the current Port Phillip Bay EMP being implemented there were several important studies and initiatives focused on the bay. These included the Port Phillip Bay Environmental Study from 1992-1996 that was directed by Commonwealth Scientific and Industrial Research Organisation (CSIRO) and investigated the ecology of the Bay, its physical processes, nutrient levels and toxicant levels.[11] A key recommendation from the study was to reduce nitrogen loads to the Bay to improve water quality. The Port Phillip Bay Environmental Study informed the State Environment Protection Policy (Waters of Victoria), which was introduced in 1997 and established the statutory framework to protect and rehabilitate Victoria's freshwater and marine environments.[12] Through the statutory framework, an EMP was required to be developed for Port Phillip Bay. The first Port Phillip Bay EMP was published in 2001 and provided an overarching framework to mitigate two key risks to the Bay's environment: nutrients and marine pests.[13]

In addition to the studies and initiatives centring on Port Phillip Bay, there have been detailed periodic studies focused on Western Port. The Westernport Bay Environment Study was published in 1975.[14] This study was followed by a series of other reviews before Melbourne Water published a major scientific review of the area in 2011, identifying five priority research themes: physical processes, nutrients and sediments, seagrasses, toxicants and iconic species.[15] A follow-up report to the 2011 report was published in 2018 and presented a synopsis of the research, highlighting key findings across the priority research themes and providing links to the individual research reports.[16] The 2018 report also updated the research needs to include: finer resolution mapping of erosion in the catchment, options for erosion control, determination of water quality targets for sediments and nutrients that support plant communities in the system and the recovery of seagrass.

For the Gippsland Lakes, the East Gippsland Catchment Management Authority completed the Gippsland Lakes Environment Report 2021 that assessed the condition of the lakes based on available data.[17] The report also highlighted some key knowledge gaps and established a framework for future assessments of condition. Subsequently, a Gippsland Lakes Environment Report for 2024 has been completed (unpublished).[18]

9. Department of Environment, Land, Water and Planning (DELWP) 2017, 'Port Phillip Bay Environmental Management Plan 2017–2027', https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/88710/PPB-EMP-2017-Main-Doc.pdf Accessed 9 December 2024.
10. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Monitoring Evaluation Reporting and Improvement (MERI) 5-yearly Report, Port Phillip Bay Environmental Management Plan 2017-2027', https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0019/723124/PPB-EMP-MERI-Report.pdf Accessed 9 December 2024.
11. Harris G 1996, 'Port Phillip Bay Environmental Study', CSIRO Publishing, Clayton, Victoria.
12. Department of Environment, Land, Water and Planning (DELWP) 2017, 'Port Phillip Bay Environmental Management Plan 2017–2027', https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/88710/PPB-EMP-2017-Main-Doc.pdf Accessed 9 December 2024.
13. Department of Environment, Land, Water and Planning (DELWP) 2017, 'Port Phillip Bay Environmental Management Plan 2017–2027', https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/88710/PPB-EMP-2017-Main-Doc.pdf Accessed 9 December 2024.
14. Shapiro MA 1975, 'Westernport Bay Environmental Study, 1973 -1974', Environmental Study Series No. 502, Ministry for Conservation, Victoria.
15. Melbourne Water 2011, 'Understanding the Western Port Environment: A summary of current knowledge and priorities for future research', Melbourne, Victoria.
16. Melbourne Water 2018, 'Understanding the Western Port Environment: a summary of research findings from the Western Port Environment Research Program 2011–2017 and priorities for future research, Coleman R, Bathgate R, Keough MJK (eds), Melbourne Water, Victoria.
17. East Gippsland Catchment Management Authority (EGCMA) 2021, 'Gippsland Lakes Environment Report 2021', Technical Report, Bairnsdale, Victoria.
18. East Gippsland Catchment Management Authority (EGCMA) 2024, 'Gippsland Lakes Environment Report 2024 - Unpublished Technical Report', Bairnsdale, Victoria.

A Future Priority of the State of the Bays 2016 Report proposed the development of a Marine Knowledge Framework (MKF) for Port Phillip Bay and Western Port. The aim of the MKF was to transition from the traditional disaggregated, species-specific research approach towards a more strategic marine research program that takes a systems approach through the establishment of research standards and protocols that emphasise the 'how' and 'why' of marine science and the integration of diverse research partnerships between government entities, academia, and Traditional Owner and citizen science groups.

The proposed MKF would also build upon the strong foundation of existing monitoring regimes by adopting advanced monitoring technologies that promote higher quality and more comprehensive data over broader spatial and temporal scales and enable greater sophistication in the analysis of the marine environment. Together, these data would improve understanding of impacts that affect the health and function of marine ecosystems and biota as well as the efficacy of management interventions.

The SoE 2018 Report expanded on the Future Priority proposed in the State of Bays 2016 Report to recommend the development and implementation of a statewide Marine and Coastal Knowledge Framework (MCKF) (Recommendation 10). This framework would include the evaluation of impacts arising from coastal sources as well the attitudes, perceptions and connections of Victorians relating to the state's marine and coastal environment.

The Victorian Government supported in principle Recommendation 10 of the SoE 2018 Report. In adopting this approach, DEECA has made significant progress towards these recommended actions.[19] In 2020, the expanded MCKF was released, aimed at improving decision-making about how our marine and coast is managed. As part of this science-policy framework, several key deliverables have been achieved or are currently in progress, including:

- establishment of the Victorian Coastal Monitoring Program (VCMP) in 2017
- launch of the Coastkit online portal in 2020
- development of a new marine ecosystem classification system in 2021
- initiation of the Port Phillip Bay EMP Seafloor Integrity Project in 2022
- creation of the first statewide marine habitat map in 2023
- identification of blue carbon nature-based restoration opportunities in 2023
- launch of the Feature Activity Sensitivity Tool (FeAST)
- creation of a statewide Marine Biodiversity Values Map in 2024
- refinement and update of the hierarchical marine biogeographic planning units, expected to be available in late 2024.

19. Department of Environment, Land, Water and Planning (DELWP) 2020, 'Victorian Government response to the state of the environment 2018 report', Melbourne, Victoria.

Junior Rangers activity, Point Cook Marine Sanctuary.
© Parks Victoria

Key findings

This section of the report provides an overview of critical findings from Part 2 – Scientific Assessments. Indicators in each of the nine themes have been evaluated within the state's marine and/or coastal environment as per the *Marine and Coastal Act 2018.* The Act defines the 'marine and coastal environment' as all private and public land and waters between the outer limit of Victorian coastal water and 5 km inland of the high-water mark of the sea, including:

a. The land (whether or not covered by water) to a depth of 200 metres below the surface of that land

b. Any water covering the land referred to in the sentence above (a) from time to time

c. The biodiversity associated with the land and water referred to in the above sentences (a and b).[20]

This definition of the marine and coastal environment also includes bays, inlets, estuaries and the Gippsland Lakes. The scales at which assessments are made vary by indicator depending upon the available data, and range from within individual biounits, catchment management regions or marine protected areas (MPAs) to across the state's marine and/or coastal environment (referred to as statewide (SW)).

Water quality and catchment inputs

Poor water quality in marine environments can adversely impact marine ecosystems and human recreational usage. Regular water quality monitoring occurs in Port Phillip Bay, Western Port and the Gippsland Lakes. The Water Quality Index (WQI) scores for:

- Port Phillip Bay have been rated as good or very good each year since monitoring and reporting began in 2001–02[21]
- Western Port have been rated as good for each year since monitoring and reporting began in 2000–01, except for 2017–18 (when water quality in Western Port was rated as fair)[22]
- the eastern Gippsland Lakes (Lake King and Lake Victoria) have been rated as good for eight of the past 10 years (with one year rated as fair and one as poor), while Lake Wellington has been rated as fair to very poor for each of the past 10 years.[23] Water quality has improved in the Gippsland Lakes during the past 15 years.

Water quality in the largely urbanised catchments that feed Port Phillip Bay and Western Port is generally poorer than the water quality in the Gippsland Lakes catchment. However, there is a general deterioration of water quality from the catchment to the Gippsland Lakes that contrasts with Port Phillip Bay and Western Port where water quality in these marine environments is considerably improved relative to the catchments. This is generally due to greater tidal flushing to dilute contaminants in Port Phillip Bay and Western Port than in the Gippsland Lakes.

The Environment Protection Authority Victoria (EPA Victoria) provides daily forecasts on the suitability of 36 Port Phillip Bay beaches for swimming and other recreational uses. Fewer beaches met long-term recreational water quality standards during the 2018–19 to 2022–23 reporting period than in previous reporting periods.[24] Increased rainfall is likely to have influenced the percentage of beaches failing to meet the long-term standards during this reporting period. Despite long-term standards often not being met, beaches are generally suitable for swimming during the summer season (outside of periods of rainfall), with most water quality samples meeting the short-term standards. The beaches that did not meet long-term standards still had water quality suitable for swimming on most days during summers.

The 2021 Index of Estuary Condition (IEC) assessed water quality as good or excellent in 54% of the state's estuaries.[25] The assessment rated water quality in 25% of the state's estuaries as poor or very poor. These estuaries were typically within catchments that were predominantly urban or agricultural. Overall, the Glenelg Hopkins, Corangamite and East Gippsland catchments were rated as good for estuarine water quality, while the Port Phillip and Westernport and West Gippsland catchments were both rated as fair.

20. Victoria State Government, *'Marine and Coastal Act 2018'*, Melbourne, Victoria.
21. EPA Victoria 2024, 'Report card 2022–23', Carlton, Victoria https://www.epa.vic.gov.au/about-epa/publications/annual-report-card-2022-2023 Accessed 18 June 2024.
22. EPA Victoria 2024, 'Report card 2022–23', Carlton, Victoria https://www.epa.vic.gov.au/about-epa/publications/annual-report-card-2022-2023 Accessed 18 June 2024.
23. EPA Victoria 2024, 'Report card 2022–23', Carlton, Victoria https://www.epa.vic.gov.au/about-epa/publications/annual-report-card-2022-2023 Accessed 18 June 2024.
24. EPA Victoria 2023, 'Beach Report and Yarra Watch Long Term Condition Report 2021–22', Carlton, Victoria https://www.epa.vic.gov.au/about-epa/publications/2056--beach-report-and-yarra-condition-report Accessed 14 May 2024.
25. Department of Environment, Land, Water and Planning (DELWP) 2021, 'Index of estuary condition', East Melbourne, Victoria.

The status of the toxicant indicator in Port Phillip Bay has been assessed as fair because the environmental condition is unlikely to be under significant widespread stress. However, there are cases of localised impacts, most notably:

- Organic contaminant accumulation in mussels from four locations in Port Phillip Bay is a serious food safety concern.[26]
- Dolphins in Port Phillip Bay and the Gippsland Lakes were found to contain the highest concentrations of per- and polyfluoroalkyl substances (PFAS) chemicals of dolphins reported anywhere in the world, according to research from 2023.[27, 28]

Stormwater condition is assessed annually in report cards as part of the Healthy Waterways Strategy. There are very strong regional differences for stormwater impacts across Port Phillip Bay's catchments.[29] For example, stream health is being severely impacted by stormwater in the highly urbanised Dandenong catchment, while only minor impacts to stream health in Western Port are occurring from stormwater.[30] Impacts to stream health from stormwater are primarily driven by the area of impervious surfaces (such as roofs, roads and pavements) and rainfall.

Reducing total nutrient and sediment loads to coastal waterways remains a key objective of many integrated catchment planning efforts across Victoria, with the Environment Reference Standard (ERS) containing several marine nutrient and total suspended solids load objectives.[31] The Port Phillip Bay Environmental Management Plan 2017–2027 also contains a target that nutrient and sediment loads do not exceed the 2017 levels in Port Phillip Bay.[32] However, performance of marine pollutant loads with objectives in the ERS is not routinely assessed for Port Phillip Bay and Western Port, and has never been completed for the Corner Inlet-Nooramunga biounit complex and the Gippsland Lakes, which is particularly concerning for Lake Wellington considering its water quality assessments.

A catchment model, maintained by Melbourne Water and the Victorian Department of Energy, Environment and Climate Action (DEECA), provides estimates of nutrients and sediment loads at the major river outlets to Port Phillip Bay and Western Port.[33] This model was used to inform the SMCE 2021 Report and used again to provided updated data to the Commissioner for the SMCE 2024 Report. The long-term average for Port Phillip Bay (2000–2023) indicates that nitrogen and sediment loads were within ERS objectives. However, the 2019–2023 period experienced particularly high rainfall, with above-average rainfall occurring over three consecutive years (2020–2022). This pattern of higher rainfall has driven recent increases in nitrogen and sediment loads to the Bay, with the lower bound of the ERS being exceeded during three of the past five years. Similarly for Western Port, the higher rainfall pattern has increased sediment loads from the catchment, with the ERS objective being exceeded twice during the last five years.

The largest wastewater discharge in Victoria comes from Melbourne Water's Western Treatment Plant (WTP) located at Werribee.[34] The WTP and Eastern Treatment Plant (ETP) are responsible for emitting the two largest nutrient loads in Australia.[35] The ERS includes annual objectives for pollutant loads to Port Phillip Bay from the WTP (3,100 tonnes based on a rolling 3-year average). In the 2022–23 Annual Report, Melbourne Water stated that Melbourne Water's 3-year rolling average nitrogen discharge was recorded at 3,553 tonnes as of June 2023. Melbourne Water is implementing capital works to reduce nitrogen loads discharged from the WTP over the next decade.[36]

There is limited quantitative analysis available to understand the extent to which regulated discharges impact the receiving marine environments. Nutrient loads from the WTP (52%) and ETP (36%) were responsible for 88% of the nutrient loads from Victorian coastal outfalls in 2020–21. This highlights the relative scale of these outfalls.

26. Shen H, Nzabanita D, Foord C, Grist S, Nugegoda D 2023, 'Environmental organic contaminant body burdens and GC-MS based untargeted metabolomics in mediterranean mussels from Port Phillip Bay, Australia', *Environmental Pollution*, 335, 122245, doi: 10.1016/j.envpol.2023.122245. Epub 2023 Jul 22. PMID: 37487873.
27. RMIT University 2023, 'Critically endangered Victorian dolphins suffering highest known levels of toxic pollutants' https://www.rmit.edu.au/news/all-news/2023/nov/victorian-dolphins-pfas Accessed 26 April 2024.
28. Foord CS, Szabo D, Robb K, Clarke BO, Nugegoda D 2024, 'Hepatic concentrations of per- and polyfluoroalkyl substances (PFAS) in dolphins from south-east Australia: Highest reported globally', *Science of the Total Environment*, 908, 168438, doi: 10.1016/j.scitotenv.2023.168438. Epub 2023 Nov 12. PMID: 37963535.
29. Melbourne Water, 'Waterways report card', https://healthywaterways.com.au/report-card?suId=PPW&tabId=river& Accessed 15 May 2024.
30. Melbourne Water, 'Waterways report card', https://healthywaterways.com.au/report-card?suId=PPW&tabId=river& Accessed 15 May 2024.
31. State Government of Victoria 2021, 'Environment Reference Standard *(Environment Protection Act 2017)*'.
32. Department of Environment, Land, Water and Planning (DELWP) 2017, 'Port Phillip Bay environmental management plan 2017–2027', East Melbourne, Victoria.
33. Melbourne Water (unpublished report) 2024, 'Port Phillip Bay and Westernport — Catchment nutrient and sediment annual loads reporting 2023'.
34. Victorian Environmental Assessment Council (VEAC) 2019, 'Assessment of the values of Victoria's marine environment', Melbourne, Victoria.
35. Rohmana QA, Fischer A, 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.
36. Melbourne Water Corporation 2023, 'Melbourne Water Annual Report 2022–23', https://www.melbournewater.com.au/media/22581/download Accessed 3 May 2024.

The coastal areas surrounding the Gippsland Lakes have a larger area of potential coastal acid sulfate soil than the potential area along the Port Phillip Bay, Western Port and Corner Inlet-Nooramunga coastlines combined. The significant likelihood of increased coastal acid sulfate soil exposure is compounded by the coupling of potential coastal acid sulfate soil in the Gippsland Lakes with the significant erosion and coastal inundation risks for the Gippsland Lakes.[37]



Wilsons Promontory Marine National Park. © Parks Victoria

37. Department of Jobs, Skills, Industry and Regions, 'Coastal Acid Sulfate Soils' https://discover.data.vic.gov.au/dataset/coastal-acid-sulphate-soils Accessed 30 January 2024.

Litter and pollution

Multiple sources indicate an overall increase in the amount of marine and coastal litter since 2018–19. Plastics were the dominant litter type while fishing gear — the litter type known to pose the most significant threat to wildlife due to entanglements — has also been on the rise.

The litter and plastics indicator was evaluated by applying the litter thresholds established under the Port Phillip Bay EMP.[38] The status of litter within the state's coastal environment was assessed as fair (Litter Index threshold of 2–100 items per 200 m^2) with a deteriorating trend due to increasing litter densities.[39] Litter categories relating to consumption, including plastic packaging, along with cigarette butts and plastic fragments contributed the most to litter counts.[40] Fishing gear, although not a dominant litter type, poses a welfare issue for marine biota from entanglements and was found to be on the rise.

Within Port Phillip Bay, the 2022–23 Litter Index results under the Port Phillip Bay EMP showed the status for litter as poor (Litter Index threshold of 100–200 items per 200 m^2), with plastics constituting the majority of the litter.[41] This represents a slight improvement from a very poor status in 2021–22.

Research has found adverse biodiversity and socioeconomic effects associated with light pollution at locations along Victoria's coastline. This has led to a status assessment of poor for the light pollution indicator. There has been a 6% total increase in night-time light emissions across Victoria's coastal regions from 2014 to 2021 and this is the basis for a deteriorating trend.[42] In the SMCE 2021 Report there was insufficient evidence to provide a status or trend assessment.

Research has also found adverse biodiversity effects associated with marine noise at locations along Victoria's coastline.

There are several sites on land within 5 km of the Victorian coastline that are known to be contaminated or are the locations of current activity involving a relatively high risk of contamination. Most of these sites are located near Port Phillip Bay, as reflected by a status assessment of fair for that region for the contaminated land indicator. The risk of contaminated land is lower in other coastal regions, where the status has been rated as good. These status assessments are consistent with the assessments made in the SMCE 2021 Report for this indicator.

Even though the data quality on the locations of contaminated and potentially contaminated land is good, knowledge of the impacts of contaminated land on coastal settlements is constantly evolving. This reduces the confidence in the status assessments.

At most coastal locations where air quality is monitored in Victoria, there are few or no breaches of air quality standards each year. The exceptions to this are years when there are significant bushfire effects or where coastal locations are near industrial activity. This information has been balanced to a status assessment of fair. A statewide assessment has been preferred in this report rather than the regional assessments that were made in the SMCE 2021 Report. This is due to bushfire smoke impacts being spatially variable in Victoria's coastal regions over the years and regional trends fluctuating significantly. A statewide assessment provides greater understanding of the overall status and trend of impacts. The trend is stable as there has been no significant change in the number of days exceeding air quality standards during the past decade.

EPA Victoria has recently expanded its air quality monitoring to incorporate more coastal locations, however insufficient data (i.e. less than 75% data capture in each quarter of a year) were collected to demonstrate compliance with the air quality objectives in the ERS for several pollutants across a recent 5-year period (2018–2022) at most coastal monitoring locations.

38. DEECA, 'Port Phillip Bay EMP: Methodology' https://www.marineandcoasts.vic.gov.au/port-phillip-bay-emp/litter/methodology 20 May 2024.
39. Sustainable 2023, 'Victorian litter audits: Benchmarks using AusLM 2022', A report to the Department of Energy, Environment and Climate Action (DEECA), Melbourne, Victoria.
40. Sustainable 2023, 'Victorian litter audits: Benchmarks using AusLM 2022', A report to the Department of Energy, Environment and Climate Action (DEECA), Melbourne, Victoria.
41. Department of Energy, Environment and Climate Action (DEECA), 'Port Phillip Bay EMP: Litter' https://www.marineandcoasts.vic.gov.au/port-phillip-bay-emp/litter Accessed 10 July 2024.
42. Jurij Stare, 'Light pollution map' https://www.lightpollutionmap.info/ Accessed 19 May 2021.

Biodiversity

Coastal and marine ecosystems

Coastal ecosystems in Victoria have experienced a long history of land clearing and altered water regimes, along with associated environmental damage that has induced a dramatic shift in Ecological Vegetation Class (EVC) composition and condition. Coastal ecosystems are considered to be in fair condition because approximately 62% of coastal native vegetation extent has been lost as of 2005 (most recent statewide data), with 16 EVCs no longer occurring in this region and nearly half occurring in a modified or degraded state.

Nearly 60% of coastal EVCs are afforded protection within the state's network of protected areas and a further 3% of vegetated private land is protected through conservation covenants. However, only a relatively small proportion of the extent of endangered EVCs occurs within areas having some form of protection, therefore these are vulnerable to further impacts from human activities. The proportion of coastal ecosystems currently occurring within this network is unclear as contemporary EVC mapping at a statewide scale is lacking. This information is critical for assessing the potential changes in EVC extent and condition within protected areas and for identifying endangered EVCs lacking representation within the state's protected area network.

Among the significant ecological communities within Victoria's coastal environment are coastal saltmarshes, mangroves and seagrass beds (see 'Seafloor health and integrity' section below). These are referred to as blue carbon ecosystems, playing a key role in carbon sequestration which affords a natural climate solution for addressing elevated CO_2 levels in the atmosphere.[43] These systems also provide critical habitat and prey resources for numerous marine and coastal wildlife species. Losses of blue carbon communities therefore reduce the delivery of the ecosystem services they provide and can result in flow-on effects for biodiversity.

Blue carbon ecosystems in Victoria have also been subject to the impacts of human activities. Over the last three decades, some of Victoria's catchments have been extensively modified, leading to contractions in the overall extent and degradation in condition, although to varying extents across these systems.

Coastal saltmarshes and mangroves, in contrast, have experienced relatively fewer losses of historical extent overall, resulting in these having a good and fair status at the state scale, respectively. Currently, coastal saltmarshes cover an estimated 26,935 hectares of Victoria's coastal environment and approximately 5,196 hectares are covered by mangrove communities, with most of these ecosystems occurring within protected areas. However, changes in the cover of coastal saltmarshes and mangroves have not been uniform across the state. Some coastal regions suffered enormous losses while others have retained most, if not all, of their historical extent, while in some regions, mangroves have even experienced an expansion in extent through landward transgression into saltmarsh. Port Phillip Bay and Corner Inlet are among the regions suffering the greatest losses of coastal saltmarshes.

Despite the extent of coastal saltmarsh and mangroves having remained relatively unchanged, the outlook for blue carbon ecosystems is, however, deteriorating as these continue to be threatened by widespread degrading processes that are further exacerbated by climate change impacts, particularly sea level rise and increasing storm surges. Barriers to tidal exchange, limited sediment availability and poor ecosystem health reduce their capacity to respond to habitat losses through lateral migration, posing a significant future risk.

Marine- and coastal-dependent species of conservation value

The marine environment is undergoing severe and rapid changes as a result of human activities and human-induced climate change. Marine waters are becoming increasingly polluted, warmer and more acidic, while development, altered hydrological regimes invasive species, over-harvesting and other

43. Costa MD, Wartman M, Macreadie PI, Ferns LW, Holden RL, Ierodiaconou D, MacDonald KJ, Mazor TK, Morris R, Nicholson E, Pomeroy A 2024, 'Spatially explicit ecosystem accounts for coastal wetland restoration', *Ecosystem Services*, 65, 101574.

fisheries interactions are placing marine biota at risk of extinction.[44, 45] As south-eastern Australia is both a hotspot for climate change and endemism, marine species in this region are at particular risk.

Enacting legislation that is designed to protect threatened species and prevent further extinctions is a key action for species-specific conservation. However, as the conservation status assessment criteria employed for listing species requires considerable data, the deficient state of knowledge for marine- and coastal-dependent species hinders the identification of species that are at risk of extinction leading to this group being under-represented under protective legislation.

In Victoria, the *Flora and Fauna Guarantee Act 1988* (FFG Act) establishes a legislative structure to enable and promote the conservation of the state's native flora and fauna while also ensuring more species do not become threatened. Tools such as action statements and the Genetic Risk Index have also been developed to improve outcomes for the state's threatened species within the state's framework for conserving threatened species.

Data deficiency and the under-representation of many marine- and coastal-dependent species within protective legislation are well demonstrated by their low representation under the FFG Act. A total of 88 of the 2,004 listed species under the FFG Act are marine- and coastal-dependent species. This number of FFG Act-listed marine and coastal-dependent species likely does not adequately reflect all species within this group requiring protection. Data gaps also hindered some threatened marine- and coastal-dependent species having their genetic risk evaluated and likely also contribute to a lack of action statements being developed for this group.

Invertebrates

Marine invertebrates comprise the major proportion of all marine biodiversity and serve as keystone species in that these are integral to the structure, health and functioning of marine ecosystems. Despite growing research on marine invertebrates, there are still significant gaps in knowledge of their ecological characteristics and threats. The loss of these ecosystem engineers, which sustain stable ecosystem balance, has been proposed to lead to widespread biodiversity loss and possibly even ecosystem collapse. Increasing networks of MPAs has been proposed as being vital for ensuring the long-term conservation of sessile invertebrates.

The condition and trend of sessile and mobile invertebrates within Victoria's intertidal zone is unclear as contemporary data are lacking. Evaluating intertidal macroalgal communities is currently not a monitoring priority under the Parks Victoria's Signs of Healthy Parks (SHP) long-term monitoring program.

Subtidal invertebrates are, however, monitored under the Port Phillip Bay EMP and Parks Victoria's SHP. These programs showed that the status of subtidal invertebrates is largely fair with the abundance of most key species remaining similar across survey years. The abundance of the short-spined sea urchin — an endemic species that is a natural component of healthy macroalgae communities but has the potential for creating urchin barrens at high densities (>8 urchins m^2) through intense herbivory (plant consumption) — has remained low within the MPAs in which these occur. However, within Port Phillip Bay, particularly within the northern regions of the bay, this urchin species has a poor status with a deteriorating trend due to densities exceeding the threshold at which herbivory levels inhibit macroalgae recovery.

Resident and migratory shorebirds and seabirds

Seabirds and three guilds of shorebirds are evaluated under the SMCE 2024 Report — resident, migratory and piscivorous species (fish eaters) — due to different threatening processes operating on each of these groups.

Resident marine and coastal shorebirds nesting on Victoria's beaches are confronted with high levels of disturbance from human activities and vulnerable to predation by introduced species that have led to declines in reproductive rates and overall population declines in some species. Breeding success is also reduced by extreme weather events that are expected to increase in frequency and

44. Sorte CJ, Davidson VE, Franklin MC, Benes KM, Doellman MM, Etter RJ, Hannigan RE, Lubchenco J, Menge BA 2017, 'Long-term declines in an intertidal foundation species parallel shifts in community composition', *Global Change Biology*, 23(1), pp. 341–352.
45. Davidson AD, Boyer AG, Kim H, Pompa-Mansilla S, Hamilton MJ, Costa DP, Ceballos G, Brown JH 2012, 'Drivers and hotspots of extinction risk in marine mammals', *Proceedings of the National Academy of Sciences*, 109(9), pp. 3395–3400.

intensity with climate change. In recent surveys, the abundances of hooded plovers and Australian fairy terns across the state were found to have increased and remained stable respectively but breeding and hatching success were lower than in the previous surveys resulting in an overall poor status and deteriorating trend for both species. Similar patterns of decline for the hooded plover have been observed within some of the state's coastal Ramsar sites. The status for coastal Ramsar sites in meeting the established limits of acceptable change (LAC) for abundance and breeding ranged from poor to good and trends were variable, although the abundance and breeding of coastal waterbirds was not found to be improving in any of the coastal Ramsar sites.

Migratory shorebirds undergo annual long-distance migrations that are energetically demanding. Therefore, shifts in habitat condition and prey availability within these staging areas can impact on abundance, reproductive output and ultimately survival. Several migratory shorebirds in Victoria have undergone strong declines throughout the 1990s and the early 2000s — consistent with the wider flyway patterns. This trend continued into the 2010s, albeit at a reduced rate. The overall abundance and diversity of migratory shorebirds within coastal areas in the state were effectively stable between 2013 and 2023. However, as LACs associated with migratory shorebird abundance and threatened migratory shorebird species have not been fully met for most of the state's coastal Ramsar sites, the overall status is assessed as fair. A combination of factors operating at multiple stages of the annual migration cycle is likely contributing to the changes in the state's abundance of migratory shorebirds, although information regarding drivers operating within Victoria is limited.

Piscivores are particularly sensitive to shifts in prey availability because of their specialised feeding strategy, where even small changes in fish resources have the potential to impact population levels. This group's foraging strategy also increases their vulnerability to entanglements with marine debris. However, little is known about the extent and magnitude of impacts that entanglements with fishing gear and other marine debris have on these species. In Victoria, the status of coastal and marine piscivorous bird species is assessed as fair to good as LACs have been met. However, the abundance and reproductive output have been declining for most Ramsar sites resulting in a largely deteriorating trend for this waterbird guild.

Victoria has 33 colonies of the iconic little penguin, each varying in size and condition of population. Some larger colonies have increased in abundance while declines have occurred in other colonies that, overall, suggests statewide stability. A fair status reflects the increasing threat of the impacts of climate change, fisheries and vessel interactions, and contamination, which have the potential for direct mortality and reduced prey resources, potentially leading to declines in survival and breeding success.

Reef fish

Reef fish play an important role in ecosystem function through herbivory, predation and as prey resources. Across the state's marine national parks monitored under the SHP program, reef fish are generally in a fair condition and their abundances remain stable. For the state's species of diadromous fish (that migrate between freshwater and saltwater environments), long-term monitoring between 2000 and 2023 revealed their status to be fair and abundance improving following declines throughout 2000 to 2010 (the Millennium Drought).

Economically-important marine fish and invertebrates

Several commercially and recreationally important invertebrate and fish stocks were classified as recovering, depleting or depleted in the Status of Australian Fish Stocks 2023 Report.[46, 47] These stocks were assessed as having a poor status for their respective sub-indicators in this report and include:

- Blacklip abalone (Indicator 23b) was classified as depleting for the Victoria Central Zone Fishery and Victorian Eastern Zone Fishery. In early 2021, there was optimism about the state of the western zone stocks and their ongoing recovery. However, this perspective changed in May 2021 when abalone viral ganglioneuritis (AVG) was again observed impacting abalone stocks at Cape Nelson, near Portland.
- Giant crab (Indicator 23e) was classified as depleted for the Victorian Giant Crab Fishery. This was based on a re-evaluation of catch per unit of effort (CPUE) data over the last eight years that revealed CPUE was lower than previously thought.
- Commercial scallop (Indicator 23f) was classified as depleted for the Victorian Ocean Scallop Fishery. There was a significant drop in the biomass available to the Victorian Ocean Scallop Fishery during the 2023 pre-season. There were also no signs of new recruitment or developing beds elsewhere in the fishery.
- Southern sand flathead (Indicator 23c) was classified as recovering in Port Phillip Bay. Continued relatively low recruitment means the stock will remain stable but at a depleted level well below the long-term reference period average.
- Black bream (Indicator 24d) was classified as recovering in the Gippsland Lakes. Recreational fishery CPUE has recently been increasing and is now slightly below the long-term reference period average. Stronger juvenile recruitment in recent years and the removal of commercial fishing pressure is expected to continue to drive stock recovery over the next five years.

All other commercially and recreationally important invertebrate and fish stocks have been assessed as having a good or fair status in this report, with the exception of greenlip abalone and dusky flathead. There was insufficient information to determine the status of those two stocks.

Marine mammals

Thirty-six marine mammals either reside in Victorian state waters or temporarily utilise these areas for feeding or calving during annual migration. With only a fraction of their historical populations remaining following an era of over-harvesting, the recovery and long-term persistence of many marine mammals are still challenged by ongoing and emerging threats, including climate change, fisheries interactions, coastal and offshore development, and marine pollution.

Logans Beach represents the only established calving and nursery ground of the genetically distinct south-eastern population of southern right whales. The status for this population has been assessed as poor as its size is currently much smaller than its pre-harvest levels. Furthermore, given the low reproductive rate and high site fidelity to the single calving ground (Logans Beach) for these whales; the small population is especially vulnerable to the impacts of climate change and anthropogenic threats, such as entanglements with fishing gear that have been on the rise.[48] An improving trend reflects signs of recovery since the cessation of the whaling industry, although the increase in population size is occurring at a slower rate than the south-western population.

46. Fisheries Research and Development Corporation (FRDC), '2023 SAFS Reports' https://fish.gov.au/reports/past-reports/2023-SAFS-Reports Accessed 9 October 2024.
47. From Fisheries Research and Development Corporation (FRDC), 'Glossary' https://www.fish.gov.au/about/glossary Accessed 4 June 2024, The SAFS classifications for recovering, depleting and depleted are defined as:
    - Recovering – Biomass is depleted and recruitment is impaired, but management measures are in place to promote stock recovery and there is evidence that recovery is occurring.
    - Depleting – Biomass is not yet depleted and recruitment is not yet impaired, but fishing pressure is too high (overfishing is occurring) and pressuring the stock in the direction of becoming recruitment impaired.
    - Depleted – Spawning stock biomass that has been reduced through catch and/or non-fishing effects, for average recruitment levels to be significantly reduced (recruitment is impaired). Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable improvements.
48. Stamation K, Watson M 2022, 'Supporting the recovery of the Southern Right Whale in eastern Australia: recommendations for threat mitigation, research and stakeholder engagement', Arthur Rylah Institute for Environmental Research (ARI) Technical Report Series No. 362, Department of Energy, Environment and Climate Action (DEECA), Heidelberg, Victoria.

Like whales, Australian fur seals have suffered a long history of over-exploitation in the state that drove some populations to the brink of extinction. Following a period of strong recovery, overall growth rates slowed and ultimately declined between 2013 to 2023. This deteriorating trend is attributed to exposure to anthropogenic threats — the greatest threat to fur seals — and has been particularly prominent among some of the state's larger fur seal populations (e.g. Seal Rocks) that are important for the species due to their high productivity.[49] Sea level rise, storm surges and entanglement in marine plastic, including recreational fishing line, impact on pup survival through drowning or density pressures, while health and reproductive output are impacted by disease, changes in food webs, interactions with fisheries and toxicants, such as the extreme contamination levels of PFAS detected among the Seal Rocks colony. Victoria's fur seal population appears to be stabilising at a new, lower-level baseline representing only 30% to 50% of the historic population size, thereby introducing a challenge for the management and conservation of the species.[50, 51]

The bottlenose dolphin, Burrunan dolphin and short-beaked common dolphin (also referred to simply as the common dolphin) regularly occur within the Victoria's marine environment. A great deal of the information available for this report focused on the Burrunan and short-beaked common dolphin. These species are assessed as poor as their proximity to major human centres and small population sizes make them vulnerable to environmental change and human impacts, where the loss of even a few individuals can have profound consequences for the population's health and long-term persistence.[52] Contaminants are of particular concern for these top-order predators, where recent research has found PFAS concentrations among the Port Phillip Bay and Gippsland Lakes Burrunan dolphin populations that not only exceeded levels believed to cause liver toxicity and a suite of health implications but are the highest levels globally.[53] The lethal freshwater skin disease has also been documented as a key threat among Gippsland Lakes dolphins, with the level of presentation likely increasing with climate change. Fortunately, some populations of dolphins utilise areas within and around MPAs that affords a refuge against anthropogenic threats, although other core areas currently remain unprotected. Expansion of the MPA network that includes areas of high use is considered important for their long-term persistence. Despite much valuable information being available regarding threats, limited time-series data means that the trend for dolphin populations in Victoria is largely unclear.

Seafloor health and integrity

Conservation of marine ecosystems

MPAs are a necessary tool for preserving biodiversity and the integrity of the marine environment. Victoria established its network of MPAs in 2002 that contribute to the National Representative System of Marine Protected Areas and, in turn, helps Australia meet international obligations. These networks incorporate the broad requirement for the criteria of comprehensiveness, adequacy and representativeness. More recently, Australian commitments for achieving Target 3 under the Kunming Montreal Global Biodiversity Framework (GBF) 2030 established additional criteria where at least 30% of coastal marine areas are to be protected and effectively conserved through ecologically representativeness and connectivity by 2030, particularly those areas important for biodiversity.

Victoria's MPA network covers approximately 12% of state waters and has remained unchanged since its establishment. Counter to previous investigations that found gaps in representation, more recent analyses based on new habitat mapping data showed that habitat complexes are generally well represented within MPAs, although rare and sediment habitats are not well captured and study authors indicated that more extensive mapping

49. McIntosh RR, Sorrell KJ, Thalmann S, Mitchell T, Gray R, Schnagl H, Arnould JPY, Dann P, Kirkwood R 2022, 'Sustained reduction in numbers of Australian fur seal pups: implications for future population monitoring', *PLOS ONE*, 17, e0265610.
50. McIntosh RR, Sorrell KJ, Thalmann S, Mitchell T, Gray R, Schnagl H, Arnould JPY, Dann P, Kirkwood R 2022, 'Sustained reduction in numbers of Australian fur seal pups: implications for future population monitoring', *PLOS ONE*, 17, e0265610.
51. Geeson JJ, Hindell MA, Hobday AJ, Speakman CN, Arnould JP 2023, 'Long-term decline in body condition of female Australian fur seals: potential causes and implications', *Frontiers in Marine Science*, 10, 1231337.
52. Charlton-Robb K, Taylor AC, McKechnie SW 2015, 'Population genetic structure of the Burrunan dolphin *(Tursiops australis)* in coastal waters of south-eastern Australia: conservation implications', *Conservation Genetics*, DOI 10.1007/s10592-014-0652-6.
53. Foord CS, Szabo D, Robb K, Clarke BO, Nugegoda D 2024, 'Hepatic concentrations of per- and polyfluoroalkyl substances (PFAS) in dolphins from south-east Australia: Highest reported globally', *Science of the Total Environment*, 908, 168438.

data and spatial data at lower hierarchal levels (i.e. biotopes) would support a more comprehensive assessment of representativeness of marine habitats. Preliminary investigations also revealed that 27% of the most valuable sites for biodiversity and 40% of irreplaceable biotope records are represented within Victoria's existing MPA network. MPAs were also found to be generally well-connected. However, the required contribution by Victoria towards the quantitative and qualitative provisions of the international GBF Target 3 is unclear.

Nitrogen cycle

Nitrogen is essential for maintaining the health and viability of marine ecosystems, providing the fuel needed for productivity. The availability of usable forms of nitrogen is often naturally limited therefore nitrogen is transformed from one form to another through various processes such as denitrification.[54] How efficiently this transformation process is carried out is referred to as denitrification efficiency (DE). In a well-balanced and healthy system, DE is suitably high to promote both the net removal of nitrogen and well-oxygenation waters. Human activities, such as agricultural runoff, urbanisation and wastewater discharges, have greatly increased nitrogen inputs, impacting the global nitrogen cycle. These inputs can lead to an excess influx of nitrogen into the system, which has the potential to cause eutrophic responses in the form of toxic algal blooms, excessive growth of undesirable or nuisance algae, or excessive phytoplankton blooms.

In Port Phillip Bay, catchment runoff and wastewater discharges, particularly from the Yarra River and WTP, are the primary nitrogen inputs. The 1997 Port Phillip Bay Environmental Study and the historical Nutrient Cycling Monitoring Program (2002–2017) concluded that there were no signals of eutrophication in the bay and that DE had not declined below the thresholds, suggesting that the nutrient balance in the bay had been maintained. Preliminary findings under the Port Phillip Bay Seafloor Integrity Project (2022–2025), however, have detected signals of eutrophication within the bay. Furthermore, the 2022–23 results of DEECA's Eutrophication Index indicated a moderate risk of eutrophication. Based on these collective results, the status is assessed as poor with a deteriorating trend.

Intertidal and subtidal ecosystems

Australia's southern coastline is unique in having among the highest global macroalgae diversity and endemism.[55] Intertidal and macroalgae communities play a critical role as ecosystem engineers within the marine environment by creating structurally complex forests that promote high species diversity and abundance and sustaining the health, function and stability of marine systems.[56, 57] However, climate change impacts are posing a severe risk to the long-term persistence of macroalgae, with those within Victoria being at particular risk as this region is recognised as an ocean-warming hotspot. Rising ocean temperatures, altered ocean currents, and increased frequency and intensity of marine heat waves and storms affect macroalgae cover directly through physiological and physical stress, reduced recolonisation capacity, and mortality, and indirectly through modifications of biotic interactions — a strong determinant of kelp distribution and abundance.[58] Warming temperatures have been linked to the range expansion and proliferation of native urchin herbivores, and the rate at which they feed upon their kelp food resources.[59, 60] The loss of foundational macroalgae, that exert a strong bottom-up influence in shaping intertidal communities, is likely to lead to severe declines of associated species and ecological function.[61]

The status and trend of macroalgae within Victoria's intertidal zone is unknown and unclear, respectively, as evaluating macroalgal communities within this marine zone is currently a monitoring priority for only two of the five marine national parks under the

54. Denitrification is the bacterial or other microbial process in which nitrates and nitrites are reduced or removed from a system.
55. Layton C, Coleman MA, Marzinelli EM, Steinberg PD, Swearer SE, Vergés A, Wernberg T, Johnson CR 2020, 'Kelp forest restoration in Australia', *Frontiers in Marine Science*, 7, p. 74.
56. Harley CD 2006, 'Effects of physical ecosystem engineering and herbivory on intertidal community structure', *Marine Ecology Progress Series*, 317, pp. 29–39.
57. Pocklington JB, Keough MJ, O'Hara TD, Bellgrove A 2019, 'The influence of canopy cover on the ecological function of a key autogenic ecosystem engineer', *Diversity*, 11(5), p. 79.
58. Davis TR, Champion C, Coleman MA 2022, 'Ecological interactions mediate projected loss of kelp biomass under climate change', *Diversity and Distributions*, 28(2), pp. 306–317.
59. Davis TR, Champion C, Coleman MA 2022, 'Ecological interactions mediate projected loss of kelp biomass under climate change', *Diversity and Distributions*, 28(2), pp. 306–317.
60. Young MA, Critchell K, Miller AD, Treml EA, Sams M, Carvalho R, Ierodiaconou D 2023, 'Mapping the impacts of multiple stressors on the decline in kelps along the coast of Victoria, Australia', *Diversity and Distributions*, 29(1), pp. 199–220.
61. Campbell AH, Kendrick GA, Russell BD, Steinberg P 2009, 'Macroalgae and temperate rocky reefs'.

Parks Victoria SHP long-term monitoring program. From the available data, the status of intertidal macroalgae within Point Addis Marine National Park and Port Phillip Heads Marine National Park is considered good due to the percent cover being above the lower LAC. However, unlike Port Phillip Heads Marine National Park, intertidal macroalgae cover within Point Addis Marine National Park has declined overall since 2005 and in the most recent survey year (2019). There is uncertainty as to whether the reduction in cover observed within Point Addis Marine National Park is limited to only within the park boundaries or is instead a broader pattern as data are lacking.

Unlike within the intertidal zone, subtidal macroalgae has received a greater level of monitoring and research focus. The status at the statewide scale is poor based on a recent investigation demonstrating that the cover has undergone severe declines across the Victorian coastline from 1998 to 2018. Cover is predicted to continue declining in response to projected increases in impacts from climate change and densities of the over-abundant native short-spined sea urchin. This pattern of a poor status and deteriorating trend is consistent in Port Phillip Bay because of the continued decline in golden kelp cover and increasing urchin densities. However, within the state's marine national parks, the status of subtidal macroalgae ranges from fair to good. Some parks exhibit improving trends due to increases in percent cover of canopy-forming macroalgae while for others the cover has declined to below lower control limits. As the short-spined sea urchin is generally not present within monitored marine national parks but does occur in low numbers within Port Phillip Heads and Cape Howe, factors other than grazing pressure may be driving changes in subtidal macroalgae cover in these MPAs.

Seagrass beds are among the most impacted of the blue carbon ecosystems in Victoria, particularly in bay areas, which is reflected by a poor status.[62] The key drivers of fluctuations and losses are primarily due to modifications in nutrient and sediment inputs from surrounding catchments as these are the most influential factors determining seagrass dynamics.[63, 64, 65] Recent investigations revealed that nearly 14,000 hectares of seagrass beds in the state collapsed more than 10 years ago while, of the remaining 49,661 hectares of seagrass beds, those that had their condition evaluated were largely in a moderately disturbed state.[66, 67]

Shellfish reefs are complex, three-dimensional living structures that provide food, shelter and refuge for a range of marine species and also serve as natural solutions to the impacts of climate change. Currently, with more than 95% of all shellfish reefs lost from estuarine and coastal waters since European colonisation, this habitat is classified as functionally extinct in Victoria.[68] Only a limited number of degraded oyster reefs remain, while mussels are primarily restricted to small areas of shallow rocky reefs and artificial structures where the only known beds or reefs occur at only a few locations, primarily within Gippsland Lakes.[69] Despite the significant losses in extent and a lack of natural recovery that has resulted in an overall poor status assessment, recent reef restoration initiatives in Port Phillip Bay and Gippsland Lakes that have proven successful in terms of natural recruitment of shellfish and restored ecological function (e.g. supporting biodiversity) has led to an improving trend.

62. Mazor T, Watermeyer K, Costa M, Carnell P, MacDonald K, Holden R, Grinter V, Hobley T, Ferns L 2023, 'Mapping Victoria's blue carbon: Opportunities for coastal habitat restoration and climate change mitigation', the State of Victoria, Department of Energy, Environment and Climate Action (DEECA), Melbourne, Victoria.
63. Wilkinson SN, Anstee JM, Joehnk KD, Karim F, Lorenz Z, Glover M, Coleman R 2016, 'Western Port sediment supply, seagrass interactions and remote sensing', Report to Melbourne Water, CSIRO, Australia.
64. Jenkins G, Keough M, Ball D, Cook P, Ferguson A, Gay J, Hirst A, Lee R, Longmore A, Macreadie P, Nayar S, Sherman C, Smith T, Ross D, York P 2015, 'Seagrass resilience in Port Phillip Bay', final report to the seagrass and reefs program for Port Phillip Bay, University of Melbourne, Melbourne.
65. Dalby O, Pucino N, Tan YM, Jackson EL, Macreadie PI, Coleman RA, Young MA, Ierodiaconou D, Sherman CD 2023, 'Identifying spatio-temporal trends in seagrass meadows to inform future restoration', *Restoration Ecology,* 31(3), e13787.
66. Costa MDP, Wartman M, Macreadie PI, Ierodiaconou D, Morris R, Nicholson E, Pomeroy A, Young M, Carnell P 2022, 'Mapping the benefits and costs of management actions for coastal wetlands in Victoria. Report submitted to the Department of Environment, Land, Water and Planning (DELWP), Deakin University, Australia.
67. Mazor T, Watermeyer K, Costa M, Carnell P, MacDonald K, Holden R, Grinter V, Hobley T, Ferns L 2023, 'Mapping Victoria's blue carbon: Opportunities for coastal habitat restoration and climate change mitigation', the State of Victoria, Department of Energy, Environment and Climate Action (DEECA), Melbourne, Victoria.
68. Ford J, Hamer P 2016, 'The forgotten shellfish reefs of coastal Victoria: documenting the loss of marine ecosystem over 200 years since European settlement', *Proceedings of the Royal Society of Victoria*, 128, pp. 87–105.
69. Ford J, Hamer P 2016, 'The forgotten shellfish reefs of coastal Victoria: documenting the loss of marine ecosystem over 200 years since European settlement', *Proceedings of the Royal Society of Victoria,* 128, pp. 87–105.

Pests and invasive species

Invasive species are a threat to Victoria's biodiversity as they can outcompete and predate on native species, disrupt ecological processes and alter the genetic composition of native plant populations. At a statewide scale, the status of coastal invasive plant and animal species is considered fair. Although no time-series data are available to allow trend analyses, several invasive species control programs are currently underway in many of the state's coastal regions with preliminary findings indicating positive responses to control treatments.

The status of marine invasive species is poor due to most regional ports having the presence of invasive marine species and more than half of these species being in high abundance. Five of the six invasive species of concern in the state were also detected within commercial ports. With no new incursions of high-risk invasive marine species having been detected within regional and commercial ports since the marine surveillance program was established in 2021, the trend is improving.

Climate and climate change impacts

This theme includes assessments of how Victoria's climate is changing and the associated impacts of those changes. None of the 'Climate and Climate Change Impacts' indicators in this report were assessed as having a good status, and deteriorating trends were observed for all indicators where the trend was known.

Sea levels have been rising along Victoria's coastline. A comparison has been made between mean sea levels in the 1990s and the 2010s — these are the only two decades where sufficient data was captured at all monitoring locations in Victoria. Considering these decades, sea level rise has been between 0.3 cm per decade (Lakes Entrance) and 4.5 cm per decade (Point Lonsdale).[70] Future rises in sea level are projected with high confidence.[71]

Increases in mean sea levels have caused coastal floods to become more frequent in Victoria. Without successful flood risk mitigation, future increases in mean sea level will lead to coastal floods occurring more often.[72]

By 2100, almost every community along Victoria's coastline will be affected by sea level rise and storm surges. The impacts on land and property along the Victorian coast are predicted to reach a cumulative loss of $337 billion by 2100 (2.68% of the projected gross state product of Victoria), with a further loss of up to $105 billion for wetlands.[73] By 2100, more than 333,000 Victorian residential or commercial properties will be exposed to a risk of damage from sea level rise and storm surge, with 151,000 properties estimated to be at a 'high risk' of damage.[74] Given the estimated economic costs without mitigation are significant for 2040 ($122 billion), action needs to be taken in the immediate future to reduce the impacts.

Several erosion assessments have been made across Victoria in recent years. More than 100 km of the Gippsland Lakes coastline were assessed as having a very high vulnerability to coastal erosion.[75] This means that more than one-quarter of the entire Victorian coastline most at risk of erosion is located along the Gippsland Lakes.

The Victorian Coastal Monitoring Program developed a suite of Coastal Erosion Indicators, using drone and satellite data, to aid in coastal management, policy and planning. An erosion warning index (EWI) score was calculated for several Victorian coastal locations in 2023.[76, 77] An EWI score of 5 or higher indicates a high erosion warning level. The highest EWI score was a 6 at Apollo Bay.[78]

70. Hague BS, Jones DA, Trewin B, Jakob D, Murphy BF, Martin D, Braganza K 2021, 'ANCHORS: A multi-decadal tide gauge dataset to monitor Australian relative sea level changes', *Geoscience Data Journal*, 9, pp. 256–272.
71. Department of Environment, Land, Water and Planning (DELWP) 2019, 'Victoria's Climate Science Report 2019', East Melbourne, Victoria.
72. Hague BS, Talke SA 2024, 'The influence of future changes in tidal range, storm surge, and mean sea level on the emergence of chronic flooding', *Earth's Future*, 12, e2023EF003993 https://doi.org/10.1029/2023EF003993 Accessed 18 March 2024.
73. Kompas T, Mallon K, Bojko M, Nhu Che T, Strain B, McKinlay M, Van Ha P, Grafton Q and Stoeckl N 2022, 'Economic Impacts from Sea Level Rise and Storm Surge in Victoria, Australia over the 21st Century', Report prepared for the Victorian Marine and Coastal Council (VMaCC), with support from the Department of Energy, Environment and Climate Action (DEECA) and Life Saving Victoria, Centre for Environmental and Economic Research, University of Melbourne, Melbourne and Climate Risk Pty Ltd, Sydney.
74. Kompas T, Mallon K, Bojko M, Nhu Che T, Strain B, McKinlay M, Van Ha P, Grafton Q and Stoeckl N 2022, 'Economic Impacts from Sea Level Rise and Storm Surge in Victoria, Australia over the 21st Century', Report prepared for the Victorian Marine and Coastal Council (VMaCC), with support from the Department of Energy, Environment and Climate Action (DEECA) and Life Saving Victoria, Centre for Environmental and Economic Research, University of Melbourne, Melbourne and Climate Risk Pty Ltd, Sydney.
75. Spatial Vision 2017, 'Victorian Coastal Hazard Assessment 2017 Technical Report 1'.
76. McCarroll RJ, Kennedy DM, Liu J, Allan B, Ierodiaconou D 2024, 'Design and application of coastal erosion indicators using satellite and drone data for a regional monitoring program', *Ocean and Coastal Management*, 253, 107146.
77. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Victorian Coastal Erosion Indicators Design and Methods — Mar 2023', https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0023/625352/VCMP_Erosion-Indicators_April_2023.pdf Accessed 29 May 2024.
78. Department of Energy, Environment and Climate Action (DEECA), 'CoastKit', https://mapshare.vic.gov.au/coastkit/ data extracted from on 30 May 2024.

For the Southern Region that includes Victorian marine waters, sea surface temperatures have warmed by more than 1°C since 1900.[79] There is an increasing frequency of marine heatwaves around Victorian marine waters in recent years causing permanent impacts on marine ecosystem health, marine habitats and species. These impacts include depleting kelp forests and sea grasses, a poleward shift in some marine species, and increased occurrence of disease.

Air temperature is an important factor in beach usage — when warm, people tend to head to the beach and this affects the utility and social and economic value of a beach, but also potentially accelerates degradation of the coastal environment if not properly managed. If the world succeeds in matching aspirations under the Paris Agreement to limit global warming to 2°C relative to a pre-industrial era baseline, then Victoria is also expected to warm by around 2°C in line with the global average.[80] Daily maximum temperatures in Melbourne are approaching a 1.5°C increase from an indicative pre-industrial era temperature. Eight of the most recent 20 years (i.e. during the period of 2003–2022) have been more than 1.5°C warmer in Melbourne than the indicative pre-industrial era temperature.[81, 82] The warming in Melbourne has been greater than other coastal locations in Victoria. The warming in Sale, Wilsons Promontory, Cape Otway and Gabo Island has been between 0.7°C and 1.0°C from the baseline 50-year period (1910–1959) to the most recent decade with data (2013–2022).[83, 84]

The increasing number of very hot days along the Victorian coastline has significant implications for participants and spectators of recreational and professional summer sport near the coast. Many local sporting competitions have extreme heat policies and competitions take place during afternoons, when summer temperatures are at their warmest. These sporting organisations will risk having their sporting fixtures being cancelled due to extreme heat unless they adapt the times of day when their activities commence (e.g. holding competitions during the mornings or evenings) or the timing of the season (e.g. holding a competition during cooler seasons such as autumn or winter rather than during summer).

There is a fluctuating pressure being exerted on the water resources and agricultural sectors by wetter years interspersing a predominately drying climate. Most coastal locations in Victoria received between 5% and 15% less rainfall in the previous 30-year period (1994–2023) compared with the 30 years from 1961 to 1990.[85]

Managing coastal hazard risks

Analysis by DEECA that was previously reported in the SMCE 2021 Report indicated the extent and quality that Victorian councils were considering climate change in land-use planning. A strong pattern emerged when comparing inland and coastal councils, with coastal councils three times more likely to have an intermediate, high or advanced consideration of climate change in land-use planning than inland councils. Nevertheless, 30% of coastal councils were assessed in 2018 as having no or basic integration of climate change into land-use planning.

Catchment Management Authorities (CMAs) play an important role in Victoria in helping the state adapt to climate change. All ten CMAs across Victoria have developed Climate Change Adaptation Plans or Strategies. These are based on the latest climate change projections of the CSIRO and have been developed in collaboration with Australia's principal research organisations. Since the publication of the SMCE 2021 Report, the Victorian Government has continued to provide planning and guidance material to support government, institutions, business and individuals to take action and respond to climate change.

79. Bureau of Meteorology (BoM), 'Australian climate variability and change — Time series graphs', http://www.bom.gov.au/cgi-bin/climate/change/timeseries.cgi?graph=sst&area=sth&season=0112&ave_yr=10&ave_period=6190 Accessed 22 May 2024.
80. Department of Environment, Land, Water and Planning (DELWP) 2019, 'Victoria's Climate Science Report 2019'.
81. The data used to generate this information were extracted from Bureau of Meteorology (BoM), ACORN-SAT Australia v2.4, Australian Climate Observations Reference Network - surface air temperature (1910–2022).
82. As of February 2024, ACORN-SAT data for Melbourne were available up until the end of 2022.
83. The data used to generate this information were extracted from Bureau of Meteorology (BoM), ACORN-SAT Australia v2.4, Australian Climate Observations Reference Network - surface air temperature (1910–2022).
84. As of February 2024, ACORN-SAT data for Melbourne was available up until the end of 2022.
85. Calculated using Bureau of Meteorology (BoM), 'Climate data online' http://www.bom.gov.au/climate/data.

Protecting and restoring coastal blue carbon ecosystems such as mangroves, tidal marshes and seagrasses offers opportunities for carbon sequestration. More appropriate management of blue carbon ecosystems can also improve fisheries and increase a coastline's resilience to rising sea levels and storm tides. Research published in 2019 showed that allowing coastal wetlands to naturally retreat with sea level rise in Victoria could sequester 1.6 million tonnes of carbon by 2050 with a value of $65 million.[86] A more recent analysis estimates that with a combination of management actions (including managed retreat), coastal wetlands could sequester 1.8 million tonnes of carbon per year with a value of $85.4 million per year.[87]

Since 2023, CoastKit has included statewide information on the spatial location of blue carbon habitat with high restoration potential, and blue carbon benefits for local councils within Western Port and eastern Port Phillip Bay have been published.[88, 89]

Communities

The *Marine and Coastal Act 2018* introduced a socioeconomic objective into SMCE reporting. While a healthy environment is fundamental to our socioeconomic needs, a healthy environment relies upon communities having social wellbeing and economic resources to contribute to good environmental outcomes.

Coastal communities

The 'Communities' theme focuses on activities undertaken by, and the liveability of, coastal communities.

The development of coastal settlements represents a significant change in land use, potentially reducing natural habitat and introducing impervious surfaces. Population in coastal areas is frequently assumed to be increasing more rapidly than in non-coastal areas. In Victoria this is not the case. Rates of coastal population growth between 2009 and 2019 (1.6%) were lower than for non-coastal areas (2.2%) and in 2019, the coastal population of Victoria formed a slightly smaller proportion of the Victorian population than a decade earlier.[90] Population growth in coastal suburbs of Melbourne has been rapid, with increasing density of development, while coastal locations near Melbourne and Geelong, particularly on the Bellarine Peninsula and around Torquay, have also experienced rapid population growth. Also of note is the very high annual growth rate (21.5%) projected for the Fishermans Bend urban renewal project that covers approximately 480 hectares and connects the Melbourne Central Business District and Port Phillip Bay.[91] This area is expected to be home to approximately 80,000 residents by 2050.[92]

Work is currently underway to protect significant landscapes in several coastal areas that are subject to development pressure. Some of this work includes recognition and protection of Aboriginal cultural heritage on a landscape scale.[93] On balance, planning controls are being strengthened to protect important landscapes, but there are no monitoring systems in place to determine whether the outcomes are being achieved in terms of protecting the qualities of these significant landscapes.

Legislative protection is given to a range of cultural heritage elements on land and in marine environments. Data on the number of registered places having cultural significance are available subject to certain restrictions in the case of Aboriginal cultural heritage. While cultural heritage can be assessed quantitatively — in June 2024, there were 40,721 registered places, 7,916 cultural heritage management plans on the Victorian Aboriginal Heritage Register, and over 1,300 heritage sites and objects listed on the Victorian Heritage Register located within 5 km of the Victorian coastline — monitoring the qualitative status of sites and the degree to which investment is supporting their preservation and protection is important.[94, 95]

86. Carnell PE, Reeves SE, Nicholson E, Macreadie P, Ierodiaconou D, Young M, Kelvin J, Janes H, Navarro A, Fitzsimons J, Gillies CL 2019, 'Mapping ocean wealth Australia: the value of coastal wetlands to people and nature', The Nature Conservancy (TNC), Melbourne.
87. Costa MDP, Wartman M, Macreadie PI, Ferns LW, Holden RL, Ierodiaconou D, MacDonald KJ, Mazor TK, Morris R, Nicholson E, Pomeroy A, Zavadil EA, Young M, Snartt R, Carnell P 2024, 'Spatially explicit ecosystem accounts for coastal wetland restoration', *Ecosystem Services*, 65, 101574.
88. Department of Energy, Environment and Climate Action (DEECA), personal communication May 2024.
89. Costa MDP, Palacios MM, Macreadie PI 2022, 'Blue carbon opportunities at a local scale within Western Port Bay and eastern Port Phillip Bay', Deakin University, Australia https://www.bluecarbonlab.org/wp-content/uploads/2023/12/website_Final-Report_Blue-Carbon-in-Western-Port.pdf Accessed 19 September 2024.
90. Data based on coastal Statistical Areas Level 2 (SA2) average annual population growth between 2009 and 2019, Australian Bureau of Statistics (ABS), 'Regional population growth', cat. 3218.0.
91. Department of Transport and Planning, 'Fishermans Bend' https://www.fishermansbend.vic.gov.au/ Accessed 11 November 2024.
92. Department of Transport and Planning, 'Fishermans Bend' https://www.fishermansbend.vic.gov.au/ Accessed 11 November 2024.
93. Department of Transport and Planning (DTP), personal communication 3 September 2024.
94. First Peoples – State Relations, personal communication 13 June 2023.
95. Department of Transport and Planning (DTP), personal communication 9 July 2024.

Tourism and recreation (including boating and fishing) are supported through Victorian Government policy and are seen as valuable sources of jobs and revenue for Victorian coastal communities. Although significantly impacted by the COVID-19 pandemic, these have generally recovered. The most recent study that examined the economic contributions of both Victorian recreational fishing and boating, that were reported in the SMCE 2021 Report, found that in 2018–19 these generated:

- $14.00 billion combined direct and indirect output, including $6.14 billion direct output
- $5.83 billion combined direct and indirect value added, including $2.12 billion direct value added
- 55,780 combined direct and indirect full-time equivalent (FTE) jobs, including 25,058 direct jobs.[96]

At present, there appears to be limited links between tourism growth policies and visitor management or environmental management strategies.[97] While data are available, they tend to be geographically broad and survey-based, making a detailed assessment of tourist impact very difficult. The Great Ocean Road Strategic Framework Plan currently under development will include a Visitor Management Framework to guide tourism investment and direct this to appropriate locations.[98] Environmental certification schemes do not yet enable comprehensive assessment of tourism operators' environmental credentials.

The rise of accommodation share platforms can reduce the rental options for low-income residents.[99] The large profits available to property owners for short-term rentals can result in a lack of available properties for long-term rent, which in turn may make recruiting essential employment roles difficult, thereby adversely impacting the community.[100] While not unique to coastal areas, many coastal towns experience high tourist demand. To curb this trend, the Victorian Parliament recently introduced a short stay levy that, from 1 January 2025, that applies a 7.5% levy on short stay accommodation bookings, including bookings made through online short stay platforms.[101]

Recreational fishing is a popular activity, contributing to people's wellbeing. Increases in recreational fishing activity may lead to increased pressures on fisheries and the broader ecosystem. Management strategies and education are required to prevent this. While some data on recreational fishing are available, there are gaps in our understanding of scale and consequences. Increasingly, programs aim to foster responsible fisher behaviour that improves environmental outcomes.

Victoria's commercial fisheries management systems are generally effective.[102] However, regulation remains important as threats of overfishing, illegal and unreported fishing, introduction of pests, bycatch and entanglements still exist.[103] In 2017–18, State and Commonwealth commercial fisheries provided $255 million of gross production value and added value of $282 million. Almost 2,500 jobs (FTE) were provided, which translated into $160 million in household income.[104]

Aquaculture is an increasingly important source of seafood in Victoria, both for the domestic and export markets. The main species farmed in Victorian coastal waters are abalone and blue mussels. Regulations are in place to prevent the spread of invasive marine species in the aquaculture industry. However, disease outbreaks remain a threat to the industry — in 2021 an outbreak of AVG led to a local marine area closure near Portland. Coastal aquaculture contributed an estimated $35 million of added value and 427 FTE jobs to the Victorian economy in 2016–17.[105]

96. Better Boating Victoria (BBV) and Victorian Fisheries Authority (VFA) 2020, 'The economic value of recreational fishing and boating in Victoria', prepared by Ernst and Young, p. 7.
97. Commissioner for Environmental Sustainability (CES) Victoria 2021, 'State of the Marine and Coastal Environment 2021 Report — Scientific Assessments', p. 430, Melbourne, Victoria.
98. Department of Transport and Planning (DTP), personal communication 3 September 2024.
99. Gurrna N, Zhang Y, Shrestha P 2020, ''Pop-up' tourism or 'invasion'? Airbnb in coastal Australia', *Annals of Tourism Research*, 81, 102845.
100. Ziffer D 2024, ''Cap and trade' for Airbnb rentals proposed to win housing back for living and save tourist towns at the same time', Australian Broadcasting Corporation https://www.abc.net.au/news/2024-06-26/the-airbnb-fix-idea-to-win-housing-back-for-living/104007226 Accessed 12 July 2024.
101. State Revenue Office Victoria, 'Short stay levy' https://www.sro.vic.gov.au/short-stay-levy Accessed 23 October 2024.
102. Commissioner for Environmental Sustainability (CES) 2021, 'State of the marine and coastal environment 2021 report', Melbourne, Victoria.
103. Commissioner for Environmental Sustainability (CES) 2021, 'State of the marine and coastal environment 2021 report', Melbourne, Victoria.
104. Ogier 2019, 'Australian Fisheries and Aquaculture Industry 2017/18: Economic Contributions Estimates Report' Fisheries Research and Development Corporation (FRDC) 2017–210, Deakin, ACT.
105. Abernethy K, Barclay K, McIlgorm A, Gilmour P, McClean N, Davey J 2020, 'Victoria's fisheries and aquaculture: economic and social contributions', Fisheries Research and Development Corporation (FRDC) 2017–092, University of Technology Sydney, Sydney.

Victoria uses both renewable and non-renewable resources from marine and coastal environments to generate electricity. The resources and energy generation sectors are undergoing major changes due to the decarbonisation of Victoria's energy sources. Development of wind and solar energy has been increasing in recent years and more projects are planned. Wind energy is a rapidly growing industry in Victoria with 37 operational wind farms located throughout the state (compared to 29 in 2021) that generated approximately 21% of Victoria's electricity in 2023.[106, 107] Approximately 10 of these are located along the southern coast.[108] Offshore gas and oil rigs in Bass Strait are beginning to reach the end of their useful lives and plans for decommissioning and disposal are being considered.

Agriculture is a major use of land in Victoria, providing economic benefits and food for the wider community. Agriculture can be undertaken sustainably. Farmers can be stewards of their land by maintaining or improving soils, vegetation and other environmental features. However, some environmental risks from agriculture do require management. Water runoff from farming land may have high nutrient loads from fertiliser or contain toxins from agricultural chemicals such as pesticides.

Melbourne Water and CSIRO have undertaken studies to estimate fine sediment loads in runoff from the Western Port catchment. This catchment has been subject to increasing urbanisation, particularly in the urban growth areas of Casey and Cardinia Shires, although a large proportion of the catchment still comprises agricultural land use with some significant areas of remnant vegetation. Although the largest proportion of fine sediment load in catchment runoff is from grazing and cropping (21%), this reflects the fact that grazing and cropping comprise a high proportion of catchment land use (31%). In contrast, roads, that only represent 3.4% of land use in the catchment, account for 24% of fine sediment load running into Western Port. Low-density residential use also causes significant runoff (12%) despite being a small proportion of overall land use (2%).[109]

Changes of agricultural land use can also influence impacts, such as a move from cropping to grazing or from grazing to silviculture, or the loss or fragmentation of agricultural land use to other uses such as urbanisation. Fragmentation or loss of agricultural land has generally been greatest close to urban areas where population growth and urbanisation comes into competition with agricultural land use. The urban development of the Geelong, Bellarine Peninsula and Surf Coast region represents the largest rate of loss of agricultural land proximate to the coast due to development between 2007 and 2022.[110]

Coastal infrastructure remains under threat from climate change due to sea level rise and increasing frequency of severe weather events. DEECA has implemented strategies to improve the management of coastal assets in response to recommendations from the Victorian Auditor General's office.

Stewardship and collaborative management

This 'Stewardship and collaborative management' theme ranges from participation in stewardship activities at the local level through to Victorian Government legislation and policy. Collaborative approaches, in contrast to 'top-down' approaches, promote co-management and participatory decision making where management is shared amongst stakeholders. Agencies and communities can create policies that lead to strong stewardship of Victoria's marine and coastal environments by working in partnership.

While measuring numbers of participants involved in a program is relatively simple, measuring institutional characteristics or the effectiveness of policies and processes is more difficult. For this reason, some of the indicators for this theme provide a narrative rather than specific assessments or precise measurements.

106. Department of Energy, Environment and Climate Action (DEECA) 2024, 'MapsahreVic' https://mapshare.vic.gov.au/vicplan/ Accessed 8 August 2024.
107. Department of Energy, Environment and Climate Action (DEECA) 'Wind Energy', https://www.energy.vic.gov.au/renewable-energy/wind-energy Accessed 15 July 2024.
108. Department of Energy, Environment and Climate Action (DEECA) 2024, 'MapsahreVic' https://mapshare.vic.gov.au/vicplan/ Accessed 8 august 2024.
109. Melbourne Water and CSIRO 2021, 'Westernport catchment planning tool' https://www.flowmatters.com.au/viz/#/mw-cpt?_page=0 Accessed 20 July 2021.
110. Department of Energy, Environment and Climate Action (DEECA), personal communication 28 October 2024

There is a growing recognition of the importance of people being connected to nature. Stewardship activities involve many participants. At the community level, there are farmers and other land managers, fishers and others who rely on marine industries, and various volunteer groups involved in environmental protection and improvement. A wide range of government departments and agencies are also involved in stewardship activities through funding processes, policy making and program management. Although stewardship is difficult to define or measure, DEECA has made progress through the development of a Marine and Coastal Stewardship Index (MCSI). Data collected for Port Phillip Bay programs indicate progress in achieving a more balanced distribution of activities, suggesting the MCSI might be effective for other regions and as a model for future data collection and indicator assessment.

It is important to acknowledge the critical role of Traditional Owners in Caring for Sea Country, that is discussed in Part 1B but not included in the following indicator assessments.

Volunteering is one activity for which data are available. Rates of volunteering have gradually declined over the last twenty years, and then rapidly because of the COVID-19 pandemic.[111] While COVID-19 related restrictions have been lifted, volunteering rates across the wider sector remain below pre-pandemic rates.[112] Despite this, environmental volunteering in Victoria has increased in terms of volunteers and hours over 2022 and 2023. This trend is supported by social research that found a significant interest among everyday Victorians in undertaking environmental volunteer activities.[113] For coastal areas (within 5 km of the coastline) in 2023–24, 16,052 environmental volunteers contributed 319,259 hours.[114] Coastal volunteer numbers in 2022–23 were similar to the pre-pandemic number of volunteers in 2018 to 2019 and total hours contributed are substantially higher. However, volunteer numbers for 2024 are lower than pre-pandemic numbers, though this can be partly attributed to a change in how one prominent citizen science organisation calculates and reports figures.[115]

Coastcare Victoria is a community-based program that supports community stewardship of Victoria's marine and coastal environments. Volunteering is central to Coastcare's activities, and the program aims to foster community appreciation of marine and coastal areas. Coastcare supports hundreds of community groups and volunteers working to protect and improve Victoria's coastline. Activities include weeding and revegetation, citizen science activities such as dune monitoring, and education and engagement activities that raise awareness of coastal values and issues.[116] Despite the success of environmental volunteering in Victoria generally, recruiting and retaining volunteers is an ongoing challenge. Participation in Coastcare Victoria remains below pre-COVID-19 pandemic levels.

Citizen science participation as a proportion of environmental volunteering has increased from pre-COVID-19 pandemic levels, and a broad range of programs continue to provide many opportunities. For coastal areas in 2023–24, 2,337 environmental volunteers participated in citizen science and contributed 53,959 hours.[117] These programs can provide important data for scientific analysis where appropriate levels of rigour are applied to data collection and analytical methods. The MCKF includes contributions from citizen science programs and, where possible, seeks to support citizen science projects delivering targeted data.[118] Ensuring that the best use is made of data collected by citizen scientists will contribute to the evidence base of critical marine and coastal scientific knowledge and help foster citizen science participation.

111. Biddle N, Boyer C, Gray M, Jahromi M 2022, 'Volunteering in Australia: The Volunteer Perspective', Volunteering Australia https://volunteeringstrategy.org.au/wpcontent/uploads/2022/10/Volunteering-in-Australia-2022-The-Volunteer-Perspective.pdf
112. Biddle N, Boyer C, Gray M, Jahromi M 2022, 'Volunteering in Australia: The Volunteer Perspective', Volunteering Australia https://volunteeringstrategy.org.au/wpcontent/uploads/2022/10/Volunteering-in-Australia-2022-The-Volunteer-Perspective.pdf
113. Department of Environment, Land, Water and Planning (DELWP) 2020, 'Environmental volunteering: 2020 social research findings: snapshot', East Melbourne, Victoria
114. Department of Energy, Environment and Climate Action (DEECA), personal communication Victoria 25 October 2024.
115. Department of Energy, Environment and Climate Action (DEECA), personal communication 25 October 2024.
116. Department of Environment, Land, Water and Planning (DELWP) 2020, 'Coastcare Victoria strategy 2021–2026', East Melbourne, Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0021/524037/Coastcare-Victoria-Strategy-2021-2026_web.pdf Accessed 3 July 2024.
117. Department of Energy, Environment and Climate Action (DEECA), personal communication Victoria 25 October 2024.
118. Department of Environment, Land, Water and Planning (DELWP) 2021, 'Victoria's Marine and Coastal Knowledge Framework and Strategic Directions 2020–22', East Melbourne Victoria.

This report's assessment of the Victorian Government's role in stewardship activities takes a narrative form, exploring Victoria's marine and coastal planning regimes and implementation strategies. The introduction of the *Marine and Coastal Act 2018* and the subsequent Marine and Coastal Policy 2020 have helped to streamline and clarify aspects of coastal policy. The Marine and Coastal Strategy 2022 aims to translate the objectives of the *Marine and Coastal Act 2018* into specific actions.

One of the initiatives is Victoria's first Marine Spatial Planning (MSP) Framework that aims to provide overarching guidance and a process for achieving integrated and coordinated planning and management of the marine environment. The MSP Guidelines and Marine Planning Areas were released in 2023 to support stewardship and collaborative management in the marine environment. The steps identified in the Marine and Spatial Planning Guidelines have recently been drawn upon to identify available information on values and uses and activities within (or relevant to) the marine environment of Gippsland.[119] This is intended to streamline the planning process for offshore wind projects to provide a synthesis of useful background information for any future strategic planning exercise.[120] There has been no commitment to undertake a full MSP process.[121]

Ongoing monitoring and assessment will be important to understand and improve on the effectiveness of recent initiatives for a process of continuous improvement and sustained clarity and coherence to be achieved.

Following a proposal suggested in the State of the Bays 2016 Report, Victoria has established a MCKF to support the knowledge needs of planning for Victoria's marine and coastal areas. One outcome has been CoastKit — an online system for marine and coastal spatial data. While the development of data systems for marine and coastal management is welcome, analysis of what the data conclude and the degree to which these are being used in decision making is still unclear and unable to be fully assessed. One indication of the interest and use of this information is the number of users who access the CoastKit portal — this has grown from 2,103 active users in 2021–22 to 3,556 in 2023–24. Another tool that aims to make data more accessible and usable is the Feature Activity Sensitivity Tool (FeAST) available within CoastKit. Released in May 2023, FeAST is a free online tool that generates first-pass environmental risk assessments for proposed developments and activities in Victoria's marine and coastal areas.

119. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Overview of values, uses and activities in Gippsland's marine environment', Melbourne, Victoria https://www.energy.vic.gov.au/__data/assets/pdf_file/0034/709909/Overview-of-values-uses-and-activities-in-Gippslands-marine-environment.pdf pp 5.
120. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Overview of values, uses and activities in Gippsland's marine environment', Melbourne, Victoria https://www.energy.vic.gov.au/__data/assets/pdf_file/0034/709909/Overview-of-values-uses-and-activities-in-Gippslands-marine-environment.pdf pp 5.
121. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Overview of values, uses and activities in Gippsland's marine environment', Melbourne, Victoria https://www.energy.vic.gov.au/__data/assets/pdf_file/0034/709909/Overview-of-values-uses-and-activities-in-Gippslands-marine-environment.pdf pp 5.

Recommendations

The following recommendations are informed by the science and analyses presented in Part 2 – Scientific Assessments of this report. These are intended to support marine and coastal environment outcomes over the next decade and beyond. Although most of the recommendations do not specify delivery timelines, except where noted, these are anticipated to be fully implemented by 2034, with clear progress evident within five years, recognising that the next SMCE Report will be due in 2029.

The recommendations:

- prioritise actions that improve multiple environmental outcomes
- focus on improving the evidence base to deliver key policy and legislative actions and targets
- are informed by the findings of other respected reports[122]
- identify actions to achieve ecologically sustainable development and support Victoria's commitment to or alignment with national and international frameworks and targets (e.g. United Nations (UN) Sustainable Development Goals (SDGs)).

Six recommendations are presented in this report. The recommendations aim to help focus effort to achieve better outcomes for Victoria's marine and coastal environment as stated in the current legislative and policy frameworks, including the *Marine and Coastal Act 2018,* the Marine and Coastal Policy, the Marine and Coastal Strategy, Marine Spatial Planning Framework, the Environment Reference Standard, Protecting Victoria's Environment – Biodiversity 2037 and Water for Victoria.

Although there is no explicit biodiversity recommendation, all six recommendations, if implemented, are expected to lead to improvements in biodiversity outcomes. Strong action is required to mitigate, adapt and protect Victoria's diverse biodiversity against the effects of climate change (Recommendation 1). Many of the pressures on marine and coastal biodiversity are linked to activities on land. Therefore, management and regulatory actions that connect activities in our catchments to benefits for Victoria's marine and coastal environment are critical (Recommendations 3, 4 and 5). Enabling marine and coastal legislation and policy, and adopting a whole-of-system approach to guide action, will protect biodiversity from the adverse impacts of development and introduced pests (Recommendation 2). Finally, tourism and visitor management can be conducted in a sustainable way that creates opportunities for biodiversity outcomes (Recommendation 6).

There is no additional Traditional Owner recommendation in this report. However, Recommendation 1 of the SoE 2023 Report recommended:

> *'That the Victorian Government resources and supports Victoria's Traditional Owners to implement a program of on-ground assessment and develop contemporary bio-cultural indicators to restore the knowledge system of Traditional Owners in Victoria consistent with policy and legislative requirements. Initially, the Victorian Government would resource and support the Eastern Maar and Wadawurrung Traditional Owners to deliver the legislative obligations of the Great Ocean Road and Environs Protection Act 2020 and inform future consultation on bio-cultural indicators with other Traditional Owners in Victoria.'*

The Victorian Government is due to respond to this recommendation in the Victorian Parliament by early 2025. It is anticipated that this response will provide direction for future development of bio-cultural indicators and opportunities for Traditional Owner engagement in future State of the Marine and Coastal Environment reports.

The CES Act requires the Victorian Government to respond to all SMCE recommendations within 12 months of the report being tabled in the Parliament of Victoria.

Table 1 provides a summary of the recommendations and challenges they propose to overcome.

122. The CES acknowledges the significant research undertaken by others, including Victorian Marine and Coastal Council's (VMaCC) Victoria's Coast and Marine Environments Under Projected Climate Change report, Victorian Auditor General's Office's (VAGO) Protecting Victoria's Coastal Assets report, and the Victorian National Parks Association (VNPA).

Climate change and spatial planning

Recommendation 1: That DEECA updates statewide coastal inundation spatial layers.

Challenges this recommendation addresses

Sea level rise is one of the most significant threats to coastal areas associated with climate change. Coastal communities in Victoria are already experiencing some of the impacts associated with sea level rise. These impacts are expected to intensify this century and include:

- more frequent and extensive inundation of low-lying areas, with the impacts exacerbated by storm surges
- loss of coastal habitat, such as roosting and nesting sites for shorebirds and seabirds
- accelerated cliff retreat and shoreline recession
- altered saltmarsh and mangrove habitats.[123]

Without successful flood risk mitigation, future increases in coastal flooding will lead to coastal floods occurring more often.[124, 125]

The Victorian Coastal Inundation Dataset is a digital dataset consisting of eight spatial layers modelling the extent of land subject to coastal inundation due to projected sea level rise from 2009 to 2100.[126] This is the current dataset being used by the Victorian Government to plan for sea level rise. It projects an 82 cm sea level rise by 2100 but it is 15 years old and requires updating using contemporary data to inform decision making.

Action 3.9 of the Victorian Marine and Coastal Strategy committed to reviewing and updating planning benchmarks in line with IPCC reports by 2023. The new benchmarks have not been announced yet.

Context

Victoria has a vast inventory of coastal assets (sea walls, groynes, piers and jetties), particularly in the bays and estuaries (Port Phillip Bay, Western Port, Gippsland Lakes and Corner Inlet), that have been constructed over the past 100 years. Increasing storms and erosion under climate change will undermine the integrity of many assets.[127]

In 2022, the University of Melbourne and Climate Risk Pty Ltd modelled the physical damage and potential economic cost of sea level rise and storm surge on Victoria's bays and coastal and marine areas. Researchers modelled scenarios (applied for 2040, 2070 and 2100) to calculate results if adequate adaptation measures are not undertaken.[128] The modelling was underpinned by the Victorian Coastal Inundation Dataset. This dataset is now 15 years old and projected an 82 cm sea level rise by 2100.

As part of the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6), the IPCC has projected sea level for a range of scenarios that includes a projection of sea level rise beyond one metre (relative to 1995–2014) by 2100 with medium confidence.[129] In 2022, a group of 28 sea-level scientists and practitioners of the World Climate Research Programme Grand Challenge on Regional Sea Level and its Impacts projected high-end global mean sea-level rise to be up to 1.3 to 1.6 metres for strong warming in 2100.[130] The approach for these high-end sea-level rise projections were complementary to the IPCC AR6 Report and provides plausible high-end scenarios representing what might happen rather than the most likely outcome. These are of particular interest to stakeholders engaged in long-term adaption planning where such uncertainties are important, such as long-life infrastructure projects or coastal land use. The new estimates are based on multiple lines of evidence and physical plausibility for each sea-level component, including the critical Antarctic ice sheet contribution.

123. Victorian Coastal Council (VCC) 2018, 'Victoria's coast and marine environments under projected climate change: Impacts, research gaps and priorities'.
124. Hague BS, Grayson RB, Talke SA, Black MT, Jakob D 2023, 'The effect of tidal range and mean sea-level changes on coastal flood hazards at Lakes Entrance, south-east Australia', *Journal of Southern Hemisphere Earth Systems Science*, 73(2), 116–130. https://doi.org/10.1071/ES22036 Accessed 18 March 2024.
125. Hague BS, Talke SA 2024, 'The influence of future changes in tidal range, storm surge, and mean sea level on the emergence of chronic flooding', *Earth's Future*, 12, e2023EF003993 https://doi.org/10.1029/2023EF003993 Accessed 18 March 2024.
126. Data Vic, 'Victorian Coastal Inundation' https://discover.data.vic.gov.au/dataset/victorian-coastal-inundation Accessed 9 October 2024.
127. Victorian Auditor General's Office (VAGO) 2018, 'Protecting Victoria's coastal assets', Melbourne, Victoria.
128. Kompas T, Mallon K, Bojko M, Che TN, Strain B, McKinlay M, Van Ha P, Grafton Q and Stoeckl N 2022, 'Economic Impacts from Sea Level Rise and Storm Surge in Victoria, Australia over the 21st Century', Report prepared for the Victorian Marine and Coastal Council (VMaCC), with support from the Department of Energy, Environment and Climate Action (DEECA) and Life Saving Victoria, Centre for Environmental and Economic Research, University of Melbourne, Melbourne and Climate Risk Pty Ltd, Sydney.
129. Intergovernmental Panel on Climate Change (IPCC) 2023, 'Summary for Policymakers', In: Climate Change 2023: Synthesis Report, Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H Lee, J Romero (eds)], IPCC, Geneva, Switzerland, pp. 1–34, doi: 10.59327/IPCC/AR6-9789291691647.001.
130. Van de Wal RSW, Nicholls RJ, Behar D, McInnes K, Stammer D, Lowe JA, Church A, DeConto R, Fettweis X, Goelzer H, Haasnoot M, Haigh ID, Hinkel J, Horton BP, James TS, Jenkins A, LeCozannet G, Levermann A, Lipscomb WH, Marzeion B, Pattyn F, Payne AJ, Pfeffer WT, Price SF, Seroussi H, Sun S, Veatch W, White K 2022, 'A high-end estimate of sea level rise for practitioners', *Earth's Future*, 10, e2022EF002751 https://doi.org/10.1029/2022EF002751 Accessed 9 October 2024.

Based on the evidence presented above, the Victorian Coastal Inundation Dataset will almost certainly not adequately capture the upper range of current sea level rise projections and requires updating to inform contemporary planning and decision-making. Action 3.9 of the Victorian Marine and Coastal Strategy committed to reviewing and updating planning benchmarks in line with IPCC reports by 2023. The new benchmarks have not been announced yet.

Recommendation 2: That DEECA collaborates with stakeholders to undertake a pilot marine spatial planning process to build knowledge and capacity for implementing marine spatial planning and to demonstrate its benefits.

Challenges this recommendation addresses

Marine spatial planning (MSP) offers important benefits, including 'proactively identifying and reducing conflicts between uses, and between uses and natural values, to help protect economic, social, cultural and environmental values linked to the marine environment.'[131] Importantly, this allows for coordinated and 'joined-up' decision making in place of management decisions being taken in isolation by individual agencies.

Substantial work has been undertaken to develop a process for MSP in Victoria. The process for initiating, approving and undertaking MSP is outlined in the Marine Spatial Planning Framework, and the Marine and Spatial Planning Guidelines provide instructions for undertaking an MSP process in a marine planning area.[132, 133] However, as a pilot process has not been undertaken yet, several components necessary for MSP implementation remain untested, including to:

- identify who should lead an MSP process
- determine an appropriate governance structure
- identify appropriate mechanism(s) for undertaking MSP
- resolve funding.[134]

A pilot process could test these guidelines to identify and resolve any outstanding issues with the MSP process.

Context

The Marine Spatial Planning Framework is part of the Marine and Coastal Policy 2020. Initiating, approving and undertaking MSP is to be undertaken in a three-step process:[135]

- determine marine planning areas and identify priorities for MSP
- seek approval to undertake MSP using a mechanism in the *Marine and Coastal Act 2018*
- undertake MSP.

Step one has been undertaken by DEECA with the Planning Areas and Marine Spatial Planning Guidelines supporting implementation of steps two and three.[136, 137]

Approval (step two) to undertake MSP in a marine planning area is required from the lead minister for MSP in Victoria (i.e. the minister with responsibility for the *Marine and Coastal Act 2018*, currently the Minister for Environment) in consultation with other relevant portfolio Ministers.[138, 139]

Effective use of MSP can coordinate the many uses of Victoria's marine environment and its assets, balancing exploration, offshore developments, coastal and marine climate change impacts, fishing, recreation and tourism. MSP helps industry, government, and the community balance and plan their aspirations for the marine environment, similar to established land planning systems.

131. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Marine Spatial Planning Factsheet' Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf
132. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Marine Spatial Planning' https://www.marineandcoasts.vic.gov.au/marine/marine-spatial-planning Accessed 17 October 2024.
133. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Marine Spatial Planning Factsheet', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf
134. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Marine Spatial Planning' https://www.marineandcoasts.vic.gov.au/marine/marine-spatial-planning Accessed 17 October 2024.
135. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Marine Spatial Planning Factsheet', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf
136. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Victoria's Marine Planning Areas', Melbourne, Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0032/681935/Victorias-Marine-Planning-Areas_FINAL.pdf
137. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Marine Spatial Planning Factsheet', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf
138. Department of Environment, Land, Water and Planning (DELWP) 2020 'Marine and Coastal Policy', Melbourne, Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0027/456534/Marine-and-Coastal-Policy_Full.pdf pp 73-74.
139. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Marine Spatial Planning' https://www.marineandcoasts.vic.gov.au/marine/marine-spatial-planning Accessed 17 October 2024.

DEECA's MSP guidelines identify eight geographic areas where a plan can be undertaken along the Victorian coast, along with the process for implementation. A pilot process could be undertaken at one of these locations where there are multiple stakeholder uses. The pilot could demonstrate the benefits of a holistic, coordinated approach to minimise environmental impacts.

The output of an MSP process is a Marine Plan that helps structure and guide management decisions in the area to which it applies.[140] By initiating an MSP process in coordination with local stakeholders in the proposed area, DEECA can demonstrate how MSP can be implemented and its benefits. This pilot process may then aid those agencies and bodies with marine management responsibilities in prosecuting the case for undertaking subsequent MSP processes in other geographic areas as part of their planning and decision-making.



A seagull looks in the direction of Half Moon Beach in Black Rock.
Credit: Kokkai Ng

140. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Marine Spatial Planning Factsheet', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf

Water quality, catchment inputs and pollution

Recommendation 3: That the Victorian Government coordinate assessments of the performance of marine pollutant loads against the Environment Reference Standard objectives for Corner Inlet, Nooramunga Marine and Coastal Park, and Lake Wellington.

Challenges this recommendation addresses

Reducing total nutrient and sediment loads to coastal waterways remains a key objective of many integrated catchment planning efforts across Victoria. Indeed, the ERS contains several marine nutrient and sediment load objectives.[141] These objectives are provided for Port Phillip Bay, Western Port, Corner Inlet, Nooramunga Marine and Coastal Park, and Lake Wellington in the Gippsland Lakes.

Melbourne Water provides the Commissioner with data on nutrient and sediment loads for Port Phillip Bay and Western Port from its catchment model. These results have been used in this report to assess performance against nutrient and sediment load objectives in the ERS.

However, an assessment of the performance of marine pollutant loads against objectives in the ERS has never been provided for Corner Inlet, Nooramunga Marine and Coastal Park, and Lake Wellington in the Gippsland Lakes.

It is noted that Action 8-25 and Action 8-26 of the Central and Gippsland Region Sustainable Water Strategy have identified this gap, although no timeline is provided to deliver the actions.[142]

Context

The indicators and objectives in the ERS provide a basis for assessment and reporting on environmental conditions in Victoria. These enable an understanding of the current condition of the environment and a basis for assessing actual and potential risks to environmental values by providing a benchmark for comparing desired outcomes to the actual state of the environment. The science-based framework in the ERS supports the legal framework for the EPA, Victorian government, local government, businesses and communities to work together to protect and rehabilitate Victoria's environment.[143]

The ERS is not a compliance standard. The primary function is to provide an environmental assessment and reporting benchmark. However, the *Environment Protection Act 2017* (EP Act) specifically requires EPA to consider the environmental values in the ERS when deciding whether to issue development, operating and pilot project licences, when reviewing operating licences and when deciding whether to issue development and operating licence exemptions and specified prescribed permits.[144]

The West Gippsland Catchment Management Authority published a Water Quality Improvement Plan (WQIP) for Corner Inlet in 2013.[145] Modelling undertaken in the development of the WQIP assessed contributions of major land use categories to the overall end-of-catchment loads to Corner Inlet and Nooramunga and quantified the management actions and land use changes required to achieve nutrient and sediment load targets. These actions were then assessed by their technical feasibility, cost effectiveness and socio-political impact and were evaluated by an expert scientific panel.

The WQIP contained the following three targets each for Corner Inlet and Nooramunga:

- Corner Inlet catchments, at least 15% total nitrogen, 15% total phosphorus, 10% total suspended sediment reduction by 2033.
- Nooramunga catchments, at least 10% total nitrogen, 10% total phosphorus, 5% total suspended sediment reduction by 2033.[146]

141. State Government of Victoria 2021, 'Environment Reference Standard (Environment Protection Act 2017)', https://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf Accessed 9 October 2024.
142. Department of Energy, Environment and Climate Action (DEECA) 2022, 'Central and Gippsland Region Sustainable Water Strategy', https://www.water.vic.gov.au/our-programs/long-term-water-resource-assessments-and-strategies/sustainable-water-strategies/central-and-gipps-sws Accessed 20 January 2025.
143. State Government of Victoria 2021, 'Environment Reference Standard (Environment Protection Act 2017)', https://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf Accessed 9 October 2024.
144. State Government of Victoria 2021, 'Environment Reference Standard (Environment Protection Act 2017)', https://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf Accessed 9 October 2024.
145. West Gippsland Catchment Management Authority (WGCMA) 2013, 'Corner Inlet water quality improvement plan 2013', Traralgon, Victoria, https://wgcma.vic.gov.au/wp-content/uploads/2023/03/corner-inlet-wqipweb.pdf Accessed 9 October 2024.
146. West Gippsland Catchment Management Authority (WGCMA) 2013, 'Corner Inlet water quality improvement plan 2013', Traralgon, Victoria https://wgcma.vic.gov.au/wp-content/uploads/2023/03/corner-inlet-wqipweb.pdf Accessed 9 October 2024.

The level of progress that has been made toward meeting these targets is unclear. The Central and Gippsland Region Sustainable Water Strategy 2022 acknowledged this gap, and the reporting on marine pollution load objectives for Lake Wellington in the Gippsland Lakes, by establishing actions 8-26 and 8-25 respectively, although no timeline is provided to deliver the actions. An assessment of marine pollutant load performance against objectives in the ERS would enable managing authorities to consider interventions to improve environmental outcomes for those coastal areas.

Recommendation 4: That the Victorian Government extends the existing land-based Australian Litter Measure program to establish a litter monitoring framework for all litter types, including microplastics, along the entire litter transport pathway, including marine ecosystems.

Challenges this recommendation addresses

Litter remains a growing issue in Victoria, causing many environmental and economic impacts, with plastic pollution (including microplastics) being one of the greatest threats to the health of our marine ecosystems and wildlife.[147] Litter pollutes and degrades land, water and food webs and poses a risk to human and animal health. Entanglements and the ingestion of litter, especially microplastics, are a threat to the survival of marine species and populations globally.[148, 149] Cleaning up litter is also costly.

Victoria does not have a single, statewide litter policy or strategy, and litter is managed in an ad hoc manner across agencies, mainly local government and water corporations.[150] Accordingly, there is a lack of coordination on litter data across the state, and no analysis of the effectiveness of actions undertaken by the various agencies and organisations committed to improving litter impacts. These issues prevent a comprehensive evidence-based evaluation of the extent, composition, sources, transport and impacts of litter in the Victoria's marine and coastal environments, and across the state more broadly.

Context

Litter data are currently collected by government under the Australian Litter Measure (AusLM) approach and litter trap audits, with the AusLM surveys serving as the basis for understanding the extent of litter in Victoria. However, these data sources have several limitations that hinder more detailed analyses and understanding of the state's litter issue, specifically 'how much?', 'where does it come from?', 'where is it going?' and 'what are its impacts?'.

The AusLM provides valuable data in terms of the number and densities of litter items and their composition. However, the below methodological approaches result in knowledge gaps regarding the four key questions above:

- Terrestrial-based survey design: the state's waterways, marine waters and sediments are not represented, thereby, excluding key litter sources, conduits of transport and deposition sites
- Urban focused: no surveys are undertaken within 'natural litter trap' environments (e.g. mangroves, saltmarshes and macroalgae communities) where litter is transported to and accumulates
- Limited in survey coverage of the coastal environment: four beach sites are surveyed along the state's 2,500-km coastline
- Excludes microplastics: plastic fragments smaller than 2.5 cm are not counted and included in analyses
- Utilises a standing stock visual count: litter is not collected during the surveys
- No evaluation of ecological impacts: entanglement records are collected but not included in litter reports, while impacts related to ingestion are not collected.

Victorian local governments undertake annual litter trap audits and provide data to DEECA. Although litter trap audits have the potential for providing vital information on litter loads, composition and sources, there are spatial and temporal gaps in the collected data that impact on its quality and utility for informing on the extent, source and transport of litter in the state. Furthermore, reporting is

147. Commonwealth of Australia 2024, 'Australia's draft Sustainable Ocean Plan', Commonwealth of Australia, Canberra, Australian National Territory.
148. McIntosh RR, Sorrell KJ, Thalmann S, Mitchell T, Gray R, Schnagl H, Arnould JPY, Dann P, Kirkwood R 2022, 'Sustained reduction in numbers of Australian fur seal pups: implications for future population monitoring', *PLOS ONE*, 17, e0265610.
149. Whitmarsh SK, Porskamp P, Tinkler P, Gray S, Howe S, Ierodiaconou D, Sams MA, Young MA 2023, 'An integrated monitoring program for Cape Howe Marine National Park, Parks Victoria Technical Series No 119, Parks Victoria (PV), Melbourne, Victoria.
150. In 2023, the Victorian Government introduced a container deposit scheme and a ban on single-use plastics, both of that are likely to have a positive impact on litter outcomes.

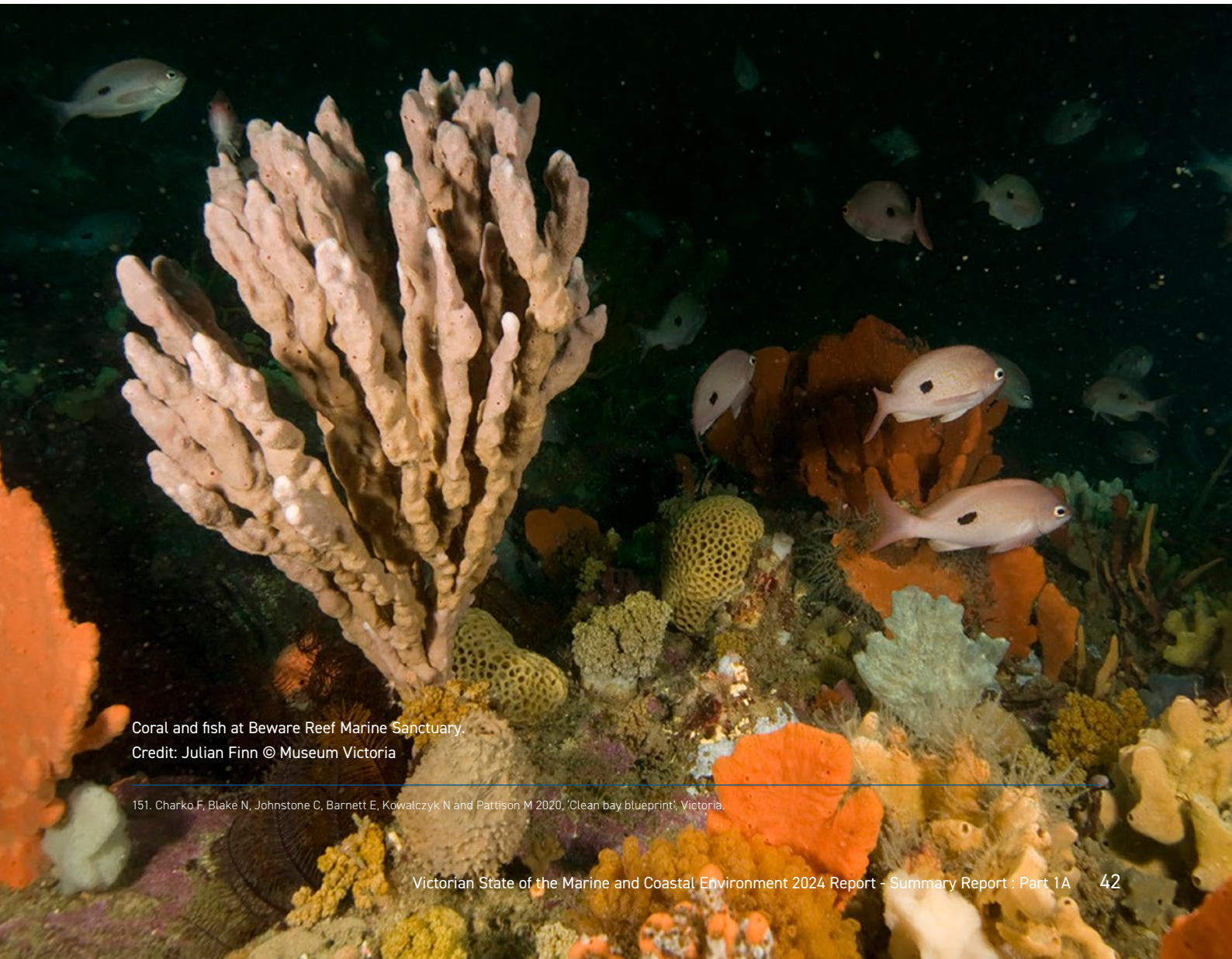
voluntary, and not all local governments report litter trap data annually, no standard methodologies are used, and data are limited to volumes, while litter composition not included.

Litter trap data are also impacted by the design of litter traps, as conventional traps are often ineffective for capturing microplastics and other small litter items.[151] Importantly, litter trap data are not published but are retained for the development of a long-term dataset that may potentially be used in the future. Access to this data in the short-term would aid decision-making.

Government-led litter monitoring is also complemented by litter data derived from non-government sources, but these are often one-off studies undertaken at the local scale that are not replicated for time-series analysis and/or employ methods that enable integration with government monitoring programs.

Another gap is data relating to litter impacts on Victoria's marine and coastal wildlife. DEECA does collect records of entanglements although these are limited to cetaceans and are not publicly available or regularly included within published reports. Furthermore, whether and how these data are used for informing litter policies and programs is unclear. Data on other impacts, such as ingestion, are absent from the state's existing monitoring approach.

The proposed litter framework would lead to publicly released reporting that includes data analysis with interpretation on litter volume, composition, land- and marine-based sources, litter transport modelling, trends and impacts, the locations of existing and emerging litter hotspots, and the outcomes of actions to reduce litter loads.



Coral and fish at Beware Reef Marine Sanctuary.
Credit: Julian Finn © Museum Victoria

151. Charko F, Blake N, Johnstone C, Barnett E, Kowalczyk N and Pattison M 2020, 'Clean bay blueprint', Victoria.

Recommendation 5: That EPA Victoria improves publicly available reporting on marine water quality and associated impacts, near coastal discharges.

Challenges this recommendation addresses

High concentrations of nutrients, pathogens, microplastics, and organic and inorganic pollutants from waterways and other discharges can threaten coastal ecology, biodiversity and affect the health of marine environment users, depending on the sensitivity of the receiving environment.[152]

The discharge of treated wastewater from 18 coastal outfalls is regulated and regularly monitored by the responsible agencies to ensure compliance with licence conditions. However, there is very limited publicly available information on marine water quality beyond Port Phillip Bay, Western Port and the Gippsland Lakes. The treated wastewater coastal outfalls and waterways that discharge to marine environments across the Victorian coastline beyond these three areas represent gaps in publicly available information on the impacts of discharges to marine environments.

Context

The discharge of treated wastewater from 18 coastal outfalls is regulated and regularly monitored by the responsible agencies to ensure compliance with licence conditions. This monitoring includes data collection outside the mixing zones to establish background readings. Each outfall is licensed by EPA Victoria and must satisfy several licence conditions, with outfall operators submitting Permission Information and Performance Statements when requested by EPA Victoria.

There are requirements in the *Environment Protection Act 2017* to manage urban stormwater and minimise harm to human health and the environment; these include the 'general environmental duty' and the 'obligations of managers of land or infrastructure'. Additionally, the EPA has published Urban Stormwater Management Guidance and local governments produce stormwater management plans.

EPA Victoria summarises the latest environmental water quality in Port Phillip Bay, Western Port and the Gippsland Lakes and their catchment waterways in an annual report card.[153] These report cards encompass water quality monitoring completed by EPA Victoria, Melbourne Water and DEECA. In the report cards, key indicators of water quality are assessed against Victorian environmental quality objectives for relevant indicators in the Environment Reference Standard (ERS).[154] Future annual report cards could include a section summarising water quality and associated impacts around other coastal discharges and outfalls.

The adoption of a risk-based approach to improve publicly available reporting — where priority locations are identified for improving marine water quality and reducing associated impacts, near coastal outfalls and discharges — would enable better decision-making in the most critical areas along the Victorian coast.

152. Rohmana QA, Fischer A, 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.
153. Environment Protection Authority (EPA) Victoria, 'Report Card', https://www.epa.vic.gov.au/for-community/monitoring-your-environment/monitoring-victorias-water-quality/report-card Accessed 9 October 2024.
154. State Government of Victoria 2021, 'Environment Reference Standard (Environment Protection Act 2017)', https://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf Accessed 9 October 2024.



Credit: Julian Finn © Museum Victoria

Tourism

Recommendation 6: That DEECA evaluates the process used to develop the Great Ocean Road Strategic Framework Plan (when completed) to identify and develop similar plans to manage tourism more broadly across Victorian coastal regions.

Challenges this recommendation addresses

Tourism is a valuable source of jobs and revenue for Victorian coastal communities. The natural environment is an important asset for attracting tourists. Although tourism provides an economic benefit for many coastal communities, the number and behaviours of tourists can potentially have negative impacts on these environments, and for communities themselves in some cases.

Currently, there appears to be limited links between tourism growth policies, visitor management and/or environmental management strategies.[155] This has the potential to lead to management conflicts and a lack of policy coherence.

Context

The Great Ocean Road region provides an example of adverse results arising from a lack of coordination and coherence between tourism promotion and visitor management, with community feedback suggesting that marketing and promotion have added to visitor congestion and created infrastructure and local environmental challenges.[156]

Recognising the challenge of increased visitor numbers and the impacts of climate change, an independent review of governance arrangements for the Great Ocean Road was undertaken in 2018. The Great Ocean Road Taskforce Co-Chairs Report identified the importance not only of a sustainable visitation management plan, but also of having a single point of accountability to lead the protection of the area and facilitate sustainable tourism to provide a great visitor experience.[157, 158, 159]

Subsequently, the Great Ocean Road Coast and Parks Authority was formed in 2020, taking on responsibility for the management of public land along the Great Ocean Road and simplifying governance previously shared across 30 responsible organisations. Among other things, this includes having responsibilities for both the promotion of visitation, and protection and management of the natural environment.[160] This arrangement allows for the holistic and balanced management of what may otherwise be potentially conflicting objectives. Additionally, the Great Ocean Road Strategic Framework Plan currently under development and authorised through the *Great Ocean Road and Environs Protection Act 2020* will include a Visitor Management Framework to guide tourism investment and direct this to appropriate locations.[161, 162]

The Plan and Framework will provide valuable experience and learnings from creating links between tourism growth policies, visitor management and environmental management in the Great Ocean Road region and could guide how such links may be established in other key tourism regions in Victoria.

155. Commissioner for Environmental Sustainability (CES) Victoria 2021, 'State of the Marine and Coastal Environment 2021 Report — Scientific Assessments', p. 430, Melbourne, Victoria.
156. Department of Transport and Planning (DTP), personal communication 3 September 2024.
157. Department of Environment, Land, Water and Planning (DELWP) 2018, 'Protecting our iconic coasts and parks, Governance of the Great Ocean Road, its land and seascapes. Independent Co-Chairs Final Report', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0026/630188/GreatOceanRoad_FinalReport_web.pdf
158. Department of Environment, Land, Water and Planning (DELWP) 2018, 'Protecting our iconic coasts and parks, Governance of the Great Ocean Road, its land and seascapes. Independent Co-Chairs Final Report', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0026/630188/GreatOceanRoad_FinalReport_web.pdf
159. Department of Environment, Land, Water and Planning (DELWP) 2018, 'Protecting our iconic coasts and parks, Governance of the Great Ocean Road, its land and seascapes. Independent Co-Chairs Final Report', Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0026/630188/GreatOceanRoad_FinalReport_web.pdf
160. Great Ocean Road Coast and Parks Authority 2023, 'Annual report 2022–23', Torquay, Victoria, pp 39.
161. This is required under the Great Ocean Road and Environs Protection Act 2020; this is also the act under that the Great Ocean Road Coast and Parks Authority was established.
162. Department of Transport and Planning (DTP), personal communication 3 September 2024.

Recommendations in summary

Table 1 provides a summary of the seven recommendations made in this report. The summary describes each recommendation in full and:

- the theme to which the recommendation relates to
- the challenges the recommendation aims to overcome.

Table 1: Summary of SMCE 2024 recommendations and the challenges addressed, by theme.

Lead theme: Climate change and spatial planning	
Recommendation 1	**That DEECA updates statewide coastal inundation spatial layers.**
Challenges this recommendation addresses	Sea level rise is one of the most significant threats to coastal areas associated with climate change. Coastal communities in Victoria are already experiencing some of the impacts associated with sea level rise. These impacts are expected to intensify this century and include: • more frequent and extensive inundation of low-lying areas, with the impacts exacerbated by storm surges • loss of coastal habitat, such as roosting and nesting sites for shorebirds and seabirds • accelerated cliff retreat and shoreline recession • altered saltmarsh and mangrove habitats[163] Without successful flood risk mitigation, future increases in coastal flooding will lead to coastal floods occurring more often.[164, 165] The Victorian Coastal Inundation Dataset is a digital dataset consisting of eight spatial layers modelling the extent of land subject to coastal inundation due to projected sea level rise from 2009 to 2100.[166] This is the current dataset being used by the Victorian Government to plan for sea level rise. It projects an 82 cm sea level rise by 2100 but it is 15 years old and requires updating using contemporary data to inform decision making. Action 3.9 of the Victorian Marine and Coastal Strategy committed to reviewing and updating planning benchmarks in line with IPCC reports by 2023. The new benchmarks have not been announced yet.
Recommendation 2	**That DEECA collaborates with stakeholders to undertake a pilot marine spatial planning process to build knowledge and capacity for implementing marine spatial planning and to demonstrate its benefits.**
Challenges this recommendation addresses	Marine spatial planning (MSP) offers important benefits, including 'proactively identifying and reducing conflicts between uses, and between uses and natural values, to help protect economic, social, cultural, and environmental values linked to the marine environment.' [167] Importantly, it allows for coordinated and 'joined-up' decision making in place of management decisions being taken in isolation by individual agencies. Substantial work has been undertaken to develop a process for MSP in Victoria.The process for initiating, approving and undertaking MSP is outlined in the Marine Spatial Planning Framework, and the Marine and Spatial Planning Guidelines provide instructions for undertaking an MSP process in a marine planning area.[168, 169] However, as a pilot process has not been undertaken yet, several components necessary for MSP implementation remain untested, including to: • identify who should lead an MSP process • determine an appropriate governance structure • identify appropriate mechanism(s) for undertaking MSP • resolve funding.[170] A pilot process could test these guidelines to identify and resolve any outstanding issues with the MSP process.

163. Victorian Coastal Council (VCC) 2018, 'Victoria's coast and marine environments under projected climate change: impacts, research gaps and priorities', Williamstown, Victoria.
164. Hague BS, Grayson RB, Talke SA, Black MT, Jakob D 2023, 'The effect of tidal range and mean sea-level changes on coastal flood hazards at Lakes Entrance, south-east Australia', *Journal of Southern Hemisphere Earth Systems Science*, 73(2), 116–130. https://doi.org/10.1071/ES22036 Accessed 18 March 2024.
165. Hague BS, Talke SA 2024, 'The influence of future changes in tidal range, storm surge, and mean sea level on the emergence of chronic flooding', *Earth's Future*, 12, e2023EF003993 https://doi.org/10.1029/2023EF003993 Accessed 18 March 2024.
166. Data Vic, 'Victorian Coastal Inundation' https://discover.data.vic.gov.au/dataset/victorian-coastal-inundation Accessed 9 October 2024.
167. Department of Energy, Environment and Climate Action (DEECA) 2023, 'Marine Spatial Planning Factsheet' Melbourne Victoria https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf
168. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Marine Spatial Planning' https://www.marineandcoasts.vic.gov.au/marine/marine-spatial-planning Accessed 17 October 2024.
169. https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0024/514581/Implementing-Marine-Spatial-Planning-in-Victoria-Fact-Sheet-PDF,-390-KB.pdf
170. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Marine Spatial Planning' https://www.marineandcoasts.vic.gov.au/marine/marine-spatial-planning Accessed 17 October 2024.

Lead theme: Water quality, catchment inputs and pollution	
Recommendation 3	**That the Victorian Government coordinate assessments of the performance of marine pollutant loads against the Environment Reference Standard objectives for Corner Inlet, Nooramunga Marine and Coastal Park, and Lake Wellington.**
Challenges this recommendation addresses	Reducing total nutrient and sediment loads to coastal waterways remains a key objective of many integrated catchment planning efforts across Victoria. Indeed, the Environment Reference Standard (ERS) contains several marine nutrient and sediment load objectives.[171] These objectives are provided for Port Phillip Bay, Western Port, Corner Inlet, Nooramunga Marine and Coastal Park, and Lake Wellington in the Gippsland Lakes. Melbourne Water provides the Commissioner with data on nutrient and sediment loads for Port Phillip Bay and Western Port from its catchment model. These results have been used in this report to assess performance against nutrient and sediment load objectives in the ERS. However, an assessment of the performance of marine pollutant loads against objectives in the ERS has never been provided for Corner Inlet, Nooramunga Marine and Coastal Park, and Lake Wellington in the Gippsland Lakes. It is noted that Action 8-25 and Action 8-26 of the Central and Gippsland Region Sustainable Water Strategy have identified this gap, although no timeline is provided to deliver the actions.[172]
Recommendation 4	**That the Victorian Government extends the existing land-based Australian Litter Measure program to establish a litter monitoring framework for all litter types, including microplastics, along the entire litter transport pathway, including marine ecosystems.**
Challenges this recommendation addresses	Litter remains a growing issue in Victoria, causing many environmental and economic impacts, with plastic pollution (including microplastics) being one of the greatest threats to the health of our marine ecosystems and wildlife.[173] Litter pollutes and degrades land, water and food webs and poses a risk to human and animal health. Entanglements and the ingestion of litter, especially microplastics, are a threat to the survival of marine species and populations globally.[174, 175] Cleaning up litter is also costly. Victoria does not have a single, statewide litter policy or strategy, and litter is managed in an ad hoc manner across agencies, mainly local government and water corporations.[176] Accordingly, there is a lack of coordination on litter data across the state, and no analysis of the effectiveness of actions undertaken by the various agencies and organisations committed to improving litter impacts. These issues prevent a comprehensive evidence-based evaluation of the extent, composition, sources, transport and impacts of litter in the Victoria's marine and coastal environments, and across the state more broadly.
Recommendation 5	**That EPA Victoria improves publicly available reporting on marine water quality, and associated impacts, near coastal discharges.**
Challenges this recommendation addresses	High concentrations of nutrients, pathogens, microplastics, and organic and inorganic pollutants from waterways and other discharges can threaten coastal ecology, biodiversity and affect the health of marine environment users, depending on the sensitivity of the receiving environment.[177] The discharge of treated wastewater from 18 coastal outfalls is regulated and regularly monitored by the responsible agencies to ensure compliance with licence conditions. However, there is very limited publicly available information on marine water quality beyond Port Phillip Bay, Western Port and the Gippsland Lakes. The treated wastewater coastal outfalls and waterways that discharge to marine environments across the Victorian coastline beyond these three areas, represent gaps in publicly available information on the impacts of discharges to marine environments.

171. State Government of Victoria 2021, 'Environment Reference Standard (Environment Protection Act 2017)', https://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf Accessed 9 October 2024.
172. Department of Energy, Environment and Climate Action (DEECA) 2022, 'Central and Gippsland Region Sustainable Water Strategy', https://www.water.vic.gov.au/our-programs/long-term-water-resource-assessments-and-strategies/sustainable-water-strategies/central-and-gipps-sws Accessed 20 January 2025.
173. Commonwealth of Australia 2024, 'Australia's draft Sustainable Ocean Plan', Commonwealth of Australia, Canberra, Australian National Territory.
174. Tulloch V, Pirotta V, Grech A, Crocetti S, Double M, How J, Kemper C, Meager J, Peddemors V, Waples K, Watson M 2020, 'Long-term trends and a risk analysis of cetacean entanglements and bycatch in fisheries gear in Australian waters', *Biodiversity and Conservation*, 29, pp. 251–282.
175. Stamation K, Watson M 2022, 'Supporting the recovery of the Southern Right Whale in eastern Australia: recommendations for threat mitigation, research and stakeholder engagement', Arthur Rylah Institute for Environmental Research (ARI) Technical Report Series No. 362, Department of Energy, Environment and Climate Action (DEECA), Heidelberg, Victoria.
176. In 2023, the Victorian Government introduced a container deposit scheme and a ban on single-use plastics, both of that are likely to have a positive impact on litter outcomes.
177. Rohmana QA, Fischer A, 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.

Australian fur seal.
Credit: Julian Finn © Museum Victoria

Lead theme: Tourism	
Recommendation 6	**That DEECA evaluates the process used to develop the Great Ocean Road Strategic Framework Plan (when completed) to identify and develop similar plans to manage tourism more broadly across Victorian coastal regions.**
Challenges this recommendation addresses	Tourism is a valuable source of jobs and revenue for Victorian coastal communities. The natural environment is an important asset for attracting tourists. Although tourism provides an economic benefit for many coastal communities, the number and behaviours of tourists can potentially have negative impacts on these environments, and for communities themselves in some cases. Currently, there appears to be limited links between tourism growth policies, visitor management and/or environmental management strategies.[178] This has the potential to lead to management conflicts and a lack of policy coherence.

178. Commissioner for Environmental Sustainability (CES) Victoria 2021, 'State of the Marine and Coastal Environment 2021 Report — Scientific Assessments', p. 430, Melbourne, Victoria.

Indicator assessment dashboard

The indicator assessment dashboard provides a high-level overview of the status, trend and confidence assessments for all 82 SMCE 2024 indicators followed by the indicator assessment report cards. Some indicators have multiple assessments — for example, for multiple regions — therefore the total number of assessments exceeds the total number of indicators. A total of 228 status assessments, 227 trend assessments and 232 confidence assessments were completed for the 82 SMCE 2024 indicator suite.

Overall summary of status assessments

Status assessments were made for 75 of the 82 SMCE 2024 indicators and resulted in a total of 228 assessments (Table 2). Overall, there were slightly more status assessments rated as good (24%) than poor (20%). Many more assessments were rated as fair (35%), with the remainder (21%) rated as unknown (Figure 3).

When considering the status assessments by theme, indicators within the 'Climate and climate change impacts' theme have the lowest performance. Thirty-three percent of 'Climate and climate change impacts' status assessments have a poor ranking, with no assessments for that theme rated as good.

The 'Biodiversity' theme has the second highest proportion of status assessments rated as poor (26%).

The 'Stewardship and collaborative management' theme had the best performance, with 67% of the status assessments for that theme ranking as good. This was the only theme that had more than half of the status assessments rated as good.

Notably, the 'Litter and pollution' theme had the highest proportion of knowledge gaps, with 40% of status assessments for this theme being rated as unknown. For the 'Litter and pollution' theme, unknown status assessments included marine noise, and litter and plastics beyond Port Phillip Bay.

Table 2: Summary of status assessments for SMCE 2024 indicators by theme.

Theme	Good	Fair	Poor	Unknown	Total
Water quality and catchment inputs	9	11	2	9	31
Litter and pollution	1	3	2	4	10
Biodiversity	21	27	26	25	99
Seafloor integrity and health	8	10	10	7	35
Pests and invasive species	5	7	1	1	14
Climate and climate change impacts	0	8	5	2	15
Managing coastal hazard risks[1]	1	2	0	0	3
Communities[1]	5	10	0	0	15
Stewardship and collaborative management[1]	4	1	0	1	6
Total	54	79	46	49	228

[1] These themes collectively have seven indicators that have narratives only because a status assessment is not appropriate for these indicators. Thus, they have not been included in the overall analysis.

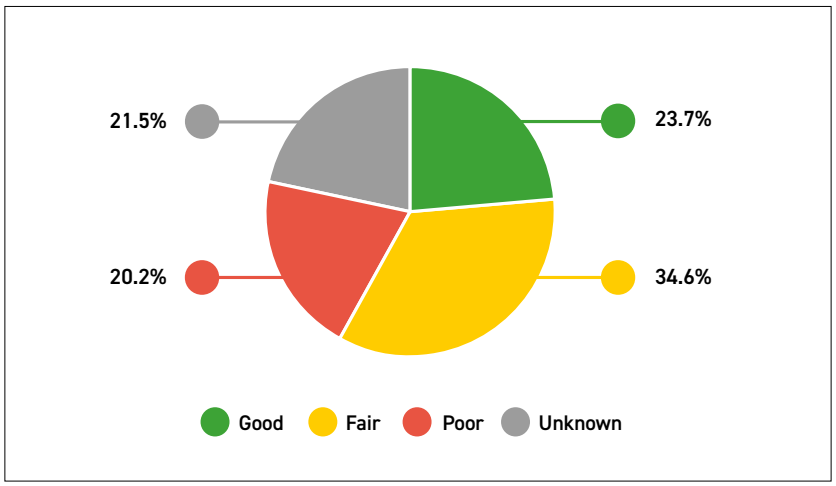


Figure 3: Proportional breakdown of status assessments for SMCE 2024 indicators.

Overall summary of trend assessments

Trend assessments were made for 74 of the 82 SMCE 2024 indicators and resulted in a total of 227 assessments (Table 3). One third (33%) of the trend assessments were rated as unclear, highlighting a limited evidence base to determine trends for several indicators. Only 12% of trend assessments were rated as improving, compared to 26% rated as deteriorating (Figure 4).

Similarly to the overall summary of status assessments, 'Climate and climate change impacts' is the worst performing theme for trend assessments. Nearly three quarters (73%) of all 'Climate and climate change impacts' trend assessments were rated as deteriorating. This was more than twice as many as the next lowest performing theme, 'Biodiversity', with 32% of trend assessments rated as deteriorating. 'Climate and climate change impacts' was also the only theme without any trend assessments rated as improving. This theme also had no trend assessments rated as stable; the trend assessments for the 'Climate and climate change impacts' theme were rated as deteriorating (73%) or unclear (27%).

The best performing theme for trend assessments was the 'Stewardship and collaborative management' theme. Half (50%) of the trend assessments for this theme were rated as improving.

Table 3: Summary of trend assessments for SMCE 2024 indicators by theme.

Theme	Improving	Stable	Deteriorating	Unclear	Total
Water quality and catchment inputs	2	8	4	17	31
Litter and pollution	1	3	2	4	10
Biodiversity	7	25	32	35	99
Seafloor integrity and health	6	9	10	10	35
Pests and invasive species	3	6	1	4	14
Climate and climate change impacts	0	0	11	4	15
Managing coastal hazard risks[1]	1	0	0	2	3
Communities[1]	4	10	0	0	14
Stewardship and collaborative management[1]	3	3	0	0	6
Total	27	64	60	76	227

[1] These themes collectively have eight indicators that have narratives only because a trend assessment is not appropriate for these indicators. Thus, they have not been included in the overall analysis.

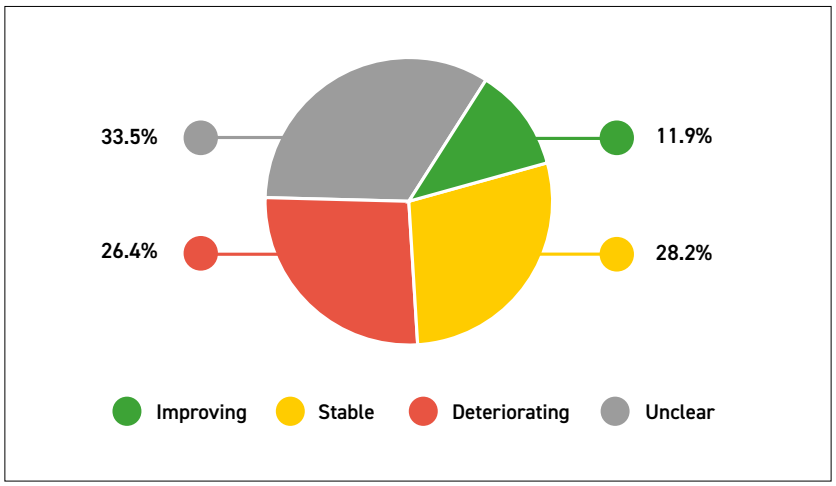


Figure 4: Proportional breakdown of trend assessments for SMCE 2024 indicators.

Overall summary of confidence assessments

Confidence assessments were made for 79 of the 82 SMCE 2024 indicators and resulted in a total of 240 assessments (Table 4). More than one third (40%) of the confidence assessments were rated as low or insufficient. Only 22% of status and trend assessments in this report were made with high confidence (Figure 5).

Comparing confidence assessments by theme can be used to identify themes with a higher proportion of knowledge gaps. Low and insufficient confidence assessments rankings highlight areas for which there is a limited evidence base for determining status and trend.

More than half of the confidence assessments for the 'Seafloor integrity and health' (60%) and 'Litter and pollution' (60%) themes were rated as low or insufficient. Conversely, none of the confidence assessments for the 'Communities' theme were rated as low or insufficient — all confidence assessments for this theme were rated as high or moderate.

Table 4: Summary of confidence assessments for SMCE 2024 indicators by theme.

Theme	High	Moderate	Low	Insufficient	Total
Water quality and catchment inputs	10	8	10	8	36
Litter and pollution	0	4	2	4	10
Biodiversity	29	31	15	24	99
Seafloor integrity and health	2	12	15	6	35
Pests and invasive species	2	7	4	1	14
Climate and climate change impacts	3	9	4	2	18
Managing coastal hazard risks[1]	0	3	1	0	4
Communities[1]	5	13	0	0	18
Stewardship and collaborative management[1]	1	4	1	0	6
Total	52	91	52	45	240

[1]These themes collectively have three indicators that have narratives only because a confidence assessment is not appropriate for these indicators. Thus, they have not been included in the overall analysis.

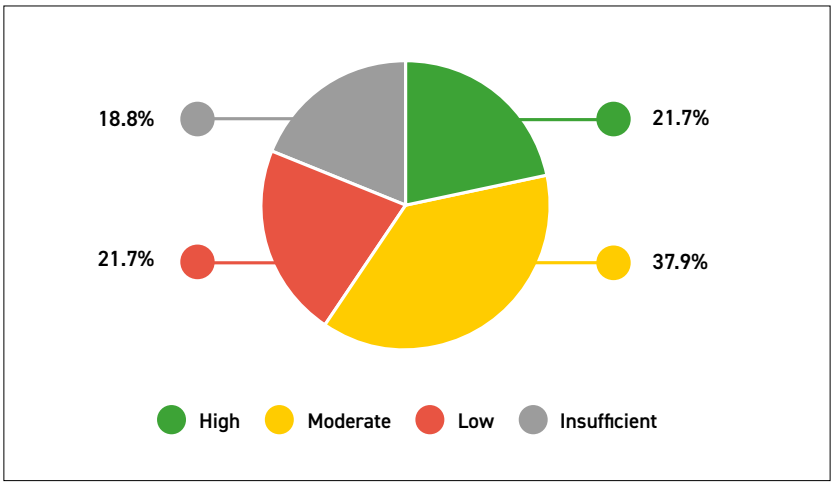


Figure 5: Proportional breakdown of confidence assessments for SMCE 2024 indicators.

Indicator assessment report cards

Key to report cards

The colour and symbol keys for the indicator assessment report cards are as follows:

Key to status



Good



Fair



Poor



Unknown



Narrative but not assessed



Not applicable

Key to trend



Improving



Stable



Deteriorating



Unclear



Narrative but not assessed



Not applicable

Key to confidence



High



Moderate



Low



Insufficient



Narrative but not assessed



Not applicable

Key to extent of information

- SW: statewide marine and coast
- GHCMA: Glenelg Hopkins Catchment Management Authority
- CCMA: Corangamite Catchment Management Authority
- PPWCMA: Port Phillip and Westernport Catchment Management Authority
- WGCMA: West Gippsland Catchment Management Authority
- EGCMA: East Gippsland Catchment Management Authority
- GDB: Glenelg-Discovery Bay biounit
- SC: Shipwreck Coast biounit
- PPH: Port Phillip Heads biounit
- PPB: Port Phillip Bay biounit
- ScWo: Schanck-Woolamai biounit
- WP: Western Port biounit
- WPW: Wilsons Prom West biounit
- CIN: Corner Inlet-Nooramunga biounit complex
- GL: Gippsland Lakes biounit
- GH: Gabo-Howe biounit
- MPA: marine protected area



Thirteenth Beach near Barwon Heads from Breamlea on a hot summer's day in Victoria, Australia. Credit: FiledIMAGE

Water quality and catchment inputs

01: Water quality (physicochemical)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
CIN						
GL	 (Lake King, Lake Victoria)  (Lake Wellington)	 (Lake King, Lake Victoria)  (Lake Wellington)		 (Lake King, Lake Victoria)  (Lake Wellington)		

02: Toxicants

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						(status) (trend)
CIN						
GL						(status) (trend)

03: Water quality (estuaries)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A			(status) (trend)
GHCMA			(status) (trend)	–	–	–
CCMA			(status) (trend)	–	–	–
PPWCMA			(status) (trend)	–	–	–
WGCMA			(status) (trend)	–	–	–
EGCMA			(status) (trend)	–	–	–
PPB	N/A	N/A	N/A			(status) (trend)
WP	N/A	N/A	N/A			(status) (trend)
CIN	N/A	N/A	N/A			(status) (trend)
GL	N/A	N/A	N/A			(status) (trend)

04: Plankton

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A	N	N	N
PPB						
WP						
CIN						
GL	 (Lake Victoria, Lake Wellington)  (Lake King)			 (Lake King, Lake Victoria)  (Lake Wellington)	 (Lake King, Lake Victoria)  (Lake Wellington)	

05: Enterococci bacteria

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						

06: Regulated point source discharges to marine waters

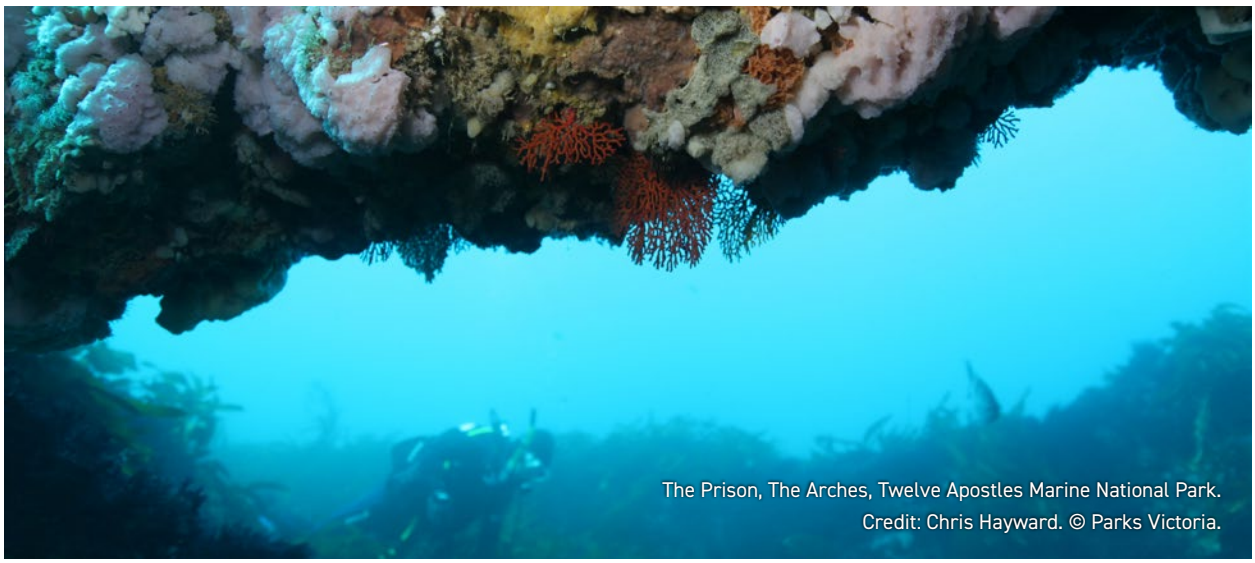
Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			

07: Stormwater

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB			(status) (trend)			(status) (trend)
WP			(status) (trend)			(status) (trend)
CIN						
GL						

08: Total nutrient loads

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP	N/A	N/A	N/A			(status) (trend)
CIN						(status) (trend)
GL						



The Prison, The Arches, Twelve Apostles Marine National Park.
Credit: Chris Hayward. © Parks Victoria.

09: Total sediment loads

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
CIN						
GL	N/A	N/A	N/A	(Lake King, Lake Victoria) (Lake Wellington)		

10: Coastal acid sulfate soils

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			

Litter and pollution

11: Litter and plastics

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						

12a: Light pollution

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			

12b: Marine noise

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				New SMCE 2024 indicator	New SMCE 2024 indicator	New SMCE 2024 indicator

13: Coastal contaminated land

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
CIN						
GL						
Other coastal locations				–	–	–

14: Coastal air quality

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB				 (ozone, nitrogen dioxide, carbon monoxide and sulfur dioxide)  (fine particle pollution)		 (near shipping terminals)  (elsewhere)
WP						
CIN						
GL				(fine particle pollution during bushfire periods) (all other times)		(during bushfires) (all other times)

Biodiversity

15: Conservation of coastal ecosystems in protected areas

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

16: Coastal saltmarsh

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
PPH				–	–	–
WP						
CIN				 (Nooramunga islands)  (Corner Inlet and Nooramunga)		
GL						

17: Mangroves

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						

18: Wetland and estuarine vegetation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A	(estuarine flora) (wetland extent) (condition of paperbark-dominated wetlands)		(estuarine flora) (wetland extent and condition of paperbark-dominated wetlands)

19: Marine- and coastal-dependent species of conservation value

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

20: Mobile invertebrates on intertidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (Point Addis Marine National Park)	?	?	?	–	–	–
MP (Point Danger Marine Sanctuary)	?	?	?	–	–	–
MPA (Barwon Bluff Marine Sanctuary)	?	?	?	–	–	–
MPA (Port Phillip Heads Marine National Park)	?	?	?	● [1]	→ [1]	● [1]
MPA (Point Cooke Marine Sanctuary)	?	?	?	● [1]	→ [1]	● [1]
MPA (Jawbone Marine Sanctuary)	?	?	?	● [1]	→ [1]	● [1]
MPA (Ricketts Point Marine Sanctuary)	?	?	?	● [1]	→ [1]	● [1]
MPA (Mushroom Reef Marine Sanctuary)	?	?	?	–	–	–
MPA (Bunurong Marine National Park)	?	?	?	–	–	–

[1] The 2021 assessment was presented under the Port Phillip Bay Biounit in the SMCE 2021 Report. However, as the assessment is based on data for MPAs, the 'extent of information' has been changed to 'MPA' in this SMCE 2024 Report.

21: Sessile invertebrates on intertidal reefs						
Extent of information	**2024 status**	**2024 trend**	**2024 confidence**	**2021 status**	**2021 trend**	**2021 data quality**
MPA (Point Addis Marine National Park)	?	?	?	–	–	–
MP (Point Danger Marine Sanctuary)	?	?	?	–	–	–
MPA (Barwon Bluff Marine Sanctuary)	?	?	?	–	–	–
MPA (Port Phillip Heads Marine National Park)	?	?	●	●[1]	→[1]	●[1]
MPA (Point Cooke Marine Sanctuary)	?	?	?	●[1]	→[1]	●[1]
MPA (Jawbone Marine Sanctuary)	?	?	?	●[1]	→[1]	●[1]
MPA (Ricketts Point Marine Sanctuary)	?	?	?	●[1]	→[1]	●[1]
MPA (Mushroom Reef Marine Sanctuary)	?	?	?	–	–	–
MPA (Bunurong Marine National Park)	?	?	?	–	–	–

[1] The 2021 assessment was presented under the Port Phillip Bay Biounit in the previous SMCE Report.

22: Invertebrates on subtidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB	 (reef invertebrates)  (short-spined sea urchins)	 (reef invertebrates)  (short-spined sea urchins)	 (reef invertebrates)  (short-spined sea urchins)	 (north)	 (north)  (south)	
WP				–	–	–
MPA (Discovery Bay Marine National Park)				–	–	–
MPA (Point Addis Marine National Park)						
MPA (Port Phillip Heads Marine National Park)				–	–	–
MPA (Wilsons Promontory Marine National Park)				–	–	–
MPA (Cape Howe Marine National Park)				–	–	–

23a: Southern calamari

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

23b: Blacklip abalone

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

23c: Greenlip abalone

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

23d: Southern rock lobster

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

23e: Giant crab

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
West of Bass Strait				–	–	–

23f: Commercial scallop

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW[1]				–	–	–
PPB						

[1] This assessment is based on the Victorian Ocean Scallop Fishery, which extends out from the coastline to 20 nautical miles.

24a: Snapper

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
South Australian border to Wilsons Promontory				–	–	–
PPB						
WP						

24b: King George whiting

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						

24c: Southern sand flathead

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						

24d: Black bream

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GL						

24e: Rock flathead

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
CIN						

24f: Bluethroat and purple wrasse

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

24g: Dusky flathead

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GL						
Lake Tyers				–	–	–
Mallacoota Inlet				–	–	–

25: Subtidal reef fish

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (SW)	N/A	N/A	N/A			
MPA (Discovery Bay Marine National Park)				–	–	–
MPA (Point Addis Marine National Park)				–	–	–
MPA (Port Phillip Heads Marine National Park)				(north)[1] (south)[1]	(north)[1] (south)[1]	[1]
MPA (Wilsons Promontory Marine National Park)				–	–	–
MPA (Cape Howe Marine National Park)				–	–	–

[1] The 2021 assessment for the Port Phillip Bay assessment was based on the aggregation of data for Port Phillip Heads Marine National Park and marine sanctuaries within the bay whereas the 2024 assessment is based only on Port Phillip Heads Marine National Park monitoring data under the SHP program. As a result, the status and trend assessments vary and direct comparisons between years cannot be assessed.

26: Diadromous fish

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				?	?	?
GDB (Ramsar site)				–	–	–
PPB (Ramsar site)				N[1]	N[1]	N[1]
WP (Ramsar Site)				N[1]	N[1]	N[1]
GL (Ramsar Site)				N[1]	N[1]	N[1]

[1] Changes in the geographic scope across SMCE reports has enabled status and trend assessments to be undertaken in 2024.

27: Marine and coastal waterbirds

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW (hooded plover)				–	–	–
SW (Australian fairy tern)				–	–	–
GDB (Ramsar site)				–	–	–
PPB (seabirds)				–	–	–
PPB (coastal waterbirds)						
WP (Ramsar site)						
CIN (Ramsar site)						
GL (Ramsar site)						

28: Migratory shorebirds

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
GDB (Ramsar Site)				–	–	–
PPB						
WP (Ramsar Site)						
CIN (Ramsar Site)						
GL (Ramsar Site)						

29: Piscivorous (fish-eating) birds

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GDB (Ramsar Site)				–	–	–
PPB						
WP (Ramsar Site)				 (WP biounit)	 (WP biounit)	 (WP biounit)
CIN (Ramsar Site)				 (CIN biounit complex)	 (CIN biounit complex)	 (CIN biounit complex)
GL (Ramsar Site)				–	–	–

30: Little penguins

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
SC				–	–	–
PPB						
ScWo				 [1]	[1]	[1]
GH				–	–	–

[1] The population of little penguins that this assessment is focused on occurs within the Schanck-Woolamai biounit. However, the 2021 status, trend and confidence assessments for this population of little penguins were previously listed under the Western Port biounit in the SMCE 2021 Report as that report had a more limited geographic scope and did not include the Schanck-Woolamai biounit.

31: Marine mammals

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW (cetacean entanglements)				–	–	–
SW (cetacean strandings)				–	–	–
SW (Australian fur seals)				–	–	–
SW (dolphin toxicity concentrations)				–	–	–
SC (southern right whales)				–	–	–
PPB (short-beaked common dolphins)						
PPB (Burrunan dolphins)						
ScWo (Australian fur seals)				 [1]	 [1]	 [1]
WP (dolphins)						
WPW (Australian fur seals)				–	–	–
GL (Burrunan dolphins)						

[1] The population of seals that this assessment focuses on occurs within the Schanck-Woolamai biounit. However, the 2021 status, trend and confidence assessments were previously listed under the Western Port biounit in the SMCE 2021 Report, as that report had a more limited geographic scope and did not include the Schanck-Woolamai biounit.

Seafloor integrity and health

32: Conservation of marine ecosystems in protected areas

Extent of information	2024 status	2024 trend	2024 confidence	Extent of information	2021 status	2021 trend	2021 data quality
MPA (proportion of state waters protected)				MPA			
MPA (ecosystem representativeness)					–	–	–
MPA (biodiversity values representativeness)					–	–	–
MPA (irreplaceable biotope representativeness)					–	–	–
MPA (connectivity)					–	–	–
MPA (biodiversity conservation)					–	–	–
MPA (management efficacy)					–	–	–

33: Nitrogen cycle

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
GL (Lake King)						
GL (Lake Victoria)						
GL (Lake Wellington)						

34: Seagrass

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						
MPA (Port Phillip Heads Marine National Park)				 [1]	 [1]	 [1]

[1] The basis for the 2021 assessment was limited to the Ramsar site, whereas the Statewide Marine Habitat Map was used in addition to Ramsar site limits of acceptable change assessments, thus direct comparisons cannot be made between SMCE reporting periods.
[2] The 2021 assessment is based on data from the State of the Parks 2018 Report, whereas the 2024 assessment focuses just on Phillip Heads Marine National Park, thus direct comparisons are inappropriate.

35: Shellfish reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						

36: Macroalgae on intertidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (SW)	N/A	N/A	N/A		?	
MPA (Point Addis Marine National Park)				–	–	–
MPA (Port Phillip Heads Marine National Park)				[1]	[1]	[1]

[1] This 2021 assessment was presented under the Port Phillip Bay biounit in the SMCE 2021 Report and collectively assessed all MPAs within the biounit. Only Port Phillip Heads Marine National Park was evaluated in 2024 to align with Parks Victoria's Signs of Healthy Parks long-term monitoring program.

37: Macroalgae dominated subtidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB				–	–	–
MPA (SW)	N/A	N/A	N/A		?	
MPA (Discovery Bay Marine National Park)		?		–	–	–
MPA (Point Addis Marine National Park)				–	–	–
MPA (Port Phillip Heads Marine National Park)				[1]	[1]	[1]
MPA (Point Cooke Marine Sanctuary)	?	?	?	[1]	[1]	[1]
MPA (Jawbone Marine Sanctuary)	?	?	?	[1]	[1]	[1]
MPA (Ricketts Point Marine Sanctuary)	?	?	?	[1]	[1]	[1]
MPA (Wilsons Promontory Marine National Park)				–	–	–
MPA (Cape Howe Marine National Park)				–	–	–

[1] The 2021 assessment for Port Phillip Heads, Point Cooke Marine Sanctuary, Jawbone Marine Sanctuary and Ricketts Point Marine Sanctuary were presented under the Port Phillip Bay Biounit in the SMCE 2021 Report.

Pests and invasive species

38: Invasive marine species

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						
MPA (SW)						

39: Coastal invasive plants

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
CCMA				–	–	–
EGCMA				–	–	–

40: Coastal invasive animals

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
CIN				–	–	–
ScWo				–	–	–
SC				–	–	–
CCMA				–	–	–
GHCMA				–	–	–

Climate and climate change impacts

41: Rainfall

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			

42: Air temperature

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB	N/A	N/A	N/A			
PPB (Melbourne)				–	–	–
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			
Other coastal locations				–	–	–

43: Water temperature

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

44: Ocean acidification

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW			(status) (trend)			(status) (trend)

45: Sea level

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A		?	
GL	N/A	N/A	N/A		?	

46: Coastal inundation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A		?	
GL	N/A	N/A	N/A		?	

47: Wave climate

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	?	?	?	?	?	?
PPB	N/A	N/A	N/A	?	?	?

48: Coastal erosion

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A		?	
PPB	N/A	N/A	N/A		?	
WP	N/A	N/A	N/A		↘	
CIN	N/A	N/A	N/A		?	
GL		?	(status) (trend)		?	
Other coastal regions		?	(status) (trend)	–	–	–

49: Seawater intrusion into coastal aquifers

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A	?	?	?
PPB		↘		–	–	–
Other coastal regions	?	?	?	–	–	–

50: Frequency and impact of fire on marine and coastal ecosystems						
Extent of information	**2024 status**	**2024 trend**	**2024 confidence**	**2021 status**	**2021 trend**	**2021 data quality**
GL						
Other coastal regions				–	–	–

51: Climate change impact on marine and coastal infrastructure						
Extent of information	**2024 status**	**2024 trend**	**2024 confidence**	**2021 status**	**2021 trend**	**2021 data quality**
SW						
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
GL	N/A	N/A	N/A			



Wilsons Promontory Marine Park. Credit: Julian Finn © Museum Victoria

Managing coastal hazard risks

52: Considering climate change risks in land use planning

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

53: Climate change adaptation plans

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

54: Nature-based adaptation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

55: Emergency planning and preparedness

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Communities

56: Coastal population (resident)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N		N	N	

57: Coastal population (visitors)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N		N	N	

58: Significant landscapes

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW		N/A			→	

59: Coastal settlements

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N		N	N	

60: Cultural heritage

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW		→			→	

61: Use of marine and coastal areas

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW		→			?	

62: Tourism

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

63: Recreational boating and fishing contribution to the Victorian economy

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

64: Recreational boating

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

65: Recreational fishing

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

66: Shipping and ports

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

67: Commercial fishing

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

68: Aquaculture

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

69: Resources and energy generation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

70: Agriculture

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

71: Built and public benefit infrastructure

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

72: Recreational boating infrastructure

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

73: Illegal activities

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Stewardship and collaborative management

74: Stewardship

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						

75: Community connection to the coast

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

76: Volunteering

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

77: Citizen science

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

78: Planning and implementation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

79: Committees and councils

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

80: Institutional knowledge and capacity

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	?	↗	●	?	?	●

81: Engagement, inclusiveness, and environmental justice

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N	N	N	N	N

82: Delivery and accountability

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	●	↗	●	●	↗	●



Squeaky Beach, Wilsons Promontory National Park.
Credit: Masha Prokudina © Parks Victoria

Commissioner *for* Environmental Sustainability Victoria

Part 1B. Summary Report

Aerial view of Lakes Entrance in the Gippsland Lakes Victoria at sunset. © traceylouise

Cultural landscapes health and management

Introduction[179]

Aboriginal people's existence and identity are underpinned by healthy cultural landscapes. The land that is now known as the State of Victoria, along with its water and other natural resources, was managed for thousands of years according to traditional laws, customs and practices. Shaped by a sustainable-use system and managed with a deep understanding of natural systems and an embedded lore and culture, Country (land, water, animals, plants, people, spirits and customs) has provided for the material, cultural and spiritual needs of thousands of generations of Aboriginal people.[180]

Victoria's cultural landscapes are unique. These are host to one of the oldest continuing cultures in the world, and home to a vast array of plants, animals and places that have both symbolic and practical value to Aboriginal Victorians — and to all other Victorians. Today's cultural landscapes reflect how Aboriginal people engage with their world and experience their surroundings. These landscapes are the product of generations of economic activity, material culture and settlement patterns. While colonisation resulted in the landscape being broken up into different land tenures and established different management regimes, Aboriginal people remain connected to Country, and cultural landscapes continue across these artificial boundaries.[181] Country is both a place of belonging, and way of believing and living, relating to all aspects of an Aboriginal person's existence, including culture, spirituality, language, law, family and identity.[182]

The Marine and Coastal Strategy 2022 highlights the role of Traditional Owners in marine and coastal management.

The full integration of Traditional Owner values, uses and practices in the rehabilitation and management of Country will foster continuity of Traditional Owner cultures, knowledge and practices to heal our coastal and marine environment for current and future generations.[183] The Marine and Coastal Strategy involves Traditional Owners in research, planning, management and monitoring of land and sea Country.

State of the Environment reporting

Since 2018, SoE reports in Victoria have included information on cultural landscape health and management. This reporting includes the following themes:

- connection to Country
- building capacity
- land justice, self-determination, governance and mechanisms for sustainability
- funding and pathways to other organisations.

These four themes aim to incorporate the social, economic, spiritual, cultural, environmental and health and wellbeing values of Victorian Traditional Owners, Registered Aboriginal Parties and Aboriginal Victorians. The intention is to respect and support Aboriginal Victorian advancement for Treaty, self-determination and empowerment, as defined in the *Advancing the Treaty Process with Aboriginal Victorians Act 2018* (Treaty Act) and as advocated by Australia's Human Rights Commission.[184]

This approach to cultural landscape health and management reporting aligns with aspirations of Victoria's Traditional Owners — as shared with the Victorian Government:

> 'Restoring the knowledge system must reflect the fundamental principle that traditional knowledge is owned by Traditional Owners. Traditional Owners as custodians of knowledge and practice continue to decide how consent to share knowledge is given.' [185]
>
> 'We need resources for data collection, then will give the state the management objectives. The State and other [land management organisations] need to support our projects, not us supplementing theirs.' [186]

179. The information included in this section has been provided by DEECA (except for 'State of the Environment reporting').
180. Parks Victoria 2018, 'Managing Country together', Melbourne, Victoria.
181. Parks Victoria 2020, 'Managing Country together' https://www.parks.vic.gov.au/managing-country-together Accessed 16 April 2020.
182. Aboriginal Victoria 2020, 'Victorian Government Aboriginal Affairs Report 2019: Culture and Country' https://www.aboriginalvictoria.vic.gov.au/victorian-government-aboriginal-affairs-report-2019/culture-country Accessed 23 April 2020.
183. Department of Environment, Land, Water and Planning (DELWP) 2022, 'Marine and coastal strategy', Victoria State Government, p. 11 https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0029/571817/Marine-and-Coastal-Strategy_May-2022.pdf Accessed 26 November 2024.
184. Australian Human Rights Commission 2019, 'Right to self-determination' https://www.humanrights.gov.au/our-work/rights-and-freedoms/right-self-determination Accessed 28 May 2019.
185. Federation of Victorian Traditional Owner Corporations. 2021. 'Victorian Traditional Owner cultural landscapes Strategy', Melbourne, Victoria.
186. Federation of Victorian Traditional Owner Corporations. 2021. 'Victorian Traditional Owner cultural landscapes Strategy', Melbourne, Victoria

The Commissioner supports the aspirations of Traditional Owners and the restoration of traditional knowledge systems. Increased connection, participation and self-determination in managing and caring for Country will improve the condition of cultural landscapes. The Commissioner acknowledges that the sharing of data, knowledge and stories to inform reporting on cultural landscape health and management is always at the discretion of Traditional Owner groups.

Victorian Aboriginal cultural heritage

Aboriginal cultural heritage in Victoria is protected under the *Aboriginal Heritage Act 2006* and Aboriginal Heritage Regulations 2018. Aboriginal cultural heritage is the knowledge and lore, practices and people, objects and places that are valued, culturally meaningful and connected to identity and Country and that has been passed on from ancestors to future generations.[187]
The *Aboriginal Heritage Act 2006* establishes a framework of mechanisms for the management and protection of Aboriginal cultural heritage, including cultural heritage management plans, cultural heritage permits, protection declarations, and Aboriginal Cultural Heritage Land Management Agreements. Aboriginal cultural heritage can be tangible or intangible, and can include secret or sacred objects, ancestral remains, Aboriginal places, knowledge, lore and practices.

Aboriginal Victoria language families

Aboriginal people have lived in Australian coastal areas for the past 65,000 years, and are often termed 'saltwater people'.[188, 189] Under Aboriginal interpretations, saltwater people are Australian Aboriginal Peoples from coastal areas across the nation who are the Traditional Owners, guardians and custodians of the lands and waters characterised by saltwater environments.[190] There are more than 250 known Australian Aboriginal languages across the nation.[191] Each saltwater Aboriginal culture group has a Country-specific relationship to its own particular lands and waters. Language and traditional knowledge are integral parts of this relationship.[192] Thus, a generic language or set of traditions does not exist.

At the time of British colonisation, there were approximately 38 languages and 11 language families across Victoria.[193] Many of the 38 languages were further divided according to family groups and their traditional lands, while the 11 language families were grouped according to shared words, grammar and sounds.[194] During British colonisation, there were approximately eight known Aboriginal language families across coastal Victoria.[195, 196] Listed geographically from west to east they are: Buandig, Dhauwurd Wurrung, Keerray Woorroong, Gadubanud, Wadawurrung, Boon Wurrung, Gunai Kurnai and Bidwell.

Since British colonisation, many languages in the larger language families have dissipated or disappeared, due to the displacement or dispossession of family groups from their Country, and to laws enforced during colonisation that forbade communities from speaking their own language or practising their culture. The importance of language in a Country-specific relationship to lands and waters, coupled with the diversity of languages and language families along Victoria's coastline and marine waters, highlights the need to support Traditional Owner and Aboriginal Victorians in practising and using their languages and language families.

187. Victorian Aboriginal Heritage Council (VAHC) 2020, 'Aboriginal cultural heritage' https://www.aboriginalheritagecouncil.vic.gov.au/aboriginal-heritage Accessed 16 April 2020.
188. Clarkson C, Jacobs Z, Marwick B, et al. 2017, 'Human occupation of northern Australia by 65,000 years ago', *Nature*, 547, pp. 306–310.
189. Thurstan R, Brittain Z, Jones D, Cameron E, Dearnaley J, Bellgrove A 2018, 'Aboriginal uses of seaweeds in temperate Australia: an archival assessment', *Journal of Applied Phycology*, 30, pp. 1821–1832.
190. Thurstan R, Brittain Z, Jones D, Cameron E, Dearnaley J, Bellgrove A 2018, 'Aboriginal uses of seaweeds in temperate Australia: an archival assessment', *Journal of Applied Phycology*, 30, pp. 1821–1832.
191. Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) 2020, 'Mabo v Queensland' (No. 2) [1992] HCA 23; (1992) 175 CLR 1 https://jade.io/article/67683 Accessed 6 October 2021.
192. Thurstan R, Brittain Z, Jones D, Cameron E, Dearnaley J, Bellgrove A 2018, 'Aboriginal uses of seaweeds in temperate Australia: an archival assessment', *Journal of Applied Phycology*, 30, pp. 1821–1832.
193. Victorian Aboriginal Corporation for Languages (VACL) 2020, 'Map: Aboriginal languages of Victoria' https://vacl.org.au/home Accessed 16 April 2020.
194. ANTaR Victoria 2020, 'Local Nations: language groups' https://antarvictoria.org.au/local-nations Accessed 16 April 2020.
195. Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) 2020, 'Mabo v Queensland' (No. 2) [1992] HCA 23; (1992) 175 CLR 1 https://jade.io/article/67683 Accessed 6 October 2021.
196. Victorian Aboriginal Corporation for Languages (VACL) 2020, 'Map: Aboriginal languages of Victoria' https://vacl.org.au/home Accessed 16 April 2020.

Victorian Aboriginal rights to access, care and manage Country

In Victoria, Aboriginal Victorians can use several federal and state mechanisms to exercise their rights to access, use and manage lands and water on Country, as a basis for self-determination and economic independence.[197] These mechanisms include:

- *Native Title Act 1993* (Commonwealth (Cth)): native title determination covering 16,051 km^2 in Victoria[198]
- *Aboriginal Heritage Act 2006* (Vic): a Traditional Owner community can be formally recognised in Victoria as a Registered Aboriginal Party (RAP) and hold decision-making responsibilities for protecting Aboriginal cultural heritage in a specific geographical area. As at August 2024, there were 12 RAPs, covering 77.5% of Victoria[199]
- *Traditional Owner Settlement Act 2010* (Vic) (TOS Act): a Traditional Owner community can achieve legally enforceable recognition by the Crown of its rights to Country, through Traditional Owner Settlement (TOS) Agreements. As of June 2023, TOS Agreements covered approximately 96,210 km^2 of Victoria.[200]

Yoorrook Justice Commission[1]

The Yoorrook Justice Commission is the first formal truth-telling process into past and ongoing injustices experienced by First Peoples in Victoria in all areas of life since colonisation.

Set up by agreement between the First Peoples' Assembly of Victoria and the Victorian Government, Yoorrook operates independently.

Yoorrook is led by five Commissioners, four of whom are Aboriginal, and three are Victorian First Peoples. These Commissioners bring a vast range of knowledge and experience about First Peoples' knowledge, systemic disadvantage, land rights, history, law, trauma and healing.

To achieve its goals of understanding, truth and transformation, Yoorrook will:

'Establish an official public record of the impact of colonisation on First Peoples in Victoria.

Develop a shared understanding among all Victorians on the impact of colonisation, and the diversity, strength and resilience of First Peoples' cultures.

Make recommendations for healing, system reform and practical changes to laws, policy and education, and matters to be included in future treaties.'

Yoorrook has already delivered an interim report (June 2022), a critical issues report (August 2023), and will deliver a final report in 2025.

[1] Yoorrook Justice Commission 2024, 'Yoorrook Justice Commission' https://yoorrookjusticecommission.org.au/ Accessed 26 November 2024.

There are notably many other mechanisms to support self-determination and economic prosperity for all Aboriginal Victorians. These include the *Victorian Charter of Human Rights and Responsibilities Act 2006* (Vic), *Corporations (Aboriginal and Torres Strait Islander) Act 2006* (Cth) and Treaty Act.

197. Petrie A 2018, 'Land and water rights of Traditional Owners in Victoria', research paper no. 3, Research and Inquiries Unit, Parliamentary Library and Information Service, Department of Parliamentary Services, Parliament of Victoria.
198. Victorian Government 2023, 'Victorian Government Aboriginal Affairs Report 2023', Victorian Government, Melbourne, p. 158 https://www.firstpeoplesrelations.vic.gov.au/victorian-government-aboriginal-affairs-report-2023 Accessed 26 November 2024.
199. Victorian Aboriginal Heritage Council (VAHC) 2024, 'Victoria's Registered Aboriginal Parties' https://www.aboriginalheritagecouncil.vic.gov.au/victoria-registered-aboriginal-parties Accessed 26 November 2024.
200. Victorian Government 2023, 'Victorian Government Aboriginal Affairs Report 2023', Victorian Government, Melbourne, p. 158 https://www.firstpeoplesrelations.vic.gov.au/victorian-government-aboriginal-affairs-report-2023 Accessed 26 November 2024.

First People's Assembly of Victoria and Treaty

Victoria is on a path to establish a Treaty agreement with its First Peoples, with negotiations expected to begin in late 2024.[201] The Victorian Government will negotiate a Statewide Treaty and local Traditional Owner Treaties.

The First Peoples' Assembly of Victoria are democratically elected representatives from Traditional Owners in all areas of the state and has been the independent body representing First Peoples in Victoria's Treaty process. The Victorian Government and the First Peoples' Assembly have agreed and established all the elements required under the Treaty Act, including a Treaty Authority, Self-Determination Fund, Treaty Negotiation Framework and a dispute resolution process.[202]

Traditional Owner Treaty negotiations will be led by First Peoples' Treaty Delegations made up of all Traditional Owners who want to negotiate Treaty over a particular local area.[203]

Native title

Mabo v Queensland (No. 2) [1992] HCA 23 (commonly known as Mabo) was a landmark decision of Australia's High Court that recognised native title in Australia for the first time. The High Court rejected the doctrine of *terra nullius* in favour of the Common Law doctrine of native title. This saw the passing of the *Native Title Act 1993* (Cth), enabling Indigenous people throughout Australia to claim traditional rights to unalienated land.[204] Native title is a set of rights and interests over land or waters where Aboriginal and Torres Strait Islander groups have practised traditional laws and customs since before the time of European occupation and continue to do so. Native title determinations of relevance to the geographic scope of this SMCE 2024 Report include:

- Gunditj Mirring Traditional Owners Aboriginal Corporation Native Title Determination 2007, covering almost 140,000 hectares across south-west Victoria. Consent determination area is bounded on the west by the Glenelg River and to the north by the Wannon River.[205]
- Gunditj Mirring Traditional Owners Aboriginal Corporation and Eastern Maar Aboriginal Corporation Native Title Determination 2011, for the land and waters between the Shaw and Eumeralla Rivers from Deen Maar (Lady Julia Percy Island), including Yambuk, to Lake Linlithgow
- Gunaikurnai Native Title Determination 2010
- Eastern Marr Aboriginal Corporation Native Title Determination 2023 for an area that includes a large proportion of the coastline of the Great Ocean Road and part of the Great Otway National Park.

Traditional Owner Settlement Agreements

The TOS Act provides a framework for the Victorian Government to recognise Traditional Owners and their rights to Country. At the time of publication, four Recognition and Settlement Agreements had been entered into:[206]

- Gunaikurnai Recognition and Settlement Agreement (that covers areas within the scope of the SMCE 2024 Report)
- Dja Dja Wurrung Recognition and Settlement Agreement
- Taungurung Recognition and Settlement Agreement
- The Wotjobaluk, Jaadwa, Jadawadjali, Wergaia and Jupagulk People of the Wotjobaluk Nations Recognition and Settlement Agreement.

201. First Peoples – State Relations 2024, 'Treaty for Victoria' https://www.firstpeoplesrelations.vic.gov.au/treaty Accessed 26 November 2024.
202. First Peoples – State Relations 2024, 'Treaty for Victoria' https://www.firstpeoplesrelations.vic.gov.au/treaty Accessed 26 November 2024.
203. First Peoples – State Relations 2024, 'Treaty for Victoria' https://www.firstpeoplesrelations.vic.gov.au/treaty Accessed 26 November 2024.
204. Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) 2020. 'Mabo v Queensland' (No. 2) [1992] HCA 23; (1992) 175 CLR 1 https://jade.io/article/67683 Accessed 6 October 2021.
205. Gunditj Mirring Traditional Owners Aboriginal Corporation 2020, 'Native title across Gunditjmara Country' https://www.gunditjmirring.com/nativetitle Accessed 23 April 2020.
206. First Peoples – State Relations 2024, 'Recognition and Settlement Agreements', https://www.firstpeoplesrelations.vic.gov.au/recognition-and-settlement-agreements Accessed 26 November 2024.

In addition, First People of the Millewa Mallee are in the process of seeking native title determination and Traditional Owner Settlement and the Eastern Maar Traditional Owner group and the State of Victoria have agreed to negotiate a Recognition and Settlement Agreement (that includes areas within the scope of the SMCE 2024 Report).[207, 208]

Registered Aboriginal Parties

In Victoria, there are currently 12 Registered Aboriginal Parties (RAPs), covering approximately 77.5% of the state.[209] Six of these have Country along the Victorian coastline, extending out into marine waters:

- Bunurong Land Council Aboriginal Corporation
- Eastern Maar Aboriginal Corporation
- Gunaikurnai Land and Waters Aboriginal Corporation.
- Gunditj Mirring Traditional Owners Aboriginal Corporation
- Wadawurrung Traditional Owners Aboriginal Corporation
- Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation.[210]

RAPs are Traditional Owner groups legally recognised under the *Aboriginal Heritage Act 2006*. As the primary guardians, RAPs are responsible for managing and protecting the Aboriginal cultural heritage of a particular area. RAPs are the primary source of advice and knowledge on matters relating to Aboriginal places or objects in their region.

Their functions include:

- evaluating cultural heritage management plans
- assessing cultural heritage permit applications
- making decisions about cultural heritage agreements
- providing advice on applications for interim or ongoing protection declarations
- entering into Aboriginal Cultural Heritage Land Management Agreements with public land managers
- nominating Aboriginal intangible heritage to the Victorian Aboriginal Heritage Register and managing intangible heritage agreements.[211]

Under the *Aboriginal Heritage Act 2006*, intangible heritage is defined as any knowledge of or expression of Aboriginal tradition, other than Aboriginal cultural heritage, and includes oral traditions, performing arts, stories, rituals, festivals, social practices, craft, visual arts, and environmental and ecological knowledge, but does not include anything that is widely known to the public. This also includes any intellectual creation or innovation.

RAPs are Traditional Owner organisations with established administrative and management functions that hold decision-making powers under the *Aboriginal Heritage Act 2006* for the protection and management of Aboriginal cultural heritage in a specified geographic area. RAPs are appointed by the Victorian Aboriginal Heritage Council, an independent statutory body. The Council consists of up to 11 Traditional Owners, who are appointed by the Minister for Aboriginal Affairs. All members are resident in Victoria and have extensive knowledge and relevant experience of Aboriginal cultural heritage in Victoria. The Office of the Victorian Aboriginal Heritage Council provides support to the Victorian Aboriginal Heritage Council. Victoria's RAPs are shown in Figure 6.

207. First People of the Millewa-Mallee Aboriginal Corporation 2024, 'Our People, Our Culture Our Country' https://fpmmac.com.au/ Accessed 26 November 2024.
208. First Peoples – State Relations 2024, 'Recognition and Settlement Agreements', https://www.firstpeoplesrelations.vic.gov.au/recognition-and-settlement-agreements Accessed 26 November 2024.
209. Victorian Aboriginal Heritage Council (VAHC) 2024, 'Victoria's Registered Aboriginal Parties' https://www.aboriginalheritagecouncil.vic.gov.au/victoria-registered-aboriginal-parties Accessed 26 November 2024.
210. Victorian Aboriginal Heritage Council (VAHC) 2024, 'Registered Aboriginal Parties in Victoria (map)' https://www.aboriginalheritagecouncil.vic.gov.au/sites/default/files/2024-08/Statewide-Appointed-RAPs-August-2024.pdf Accessed 26 November 2024.
211. Victorian Aboriginal Heritage Council (VAHC) 2023, 'About Registered Aboriginal Parties' https://www.aboriginalheritagecouncil.vic.gov.au/about-victorias-registered-aboriginal-parties Accessed 26 November 2024.

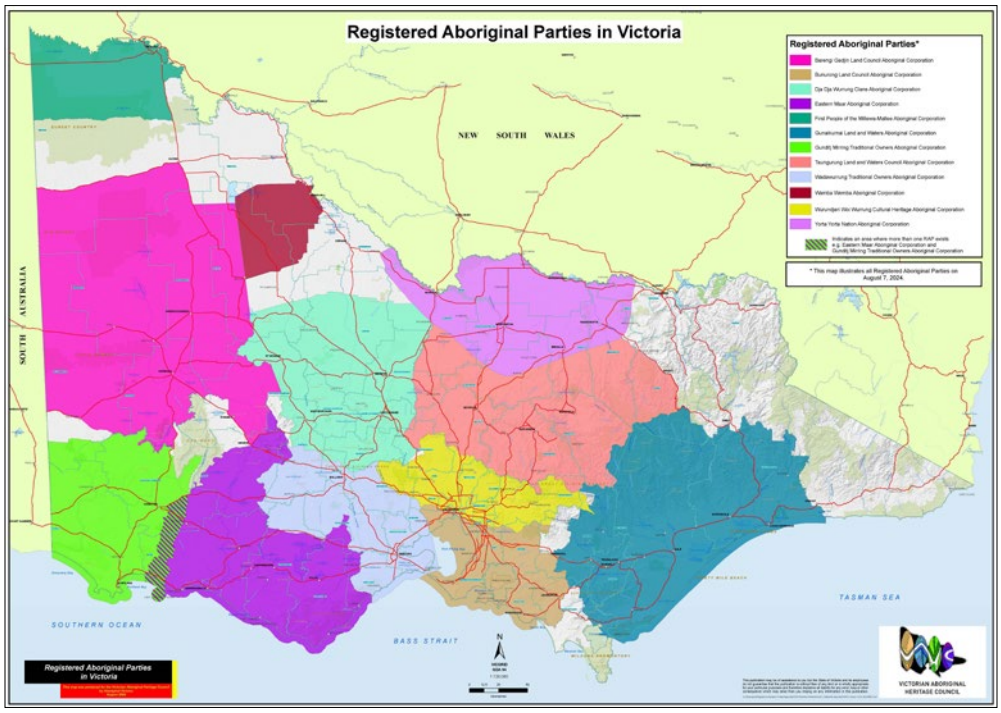


Figure 6: Registered Aboriginal Parties in Victoria as of 7 August 2024.[212]

To reiterate, Traditional Owners are formally recognised by the Victorian Government in three ways: through the *Native Title Act 1993* (Cth); by way of a recognition and settlement agreement under the TOS Act; and through appointment as a RAP under the *Aboriginal Heritage Act 2006* (Vic).

Caring for Country

Under the terms and objectives of these legislative mechanisms for ensuring Aboriginal Victorian rights to access, manage and care for Country, several formal approaches support Treaty, self-determination, land justice and economic prosperity. Some of these are discussed below, but this is not a complete list. There are many formal and informal agreements and partnerships between Aboriginal Victorian communities and local government, government statutory bodies and the wider community that are not listed here.

Joint management plans

Joint management refers to a formal partnership between Traditional Owner communities and the Victorian Government that promotes the sharing of knowledge on the management of Crown land, such as national parks or other public parks.[213, 214] Joint management is established under the terms of the *Conservation, Forests and Lands Act 1987* (Vic) and the *Traditional Owners Settlement Act 2010* (Vic) via a Recognition and Settlement Agreement. Joint management is formalised via a Traditional Owner Land Management Agreement (TOLMA) by Traditional Owner communities under a form of land title called Aboriginal Title. The TOLMA can include a provision for national parks and other public parks to be returned to Aboriginal ownership while continuing to be managed as a national park or a public park. The TOLMA establishes a process for developing joint management plans on Aboriginal Title lands and involves Traditional Owners working with Parks Victoria and DEECA staff in sharing knowledge to manage these lands.

212. First Peoples – State Relations, Department of Premier and Cabinet, 2024, 'Registered Aboriginal Parties in Victoria'https://www.aboriginalheritagecouncil.vic.gov.au/victoria-registered-aboriginal-parties Accessed 26 November 2024.
213. Parks Victoria 2020, 'Managing Country together' https://www.parks.vic.gov.au/managing-country-together Accessed 16 April 2020.
214. Petrie A 2018, 'Land and water rights of Traditional Owners in Victoria', Research paper no. 3, Research and Inquiries Unit, Parliamentary Library and Information Service, Department of Parliamentary Services, Parliament of Victoria.

Joint management plans are endorsed by the Secretary of DEECA and the Victorian Minister for Environment. Endorsed plans also allow for the establishment of Traditional Owner Land Management Boards, to recognise the knowledge and culture of Traditional Owner communities in the joint management of Aboriginal Title lands. Traditional Owner Land Management Board members are appointed by the Minister for Environment, where membership composition is at least 50% Traditional Owner representation, DEECA Secretary's nominee and general members. Membership can range between seven and eleven people. Joint management also aims to economically benefit the whole Traditional Owner community through the creation of jobs, such as joint manager rangers, and potential commercial partnerships, while supporting reconciliation, land justice and community healing.[215]

Parks Victoria and DEECA will continue to manage the lands on a day-to-day basis and will permanently keep some core management functions.[216] This includes fire management and catchment management including designated water supply catchment areas under the *National Parks Act 1975* (Vic).[217] Traditional Owner Land Management Boards will also play a role in monitoring and supporting compliance with Joint Management Plans.

At the time of writing, Victoria had formal agreements with six Traditional Owner groups for joint management of traditional lands under either the *Native Title Act 1993* (Cth), TOS Act and/or the *Aboriginal Heritage Act 2006* (Vic).[218]

Formal agreements relevant to the geographic scope of this SMCE 2024 Report include:

- Gunaikurnai Settlement Agreement: established in 2010, the first agreement under the TOS Act
- Gunditjmara Settlement Agreement: established in 2007 following a consent determination from the High Court of Australia.[219]

Aboriginal Cultural Heritage Land Management Agreements

An Aboriginal Cultural Heritage Land Management Agreement is a voluntary agreement between a RAP and a public land manager.[220] This facilitates a proactive, holistic approach to managing and protecting Aboriginal cultural heritage and landscape during ongoing, routine land management activities in a RAP area.[221] These agreements document the approach taken to manage Aboriginal cultural heritage by setting out the results of a cultural heritage assessment and mutually agreed measures on how Aboriginal cultural heritage will be protected and managed during land management activities over a specified time frame.[222] As of 31 December 2023, four RAPs have entered into an Aboriginal Cultural Heritage Land Management Agreement.[223]

Whole of Country Plans

Several Victorian Traditional Owner organisations, including RAPs, are working in partnership with government and non-government organisations to develop Whole of Country Plans, strategies and assessment frameworks that will integrate cultural heritage and spiritual values, self-determination and governance, health and wellbeing, and economic capacity to improve, care and manage the cultural landscape health of Country. Whole of Country Plans are overarching, long-term visions that set out clear

215. Parks Victoria 2020, 'Managing Country together' https://www.parks.vic.gov.au/managing-country-together Accessed 16 April 2020.
216. Department of Energy, Environment and Climate Action (DEECA) 2019, 'Joint Management' https://www.forestsandreserves.vic.gov.au/land-management/joint-management Accessed 26 November 2024.
217. Department of Energy, Environment and Climate Action (DEECA) 2019, 'Joint Management' https://www.forestsandreserves.vic.gov.au/land-management/joint-management Accessed 26 November 2024.
218. Department of Energy, Environment and Climate Action (DEECA) 2024, 'Agreements with Traditional Owners' https://www.forestsandreserves.vic.gov.au/land-management/what-we-do/agreements-with-traditional-owners Accessed 26 November 2024.
219. Native Title Tribunal 2007, 'The Gunditjmara People's native title determinations 30 March 2007 south-west Victoria' http://www.nntt.gov.au/Information%20Publications/Determination%20brochure%20Gunditjmara%20March%202007.pdf
220. Aboriginal Victoria 2020, 'Cultural heritage management plans, permits, agreements and tests: processes under the Aboriginal Heritage Act 2006 for managing and protecting Aboriginal cultural heritage' https://www.aboriginalvictoria.vic.gov.au/cultural-heritage-management-plans-permits-agreements-and-tests Accessed 16 April 2020.
221. Aboriginal Victoria 2020, 'Cultural heritage management plans, permits, agreements and tests: processes under the Aboriginal Heritage Act 2006 for managing and protecting Aboriginal cultural heritage' https://www.aboriginalvictoria.vic.gov.au/cultural-heritage-management-plans-permits-agreements-and-tests Accessed 16 April 2020.
222. Aboriginal Victoria 2020, 'Aboriginal Cultural Heritage Land Management Agreements' https://www.aboriginalvictoria.vic.gov.au/aboriginal-cultural-heritage-land-management-agreements Accessed 23 April 2020.
223. Victorian Government 2023, 'Victorian Government Aboriginal Affairs Report 2023', Victorian Government, Melbourne, p. 160 https://www.firstpeoplesrelations.vic.gov.au/victorian-government-aboriginal-affairs-report-2023 Accessed 26 November 2024.

goals and priorities, principles of engagement, and measures of success in caring for Country.[224] At the time of the SMCE 2021 Report publication, there were nine Whole of Country Plans, with three being relevant to the geographic scope of that report:[225]

- Gunaikurnai Whole-of-Country Plan – Gunaikurnai Land and Waters Aboriginal Corporation
- Budj Bim Master Plan (including United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Landscape listing and Indigenous Protected Areas) – Gunditj Mirring Traditional Owners Aboriginal Corporation
- Meerreengeeye ngakeepoorryeeyt Country Plan – Eastern Maar Aboriginal Corporation.

Indigenous Peoples' Protected Areas

Indigenous Peoples' Protected Areas (IPAs), also known as Indigenous Peoples' and Community Conserved Territories and Areas, are defined as:

> 'clearly defined geographical spaces, within the lands and waters under traditional occupation and use by a given Indigenous people, nation or community, that are voluntarily dedicated and managed, through legal or other effective means including their customary law and institutions, to achieve the long-term conservation of nature with associated ecosystem services, as well as the protection of the inhabiting communities and their culture, livelihoods and cultural creations.' [226]

IPA rules generally intertwine with cultural and spiritual values. Although some of the protected areas governed by Indigenous peoples and local communities have been in existence for hundreds or even thousands of years, their recognition by national governments and their inclusion in national protected area systems is a much more recent phenomenon.[227] The main distinguishing features of IPAs have to do with the socio-political arrangements that are established between Indigenous peoples and government of lands and resources in Indigenous peoples' lands:

- IPAs are based on the collective rights of the respective Indigenous people, nation or community to lands, territories and resources, under national contexts.
- IPAs are established as protected areas in application of the right of self-determination, exercised mainly through:
  - self-declaration of the protected area by the Indigenous people or nation with collective territorial rights on the area
  - free, prior and informed consent of the people, nation or community with territorial rights on the area, in cases where the designation proposal is originated in government agencies, conservation organisations or other actors.
- IPAs are based on ancestral or traditional occupation.
  - Occupation, use and management are connected to, and dependent upon, the broader socio-cultural and political structure of a people or nation that includes their customary law and institutions.
- IPAs are self-governed by Indigenous institutions within their territories and the protected areas contained therein, in application of arrangements established with system-level protected area authorities.[228]

In Australia, IPAs have been created at the request or initiative of Indigenous owners, or through joint arrangements with governments and agencies. In such cases, Indigenous land and resource rights, and Indigenous government of the land, are important features. In Victoria, RAPs and Traditional Owners are primary guardians responsible for IPAs. Within the geographic scope of the SMCE

224. Aboriginal Victoria 2020, 'Victorian Government Aboriginal Affairs Report 2019: Culture and Country' https://www.aboriginalvictoria.vic.gov.au/victorian-government-aboriginal-affairs-report-2019/culture-country Accessed 23 April 2020.
225. The Victorian Government Aboriginal Affairs Report has not provided data for the number of Whole of Country Plans since 2019-20.
226. Stolton S, Shadie P, Dudley N 2013, 'IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types', Best practice protected area guidelines series no. 21, International Union for Conservation of Nature, Gland, Switzerland https://www.iucn.org/theme/protected-areas/resources/iucn-wcpa-best-practice-guidelines-protected-area-managers-series Accessed 24 September 2021.
227. Stolton S, Shadie P, Dudley N 2013, 'IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types', Best practice protected area guidelines series no. 21, International Union for Conservation of Nature, Gland, Switzerland https://www.iucn.org/theme/protected-areas/resources/iucn-wcpa-best-practice-guidelines-protected-area-managers-series Accessed 24 September 2021.
228. Stolton S, Shadie P, Dudley N 2013, 'IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types', Best practice protected area guidelines series no. 21, International Union for Conservation of Nature, Gland, Switzerland https://www.iucn.org/theme/protected-areas/resources/iucn-wcpa-best-practice-guidelines-protected-area-managers-series Accessed 24 September 2021.

2024 Report, the Gunditj Mirring Traditional Owners Aboriginal Corporation is the guardian for the IPA in the Budj Bim UNESCO World Heritage Landscape.

In 2021 the Australian Government announced 10 Sea Country IPA consultation projects around Australia, designed to fund Indigenous organisations to expand existing IPAs and create new IPAs. The program:

> 'seeks to increase the area of sea in IPAs to strengthen the conservation and protection of Australia's unique marine and coastal environments, while creating employment and economic opportunities for Indigenous Australians.'[229]

This includes the following Victorian projects:

- Gunditjmara Sea Country IPA (Gunditj Mirring Traditional Owners Aboriginal Corporation with Eastern Marr Aboriginal Corporation)
- Nanjit to Mallacoota Sea Country IPA (Gurnaikurnai Land and Waters Aboriginal Corporation).[230]

Sea Country Partnership

The Sea Country Partnership comprises of the six RAP groups with marine and coastal country: Bunurong, Eastern Maar, Gunditj Mirring, Gunaikurnai, Wadawurrung and Wurundjeri.

The Partnership has been developed over five years and is founded on the basic fundamentals of: trust, equality, transparency, and honesty. It has been established outside of the usual regionally based engagement paradigm, thus elevating sea country issues to a state level that recognises the similarity of challenges facing the Sea Country RAP groups across the state. Despite initial concerns, the groups participated in the development of the Marine and Coastal Strategy 2022 as rights-holders rather than stakeholders, where they saw the benefits of a Partnership based on the above fundamentals — Nothing about us, without us.

The Partnership has provided benefits to its members by sharing knowledge among each other about the developments occurring in each other's sea country, and the individual projects they are undertaking to care for sea country.

The success of the Partnership can be seen in how its members utilise it. Attendance has increased to include senior RAP staff from each organisation; and they make use of the forum to meet with Federal departments who wish to engage to discuss major federal policy reforms, such as the development of Commonwealth South Eastern Marine Park Management Plans, and the development of the high-level Sustainable Oceans Plan (SOP). Members have since established themselves as a Saltwater Council to better advise state, federal and local governments, and to support the independence of Partnership members.

Sea Country projects and activities

Sea Country Grants provide funds to Partnership members to assist them to conduct the following:

Implementation of the Marine and Coastal Strategy 2022

- Partnership members have agreed to implement the Marine and Coastal Strategy 2022 by leading 10 Activities, and partner in a further 34 with local governments, Parks Victoria, Catchment Management Authorities, and others over the 5-year duration of the Marine and Coastal Strategy.

Sea Rangers/Sea Guardian programs

- Except for Wadawurrung, all groups engage workers in the role of Ranger/Guardian or sea country/estuary project officers.
- Bunurong has one Sea Country Officer.
- Eastern Maar has two Sea Country Guardians and two Sea Country Managers.
- Gunaikurnai has one Sea Country officer and a team of Rangers who do a variety of work including some sea country work.
- Gunditj Mirring has one Sea Country Ranger and one Sea Country manager.
- Wurundjeri has a Water Project Officer – Estuaries and Rivers.

229. Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, 'Sea Country Indigenous Protected Areas Program – Grant Opportunity' https://www.dcceew.gov.au/environment/land/indigenous-protected-areas/sea-country-grant-opportunity Accessed 26 November 2024.
230. Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, 'Sea Country Indigenous Protected Areas Program – Grant Opportunity' https://www.dcceew.gov.au/environment/land/indigenous-protected-areas/sea-country-grant-opportunity Accessed 26 November 2024.

Drone training

- Eastern Maar and Wadawurrung are actively involved in drone training with Wadawurrung currently in the process of purchasing drones. Other groups have expressed an interest in exploring drone utilisation and are taking note of the relative success of the drone programs of other members.

Coastal monitoring

- All Partnership members actively monitor their coastal country, some to a higher degree than others. For example, erosion risk mitigation is extremely important to Gunaikurnai while the monitoring of sea-grass beds in the Western Port Bay Biosphere is paramount to Bunurong and the protection of their World Heritage Area. Gunditj Mirring and Eastern Maar are actively engaged in the eradication of vermin from their sacred island Deen Maar.

Marine Spatial Planning

- MSP is seen by all groups as imperative to their inclusion on decisions and to protect their rights to manage marine and coastal country. Gunditj Mirring are seeking to utilise MSP to manage onshore transmission lines from offshore renewable energy sources, while Gunaikurnai seek to utilise MSP to assist the Lake Tyres Aboriginal Trust members locate and map underwater material culture in Lake Tyres and to then develop management plans to protect these.

Climate change mitigation

- All groups are seeking to develop and implement climate mitigation strategies to protect their cultural and biocultural values under risk from erosion and climate change. Gunaikurnai are mapping the geomorphology of the western edge of the Indigenous Protected Area at Nooramunga, while developing strategies to protect burial sites from current erosion and future threats. Bunurong are developing strategies to protect burial sites located at Sea Rock, Phillip Island, and are also propagating mangroves and kelp to be utilised in the future. Wadawurrung are developing a Coastal Adaptation Plan to protect their cultural heritage and values along the Victorian Surf Coast.

Marine research

- All groups are intensely interested in the research activities of each other, and they actively share their information among themselves.
- Gunaikurnai have partnered with the Arthur Rylah Institute to conduct the first ever tagging program of long-finned eel. This research has also led to the discovery of an increase in the endangered grayling fish. They are also partnering with CSIRO to tag grey nurse sharks and monitor their habitat in Gunaikurnai waters and are exploring a project to tag great white sharks in conjunction with Gunditj Mirring and Eastern Maar.
- Wurundjeri are progressing a project to repopulate the Bolin Bolin Billabong with short-finned eel. To facilitate this, they will be working with Gunditj Mirring, who practice aquaculture of the short-finned eel at their tourism enterprise, Ta Rak on the shore of Lake Condah.
- Gunditj Mirring are developing a marine archaeology project to map the underwater river systems in the Kardermudelar (Portland Bay) and have been invited to participate in an environmental DNA (e-DNA) pilot project with Eastern Maar.
- Eastern Maar is developing an E-DNA pilot project that uses large volumes of water to assess the likelihood of individual marine species located in a specific body of water. All groups are interested in the outcomes of this Pilot.

All groups engage with tertiary institutions and/or citizen science groups.

Biocultural mapping

- Eastern Maar is leading endeavours to map the biocultural values of Country with their project at the Dreeite Reserve near Colac. This connection between Aboriginal historical creation stories and the environment is exciting to all groups. Eastern Maar is extending their project to include the marine environment, and there are discussions regarding Eastern Maar presenting to individual RAP groups regarding biocultural mapping.

Sea Country plans

- All groups are developing a Sea Country addendum to their Country Plans and are at various stages in doing so. Fundamental to this are cultural values assessments and engagement and capacity building of their membership.

Cultural values assessments and sea country engagement programs for Original Custodians and RAP members.

- Partnership members recognise that without assessments to attain accurate data of the cultural and biocultural values in the marine and coastal space, one cannot design strategies or allocate resources and funds to mitigate risk to these values.
- The Bunurong are utilising local government's development of Coastal Marine Management Plans (CMMPs) to assess their cultural values in six local government areas.
- All groups conduct engagement projects with their members and non-members in their areas. These take the form of day trips of specific age groups to locations that are important the specific group concerned and to the need to gather cultural and biocultural data in that location.
- Gunaikurnai have extended their engagement to Original Custodians outside of their membership to include Far East Gippsland Groups and members of the Lake Tyres Aboriginal Trust.

Marine park management

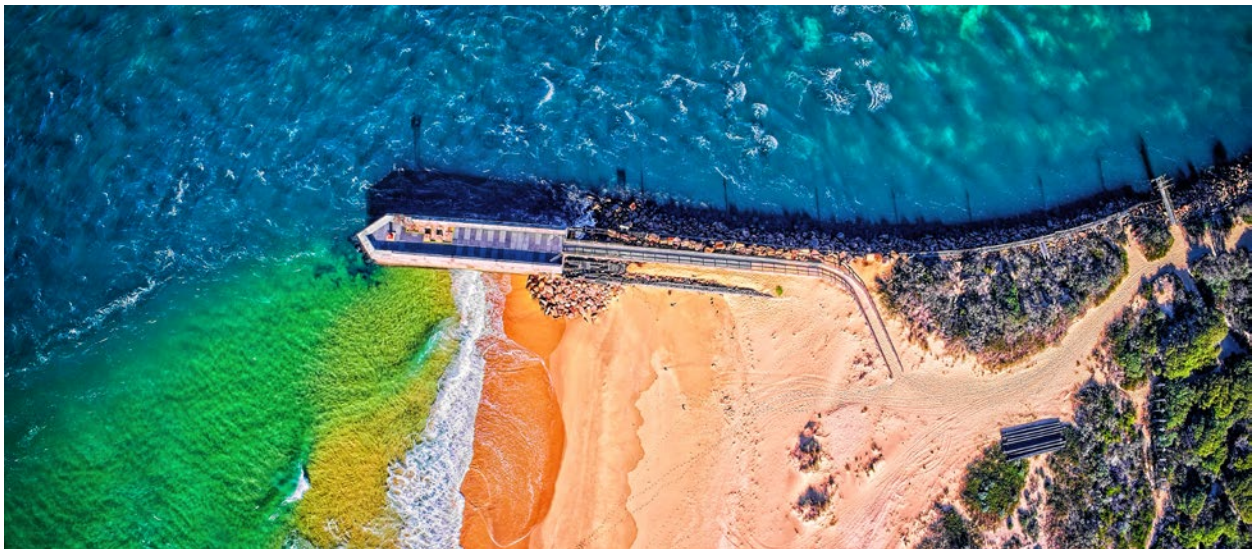
- Eastern Maar's has co-management responsibilities of the Commonwealth's Apollo Marine Park and is supported by Deakin University who provide resources and mapping expertise and marine science support. Their Sea Country Guardian manages this and assists with the management of their Indigenous Protected Area with another Sea Country Guardian. Eastern Maar has longer term aspirations to co-manage other marine parks within their sea country.
- Other Partnership members do not have the capacity to entertain managing marine parks at this point in time.

Commonwealth/state marine and coastal program coordination

- Eastern Maar, Gunaikurnai and Gunditj Mirring all have Commonwealth registered IPAs, with Eastern Maar and Gunditj Mirring also having a shared IPA area. The Sea Country Grant program supports the management of IPAs and state marine and coastal areas.

Blue carbon

- Outside of the Sea Country Grants, both Bunurong and Wadawurrung accessed funds from Victoria's Resilient Coast (VRC) to conduct cultural values assessments in regard to blue carbon. These funds were managed by the VRC team which addressed Bunurong and Wadawurrung's capacity constraints.



Aerial view of The Entrance in the Gippsland Lakes Victoria. © traceylouise

Marine and coastal policy and legislative context

Victorian, national and international public policies and legislation are of direct relevance to this SMCE 2024 Report. Prominent policies and legislative obligations are briefly described below. Greater detail for relevant policies, including how they relate to marine and coastal environmental condition and management, is provided in the indicator narratives of Part 2 – Scientific Assessments.

International context

When the parties to the United Nations Convention on Biological Diversity (CBD) met in 2010 at Aichi, Japan, they committed to the Strategic Plan for Biodiversity 2011–2020. This set five strategic goals and 20 targets for countries to slow and reverse biodiversity loss during the United Nations Decade on Biodiversity. The targets — that included conservation of 10% of marine areas — and the CBD Strategic Plan for Biodiversity, expired in 2020.

In December 2022, the global community renewed biodiversity targets under the GBF 2030 at the 15th Conference of Parties to the CBD. Target 3 of the GBF 2030 is to scale up area-based conservation to ensure and enable that by 2030 at least 30% of terrestrial, inland water, and marine and coastal areas are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas (commonly referred to as '30 by 30').[231] The GBF 2030 targets have been included in Australia's National Strategy for Nature.[232]

The 2030 Agenda for Sustainable Development was adopted by the United Nations in 2015 and comprises 17 goals with 169 targets.[233] 'Indicator 32: Conservation of marine ecosystems in protected areas' contains an analysis of Victoria's extent of MPAs areas against international benchmarks for levels of protection, such as the former Aichi targets and the SDGs. Both Aichi Target 11 and SDG Target 14.5 aim for at least 10% of coastal and marine areas to be conserved.

The Ramsar Convention aims to halt the loss of wetlands and conserve those that remain.[234, 235] Victoria has 12 wetland sites on the List of Wetlands of International Importance, including the Gippsland Lakes. As a signatory to the Ramsar Convention, Australia has committed to wetlands conservation, reserves and education. The first of a series of national action plans was released in 2016, and forms part of Australia's implementation of the four goals and 19 strategies of the Ramsar Strategic Plan 2016–24.

National context

Several national policies, strategies, plans and laws are relevant to the scope of this report.

The Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) is responsible for protecting and strengthening Australia's agriculture, water resources, environment and heritage. The relevant ministers administer various national laws, including the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.[236] This is Australia's most important piece of environmental legislation and covers environment and heritage protection, and biodiversity conservation. Actions that will lead to changes in land use or land management in any state or territory may be subject to its provisions.

The EPBC Act protects nine 'matters of national environmental significance', including:

- listed threatened species and communities
- listed migratory species
- Ramsar wetlands of international importance
- world heritage areas
- national heritage places.

231. Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, 'Australia's National Biodiversity Strategy and Action Plan' https://www.dcceew.gov.au/environment/biodiversity/conservation/strategy Accessed 31 October 2024.
232. Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, 'Australia's National Biodiversity Strategy and Action Plan' https://www.dcceew.gov.au/environment/biodiversity/conservation/strategy Accessed 31 October 2024.
233. United Nations Department of Economic and Social Affairs, 'The 17 goals' https://sdgs.un.org/goals Accessed 25 October 2024.
234. Convention on Wetlands Secretariat 2024, 'Wetlands of international importance' https://www.ramsar.org/our-work/wetlands-international-importance Accessed 28 October 2024.
235. United Nations Convention on wetlands of international importance especially as waterfowl habitat, 2 February 1971 https://treaties.un.org/doc/Publication/UNTS/Volume%20996/volume-996-I-14583-English.pdf
236. Commonwealth of Australia, *'Environment Protection and Biodiversity Conservation Act 1999'* https://www.legislation.gov.au/C2004A00485/latest/text Accessed 31 October 2024.

The Australian Government has recently updated *Australia's Strategy for Nature 2024–2030* (Australia's national biodiversity strategy and action plan) to reflect Australia's contributions to the GBF 2030.[237] This establishes six new targets and three enablers of change to halt and reverse biodiversity loss in Australia.

The National Climate Resilience and Adaptation Strategy 2021–2025 seeks to position Australia to better anticipate, manage and adapt to climate change by supporting governments, communities and businesses to better adapt to climate change. The Strategy operates across the natural, built, social and economic domains to drive adaptation and recognises that effective adaptation must be:

- informed by the best available science and information
- delivered through partnerships and investments, and
- guided by effective governance and coordination.[238]

The Strategy details three objectives to enable effective adaptation:

- drive investment and action through collaboration
- improve climate information and services
- assess progress and improve over time.[239]

Various standards, guidelines and strategies have been developed to mitigate risks associated with shipping and ports. The International Convention for the Control and Management of Ships' Ballast Water and Sediment places obligations on vessels to manage ballast water to reduce the translocation of invasive marine species.[240] Australian commercial shipping standards assist in maintaining vessel safety, thus minimising the risk of potential accidents, such as oil spills. The *Biosecurity Act 2015* deals with ballast water and marine pests.[241, 242] The Australian Ballast Water Management Requirements set out the obligations on vessel operators for the management of ballast water and ballast tank sediment when operating in Australian seas.[243] Similarly, the Australian biofouling management requirements set out operator obligations for the management of biofouling.[244] National guidelines provide guidance on dealing with problems such as biofouling (Anti-Fouling and In-water Cleaning Guidelines 2015, that are currently being revised).[245, 246]

To minimise the risks associated with marine pests, the Australian Government, in conjunction with state and territory governments, industry, research organisations and non-government organisations introduced *MarinePestPlan 2018–2023* that concluded on 30 June 2023 (and is currently being reviewed).[247, 248] One outcome of *MarinePestPlan* was the National Marine Pest Surveillance Strategy, that 'outlines priority requirements for enhancing surveillance of marine pests in Australia' and 'aims to improve coordination and implementation of these surveillance activities.' [249] The National Marine Pest Surveillance Strategy identifies four objectives for marine pest surveillance:

- define the need, objectives and scope for surveillance
- describe the different components and types of surveillance required to meet those objectives
- outline a nationally agreed approach to marine pest surveillance
- outline stakeholder roles and responsibilities, including identification of lead agencies for surveillance and communications.[250]

237. Commonwealth of Australia 2024, 'Australia's Strategy for Nature 2024–2030' https://www.dcceew.gov.au/environment/biodiversity/conservation/publications/australias-strategy-for-nature Accessed 31 October 2024.
238. Department of Agriculture, Water and the Environment (DAWE) 2021, 'National Climate Resilience and Adaptation Strategy 2021 to 2025: Positioning Australia to better anticipate, manage and adapt to our changing climate', Canberra.
239. Department of Agriculture, Water and the Environment (DAWE) 2021, 'National Climate Resilience and Adaptation Strategy 2021 to 2025: Positioning Australia to better anticipate, manage and adapt to our changing climate', Canberra.
240. International Maritime Organisation 2004, 'International convention for the control and management of ships' ballast water and sediments. Adoption: 13 February 2004; Entry into force: 8 September 2017' https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-(BWM).aspx Accessed 31 October 2024.
241. Australian Maritime Safety Authority (AMSA) 2021, 'National standard for commercial vessels (NSCV)', Australian Government, Canberra https://www.amsa.gov.au/nscv Accessed 31 October 2024.
242. Commonwealth of Australia, *Biosecurity Act 2015* https://www.legislation.gov.au/C2015A00061/latest/text Accessed 31 October 2024.
243. Department of Agriculture, Water and the Environment 2020, 'Australian ballast water management requirements: version 8', Australian Government, Canberra.
244. Department of Agriculture, Fisheries and Foresty (DAFF) 'Australian biofouling requirements', 2023 https://www.agriculture.gov.au/biosecurity-trade/aircraft-vessels-military/vessels/marine-pest-biosecurity/biofouling/australian-biofouling-requirements Accessed 19 June 2024.
245. Department of Agriculture, Department of Environment 2015, 'Anti-fouling and in-water cleaning guidelines', Australian Government, Canberra.
246. Department of Agriculture, Forestry and Fisheries (DAFF) 2024, 'Australian anti-fouling and in-water cleaning guidelines: exposure draft', Canberra, July, CC BY 4.0.
247. Department of Agriculture and Water Resources 2018, 'MarinePestPlan 2018–2023: The national strategic plan for marine pest biosecurity', Australian Government, Canberra.
248. Department of Agriculture, Forestry and Fisheries (DAFF) 2024, 'MarinePestPlan 2018–2023' https://www.marinepests.gov.au/what-we-do/publications/marine-pest-plan Accessed 1 November 2024.
249. Department of Agriculture, Marine Pest Sectoral Committee 2019, 'National Marine Pest Surveillance Strategy', Canberra, December, CC BY 4.0. pp 5.
250. Department of Agriculture, Marine Pest Sectoral Committee 2019, 'National Marine Pest Surveillance Strategy', Canberra, December, CC BY 4.0. pp 5.

The National Light Pollution Guidelines for Wildlife was published by the Australian Government in January 2020 and updated in 2023.[251] In the introduction to these guidelines, natural darkness was described as providing a conservation value in the same way that clean water, air and soil have intrinsic value.

Under development is a Sustainable Ocean Plan for Australia that aims to facilitate cooperation across governments, industries, research organisations, conservation groups and communities to better manage Australia's ocean.[252] As a member of the 18-nation Ocean Panel, Australia's Prime Minister committed to developing the plan to guide 100% sustainable management of the ocean under the Australian Government's jurisdiction.[253]

Victorian context

Several Victorian Government agencies and organisations form the governance arrangements that influence biodiversity conservation and bushfire management and recovery. They interact with a diverse and complex set of policies, laws, regulations, strategies, plans and monitoring frameworks.

Most directly relevant to this report is the *Marine and Coastal Act 2018*, and the policies and activities established by this Act are briefly outlined below (see Table 5 for a complete list of the Victorian legislation and policies relevant to the SMCE 2024 Report). Several other relevant acts and policies are also outlined.

Marine and Coastal Act

The *Marine and Coastal Act 2018* aims to protect Victoria's marine and coastal environment now and into the future, and outlines the following objectives for the planning and management of the marine and coastal environment in Victoria:

- to protect and enhance the marine and coastal environment
- to promote the resilience of marine and coastal ecosystems, communities and assets to climate change
- to respect natural processes in planning for and managing current and future risks to people and assets from coastal hazards and climate change
- to acknowledge Traditional Owner groups' knowledge, rights and aspirations for land and sea Country
- to promote a diversity of experience in the marine and coastal environment
- to promote the ecologically sustainable use and development of the marine and coastal environment and its resources in appropriate areas
- to improve community, user group and industry stewardship and understanding of the marine and coastal environment
- to engage with specified Aboriginal parties, the community, user groups and industry in marine and coastal planning, management and protection
- to build scientific understanding of the marine and coastal environment.

The *Marine and Coastal Act 2018* is complemented by the Marine and Coastal Policy 2020, that includes the Marine Spatial Planning Framework and the Marine and Coastal Strategy 2022.[254, 255, 256]

Victorian Marine and Coastal Council

A Marine and Coastal Council, appointed under the *Marine and Coastal Act 2018* since August 2018, provides independent advice to the government on a range of matters including:

- the development and implementation of statewide policy and strategy, and other plans developed under the *Marine and Coastal Act 2018*
- significant decisions relating to the marine and coastal environment
- matters requiring scientific research.

251. Australian Government Department of the Climate Change, Energy, the Environment and Water (DCCEEW), and Western Australian Department of Biodiversity, Conservation and Attractions 2023, 'National light pollution guidelines for wildlife', Commonwealth of Australia.
252. Department of Climate Change, Energy, the Environment and Water (DCCEEW), 'Draft Sustainable Ocean Plan' https://consult.dcceew.gov.au/draft-sustainable-ocean-plan Accessed 31 October 2024.
253. Commonwealth of Australia 2024, 'Australia's draft Sustainable Ocean Plan', Commonwealth of Australia, Canberra, August, CC BY 4.0, pp. 8.
254. Department of Energy, Environment and Climate Action (DEECA), 'Marine and Coastal Policy' https://www.marineandcoasts.vic.gov.au/marine-coastal-management/marine-and-coastal-policy Accessed 31 October 2024.
255. Department of Energy, Environment and Climate Action (DEECA), 'Marine Spatial Planning' https://www.marineandcoasts.vic.gov.au/marine/marine-spatial-planning Accessed 31 October 2024.
256. Department of Energy, Environment and Climate Action (DEECA), 'Marine and Coastal Strategy' https://www.marineandcoasts.vic.gov.au/marine-coastal-management/marine-and-coastal-strategy Accessed 31 October 2024.

Marine and Coastal Policy 2020

The *Marine and Coastal Act 2018* requires the Minister to make a marine and coastal policy that:

- sets out policies for planning and managing the marine and coastal environment
- provides guidance to decision-makers in delivering the objectives of the *Marine and Coastal Act 2018*
- includes a Marine Spatial Planning Framework to set out steps for achieving integrated and coordinated planning and management of Victoria's marine environment.

The Victorian Government, with guidance from the Victorian Marine and Coastal Council (VMaCC), developed the Victorian Marine and Coastal Policy, released in March 2020.[257] An important focus of the policy is to manage the health of the marine and coastal environment for ecosystems, communities and built assets to be as resilient as possible in the face of future change. The 'Victoria's Resilient Coast – Adapting for 2100+' provides a framework, guidelines and support for Local Government, land managers and their communities to:

- enable place-based, best practice and long-term coastal hazard risk management and adaptation
- build on the directions in the Marine and Coastal Policy 2020.[258]



Colourful and unique designs on the Brighton Beach beach huts outside Melbourne, Victoria. Credit: SellOnlineMarketing

Marine and Coastal Strategy 2022

The *Marine and Coastal Act 2018* requires the relevant Victorian Government minister to make a marine and coastal strategy within 12 months of formulating the marine and coastal policy. The Strategy was released in May 2022, covers five years to 2027 and contains six actions:

- Action 1: Traditional Owners determine how their rights and obligations are embedded into planning and management of the marine and coastal environment
- Action 2: Improve the condition and connectivity of habitats and respect and care for our marine and coastal areas
- Action 3: Adapt to climate change
- Action 4: Support sustainable use and development
- Action 5: Implement the Marine Spatial Planning Framework
- Action 6: Identify resource needs for sustainable marine and coastal management.[259]

Marine Spatial Planning Framework

As mentioned above, the *Marine and Coastal Act 2018* requires development of a statewide marine and coastal policy that includes a Marine Spatial Planning Framework that guides integrated planning and management of Victoria's marine environment and sets out the approach for MSP. The Marine Spatial Planning Framework aims to provide an overarching guide for planning, management and decision-making by marine sectors.

257. Department of Environment, Land Water and Planning (DELWP) 2020, 'Marine and coastal policy', East Melbourne, Victoria.
258. Department of Energy, Environment and Climate Action (DEECA), 'Victoria's Resilient Coast — Adapting for 2100+' https://www.marineandcoasts.vic.gov.au/marine-coastal-management/victorias-resilient-coast-adapting-for-2100 Accessed 31 October 2024.
259. Department of Energy, Environment and Climate Action (DEECA), 'Marine and Coastal Strategy' https://www.marineandcoasts.vic.gov.au/marine-coastal-management/marine-and-coastal-strategy Accessed 31 October 2024.

Environmental Management Plans

EMPs can be developed under the *Marine and Coastal Act 2018* at the discretion of the Minister. Currently only one EMP is implemented in Victoria. The *Marine and Coastal Act 2018* requires an EMP for Port Phillip Bay and 5-yearly evaluations. This plan and any others developed in the future for other marine and coastal ecosystems will aim to align government, industry and community groups on actions to manage future challenges resulting from population growth, urbanisation and climate change. The monitoring, evaluation, reporting and improvement mechanisms associated with developing and implementing EMPs will be used to inform future SMCE reports.

Other relevant legislation and policy

The FFG Act provides for the protection and, where possible, recovery or restoration of marine and coastal species. Protecting Victoria's Environment – Biodiversity 2037 steps out the long-term approaches and strategies for achieving this objective. Several threatened marine species and communities are protected under the FFG Act (e.g. San Remo Marine Community; Port Phillip Bay Entrance Deep Canyon Marine Community and Western Port Bryozoan Reef Community).[260]

In July 2021, the EP Act came into effect, incorporating findings from the Victorian 2016 Inquiry into the EPA.[261] This Act's subordinate legislation includes Environment Protection Regulations 2021 and the ERS.[262, 263] The ERS is a new tool that identifies environmental values that Victorians want to achieve and maintain, and enables the assessment of these values across Victoria.[264] A key element of this reform was the introduction of the General Environmental Duty. This requires all Victorians to take reasonable and practical steps to reduce the human and environmental health risks of their activities.[265]

Victoria's Climate Change Strategy, released in 2021, aims to be a roadmap to net-zero greenhouse gas emissions and a climate-resilient Victoria by 2050. The initiatives in the Climate Change Strategy intend to support communities and businesses in making changes needed to reduce the effects of climate change and continue to support economic growth.[266]

The Invasive Plants and Animals Policy Framework presents the overarching Victorian Government approach to the management of existing and potential invasive species. The Framework incorporates a biosecurity approach aimed at ensuring Victoria maintains a comprehensive planning framework to guide future policy, planning and community activity specific to invasive species. The document sets out a vision for outcomes that invasive species management can achieve for Victoria, and a framework for working towards that vision. Response to invasive pests is also part of the State Emergency Management Plan Animal, Plant, Marine and Environmental Biosecurity Sub-Plan, that contains information on biosecurity mitigation, preparedness, response, relief and recovery.[267] The Plan is aligned with national arrangements and reflects an integrated approach and shared responsibility for biosecurity management between government, agencies, industries, businesses, Traditional Owners and the community.[268]

260. Department of Environment, Land, Water and Planning (DELWP) 2017, 'Protecting Victoria's Environment — Biodiversity 2037', East Melbourne, Victoria.
261. Environmental Protection Authority Victoria 2021, 'New laws to better protect the environment' https://www.epa.vic.gov.au/about-epa/laws/new-laws Accessed 2 August 2021.
262. Environmental Protection Authority Victoria 2021, 'Laws and regulations' https://www.epa.vic.gov.au/about-epa/laws Accessed 1 November 2024.
263. Environmental Protection Authority Victoria 2024, 'The Environment Reference Standard' https://www.epa.vic.gov.au/about-epa/laws/compliance-and-directions/environment-reference-standard Accessed 1 November 2024.
264. Environmental Protection Authority Victoria 2024, 'The Environment Reference Standard' https://www.epa.vic.gov.au/about-epa/laws/compliance-and-directions/environment-reference-standard Accessed 1 November 2024.
265. Department of Energy, Environment and Climate Action (DEECA), '*Environment Protection Act 2017* and subordinate legislation' https://www.environment.vic.gov.au/sustainability/ep-act-2017 Accessed 31 October 2024.
266. Department of Energy, Environment and Climate Action (DEECA), 2024, 'Victoria's climate change strategy' https://www.climatechange.vic.gov.au/victorias-climate-change-strategy Accessed 1 November 2024.
267. Department of Energy, Environment and Climate Action (DEECA), 2024 'State Emergency Management Plan Animal, Plant, Marine and Environmental Biosecurity Sub Plan', East Melbourne Victoria.
268. Department of Energy, Environment and Climate Action (DEECA), 2024 'State Emergency Management Plan Animal, Plant, Marine and Environmental Biosecurity Sub Plan', East Melbourne Victoria.

Table 5: Victorian legislation and policies relevant to the SMCE 2024 Report.

Theme	Legislation and policies
Water quality and catchment inputs	• *Water Act 1989* • *Environmental Protection Act 2017* • State Environment Protection Policy (Waters) 2018 • Melbourne Water 2018, Healthy Waterways Strategy 2018–2028 • Port Phillip Bay Environmental Management Plan 2017–2027 • Coastcare Victoria Strategy 2020–2025 • State Environment Protection Policy (Waters) Environment Reference Standards 2021
Litter and pollution	• *Environmental Protection Act 2017* • Healthy Waterways Strategy 2018–2028 • Environment Protection Regulations 2021 • Coastcare Victoria Strategy 2020–2025
Biodiversity	• *National Parks Act 1975* • *Wildlife Act 1975* • *Flora and Fauna Guarantee Act 1988* • *Fisheries Act 1995* • Wildlife Regulations 2002 • Victorian Fisheries Regulations 2009 • Wildlife Regulations 2013 (wildlife habitat) • *Environmental Protection Act 2017* • Port Phillip Bay Environmental Management Plan 2017–2027 • *Parks Victoria Act 2018* • Wildlife (Marine Mammal) Regulations 2019 • Coastcare Victoria Strategy 2020–2025s • Biodiversity 2037 • Environment Reference Standards
Seafloor integrity and health	• *Land Act 1958* • *National Parks Act 1975* • Port Phillip Bay Environmental Management Plan 2017–2027 • Biodiversity 2037
Pests and invasive species	• *National Parks Act 1975* • *Catchment and Land Protection Act 1994* • *Flora and Fauna Guarantee Act 1988* • *Fisheries Act 1995* • *Sustainable Forests (Timber) Act 2004* • State Emergency Management Plan Biosecurity Sub-plan • Invasive Plants and Animals Policy Framework

Theme	Legislation and policies
Climate and climate change impacts	• *Climate Change Act 2017* • Victoria's Draft 30-Year Infrastructure Strategy 2020 • Victoria's Climate Change Strategy 2021 • Siting and Design Guidelines for Structures on the Victorian Coast, May 2020
Managing coastal hazards and risks	• *Emergency Management Act 2013* • *Climate Change Act 2017* • Victoria's Climate Change Strategy 2021 • Marine and Coastal Policy 2022, Chapter 6 – Managing Coastal Hazard Risk • Victoria's Resilient Coast – Adapting for 2100+

Communities	• *Prevention of Cruelty to Animals Act 1986*
	• *Victorian Planning and Environment Act 1987*
	• *Fisheries Act 1995*
	• *Port Management Act 1995*
	• *Aboriginal Heritage Act 2006*
	• *Heritage Act 2017*
	• *Heritage (Underwater Cultural Heritage) Regulations 2017*
	• State Emergency Management Plan Biosecurity Sub-plan
	• *Environmental Protection Act 2017*
	• *Planning and Environment Amendment (Distinctive Areas and Landscapes) Act 2018*
	• *Marine and Coastal Act 2018*
	• *Great Ocean Road and Environs Protection Act 2020*
	• Siting and Design Guidelines for Structures on the Victorian Coast May 2020
	• Marine and Coastal Policy 2020
	• Victoria's Climate Change Strategy 2021
	• Marine Spatial Planning Framework, including:
	  • Marine Spatial Planning Guidelines 2023
	  • Marine Planning Areas 2023
	• Marine and Coastal Strategy 2022
	• Victorian Planning Provisions

Stewardship and collaborative management	• *Crown Land Reserves Act 1978*
	• *Coastal Waters (State Title) Act 1980*
	• *Catchment and Land Protection Act 1994*
	• *Environmental Protection Act 2017*
	• *Marine and Coastal Act 2018*
	• Marine and Coastal Policy 2020
	• Marine and Coastal Strategy 2022
	• Marine Spatial Planning Framework, including:
	  • Marine Spatial Planning Guidelines 2023
	  • Marine Planning Areas 2023
	• Coastcare Victoria Strategy 2020–2025

Indicator assessment summaries

Guide to indicator assessment summaries

Each indicator assessment summary presents:

- 2024 and 2021 traffic-light report cards
- extent of information
- measure(s)
- data source(s)
- rationale for assessing the indicator
- the criteria used for determining the status, if applicable
- rationale of the indicator assessment.

Further detail on each component of the indicator assessment summary is provided below.

Traffic-light report card

Status

The status summary presents an overall analysis of the assessment for each selected indicator. An indicator can be assessed as having a good, fair or poor status (see status thresholds below). Where there are insufficient data, the indicator status is assessed as unknown.

The key for status in the report card is:

- **Good:** Environmental condition is healthy within the marine and coastal areas, OR pressure is likely to have negligible impact on environmental condition, human health and/or human wellbeing, OR comprehensive protection of natural ecosystems and biodiversity is evident.
- **Fair:** Environmental condition is neither positive nor negative and may be variable along the marine and coastal areas, OR pressure is likely to have limited impact on environmental condition, human health and/or human wellbeing, OR moderate protection of natural ecosystems and biodiversity is evident.
- **Poor:** Environmental condition is under significant stress within the marine and coastal areas, OR pressure is likely to have significant negative impact on environmental condition, human health and/or human wellbeing, OR inadequate protection of natural ecosystems and biodiversity is evident.
- **Unknown:** Data are insufficient to assess status.
- **Narrative (N):** A status assessment cannot be made because it is inappropriate for the indicator.
- **Not applicable (N/A):** An indicator status assessment cannot be made because the indicator is not relevant for this region.



Good



Fair



Poor



Unknown



Narrative but not assessed



Not applicable

Trend

The trend traffic light presents an overall analysis of the trend assessments for each selected indicator. The trend identifies whether the status of the indicator is deteriorating, improving or remaining stable. Importantly, trend does not represent whether the measure used to assess the indicator is increasing or decreasing (e.g. increasing litter and plastic pollution), but instead reflects whether the change in the indicator measure denotes an improved or deteriorating environmental outcome.

The key for trend in the report card is:

- **Improving:** Environmental condition is improving within the marine and coastal areas, OR the adverse impacts on environmental condition, human health, and/or human wellbeing from pressures are decreasing, OR protection of natural ecosystems and biodiversity is increasing.
- **Stable:** Environmental condition is being maintained within the marine and coastal areas, OR the impacts on environmental condition and/or human health from pressures have not changed significantly, OR protection of natural ecosystems and biodiversity is being maintained.
- **Deteriorating:** Environmental condition is decreasing within the marine and coastal areas, OR the adverse impacts on environmental condition, human health and/or human wellbeing from pressures are increasing, OR protection of natural ecosystems and biodiversity is decreasing.
- **Unclear:** Data are insufficient to assess trend.
- **Narrative (N):** A trend assessment cannot be made because it is inappropriate for the indicator.
- **Not applicable (N/A):** A trend assessment cannot be made because the indicator is not relevant for this region, OR because the indicator assessment is based on current environmental condition only and it is not applicable to provide a trend assessment.



Improving



Stable



Deteriorating



Unclear



Narrative but not assessed



Not applicable

Confidence

The confidence traffic light reflects on knowledge gaps and data limitations when assessing the status and trend of the indicator.

The key for confidence in the report card is:

- **High:** Adequate high-quality evidence and high level of consensus.
- **Moderate:** Limited evidence or limited consensus.
- **Low:** An assessment can be made, but there is only minimal evidence to guide the assessment.
- **Insufficient:** There is negligible evidence (or suitable data and/or thresholds) and no status and trend assessments can be made. This level of confidence in the SMCE 2021 Report was referred to as 'unknown'.
- **Narrative (N):** A confidence assessment cannot be made because it is inappropriate for the indicator.
- **Not applicable (N/A):** A confidence assessment cannot be made because status and trend assessments have not been made for the indicator.



High



Moderate



Low



Insufficient



Narrative but not assessed



Not applicable

Extent of information

This considers the localisation of impacts associated with each indicator and/or the spatial scale of the evidence supporting the assessment. The regions considered in this report have expanded since publication of the SMCE 2021 Report and include (Figures 7 to 9):

- Statewide marine and coast (SW)
- Glenelg Hopkins Catchment Management Authority (GHCMA)
- Corangamite Catchment Management Authority (CCMA)
- Port Phillip and Westernport Catchment Management Authority (PPWCMA)
- West Gippsland Catchment Management Authority (WGCMA)
- East Gippsland Catchment Management Authority (EGCMA)
- Glenelg-Discovery Bay biounit (GDB)
- Shipwreck Coast biounit (SC)
- Port Phillip Heads biounit (PPH)
- Port Phillip Bay biounit (PPB)
- Schanck-Woolamai biounit (ScWo)
- Western Port biounit (WP)
- Wilsons Prom West biounit (WPW)
- Corner Inlet-Nooramunga biounit complex (CIN)
- Gippsland Lakes biounit (GL)
- Gabo-Howe biounit (GH)
- Marine protected area (MPA)

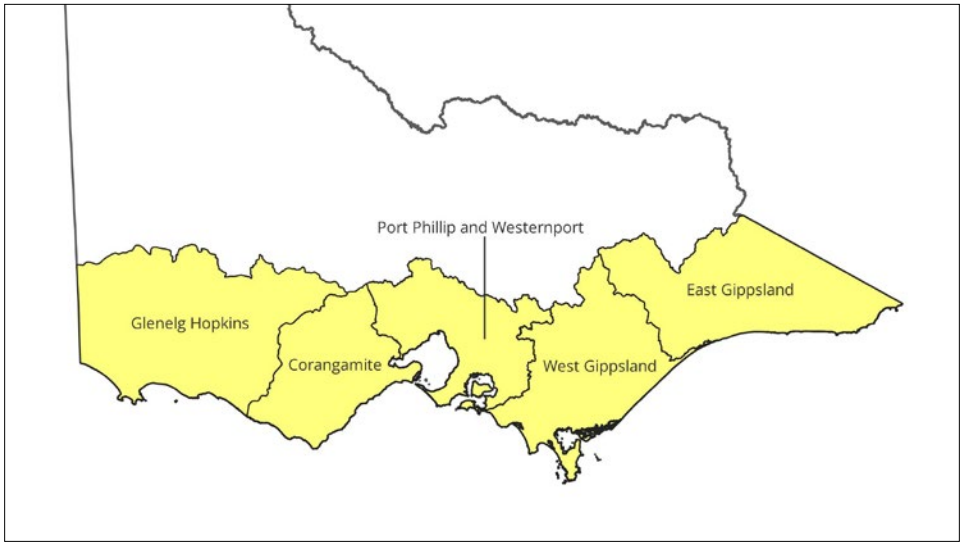


Figure 7: Map of coastal catchment management regions in Victoria.[269]

269. As of 1 January 2022, responsibility for the Port Phillip and Westernport CMA region was transferred to Melbourne Water. In this report, the authority is referred to as the former Port Phillip and Westernport CMA.

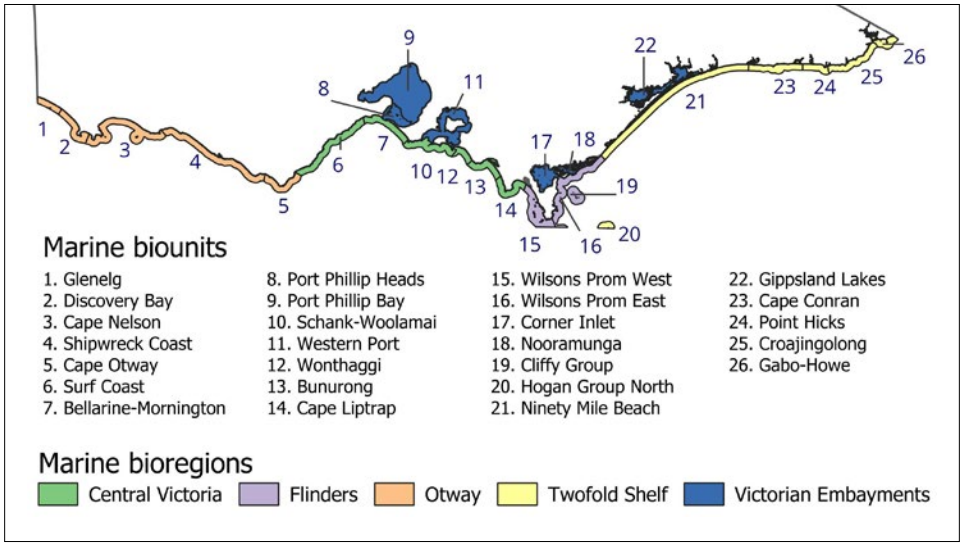


Figure 8: Map of biounits across the Victorian coastline.

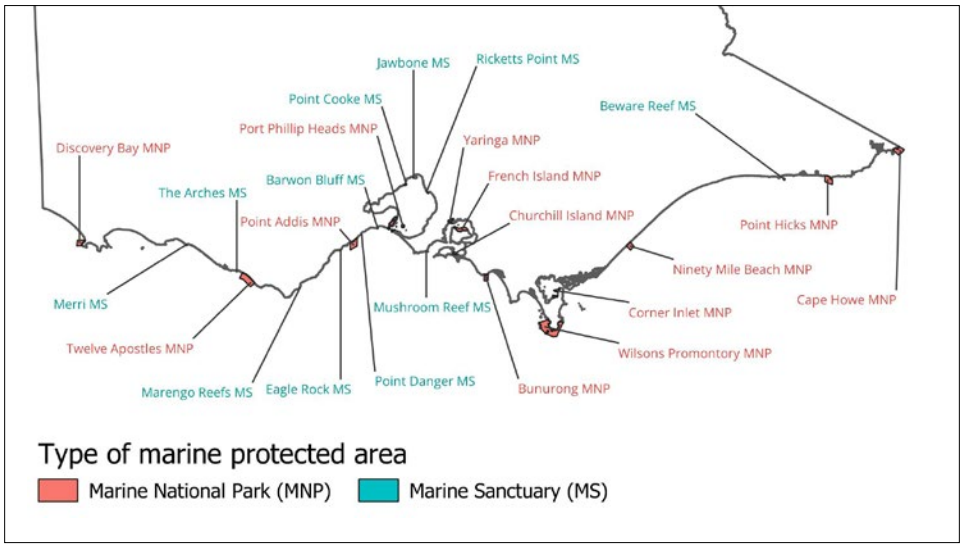


Figure 9: Map of Victoria's marine protected areas.

Data sources

The assessments of SMCE 2024 indicators rely on data that are collected, managed, analysed and reported on by government departments and agencies, non-government organisations and the academic sector. While a range of sources is needed to comprehensively evaluate the status and trend of an indicator, this list presents the custodians of key datasets used in the assessment.

Measures

This section presents the specific measurements and datasets used to inform the status and trend assessments.

Why this indicator

This section describes the importance for monitoring and reporting on the indicator in terms of its influence on the condition and/or management of the natural environment.

Why this assessment in 2024

This section provides a brief synopsis of the indicator's current performance and the evidence that supports the assessment.

Wilsons Promontory National Park, Friends of the Prom volunteers. © Parks Victoria

Indicator assessment summaries by theme

Water quality and catchment inputs

01: Water quality (physicochemical)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
CIN						
GL	 (Lake King, Lake Victoria)  (Lake Wellington)	 (Lake King, Lake Victoria)  (Lake Wellington)		 (Lake King, Lake Victoria)  (Lake Wellington)		

Data source(s)	DEECA EPA Victoria Melbourne Water
Measure(s)	Water Quality Index (WQI) scores

Why this indicator?

Water quality affects the distribution and abundance of marine aquatic plants and animals, and a range of biogeochemical and ecological processes. Maintaining good water quality is also important for public health, recreational users of coastal waterways and the overall amenity of the coast.

The assessments for this indicator are based on the water quality results measured in marine water bodies, embayments and coastal lagoons, rather than water quality results from the catchment.

Why this assessment in 2024?

These assessments are based on the Water Quality Index (WQI) scores for Port Phillip Bay, Western Port and the Gippsland Lakes. Water quality is not monitored routinely in other Victorian marine waters.

Port Phillip Bay has been rated as good or very good each financial year since monitoring and reporting began in 2001–02.

Western Port has been rated as good in each financial year since monitoring and reporting began in 2000–01, except for 2017–18 when water quality was rated as fair.

For the Gippsland Lakes, the Eastern Lakes (Lake King and Lake Victoria) have been rated as good for eight of the past 10 financial years (with one year rated as fair and one as poor), while Lake Wellington has been rated as fair or poor for each of the past 10 financial years. The rolling 5-year average WQI score for Lake Wellington for 2018–19 to 2022–23 was 3.9 out of 10, that rates as poor but is the highest 5-yearly average recorded in the lake.

Confidence in the status and trend assessments is high because the WQI is benchmarked against objectives in the Environment Reference Standard and there are adequate spatial and temporal monitoring data.

Water quality is not currently routinely measured in the Corner Inlet and Nooramunga biounits. Therefore, the status and trend assessments for that region have been assessed as unknown and unclear respectively.

02: Toxicants

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			 (status) (trend)
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			 (status) (trend)

Data source(s)	Academic research Melbourne Water
Measure(s)	Assessment against toxicants listed in Environment Reference Standard (ERS) and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality

Why this indicator?

Toxicants are chemical pollutants that have toxic effects on biota. These include both organic and inorganic toxicants. Metals (e.g. lead and cadmium) are inorganic toxicants that pose significant risk to the health of coastal waterways.

Why this assessment in 2024?

The status has been assessed as fair because the environmental condition is variable but, based on a limited number of focused studies, is unlikely to be under significant widespread stress across the state. This is also the basis for a statewide assessment being preferred to regional assessments.

There are instances of localised impacts, most notably:

- Organic contaminant accumulation in mussels from four locations in Port Phillip Bay is a serious food safety concern.
- Dolphins in Port Phillip Bay and the Gippsland Lakes were found with the highest concentrations of per- and polyfluoroalkyl substances chemicals in dolphins reported anywhere in the world, according to research from 2023.

These research studies provide 'point-in-time' assessments; therefore, trend is unclear. The confidence in the status and trend assessments is assessed as low.

03: Water quality (estuaries)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A			(status) (trend)
GHCMA			(status) (trend)	–	–	–
CCMA			(status) (trend)	–	–	–
PPWCMA			(status) (trend)	–	–	–
WGCMA			(status) (trend)	–	–	–
EGCMA			(status) (trend)	–	–	–
PPB	N/A	N/A	N/A			(status) (trend)
WP	N/A	N/A	N/A			(status) (trend)
CIN	N/A	N/A	N/A			(status) (trend)
GL	N/A	N/A	N/A			(status) (trend)

Data source(s)	DEECA
Measure(s)	Index of Estuary Condition water quality sub-index

Why this indicator?

Elevated sediments and nutrients in the water column of estuaries can alter the production of benthic plants (e.g. seagrasses and macroalgae) and disrupt food webs with flow-on effects for estuarine fauna.

Why this assessment in 2024?

Due to the consistent and systematic measurement of estuarine water quality condition and the robust scoring and assessment methods in the 2021 Index of Estuary Condition (IEC) assessments, there is high confidence in the status assessment for estuarine water quality in this indicator.

Water Quality was good or excellent in 54% of the state's estuaries. It was poor or very poor in 25% of these that were typically estuaries with catchments that were predominantly urban or agricultural.

The regional status assessments reflect variable estuarine water quality across the state, although more estuaries recorded good or excellent water quality than poor or very poor. As this is the first IEC, and IECs are designed to be point-in-time assessments, no time series data are available to assess trends.

Assessments in the State of the Marine and Coastal Environment (SMCE) 2021 Report focused on specific marine biounits (Port Phillip Bay, Western Port, Corner Inlet and Nooramunga, and the Gippsland Lakes), complemented by a statewide assessment incorporating results for all estuarine environments across the state. In this SMCE 2024 Report, the data have been categorised by Catchment Management Authority (CMA), with status assessments made for all CMA's that manage estuarine environments in Victoria.



Terebellid Worm Larva is free swimming and planktonic, mostly found in marine habitats, living in permanent tubes in the sediment of the sea floor or on the reef.
Credit: Peter Parks/imagequest3d.com © Image Quest 3-D

04: Plankton

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A	N	N	N
PPB						
WP						
CIN						
GL	 (Lake Victoria, Lake Wellington)  (Lake King)			 (Lake King, Lake Victoria)  (Lake Wellington)	 (Lake King, Lake Victoria)  (Lake Wellington)	
Data source(s)	EPA Victoria IMOS					
Measure(s)	Chlorophyll-a (µg/L)					

Why this indicator?

Plankton are an extremely important part of the marine and coastal environment due to their role in food chains and oxygen production. Without plankton, the Earth would be warmer and devoid of large fish and charismatic animals. This indicator assesses plankton in marine waters.

Why this assessment in 2024?

These assessments are based on the chlorophyll-a water quality ratings for Port Phillip Bay, Western Port and the Gippsland Lakes. Chlorophyll-a is not routinely monitored and assessed in other Victorian marine waters.

For Port Phillip Bay, chlorophyll-a ratings fluctuated between fair and very good from the 2001–02 to 2012–13 financial years but have been rated as very good since that time.

Chlorophyll-a in Western Port was rated as fair to poor from the 2000–01 to 2011–12 financial years, before improving to good to very good from 2014–15 to 2019–20. No assessments are available since 2019–20, leading to status and trend ratings of unknown and unclear for this report.

The Gippsland Lakes Environment Report 2024 (unpublished) assessed the status of chlorophyll-a as fair for Lake Victoria and Lake Wellington, and poor for Lake King. Median chlorophyll-a concentrations from 2017 to 2022 in Lakes Wellington, Victoria and King were 10, 8 and 4 µg/L respectively, illustrating the gradient in phytoplankton biomass across the main lakes.

Confidence in the status and trend assessments for Port Phillip Bay and Gippsland Lakes is moderate because chlorophyll-a concentrations have been used to infer phytoplankton biomass.

Phytoplankton is not currently routinely measured in the marine environment of the Corner Inlet and Nooramunga biounits. Therefore, the status and trend assessments have been assessed as unknown and unclear, respectively.

05: Enterococci bacteria

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						

Data source(s)	EPA Victoria
Measure(s)	Number of beaches meeting long-term standards for primary and secondary contact

Why this indicator?

Poor water quality in marine environments adversely impacts marine ecosystems and human recreational usage. Enterococci is a bacterial indicator of microbial water quality. It is used to indicate the presence of faecal pollution at a beach. The concentration of enterococci in marine environments generally increases after significant rainfall events as faecal pollution is transported to beaches through stormwater drains and river outlets. Elevated enterococci levels can also occur regardless of rain, due to other reasons such as damaged toilet facilities, sewer spills, animal faeces, bather shedding or non-faecal sources (for example, decomposing organic matter like seaweed or animals). Increased enterococci levels may indicate an increase of disease-causing microorganisms (i.e. pathogens) of faecal origin which can lead to gastrointestinal and respiratory illnesses and as skin irritations. Children, the elderly, and people with vulnerable immune systems that recreationally use water (e.g. swimming) when it is contaminated by these pathogens are at the highest risk of illness.

Why this assessment in 2024?

Fewer beaches met long-term microbial water quality standards during the 2018–19 to 2022–23 reporting period than previous 5-yearly reporting periods. This has led to a trend rating of deteriorating. Increased rainfall is likely to have influenced the percentage of beaches failing to meet long-term microbial water quality standards during this reporting period.

Despite long-term standards often not being met, beaches are generally suitable for swimming during the summer season (except for rainfall periods), with most water quality samples meeting the short-term standards. The beaches that didn't meet long-term standards still had microbial water quality suitable for swimming on most days during summers. Therefore, the status is assessed as fair.

The confidence in the status and trend assessments is high due to the rigorous monitoring program and the robust set of water quality standards.

06: Regulated point source discharges to marine waters

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
CIN						
Data source(s)	Clean Ocean Foundation EPA Victoria					
Measure(s)	Volumes and nutrient loads discharged to marine waters from regulated point sources					

Why this indicator?

Oceans are used as receiving waters for treated sewage effluent and other wastewater from industrial processes. The assumption is that with rapid dilution in the receiving waters, contaminants in the wastewater are at low enough concentrations to have no toxic effect on marine plants and animals. The discharges of waste from 19 outfalls, including the Eastern and Western Treatment Plants, are regularly monitored by the agencies responsible for them to ensure compliance with licence conditions.

Why this assessment in 2024?

The status assessment of fair is based on:

- An assumption that licence conditions for water discharges from outfalls are set at limits that protect receiving marine environments.
- That there are a moderate number of breaches of these conditions in most years.

The trend is unclear because there are no long-term time series with data on discharge volumes and number of compliance breaches.

Limited quantitative analysis is available for understanding the extent to which regulated discharges impact the receiving marine environments. Therefore, confidence in the status assessment is low.

Assessments in the State of the Marine and Coastal Environment 2021 Report focused on specific marine biounits (Port Phillip Bay, Western Port, Corner Inlet and Nooramunga, and the Gippsland Lakes). Assessments in this indicator were made for the marine biounits with ocean outfalls. This State of the Marine and Coastal Environment 2024 Report has a broader statewide scope, and the statewide assessment incorporates data from all ocean outfalls across the state.

07: Stormwater

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB			 (status) (trend)			 (status) (trend)
WP			 (status) (trend)			 (status) (trend)
CIN						
GL						

Data source(s)	Melbourne Water
Measure(s)	Directly connected imperviousness, which is the proportion of the impervious surface that is directly connected to a stream through a conventional drainage connection.

Why this indicator?

Stormwater has a direct impact upon the health of coastal waterways. As stormwater drains, it carries pollutants with it like litter, sediment and oil. These are a major cause of pollution in our rivers, creeks, lakes and bays.

Why this assessment in 2024?

Port Phillip Bay

The status of fair is due to the variable stormwater conditions across Port Phillip Bay's catchments. There are very strong regional differences within the overall assessment for the bay. For example, only minor impacts to stream health are occurring from stormwater in the Werribee catchment, while stream health is being severely impacted from stormwater in the Dandenong catchment. Despite the analysis by catchment, there has been no public reporting assessing whether the Victorian Government's target (ensuring that nutrient and sediment loads do not exceed the 2017 levels) is being met, therefore there is only a moderate confidence in the stormwater status assessment. No time series data are available to provide a trend assessment.

Western Port

The status of good is due to Melbourne Water's assessment that only minor impacts to stream health in Western Port are occurring from stormwater. No time series data are available to provide a trend assessment. Given that no data on the stormwater loads into Western Port are available, the confidence in these assessments is rated as moderate.

Corner Inlet-Nooramunga and Gippsland Lakes

Stormwater impacts on Corner Inlet–Nooramunga and Gippsland Lakes remain largely unknown.

08: Total nutrient loads

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						 (status) (trend)
CIN						 (status) (trend)
GL						
Data source(s)	EGCMA					
Measure(s)	Total nitrogen and phosphorus loads (t/yr)					

Why this indicator?

Nutrients such as nitrogen and phosphorus are necessary for ecological functioning in coastal waters. However, excessive levels of nutrients can increase the growth of aquatic plants, and subsequently impact water quality, by stimulating blooms of nuisance plants, phytoplankton and algae (including blue-green algae). This in turn can dominate and change dynamics of the entire food chain.

Why this assessment in 2024?

Port Phillip Bay

The status of fair and the trend of deteriorating are based on the lower bound of the Environment Reference Standard (ERS) being exceeded in three of the past five years. This trend was largely driven by increased rainfall in recent years that led to a 41% increase in nitrogen loads from the catchments to Port Phillip Bay over the last five years (2019–2023) compared to the previous five years.

Corner Inlet-Nooramunga

Even though there are marine nutrient load objectives for Corner Inlet in the ERS, no data are available to assess compliance with these objectives.

Gippsland Lakes

The East Gippsland Catchment Management Authority assessed nutrient loads as having a good status and improving trend in the Gippsland Lakes Environment Report 2024 (unpublished). However, no specific data are available to assess compliance with the total phosphorus load objective in the ERS for Lake Wellington, which is the basis of the status assessment of unknown. Flows and loads vary substantially over time, but there appears to be a decreasing trend (improving condition) in nutrient loads following the peaks of 2007. The exception to this was in 2021 when there was very high rainfall and large loads of sediments and nutrients entering the system.

Western Port

No assessment has been made because there are no marine nutrient load objectives for Western Port in the ERS.

09: Total sediment loads

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
CIN						
GL				 (Lake King, Lake Victoria)  (Lake Wellington)		

Data source(s)	Melbourne Water
Measure(s)	Total Suspended Solids loads (t/yr)

Why this indicator?

Higher loads of sediments can reduce the amount of light available for seagrass growth and may transport toxicants and nutrients into the marine environment. Sediment toxicants can affect fish and invertebrates in inshore areas, and marine mammals and waterbirds (through the food chain).

Why this assessment in 2024?

Port Phillip Bay

The status of fair and the trend of deteriorating are based on the lower bound of the Environment Reference Standard (ERS) being exceeded in three of the past five years. This trend was largely driven by above-average rainfall in recent years that led to an estimated 36% increase in sediment loads from the catchments to Port Phillip Bay over the last five years (2019–2023) compared to the five years previous.

Western Port

The status of fair and the trend of deteriorating are based on the ERS being exceeded in two of the past five years. This trend was largely driven by above average rainfall in recent years that has led to an estimated 78% increase in sediment loads from the catchments to Western Port over the last five years (2019–2023) compared to the five years previous.[270]

Corner Inlet-Nooramunga

No data are available to assess compliance with total suspended solids load objectives in the ERS for Corner Inlet and Nooramunga Marine and Coastal Park.

Gippsland Lakes

No assessment has been made because there are no marine suspended solids load objectives for the Gippsland Lakes in the ERS.

270. The catchment model that is used to provide estimates of sediment loads for this indicator is refined and improved over time. Melbourne Water and DEECA maintain this catchment model. Updates to the catchment model made between the SMCE 2021 Report and SMCE 2024 Report have led to lower estimated annual sediment loads forWestern Port being reported in this SMCE 2024 Report compared with the estimated sediment loads used to inform the Western Port status assessment in the SMCE 2021 Report. This is why the Western Port status assessment has improved from Poor in 2021 to Fair in 2024 despite the trend being assessed as deteriorating in 2024.

10: Coastal acid sulfate soils

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	?	?	?	–	–	–
PPB	N/A	N/A	N/A	?	?	?
WP	N/A	N/A	N/A	?	?	?
CIN	N/A	N/A	N/A	?	?	?
GL	N/A	N/A	N/A	?	?	?

Data source(s)	DEECA
Measure(s)	Area of potential coastal acid sulfate soil within 5 km of the high-water mark adjacent to marine biounits.

Why this indicator?

Coastal acid sulfate soils occur naturally along many parts of Victoria's coastal zone and, if left undisturbed, are largely benign. However, if disturbed (i.e., water drains from the soil and air enters), they can react with oxygen and produce sulfuric acid. This can be detrimental to the environment with impacts that include acidification of water and soil, de-oxygenation of water, poor water quality, dissolution of soil, rock and concrete, and corrosion of metals.

Why this assessment in 2024?

Potential coastal acid sulfate soil sites have been mapped along the Victorian coastline.

A total of 116,445 hectares of land within 5 km of the Victorian coastline has been designated as prospective land (i.e. land for which the geomorphological composition indicates that there is a potential or prospect of encountering sulfidic or sulfuric material). That area of prospective land represents 4.5% of all Victorian coastal land (i.e. land within 5 km of the coastline).

There are no thresholds to guide status and trend assessments and there is no available evidence on the impact of coastal acid sulfate soils.

A statewide assessment has been preferred to regional assessments because there is an absence of available evidence on the impact of coastal acid sulfate soils across the state.



French Island National Park.
Credit: Christian Pearson – Misheye © Parks Victoria

Litter and pollution

11: Litter and plastics						
Extent of information	**2024 status**	**2024 trend**	**2024 confidence**	**2021 status**	**2021 trend**	**2021 data quality**
SW				–	–	–
PPB						
WP						
CIN						
GL						
Data source(s)	AusLM DEECA LitterWatch					
Measure(s)	Number of litter items (including plastic and microplastic) Litter density (including plastic and microplastic) Number of entanglements					

Why this indicator?

Litter reduces environmental values, the amenity of communities and imposes a significant resource and financial burden on governments for enforcement and clean-ups. Wildlife is threatened through the ingestion or entanglement with litter. Contamination arising from rotting and rusting litter items pollutes and degrades soils, water quality and food webs and may also pose a threat to human health.

Why this assessment in 2024?

Recent data were unavailable for Western Port, Corner Inlet and Nooramunga, Gippsland Lakes, thus, the status and trend are unknown and unclear, respectively.

Statewide

The status of litter across the state has been assessed based on the established thresholds under the Port Phillip Bay Environmental Management Plan.

The 2022 Australian Litter Measure (AusLM) results indicated that the four beach sites had a total of 573 litter items counted and a density of 14 litter items per 200 m^2. Based on Litter Index thresholds, this density equates to a fair status (Litter Index threshold of 2 - 100 items per 200 m^2). The fair status is also supported by the most recent LitterWatch results. Across the three monitoring schemes (National Litter Index, AusLM and LitterWatch), plastics was the dominant litter type.

Litter densities have increased when comparing the litter density from the 2018-19 National Litter Index results, which was 4 items per 200 m^2, to the 2022 AusLM results. LitterWatch data also demonstrated an increase over the same period, rising overall from two items per 200 m^2 to six items per 200 m^2. The density of plastic litter items also rose across years. Fishing gear, although not a dominant litter type, does pose a welfare issue for marine biota in terms of entanglements. An increasing trend for this litter type coincides with an increasing rate of entanglements among some cetacean species, although a decline was evident for other species. Thus, the trend is assessed as deteriorating.

Confidence is assessed as moderate due to survey sites not being evenly distributed within the state's coastal environment and differences in methodologies across monitoring programs. Furthermore, entanglements can go undetected, thus the number of reports is likely an underestimation.

Port Phillip Bay

The 2022-23 Litter Index results under the Port Phillip Bay Environmental Management Plan showed that the status for litter was poor and composed primarily of plastics. Since 2020–21, the status for Port Phillip Bay has risen from very poor to poor, indicating an improving trend. Given that surveys were not representative of the entire bay, with most sites located within two local government areas, confidence is considered low.

12a: Light pollution

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A	?	?	?
WP	N/A	N/A	N/A	?	?	?
CIN	N/A	N/A	N/A	?	?	?
GL	N/A	N/A	N/A	?	?	?

Data source(s)	Academic research NOAA Earth observation group
Measure(s)	Artificial light at night measured as Radiance ($W/cm^2 * sr$)

Why this indicator?

Light pollution is excessive or obtrusive artificial light that has an adverse impact on biodiversity, and potentially human health. It is a global issue, impacting at both national and regional scales, and increasing in prevalence as the world becomes more populated and industrialised. In addition to the negative biodiversity and health effects, outdoor lighting can be inefficient and reduce energy resources while carrying a significant financial burden.

Why this assessment in 2024?

Research has found adverse biodiversity and socio-economic effects associated with light pollution at places along Victoria's coastline. This has led to a status assessment of poor.

There has been a 6% total increase in night-time light emissions across Victoria's coastal regions from 2014 to 2021, which is the basis for a deteriorating trend.

The confidence in these status and trend assessments is low due to the absence of systematic measurements and analysis of light pollution in Victoria.

A statewide assessment has been preferred to regional assessments because there is consistency across the state's coastal areas for the impacts from, and trends of, light pollution.

12b: Marine noise

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	?	?	?	New SMCE 2024 indicator	New SMCE 2024 indicator	New SMCE 2024 indicator
Data source(s)	Academic research					
Measure(s)	Acoustic noise levels Observed impacts of marine and coastal species					

Why this indicator?

Sound is the most efficient means of communicating underwater, especially for many marine species.

There has been growing concern over the potential impacts of ocean noise on the efficiency of sound traveling underwater and the overall well-being of marine species. Human-caused sound can affect the health of animals.

Why this assessment in 2024?

Research has found adverse biodiversity effects associated with marine noise at places along Victoria's coastline.

The status and trend have been rated as unknown and unclear, respectively, due to the limited local studies and the absence of systematic measurements and analysis of marine noise in Victoria.



Dolphin in Port Phillip Bay.
© Parks Victoria

13: Coastal contaminated land

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
CIN						
GL						
Other coastal locations				–	–	–
Data source(s)	EPA Victoria					
Measure(s)	Numbers of contaminated and potentially contaminated land locations within 5 km of the coastline for various datasets published on Victoria Unearthed.					

Why this indicator?

Like other economies with a significant history of settlement and industrial activity, Victoria has a legacy of waste and pollution. Contaminated sites range from old mines and industrial sites to petrol stations and dry-cleaning operations. Many of these sites require active management to reduce the risk to human health and the environment.

Why this assessment in 2024?

The only region-specific assessments in 2024 have been made for Port Phillip Bay, which reflects consistency across the state's other coastal locations for the lower risk of impacts from contaminated land.

There are several sites within 5 km of the Victorian coastline that are known to be contaminated or are the location of current activity involving a relatively high risk of contamination. Most of these sites are located near Port Phillip Bay, which is reflected by a status assessment of fair for that region. The risk of contaminated land is lower in other coastal regions, where the status has been rated as good.

Even though information from Victoria Unearthed is 'point-in-time' spatial data, the trend has been assessed as stable due the regional status assessments for this indicator remaining unchanged from 2021 to 2024.

The confidence in the assessments is rated as moderate because even though data quality on the locations of contaminated and potentially contaminated land locations is good, it is based on 'point-in-time' spatial data and knowledge on the impacts of contaminated land on coastal settlements is constantly evolving.

14: Coastal air quality

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB				 (ozone, nitrogen dioxide, carbon monoxide and sulfur dioxide)  (fine particle pollution)		 (near shipping terminals)  (elsewhere)
WP						
CIN						
GL				 (fine particle pollution during bushfire periods)  (all other times)		 (during bushfires)  (all other times)
Data source(s)	Academic research EPA Victoria					
Measure(s)	Number of exceedances of air quality standards					

Why this indicator?

Good air quality is essential for human health. The links between air quality, population exposure and health are an increasing focus for research and policy development.

Why this assessment in 2024?

At most coastal locations where air quality is monitored in Victoria, there are few or no breaches of air quality standards each year. The exceptions to this are years when there are significant bushfire effects, or where coastal locations are near industrial activity. This information has been balanced to a status assessment of fair. A statewide assessment has been preferred to regional assessments because bushfire smoke impacts have been spatially variable in Victoria's coastal regions over the years — the regional assessments fluctuate more dramatically and the overall story of coastal air quality is best described by a statewide assessment.

The trend is stable as there is no obvious increase or decrease in the number of days exceeding air quality standards during the past decade.

Environment Protection Authority Victoria has recently expanded its air quality monitoring to incorporate many more coastal locations. However, insufficient data (i.e. less than 75% data capture in each quarter of a year) were collected to demonstrate compliance with the Environment Reference Standard objectives for several pollutants across multiple years at most monitoring locations. Therefore, the confidence in the assessments is rated as moderate.

A statewide assessment has been preferred to regional assessments because there is consistency across the state's coastal areas for the impacts from, and trends of, air pollution.



Port Phillip Heads Marine National Park.
Credit: Christian Pearson © Parks Victoria

Biodiversity

15: Conservation of coastal ecosystems in protected areas

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA
Measure(s)	Area of EVCs within 5 km of the high-water mark (coastal environment) Proportion (%) of EVCs within 5 km of the high-water mark designated as an IUCN protected area Bioregional conservation status of EVCs

Why this indicator?

Assessing the area and type of coastal ecosystems with formal protection and the degree of protection is critical for evaluating whether the state's network of marine protected areas is meeting the required criteria of comprehensiveness, adequacy and representativeness and tracking progress towards meeting international benchmarks for protection.

Why this assessment in 2024?

The status of coastal ecosystems in Victoria has been assessed as fair due to the loss of approximately 62% of Ecological Vegetation Class (EVC) spatial extent between colonisation and 2005 (most recent statewide data) and moderate levels of ecological degradation with over half of the EVCs having a bioregional conservation status of rare or least concern. Additionally, nearly 60% of EVCs are afforded protection within the state's network of protected areas and a further 3% of vegetated private land protected through conservation covenants. However, only a relatively small proportion of the extent of endangered EVCs occurs within areas having some form of protection.

Despite there being no additions to the state's network of protected areas since establishment in 2002, a lack of contemporary EVC mapping at a statewide scale prevents an assessment of changes in EVC extent and condition within protected areas. Thus, trend was assessed as unclear and confidence low.



Australian Sealions. Credit: atosan

16: Coastal saltmarsh

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
PPH				–	–	–
WP						
CIN				 (Nooramunga islands)  (Corner Inlet and Nooramunga)		
GL						

Data source(s)	Deakin University DEECA
Measure(s)	Extent (ha) of saltmarsh Change in coastal saltmarsh extent since European colonisation Ramsar site limits of acceptable change

Why this indicator?

Coastal saltmarsh communities provide several ecosystem services that range from supporting biodiversity and fishing industries, protecting shorelines from erosion and wave surges, improving water quality and quantity, to carbon sequestration. The Subtropical and Temperate Coastal Saltmarsh natural community is also listed as a threatened ecological community under the *Environment Protection and Biodiversity Conservation Act 1999*.

Why this assessment in 2024?

Assessments are based on the Statewide Marine Habitat Map, pre-colonisation mapping, Ramsar site limits of acceptable change (LAC) assessments, recent condition assessments of mapped coastal saltmarshes and results of regional catchment strategy monitoring.

Statewide

The statewide status was assessed as good as the current extent represents approximately 80% of the pre-1750 distribution. Additionally, most of the coastal saltmarshes assessed have shown little to no degradation from tidal restrictions or agriculture overall, however these are based on only a small proportion of mangroves that was further limited by only two threatening processes being considered. Although the extent of coastal saltmarsh has remained relatively unchanged since European colonisation (pre-1750), their health and maintenance are still threatened by widespread degrading processes while the combined impacts of climate change, specifically sea level rise, and coastal squeeze poses a future risk. Thus, the statewide trend is assessed as deteriorating.

The confidence is considered moderate due to mapping limitations for this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of coastal saltmarsh extent and restricted to two threatening processes.

Port Phillip Bay

The status for Port Phillip Bay is assessed as poor due to less than half of the pre-1750 distribution remaining as a result of anthropogenic impacts and coastal saltmarsh condition primarily being moderately disturbed. Reductions have also occurred within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. However, these losses did not exceed the LAC threshold. The trend is deteriorating as result of a significant losses within the biounit coupled with the ongoing threats associated with development that are further exacerbated by climate change impacts.

The confidence is considered low due to mapping limitations for this dynamic community type, variability in mapping methodologies across studies and no recent condition assessments being undertaken.

Port Phillip Heads

The status for Port Phillip Heads is assessed as good as more than 80% of the pre-1750 coastal saltmarsh extent remains. The condition was also found to be in a natural state, although this was based on a small proportion of the total extent being assessed and only two threatening processes considered. Although extent has changed little since colonisation, the trend is deteriorating due to the ongoing threats associated with development that are further exacerbated by climate change impacts.

The confidence is considered moderate due to mapping limitations for this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of coastal saltmarsh extent and restricted to two threatening processes.

Western Port

The status for Western Port is assessed as good as nearly 90% of the pre-1750 coastal saltmarsh communities remain. The condition was also found to be in a natural state for most assessed saltmarshes as these are not impacted by levees and agriculture, although approximately 8% were found to have high levels of disturbance, particularly from invasive species. Although the extent has changed little since colonisation, the trend is deteriorating due to the ongoing threats associated with development and altered hydrological regimes that are further exacerbated by the impacts of climate change.

The confidence is considered moderate due to mapping limitations for this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of coastal saltmarsh extent.

Corner Inlet and Nooramunga

The status for Corner Inlet and Nooramunga is assessed as poor. Although Nooramunga has experienced a relatively small decline in extent and the Corner Inlet Ramsar Site increased in extent, Corner Inlet has lost half of the historical extent and was reported to have suffered some of the greatest losses of coastal saltmarsh in the state. Furthermore, the condition has been moderately or severely impacted by threatening processes, particularly invasive species. The trend is deteriorating as a result of significant losses within the biounit complex coupled with the ongoing threats associated with development that are further exacerbated by climate change impacts.

The confidence is considered moderate due to mapping limitations for this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of coastal saltmarsh extent and restricted to two threatening processes.

Gippsland Lakes

The status for Gippsland Lakes is assessed as good. Although there have been slight reductions since pre-colonisation, several lines of evidence indicate that coastal saltmarsh cover has expanded in more recent years. Recent assessments of the Gippsland Ramsar Site showed that the LAC had been met and that the condition of coastal saltmarshes was in good to excellent condition. Despite ongoing threats associated with development that are further exacerbated by the impacts of climate change, the trend is assessed as improving due to the recent increase in spatial extent.

The confidence is considered moderate due to mapping limitations for this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of coastal saltmarsh extent and restricted to two threatening processes.

17: Mangroves

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
Data source(s)	Deakin University DEECA					
Measure(s)	Extent (ha) of mangroves Change in mangrove extent since European colonisation Mangrove habitat condition Ramsar site limits of acceptable change					

Why this indicator?

Mangroves are critical habitats for many marine and coastal species and provide ecosystem services for coastal communities.

Why this assessment in 2024?

Assessments are based on the Statewide Marine Habitat Map, pre-colonisation mapping, Ramsar site limits of acceptable change (LAC) assessments, recent condition assessments of mapped mangroves and the results of regional catchment strategy monitoring.

Statewide

The statewide status was assessed as fair as the current extent represents approximately 92% of the pre-1750 distribution and recent assessment of mangrove condition showed that they are experiencing moderate levels of disturbance, however, these were based on only a small proportion of mangrove stands which was further limited by only two threatening processes being considered. Despite the extent of mangroves remaining relatively unchanged overall since European colonisation (pre-1750), their health and maintenance are still threatened by widespread degrading processes while the combined impacts of climate change, specifically sea level rise, and coastal squeeze poses a future risk. Thus, the statewide trend is assessed as deteriorating.

The confidence is considered moderate due to the limitations associated with mapping this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of mangrove extent and restricted to two threatening processes.

Port Phillip Bay

The status for Port Phillip Bay is assessed as good given that the extent of mangroves has been retained since colonisation and the LAC for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsular Ramsar Site being met. Although there has been little change in extent since pre-colonisation, mangroves in Port Phillip Bay are assessed as deteriorating due to ongoing threats associated with development and the impacts of climate change.

The confidence is considered low due to the limitations associated with mapping this dynamic community type, variability in mapping methodologies across studies and no recent condition assessments being undertaken.

Western Port

The status for Western Port is assessed as good due to 95% of mangrove extent has remained since colonisation. Furthermore, historical losses have been somewhat compensated by recovery coupled with the implementation of mangrove restoration and Spartina control programs. Yet, the existing mangrove stands are now more scattered and discontinuous than they once were and the disturbances within the wider catchment that place mangroves at risk remain. No recent LAC assessments have been conducted for mangroves within the Western Port Ramsar Site, thus this measure did not form part of the indicator assessment. The trend is stable as the extent changed little since colonisation. Restoration and threat abatement programs have also been implemented to help counter the impacts of other ongoing threats.

The confidence is considered moderate due to the limitations associated with mapping this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of mangrove extent and restricted to two threatening processes.

Corner Inlet-Nooramunga

The status for the Corner Inlet-Nooramunga biounit complex is assessed as fair as most mangroves within this biounit complex remain and the condition of assessed stands was considered to be experiencing moderate levels of disturbance. Furthermore, the LAC relating to mangroves for the Corner Inlet Ramsar Site had been met as of 2020. Despite extensive landward incursions of mangroves being recorded in Corner Inlet, the spatial extent of this ecosystem has declined within these biounits, particularly Corner Inlet, relative to pre-colonisation. Additionally, barriers to tidal influences have the potential to impact the condition of mangroves while the processes of urban expansion and population growth, and their associated impacts, are also threatening coastal areas of the West Gippsland catchment where the mangroves occur. Thus, the trend is assessed as deteriorating.

The confidence is considered moderate due to the limitations associated with mapping this dynamic community type, variability in mapping methodologies across studies and condition assessments being undertaken for a limited proportion of mangrove extent and restricted to two threatening processes.

18: Wetland and estuarine vegetation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB						
WP						
CIN						
GL				 (estuarine flora)  (wetland extent)  (condition of paperbark-dominated wetlands)		 (estuarine flora)  (wetland extent and condition of paperbark-dominated wetlands)
Data source(s)	DEECA					
Measure(s)	Index of Estuary Condition flora sub-index					

Why this indicator?

The condition of estuarine flora is threatened by anthropogenic land use, hydrological modifications, and invasions by exotic plants.

Why this assessment in 2024?

This is a high-level summary indicator that provides an overview of coastal, wetland and estuarine vegetation beyond those vegetation types covered as standalone indicators (e.g. saltmarsh and mangroves). Thus, the 2024 assessment is presented at the statewide scale only.

Flora for 100 estuaries across Victoria were assessed as part of the Index of Estuary Condition (IEC). The status of the state's estuarine vegetation is assessed as good based on the flora sub-index scores. Most estuaries were in moderate (39% of estuaries) to good condition (33% of estuaries), with 17% in excellent condition and no estuaries having vegetation in very poor condition. As the IEC provides a coarse snapshot of relative estuary condition across Victoria, it is not designed for evaluating changes in condition over time, thus, the trend is assessed as unclear. The confidence is low given that the assessment is based on data collected between 2013 to 2019.

19: Marine- and coastal-dependent species of conservation value

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	?	?	?	?	?	?

Data source(s)	Academic research ARI DEECA
Measure(s)	Number of FFG-listed marine- and coastal-dependent species listed under the *Flora and Fauna Guarantee Act 1988* Genetic risk rating for marine- and coastal-dependent species of conservation value Proportion of marine- and coastal-dependent species of conservation value with action statements developed in the last 10 years

Why this indicator?

Protecting species populations from threatening processes relies upon effective conservation tools and monitoring programs, current knowledge of the ecological characteristics and life histories of species, and legislative instruments that adequately reflect the conservation risk of the state's flora and fauna species.

Why this assessment in 2024?

As no formal list of marine- and coastal-dependent species exists for the state, the species considered within this indicator are based on the list of threatened marine- and coastal-dependent species developed by the Victorian Environmental Assessment Council and presented in their Assessment of the Values of Victoria's Marine Environment report.

This indicator provides information on the number of marine and coastal-dependent species listed under the *Flora and Fauna Guarantee Act 1988* (FFG), their genetic risk rating, a measure of a species' capacity to adaptively respond to changes in environmental conditions and the proportion of these species having a current (<10 years old) action statement.

A total of 2,004 species are listed under the FFG Act, of which, 87 are marine- and coastal-dependent species. Of the listed marine and coastal-dependent species, 24% have an existing action statement prepared, although these are largely outdated with only 10% having action statements prepared within the last 10 years. Most of the 37 marine- and coastal-dependent species evaluated had a low genetic risk rating.

Despite some data being available that inform the current metrics used for the assessment of this indicator, limitations around the data have resulted in an unknown status and unclear trend. In particular, the deficient state of knowledge for marine- and coastal-dependent species hinders the identification of which species are at risk of extinction, and this has led to this group being under-represented under the FFG Act and other protective legislation and conservation programs. The lack of data also limits the application of conservation tools for this group, such as the evaluation of genetic risk. A status and trend assessment is further hindered by a lack of established benchmarks as to what constitutes an adequate proportion of current action statements.

20: Mobile invertebrates on intertidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (Point Addis Marine National Park)	?	?	?	–	–	–
MP (Point Danger Marine Sanctuary)	?	?	?	–	–	–
MPA (Barwon Bluff Marine Sanctuary)	?	?	?	–	–	–
MPA (Port Phillip Heads Marine National Park)	?	?	?	● [1]	→ [1]	● [1]
MPA (Point Cooke Marine Sanctuary)	?	?	?	● [1]	→ [1]	● [1]
MPA (Jawbone Marine Sanctuary)	?	?	?	● [1]	→ [1]	● [1]
MPA (Ricketts Point Marine Sanctuary)	?	?	?	● [1]	→ [1]	● [1]
MPA (Mushroom Reef Marine Sanctuary)	?	?	?	–	–	–
MPA (Bunurong Marine National Park)	?	?	?	–	–	–

Data source(s)	PV
Measure(s)	Mobile invertebrate abundance Mobile invertebrate species richness and diversity Body size

Why this indicator?

Mobile invertebrates within the intertidal zone, such as snails and sea stars, are important food sources for marine and coastal animals. Any declines in populations or cover could indicate the effects of illegal harvesting, trampling, reduced water quality or climate change.

Why this assessment in 2024?

Mobile invertebrates were previously monitored under the historical Intertidal Reef Monitoring Program that ceased in 2014. Since that time, Parks Victoria has established the Signs of Healthy Parks (SHP) program for its network of marine national parks and sanctuaries, however, evaluating intertidal invertebrates is currently an identified gap under the SHP program as this group is not a target of long-term monitoring. Data on intertidal invertebrates are, however, collected through other monitoring programs undertaken by Parks Victoria, such as the Rapid Health Assessment, although variation in methodologies across programs means that comparisons are inappropriate. Thus, the status and trend are assessed as unknown and unclear, respectively.

[1] The 2021 assessment was presented under the Port Phillip Bay Biounit in the SMCE 2021 Report. However, as the assessment is based on data for MPAs, the 'extent of information' has been changed to 'MPA' in this SMCE 2024 Report.

21: Sessile invertebrates on intertidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (Point Addis Marine National Park)	?	?	?	–	–	–
MP (Point Danger Marine Sanctuary)	?	?	?	–	–	–
MPA (Barwon Bluff Marine Sanctuary)	?	?	?	–	–	–
MPA (Port Phillip Heads Marine National Park)	?	?	●	●[1]	→[1]	●[1]
MPA (Point Cooke Marine Sanctuary)	?	?	?	●[1]	→[1]	●[1]
MPA (Jawbone Marine Sanctuary)	?	?	?	●[1]	→[1]	●[1]
MPA (Ricketts Point Marine Sanctuary)	?	?	?	●[1]	→[1]	●[1]
MPA (Mushroom Reef Marine Sanctuary)	?	?	?	–	–	–
MPA (Bunurong Marine National Park)	?	?	?	–	–	–

Data source(s)	PV
Measure(s)	Sessile invertebrate abundance Sessile invertebrate species richness and diversity

Why this indicator?

Sessile invertebrates, such as mussels and barnacles, play a major role as ecosystem engineers in the structuring of the community, and driving species diversity and ecosystem function. These also cycle nutrients and organic matter, trap and remove excess nutrients and pollutants, maintain water quality and form the basis of many food chains. Declining populations could indicate impacts from illegal harvesting, reduced water quality, invasive species or climate change.

Why this assessment in 2024?

Sessile invertebrates were previously monitored under the historical Intertidal Reef Monitoring Program that ceased in 2014. Since that time, Parks Victoria has established the Signs of Healthy Parks (SHP) program for its network of marine national parks and sanctuaries, however, evaluating intertidal invertebrates is currently an identified gap under the SHP program as this group is not a target of long-term monitoring. Data on intertidal invertebrates are, however, collected through other monitoring programs undertaken by Parks Victoria, such as the Rapid Health Assessment, although variation in methodologies across programs means that comparisons are inappropriate. Thus, the status and trend are assessed as unknown and unclear, respectively.

[1] The 2021 assessment was presented under the Port Phillip Bay Biounit in the previous SMCE Report.

22: Invertebrates on subtidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB	 (reef invertebrates)  (short-spined sea urchins)	 (reef invertebrates)  (short-spined sea urchins)	 (reef invertebrates)  (short-spined sea urchins)	 (north)	 (north)  (south)	
WP				–	–	–
MPA (Discovery Bay Marine National Park)				–	–	–
MPA (Point Addis Marine National Park)						
MPA (Port Phillip Heads Marine National Park)				–	–	–
MPA (Wilsons Promontory Marine National Park)				–	–	–
MPA (Cape Howe Marine National Park)				–	–	–
Data source(s)	PV					
Measure(s)	Abundance Species richness Limits of acceptable change					

Why this indicator?

Most mobile megafaunal invertebrates, such as abalone and rock lobster, are key species in marine national parks and sanctuaries. Outside the park boundaries these are targeted by commercial and recreational fishers. Monitoring these species can provide critical information about the ecological health of ecosystems and where threats may arise that require management.

Why this assessment in 2024?

Port Phillip Bay

A good status, improving trend and low confidence for reef invertebrates within Port Phillip Bay was based on monitoring 2022–23 results under the bay's environmental management plan. The status for the over-abundant short-spined urchin is poor with a deteriorating trend due to urchin density exceeding the eight urchin per square metres in some sites within the bay, particularly in the north. This density threshold represents the tipping point above which overgrazing occurs. Confidence is moderate due to limited recent data.

Western Port

The status of the Western Port Bryozoan Reefs community is considered poor due to its limited geographic distribution, high-level of risk to threatening processes and limited capacity for range expansion and recovery. No information is available regarding changes in spatial extent or ecosystem health resulting in an unclear trend. Confidence is considered moderate given the breadth of information and research focus regarding this newly described invertebrate community.

Port Phillip Heads Marine National Park

The status is assessed as fair due to some species exceeding their limits of acceptable change while others were within acceptable limits of change. In keystone species, the abundance of greenlip abalone is in good condition while the blacklip abalone has been below its lower control limit. Also important is the consistent, relatively low abundance of the short-spined sea urchin, a species that has the capacity to overgraze on macroalgae and create urchin barrens, while the invasive northern seastar has been detected at a survey reference site in relative proximity to the park. Trend is considered stable given that the abundance of some species showed increases while others declined. Confidence is low due a lack of recent data.

Point Addis Marine National Park

The overall status is assessed as fair based on the overall abundance of select macroinvertebrates. Despite consistent declines in both turban shells and blacklip abalone within the park which had driven a downward shift in the overall condition of mobile macroinvertebrate on subtidal reefs from good to fair, this level has been maintained for the last four survey years resulting in a stable trend assessment. Confidence is low given that the assessments are based on data from 2018.

Wilsons Promontory Marine National Park

The status of fair for invertebrates within Wilsons Promontory was based on the abundance of invertebrate species being within or above the lower control limits. The trend was assessed as deteriorating due to recent declines in key invertebrate species. Confidence is moderate due to the most recent monitoring occurring in 2020.

Cape Howe Marine National Park

The status for Cape Howe was assessed as fair due to the condition of key invertebrate species ranging between poor and good. The trend was assessed as deteriorating due to recent declines in key invertebrate species. Confidence is moderate due to the most recent monitoring occurring in 2021.

Discovery Bay Marine National Park

The status of good for Discovery Bay was based on higher abundance and body size of southern rock lobsters within the park relative to outside. Trend is stable as communities of invertebrates remained similar across surveys years. Confidence is low due to a lack of condition assessments for invertebrate species.

23a: Southern calamari

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE)

Why this indicator?

Many invertebrates represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

CPUE is well above the reference period average for the short-lived and highly dynamic population. In the context of the biology and relatively low level of fishing pressure, the stock is expected to remain sustainable into the future, as reflected by a good status and stable trend.

23b: Blacklip abalone

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	Consultant reports FRDC
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

Many invertebrates represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

In early 2021, there was optimism about the state of the western zone stocks and their ongoing recovery. However, this perspective changed in May 2021 when abalone viral ganglioneuritis was again observed impacting abalone stocks at Cape Nelson, near Portland.

As part of the Fisheries Research and Development Corporation's 2023 stock assessments and based on catch, CPUE and fishery independent surveys, the Victorian blacklip abalone stock assessments were as follows for each management zone:

- Depleting for the Victoria Central Zone Fishery and Victorian Eastern Zone Fishery.
- Not assessed for the Victoria Western Zone Fishery.

These FRDC assessments are the basis of the status and trend assessments of poor and deteriorating, respectively, for this indicator.

23c: Greenlip abalone

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	Consultant reports FRDC
Measure(s)	Landings/harvest Catch per unit of effort Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

Many invertebrates represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

In 2020, the Fisheries Research and Development Corporation determined that insufficient information was available to classify the status of this stock, therefore the status and trend were assessed as unknown and unclear respectively in the State of the Marine and Coastal 2021 Report.

In 2023, reporting highlighted that catches appeared to be sustainable at current levels in the central zone, however catches were too low in the western zone to make an assessment. The Fisheries Research and Development Corporation again determined that insufficient information was available to classify the status of this stock, and therefore status and trend have once again been assessed as unknown and unclear respectively.

23d: Southern rock lobster

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

Many invertebrates represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

The southern Australian stock is assessed as sustainable, but CPUE is at low levels and the abundance of undersize lobsters near record lows in the western and eastern zones of the Victorian fishery. Balancing this information, the status is assessed as fair with a stable trend.

23e: Giant crab

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
West of Bass Strait				–	–	–

Data source(s)	Consultant reports FRDC
Measure(s)	Landings/harvest Catch per unit of effort (CPUE)

Why this indicator?

Many invertebrates represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

In the 2020 Status of Australian Fish Stocks (SAFS) stock assessment for the Victorian Giant Crab Fishery, the stock was classified as sustainable because the evidence indicated that the biomass of this stock was unlikely to be depleted, recruitment was unlikely to be impaired and the existing level of fishing mortality was unlikely to cause the stock to become recruitment impaired. However, factors including the lack of fishery independent surveys, limited length frequency data, the significant decline in the number of operators targeting giant crab and a decrease in the spatial distribution of the fishery, all added to the uncertainty in the stock assessment.

In the 2023 SAFS report, the giant crab classification was updated to depleted for the Victorian Giant Crab Fishery. This was based on CPUE trends revealing substantially declining trends.

Therefore, the status and trend are assessed as poor and deteriorating respectively for this indicator. However, these assessments are made with low confidence to reflect the uncertainty and data gaps.

23f: Commercial scallop

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW[1]				–	–	–
PPB						

Data source(s)	Consultant reports FRDC
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

Many invertebrates represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

There are two stocks managed in Victorian waters, the Port Phillip Bay Dive Scallop Fishery and the Ocean Scallop Fishery. The commercial scallop stock in Port Phillip Bay was assessed as having low relative importance in the Victorian Fisheries Authority's (VFA) 2024 reporting, mainly due to a decline in fishing effort and low catches. The VFA hypothesised that the impact of the impact of fishing for commercial scallops in Port Phillip Bay will become negligible if low catches persist. Therefore, this assessment focuses on commercial scallop fishing in Victorian-managed waters of northeast Bass Strait.

There was a significant drop in the biomass available to the Victorian Ocean Scallop Fishery during the 2023 pre-season. There were also no signs of new recruitment or developing beds elsewhere in the fishery.

As part of the Fisheries Research and Development Corporation's 2023 stock assessments, commercial scallop was classified as a depleted stock for the Victorian Ocean Scallop Fishery.

Therefore, the status is assessed as poor and the trend as deteriorating.

[1] This assessment is based on the Victorian Ocean Scallop Fishery, which extends out from the coastline to 20 nautical miles.

24a: Snapper

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
South Australian border to Wilsons Promontory				–	–	–
PPB						
WP						
Data source(s)	VFA					
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)					

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

This assessment focuses on snapper from the South Australian border to Wilsons Promontory. This provides consistency with reporting done by the Victorian Fisheries Authority and the Fisheries Research and Development Corporation. The 2021 assessment included individual assessments for Port Phillip Bay and Western Port.

The CPUE has been generally stable since 2014. Very strong recent juvenile recruitment suggests major increases in biomass are expected over the next five years and this stock is likely to be upgraded to a good status in the SMCE 2029 Report.

24b: King George whiting

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

This assessment focuses on King George whiting at the statewide scale. This provides consistency with reporting done by the Victorian Fisheries Authority and the Fisheries Research and Development Corporation.

None of the fishery CPUE or pre-recruit time series show persistently declining trends, providing reassurance that the adult stock in coastal waters is continuing to be replenished at rates sufficient to prevent declines in recruitment potential/egg production.

Recent modest post-larval recruitment is expected to result in a decline in fishery performance, but the stock is expected to remain within historical bounds and sustainable.

24c: Southern sand flathead

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

Continued relatively low recruitment means the stock will remain stable but at a depleted level well below the reference period average for creel survey CPUE.

24d: Black bream

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GL						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE) Recruitment (using fishery independent sampling of recruits and or pre-recruits)

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

Recreational fishery CPUE has recently been increasing and is now slightly below reference period average. Stronger juvenile recruitment in recent years and the removal of commercial fishing pressure is expected to continue to drive stock recovery over the next five years.

24e: Rock flathead

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
CIN						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE)

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

There has been a major increase in commercial mesh net effort over the last two years accompanied by a downward trend in CPUE. No recruitment data are available, which reduces the confidence assessment and led to this stock not being classified in the most recent Status of Australian Fish Stocks report (2023).

Given the lack of new distinctive information since this indicator was assessed in the State of the Marine and Coastal Environment 2021 Report, the status of fair has been retained. The trend is unclear, which reflects a downward trend of CPUE from commercial mesh nets being balanced by a record CPUE from seine nets being observed in 2021 to 2022.

24f: Bluethroat and purple wrasse

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	VFA
Measure(s)	Landings/harvest Catch per unit of effort (CPUE)

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

The current harvest and effort appear to present a low risk for the stock becoming recruitment impaired statewide. Based on this evidence the species is considered sustainable and the status has been rated as good.

However, there is some uncertainty about the effect new licence arrangements are having on CPUE, which has led to a trend assessment of unclear and a confidence assessment of moderate.

24g: Dusky flathead

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GL						
Lake Tyers				–	–	–
Mallacoota Inlet				–	–	–
Data source(s)	FRDC VFA					
Measure(s)	Landings/harvest Catch per unit of effort (CPUE)					

Why this indicator?

There are many fish species that represent important fisheries in Victoria. An understanding of the abundance, distribution and life histories of these species is critical to their sustainable management.

Why this assessment in 2024?

This assessment focuses on dusky flathead in the Gippsland Lakes, Lake Tyers and Mallacoota Inlet. This provides consistency with reporting undertaken by the Victorian Fisheries Authority and the Fisheries Research and Development Corporation (FRDC).

As part of the FRDC's 2023 national stock status assessments, dusky flathead in Victoria was classified as an undefined stock. The FRDC state that insufficient information exists to confidently determine stock status. Recreational catch rates have stabilised since 2014, however, future trends are uncertain as there is a lack of reliable information of recent recruitment.



Nudibranch, Port Phillip Bay.
© Parks Victoria

25: Subtidal reef fish

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (SW)	N/A	N/A	N/A			
MPA (Discovery Bay Marine National Park)				–	–	–
MPA (Point Addis Marine National Park)				–	–	–
MPA (Port Phillip Heads Marine National Park)				 (north)[1]  (south)[1]	 (north)[1]  (south)[1]	 [1]
MPA (Wilsons Promontory Marine National Park)				–	–	–
MPA (Cape Howe Marine National Park)				–	–	–
Data source(s)	PV					
Measure(s)	Abundance Body size Species richness and diversity Limits of acceptable change Number of observations of species of conservation concern Number of observations of economically-important species					

Why this indicator?

Reef fish are highly visible and colourful elements of subtidal reefs. They are key species in marine national parks and sanctuaries and are popular with divers and snorkellers. Monitored changes in their populations could indicate excessive harvesting, water pollution or climate change, and could alert agencies to the need for management action.

Why this assessment in 2024?

In 2021, a statewide assessment was undertaken based on all marine protected areas having available data at the time, except for those parks and sanctuaries occurring within Port Phillip Bay that were evaluated under the Port Phillip Bay biounit. No statewide evaluation was undertaken as each marine national park included within Parks Victoria's Signs of Healthy Parks program was evaluated separately in order for the State of Marine and Coastal Environment reporting to align with this long-term monitoring program.

Discovery Bay Marine National Park

The status for Discovery Bay Marine National Park is good based on the results of baited remote underwater video station (BRUVS) surveys, which found a high diversity of reef fish species, including five species targeted for fishing and three of conservation interest. Fish assemblages remained stable across years while species richness and abundance were both found to increase from 2012 to 2023 resulting in an improving trend. Confidence is low due to the assessment being based on only two timepoints.

Point Addis Marine National Park

The status for Point Addis Marine National Park is assessed as good due to the overall abundance and body size of key fish species being above their lower control limit. Trend is stable as this healthy condition has been maintained since surveys began in 2003. Species richness also changed little across years. Confidence is low given that the assessments are based on data from 2018.

Port Phillip Heads Marine National Park

The status for Port Phillp Bay Marine National Park is assessed as good as underwater visual census (UVC) results indicated that the condition of the six key fish species was healthy overall, as all were above their lower control limit as of 2019. Additionally, the body size of key fish species was overall fair to good except for a single species.

The trend is considered stable as half of the key reef fish species increased in abundance in the most recent assessments (2018 and 2019), with the condition of two improving from fair to good. An overall increasing trend in abundance was also demonstrated by the BRUVS results. The blue-throat wrasse, a species targeted by fisheries, increasingly made up a high proportion of UVC observations to become the most dominant species in 2018 and again in 2019. However, the abundance of the remaining three species declined, although abundances did not fall below levels previously observed in 2003 nor did they fall below the lower limits of acceptable change. Reductions in body size were also observed for most species from 2018 to 2019, with three species showing overall decreases in body size since 2003. Confidence is low given that the assessments are based on data from 2019.

Wilsons Promontory Marine National Park

The status of reef fish in Wilsons Promontory Marine National Park is assessed as fair as the results of the UVC surveys showed that four of the six key fish species had healthy populations within the park. The body size and abundance of four species was in good condition while the abundance of another two species was fair and poor. The body size of four species also remained above their lower limits of acceptable change as of 2020. However, there was a lack of records for one key reef fish species in recent surveys. Notable observations from BRUVS surveys were also made for two species of conservation interest in both 2016 and 2021.

The trend is assessed as stable as the abundance of two species increased, two remained relatively stable, and two species declined. Body size, overall, declined for three species, remained stable for two and increased for a single species.

Confidence is high due to the temporal and spatial breadth of the data.

Cape Howe Marine National Park

The status of reef fish for Cape Howe marine national Park is assessed as fair as most key fish species overall were found to be in good health as of 2021, however, there have been clear declines in condition among some species. The body size and abundance of six of the twelve key reef fish species were above their lower limits of acceptable change, while the remaining species were within or below this threshold. Furthermore, three species lacked recent UVC observations from within the park, although they were observed during BRUVS surveys.

The trend is stable as the abundance of seven of the twelve key reef species demonstrated increases in abundance while the remaining species either remained stable or declined. Most species demonstrated declines in body size in recent survey years, with only three demonstrating an increase.

Confidence is high due to the temporal and spatial breadth of the data.

[1] The 2021 assessment for the Port Phillip Bay assessment was based on the aggregation of data for Port Phillip Heads Marine National Park and marine sanctuaries within the bay whereas the 2024 assessment is based only on Port Phillip Heads Marine National Park monitoring data under the State of Healthy Parks program. As a result, the status and trend assessments vary and direct comparisons between years cannot be assessed.

26: Diadromous fish

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
GDB (Ramsar site)				–	–	–
PPB (Ramsar site)						
WP (Ramsar Site)						
GL (Ramsar Site)						
Data source(s)	ARI DEECA Melbourne Water					
Measure(s)	Ramsar site limits of acceptable change Abundance of diadromous fish species					

Why this indicator?

Diadromous fish, like the Australian grayling and short-finned and long-finned eels, are those species that must undertake migrations between estuarine or marine and freshwater environments to complete their life cycles. Worldwide, many migratory fish species are threatened with extinction due to alteration of natural flow regimes and barriers to dispersal.

Why this assessment in 2024?

Statewide

The statewide status is assessed as fair as the condition of diadromous species was considered average to poor at the waterway and state-wide levels. The trend is improving as long-term monitoring indicated that several diadromous species increased in abundance between 2010 and 2023. Confidence is high due to the data having a broad spatial breadth and covered several diadromous fish species.

Glenelg-Discovery Bay

The status for the Glenelg-Discovery Bay Ramsar Site is assessed as good as the 2024 limits of acceptable change (LAC) assessment relating to diadromous fish has been met. The trend is assessed as stable as the LAC was also met in 2021. Confidence is high due to the assessments being based on contemporary information.

Port Phillip Bay

The status for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is assessed as good as the 2022 LAC assessment relating to diadromous fish had been met. The trend is assessed as stable as the LAC was also met in 2020. Confidence is high due to the assessments being based on contemporary information.

Western Port

The status for the Western Port Ramsar Site is assessed as good as the 2020 LAC assessment relating to diadromous fish had been met. The trend is stable as the LAC has continuously been met since 2016. Confidence is moderate based on the age of the data.

Gippsland Lakes

The status and trend for the Gippsland Lakes Ramsar Site is assessed as good and stable, respectively, as the 2020 assessment indicated that the LAC relating to diadromous fish has been met since 2005. Confidence is moderate based on the age of the data.

[1] Changes in the geographic scope across SMCE reports has enabled status and trend assessments to be undertaken in 2024.



Green Moray Eel, Gabo Island Lighthouse Reserve.
Credit: Mark Norman © Museum Victoria

27: Marine and coastal waterbirds

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW (hooded plover)				–	–	–
SW (Australian fairy tern)				–	–	–
GDB (Ramsar site)				–	–	–
PPB (seabirds)				–	–	–
PPB (coastal waterbirds)						
WP (Ramsar site)						
CIN (Ramsar site)						
GL (Ramsar site)						

Data source(s)	BirdLife Australia DEECA
Measure(s)	Marine and coastal waterbird abundance Marine and coastal waterbird breeding Marine and coastal waterbird diversity Ramsar site limits of acceptable change

Why this indicator?

Maintaining a robust set of time-series data on waterbird numbers can assist agencies in monitoring and management.

Why this assessment in 2024?

Statewide — hooded plover

A total of 1,664 hooded plovers were counted across the entire coastline of the south-eastern mainland of Australia during the 2022 biennial census, with 761 birds occurring within Victoria. Although abundance was higher in the 2022 census compared to the 2020 census, evidence of breeding and hatching success was lower than the previous surveys. Threat assessments indicated that most hooded plover survey sites had evidence of human and/or dogs within 100-metre buffer distance of disturbance for this species. As a result, the status is assessed as poor with a deteriorating trend. The confidence is high given the high quality and spatial coverage of the data.

Statewide — Australian fairy tern

The 2024 census of Australian fairy terns showed that 11 colonies made up of 100 to 150 breeding pairs occur in Victoria. Despite the 2024 population estimates being similar to the highest state count of 341 adults in 2019, Australian fairy terns in Victoria have experienced a reduction of their breeding habitat range and population size since the 1980s. The threats of extreme weather resulted in the loss of nests in some sites and the threats of human disturbance, dogs, foxes and silver gulls were also detected during the census. With reductions in breeding habitat and population size, coupled with the impacts of extreme weather on productivity and existing threats, the status is assessed as poor and the trend deteriorating. The confidence is moderate due to a lack of time series data for this species.

Glenelg-Discovery Bay

The most recent limits of acceptable change (LAC) assessments for the Glenelg Estuary and Discovery Bay Ramsar Site showed that the waterbird abundance and threatened species LAC have been met. However, the average fledgling production rate for the hooded plover is well below the target and threats were identified during the 2023-24 surveys. Thus, the status is assessed as fair. The trend is assessed as deteriorating due to declines in maximum counts among most species from the key waterbird guilds and the number of breeding pairs for hooded plovers. The confidence is high due to the quality of the data.

Port Phillip Bay — seabirds

A single species of seabird — the Australasian gannet — is evaluated under the Port Phillip Bay Environment Management Plan (EMP). The 2021-2022 results indicated that the status for this species is fair and the trend stable. The confidence was assessed as low given the assessment is based on a single species.

Port Phillip Bay — waterbirds

Waterbirds and resident shorebirds are evaluated under the Port Phillip Bay EMP. The 2021-22 results indicated that resident shorebirds had a very poor status with a declining trend while waterbirds had a good status with a declining trend. A more recent assessment for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site found that all waterbird LACs having sufficient data were found to have been met except for the threatened species LAC, which was exceeded for one species. Monitoring at the Western Treatment Plant between 2020 to 2023 showed that the long-term trends for shorebirds are overall positive as three of the most common shorebird species have continued to increase. However, for waterfowl, four species have suffered significant declines — three of which are listed under the *Flora and Fauna Guarantee Act 1988* — and half of the most numerous species had decreased observations during the monitoring period. Breeding of waterbirds at the Western Treatment Plant was also considered remarkably low. Based on the collective results, particularly the pattern of decline among threatened waterbird species, the status is assessed as poor with a deteriorating trend. Confidence is high based on the assessments being based on contemporary data and being of high quality.

Western Port

According to the most recent LAC assessments for the Western Port Ramsar Site, the waterbird abundance and breeding LACs have been met, which was consistent with the 2020 results, while the threatened species LAC was exceeded for three of the six species. Therefore, the status is assessed as poor with a deteriorating trend. The confidence is high due to the quality of the data.

Corner Inlet-Nooramunga

According to the most recent LAC assessments for the Corner Inlet Ramsar Site, the waterbird breeding and threatened waterbird species LAC were both met, while the abundance LAC was exceeded for three of the nine species. These results differ from those of previous assessments which found that the abundance LAC was met whereas the threatened species LAC was exceeded for one species. Therefore, the status is assessed as poor with a deteriorating trend. The confidence is high due to the quality of the data.

Gippsland Lakes

The most recent LAC assessments for the Gippsland Lakes Ramsar Site found that the waterbird abundance, breeding and threatened species LAC have been met resulting in a good status. The trend is assessed as stable due the results for waterbird abundance aligning with the findings of previous LAC assessments, however, there were no data regarding waterbird breeding which had led to a fair status in the State of the Marine and Coastal Environment 2021 Report. The confidence is high due to the quality of the data.

28: Migratory shorebirds

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
GDB (Ramsar Site)				–	–	–
PPB						
WP (Ramsar Site)						
CIN (Ramsar Site)						
GL (Ramsar Site)						

Data source(s)	BirdLife Australia DEECA Melbourne Water
Measure(s)	Migratory shorebird abundance and diversity Ramsar site limits of acceptable change

Why this indicator?

Measuring trends in the distribution and abundance of migratory shorebirds can assist federal and state agencies and community organisations to protect habitats and minimise threats.



Hundreds of gulls fly at the noobies in Philip Island. Credit: Martin Helgemeir © Parks Victoria

Why this assessment in 2024?

Statewide

The statewide trend is assessed as fair due to the majority of Ramsar sites not fully meeting their associated limits of acceptable change (LAC) and abundance not exhibiting signs of recovery following decades of decline. Trend in abundance and species diversity is assessed as stable based on recent analyses undertaken by BirdLife Australia which found that both measures remained effectively unchanged between 2013 and 2023. The confidence is considered moderate due to the quality and breadth of species records, however, information regarding contributing factors impacting on migratory shorebirds populations in the state is lacking.

Glenelg-Discovery Bay

The assessment for the Glenelg-Discovery Bay biounit complex is based on data for the Glenelg and Discovery Bay Ramsar site. The status is fair as the LACs for migratory shorebirds have been met, however, the threat assessment for the site found evidence of illegal access of off-road vehicles and invasive predators were detected at the site. With limited time-series data, the trend is unclear and confidence moderate.

Port Phillip Bay

The assessment for Port Phillip Bay is based on data for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site and evaluations for the Port Phillip Bay Environmental Management Plan. The status is poor due to the very poor status for migratory shorebirds under the Port Phillip Bay Environmental Management Plan and the Ramsar site LACs not being fully met. The trend is deteriorating as some species have shown significant declines, with the eastern curlew now considered locally extinct within the Ramsar site. The confidence is considered high due to the quality of the data.

Western Port

The assessment for Western Port is based on data for the Western Port Ramsar Site. The status is assessed as fair due to the LACs relating to migratory shorebirds not being fully being met. The trend is assessed as deteriorating as LACs were not fully met for three species. The confidence is considered high given the quality of the data.

Corner Inlet-Nooramunga

The assessment for Corner Inlet-Nooramunga is based on data for the Corner Inlet Ramsar Site. The status is assessed as fair due to the LACs related to migratory shorebird abundance was not being fully met for three species while the LAC for threatened migratory birds met. The trend is deteriorating as the LACs for abundance have continued to below the LAC threshold. The confidence is considered high due to the quality of the data.

Gippsland Lakes

The assessment for the Gippsland Lakes is based on data for the Gippsland Lakes Ramsar Site. The status is assessed as fair due to the evidence of ecological degradation of the site, although LACs related to migratory shorebirds have been fully met. The trend is assessed as stable as the four migratory shorebird species listed under the LACs have been recorded in most years since 2019. The confidence is considered high due to the quality of the data.

29: Piscivorous (fish-eating) birds

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GDB (Ramsar Site)				–	–	–
PPB						
WP (Ramsar Site)				 (WP biounit)	 (WP biounit)	 (WP biounit)
CIN (Ramsar Site)				 (CIN biounit complex)	 (CIN biounit complex)	 (CIN biounit complex)
GL (Ramsar Site)				–	–	–

Data source(s)	BirdLife Australia DEECA
Measure(s)	Piscivorous bird abundance Piscivorous bird diversity Ramsar site limits of acceptable change

Why this indicator?

It is important to understand the causes of changes in top-order predators, such as piscivorous birds (e.g. pelicans, terns, cormorants), as they could indicate fundamental changes in the ecology of the marine and coastal areas.



Pelican.
© Parks Victoria

Why this assessment in 2024?

Glenelg -Discovery Bay

Recent assessments for the Glenelg Estuary and Discovery Bay Ramsar Site found that the abundance and diversity limits of acceptable change (LAC) have been met. However, a number of threats potentially impacting on piscivorous species and other waterbirds on the site were detected and maximum counts among six of the ten piscivorous species were lower in 2024 than in previous years. Thus, the status is assessed as fair. With an overall decline in maximum counts from 2019 to 2024 for some species, the trend is assessed as deteriorating. The confidence is high due to the quality of the data.

Port Phillip Bay

A single species of piscivore — the Australasian gannet — is evaluated under the Port Phillip Bay Environmental Management Plan. The 2021-2022 results indicated that the status for this species is fair and the trend stable. The recent LAC assessments of piscivorous waterbird abundance, diversity, breeding and threatened species for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site have all been met. The previous assessments in 2020 also found that LAC thresholds had not been exceeded. Collectively, these findings have resulted in a good status and stable trend. The confidence was assessed as moderate given that the data for the Ramsar site are of high quality, while the assessment for the biounit as a whole is based on a single species.

Western Port

Recent LAC assessments for the Western Port Ramsar Site found that piscivore abundance, breeding and threatened species LACs were all met resulting in a good status. Trend could not be evaluated as the 2021 indicator assessment was for the whole of the biounit based on research focused on 13 piscivorous species using different survey methodologies. The confidence is moderate due to the lack of time-series data.

Corner Inlet-Nooramunga

Recent LAC assessments for the Corner Inlet Ramsar Site found that piscivore abundance and breeding LACs were all met. However, survey results indicate that the piscivorous species and other resident shorebirds on the barrier islands of Corner Inlet invest a high effort into breeding with little to no output. Thus, the status is assessed as fair. The trend is deteriorating due to the decline in reproductive success for the critically endangered fairy tern. However, direct comparisons with the 2021 assessment cannot be made due to that assessment being for the entire biounit as a whole. The confidence is high due to the quality of the data.

Gippsland Lakes

Recent LAC assessments for the Gippsland Lakes Ramsar Site showed that LACs relating to the abundance, diversity and breeding of fishers and other piscivorous waterbirds were all met. However, despite the LAC thresholds not being exceeded, the maximum counts for some species were lower in 2021 and 2022 than in previous years. Thus, the status is assessed as fair and the trend deteriorating. The confidence is high given the quality of the data.

30: Little penguins

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
SC				–	–	–
PPB		?				
ScWo				[1]	[1]	[1]
GH				–	–	–

Data source(s)	Academic research Earthcare St Kilda Phillip Island Nature Parks
Measure(s)	Estimated little penguin population size Little penguin breeding performance Contamination levels within little penguin populations Fisheries interactions

Why this indicator?

Little penguins are top-order predators that serve as bio-indicators of the health of the marine environment as they integrate changes occurring at lower levels in the trophic network. Little penguin colonies at Phillip Island and St Kilda have also become major tourist assets, with any decline in their health having potential economic impacts. The development and effective implementation of evidence-based conservation plans are critical to maintaining healthy little penguin populations as those colonies lacking such planning instruments have declined.



Little Penguins, Phillip Island. Credit: Phillip Island Nature Parks
© Parks Victoria

Why this assessment in 2024?

The measures for this indicator have been broadened based on recent work relating to threatening processes impacting on little penguins. As the 2021 assessments were based exclusively on population parameters, the inclusion of the additional measures that focus on risks posed by contamination and fisheries interactions has led to a decline in the status and trend of little penguins.

Statewide

The condition of the statewide little penguin population is assessed as fair as populations are increasingly threatened by the impacts of climate change, fisheries and vessel interactions, and contamination, which have the potential for direct mortality and reducing prey resources that can lead to declines in survival and breeding success. With some colonies increasing but others decreasing, the overall little penguin population at the statewide scale is considered stable. Confidence in the status assessment is moderate due to a lack of consistent and comprehensive reporting of demographic parameters across Victorian colonies and the limited information regarding fisheries interactions and potential changes in prey resource availability.

Shipwreck Coast

The status of the Middle Island colony within the Shipwreck Coast biounit has been assessed as poor with a deteriorating trend due to declines in breeding activity and the number of adults observed arriving on the island. Confidence is assessed as moderate because of disruptions in monitoring due to COVID-19 and access issues.

Port Phillip Bay

The status of the St Kilda colony within Port Phillip Bay is assessed as fair as the St Kilda population is quite vulnerable to contamination and human disturbance from their heavily urbanised environment and changes in prey availability due to their foraging range being restricted to Port Phillip Bay. Although the long-term monitoring revealed recent declines in the total number of penguins captured, number of unique penguins captured, and number of chicks microchipped, the trend is unclear because of disruptions in monitoring due to COVID-19, the lack of recent data and the identified need for improving methodologies for estimating population trends. Confidence in the status assessment is moderate due to a lack of data for current breeding population estimates and potential impacts on prey availability from competition with fisheries.

Schanck-Woolamai

The Phillip Island colony within the Schanck-Woolamai biounit is assessed as having a fair status with a stable trend given that the breeding population size has remained relatively unchanged between the 2019-20 and 2022-23 breeding seasons and management interventions have been effective in combatting the impacts of introduced predators and tourism. However, vessel interactions and contamination exposure are emerging threats to this colony. Confidence is high due to the quality and temporal extent of the data.

Gabo-Howe

The status of the Gabo Island colony within the Gabo-Howe biounit is assessed as poor with a deteriorating trend due to a sharp reduction in observed breeding activity. Confidence is considered moderate due to limited information regarding demographic parameters and threatening processes.

[1] The population of little penguins that this assessment is focused on occurs within the Schanck-Woolamai biounit. However, the 2021 status, trend and confidence assessments for this population of little penguins were previously listed under the Western Port biounit in the SMCE 2021 Report as that report had a more limited geographic scope and did not include the Schanck-Woolamai biounit.

31: Marine mammals

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW (cetacean entanglements)				–	–	–
SW (cetacean strandings)				–	–	–
SW (Australian fur seals)				–	–	–
SW (dolphin toxicity concentrations)				–	–	–
SC (southern right whales)				–	–	–
PPB (short-beaked common dolphins)						
PPB (Burrunan dolphins)						
ScWo (Australian fur seals)				 [1]	 [1]	 [1]
WP (dolphins)						
WPW (Australian fur seals)				–	–	–
GL (Burrunan dolphins)						

Data source(s)	Academic research Dolphin Research Institute Marine Mammal Foundation Phillip Island Nature Parks
Measure(s)	Marine mammal population estimates Marine mammal reproduction rate Entanglement and stranding rates Toxicity concentrations among marine mammal populations Body condition and health indices for marine mammals

Why this indicator?

Victorian marine waters are home to a diversity of marine mammal species, including whales, dolphins and seals. As top predators, cetaceans and seals play an important role in shaping the structure and function of marine ecosystems and are important indicators of the state of food webs, levels of hazardous substances and direct anthropogenic impacts.

Why this assessment in 2024?

Statewide

Between 2003 and 2021, 26 cetacean entanglements were reported in the state, equating to more than one incident per year. The number of entanglements has been on an overall decline since a peak in 2019 resulting in an improving trend. The small population sizes of several of these species and the ubiquity of marine debris places cetaceans at risk, where losing even a very small number of individuals can impact their viability. Thus, the statewide status of cetaceans is assessed as poor. The confidence is considered moderate as the data do not provide a breakdown of annual entanglements by species nor does it provide the most recent entanglement rates.

No current statewide strandings data for marine mammals are available therefore the status is unknown, the trend unclear, and there are insufficient data for a confidence assessment.

No current statewide population estimates or entanglement rates for Australian fur seals are available, therefore the status is unknown, the trend unclear and there are insufficient data for a confidence assessment.

Recent research has found that mercury concentrations in the Burrunan and common bottlenose dolphins inhabiting south-eastern Australia are among the highest globally, with bioaccumulation likely to be continuing. Based on these findings, the status is assessed as poor and the trend deteriorating. Confidence is high due to the spatial and temporal breadth of the data.

Shipwreck coast

Logans Beach, within the Shipwreck Coast biounit, is currently the only established calving and nursery ground of the genetically distinct south-eastern population of southern right whales. An improving trend is based on this population showing signs of recovery since the cessation of the whaling industry but noting that it is increasing at a slower rate than the southwestern population and has a much smaller population size. Despite the increasing number of whales, the calving rate has not changed for over 30 years, which suggests a potential lengthening of calving intervals. A poor status is based on the population size of south-eastern southern right whale being much smaller than pre-harvest levels with individuals having low reproductive rates and high site fidelity to the single calving ground. Together, these traits make the population especially vulnerable to the impacts of climate change and anthropogenic threats, such as entanglements which have been on the rise. The confidence is assessed as moderate due to a lack of recent population estimates.

Port Phillip Bay

Two species of dolphins reside within Port Phillip Bay: the short-beaked common dolphin and the Burrunan dolphin. The status for the short-beaked common dolphin, which is the only known population of this oceanic species globally that has colonised a shallow embayment, is considered poor. This is due to new information showing individuals with per- and polyfluoroalkyl substances (PFAS) concentrations that exceed critical levels and signs of physical trauma, that likely a result of interactions with boats and/or marine debris — a threat that has seen a slight rise in within the bay in recent years. Despite a greater understanding of the status of this species since the State of the Marine and Coastal Environment 2021 assessment, which has led to a decline in status across reports, the trend for the short-beaked common dolphin is assessed as improving as its population size and calving rates have increased. However, the number of calves born annually has remained relatively stable in more recent years. The assessment has high confidence due to full time-series data and reports on key threats that place the population at risk.

The most recent population estimate for the Burrunan dolphin within Port Phillip Bay is 83 individuals, which is lower than previous estimates that ranged between 120 to 150 individuals, indicating a deteriorating trend. A poor status is based on the species being at elevated risk of decline or even extinction. This is due to the Port Phillip Bay population of Burrunan dolphins being isolated, small and subject to intense anthropogenic pressures. Adding to this is the decline in its preferred habitat type in the bay and recent reports of dolphins having PFAS concentrations which not only exceed levels believed to cause liver toxicity and a suite of health implications but are the highest levels globally. Relatively high mercury concentrations have also been detected among beach-cast Burrunan dolphins compared to live individuals. The confidence is considered high based on extensive information regarding threats and recent region-wide data for estimating population size.

Schanck-Woolamai

Seal Rocks in the Schanck-Woolamai biounit is one of the most productive Australian fur seal colonies in Victoria making it important to the recovery of the species. A deteriorating trend is based on a steady decline in pup abundance from 1995 to 2023 and increasing rates of entanglement with recreational fishing gear and other marine debris. The status is considered poor due to the population being well below pre-harvest levels (prior to commercial hunting) and the continued exposure to anthropogenic threats (e.g. marine debris). The confidence is high given the availability of recent data on population size and threatening processes.

Western Port

The status for the bottlenose dolphins residing in Western Port is considered poor as the population size is very small making these dolphins vulnerable to environmental change and human impacts, where the loss of even a few individuals can have consequences for the population's health and long-term persistence. Time-series data are lacking for the dolphin population in Western Port, resulting in an unclear trend assessment. The confidence is low due to limited data.

Wilsons Prom West

Kanowna Island, in the Wilsons Prom West biounit, represents the second largest breeding colony of Australian fur seals for the species. Changes in broad- and local-scale environmental factors, anticipated to continue with climate change, have led to significant reductions in the body condition of breeding females between 1997 to 2021. Thus, the trend is assessed as deteriorating. The status is assessed as poor based on the reduced health of the breeding population and the high potential for impacts on reproductive output and pup survival. The confidence is considered high given the availability of recent data on population size and threatening processes.

Gippsland Lakes

Population estimates reported for the Burrunan dolphin within Gippsland Lakes varies across sources, ranging between 50 and 94 individuals, but time-series data are lacking for this population as are recent estimates. Thus, the trend is assessed as unclear. A poor status is based on the species being at elevated risk of decline or even extinction. This is due to the Gippsland Lakes population of Burrunan dolphin being small, suffering mortality from freshwater skin disease and subject to anthropogenic pressures, particularly persistent organic pollutants and vessel disturbance. Burrunan dolphins were found to have PFAS concentrations that not only exceed levels believed to cause liver toxicity and a suite of health implications, but that are the highest levels globally. Relatively high mercury concentrations have also been detected among beach-cast Burrunan dolphins compared to live individuals. Furthermore, frequent breaches to regulatory requirements are exposing dolphins to pressures from ecotourism and boating. The confidence is considered moderate based on extensive information regarding threats but a lack of recent data for estimating population size.

[1] The population of seals that this assessment focuses on occurs within the Schanck-Woolamai biounit. However, the 2021 status, trend and confidence assessments were previously listed under the Western Port biounit in the SMCE 2021 Report, as that report had a more limited geographic scope and did not include the Schanck-Woolamai biounit.



Seal underwater, St Leonards Pier, Port Phillip Bay.
Credit: Andrew Newton
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Seafloor integrity and health

32: Conservation of marine ecosystems in protected areas

Extent of information	2024 status	2024 trend	2024 confidence	Extent of information	2021 status	2021 trend	2021 data quality
MPA (proportion of state waters protected)	?	→	●	MPA	●	→	●
MPA (ecosystem representativeness)	●	?	●		–	–	–
MPA (biodiversity values representativeness)	?	?	?		–	–	–
MPA (irreplaceable biotope representativeness)	?	?	?		–	–	–
MPA (connectivity)	●	?	●		–	–	–
MPA (biodiversity conservation)	●	?	●		–	–	–
MPA (management efficacy)	?	?	?		–	–	–

Data source(s)

DEECA
PV
VEAC
VNPA

Measure(s)

Proportion of Victoria's state waters that are protected
Representation of ecosystems within marine protected areas (MPAs)
Representation of biodiversity values within MPAs
Representation of irreplaceable biotopes within MPAs
Ecological connectivity between MPAs
Achievement of MPA biodiversity conservation objectives
Management effectiveness

Why this indicator?

MPAs are place-based tools used for conservation in the marine environment to preserve the biodiversity and the integrity of marine ecosystems by buffering them from the impacts of exploitation, coastal development and pollution. The evaluation of area-based conservation measures (proportion of marine environment under protection), ecological representation, ecological connectivity and management efficiency enable Victoria's contribution towards international and national targets to be determined.

Why this assessment in 2024?

This indicator assessment is based on Victoria's contribution towards the achievement of quantitative and qualitative provisions of the Kunming-Montreal Global Biodiversity Framework (GBF) Target 3.

At least 30% of coastal and marine areas to be protected by 2030

Australia has already achieved this quantitative provision with its national representative system of marine protected areas (MPAs) covering 45% of its waters. For Victoria, approximately 12% of state waters are protected by the state's MPA network which is the third lowest area of protection among Australian jurisdictions. However, as no state-level target has been established in terms of Victoria's contribution towards the international GBF target, and the 2021 assessment was based on the achievement of international target (Aichi Target 11) under the former Strategic Plan for Biodiversity 2011–2020, the status is unknown. The trend is stable as no new MPAs have been added to the Victoria's MPA network since its establishment in 2002. The confidence is rated as high due to the data being contemporary and of high quality.

Representation of the full diversity of ecosystems

A recent assessment based on new habitat mapping data revealed that habitat complexes are generally well represented within MPAs relative to their associated biounit. However, despite examples of available habitat complexes being represented, the proportional area of habitat complexes within MPAs differ from that of the associated biounits and rare and sediment habitats are not well captured. Similar results were also found when assessing habitat complex representation using the 2023 Statewide Marine Habitat Map. The status is, therefore, assessed as fair. Although the state's network of MPAs have not changed since its establishment, assessing temporal changes in ecosystem representativeness was hindered by previous assessments being based on insufficient data. Thus, it is unclear whether factors within MPA boundaries which have the potential for impacting on the spatial distribution of ecosystems, such as ineffective management or threatening processes, have resulted in changes in representativeness. The confidence is rated as moderate due to the limitations of the predictive modelling used in developing the statewide marine habitat map.

Prioritising areas of particular importance to biodiversity

The representativeness of areas having high biodiversity value was assessed using new tools developed by the Department of Energy, Environment and Climate Action — Marine Biodiversity Values mapping and Irreplaceability. A total of 27% of the top 20% most valuable sites for biodiversity and 40% of irreplaceable biotope records are represented within Victoria's existing MPA network. As no state-level target has been established for the representation of important areas for biodiversity or irreplaceable biotopes, the status for these measures is assessed as unknown. The trend is unclear as these are the first analyses undertaken using this new information.

Well-connected system of marine protected and conservation areas

The results of a recent analysis examining the patterns of ecological connectivity within biounits and their associated MPAs suggested that MPAs are generally well connected. The status is, therefore, assessed as fair. Trend is unclear as these are the first analyses undertaken using this new information. The confidence is low due to connectivity between MPAs not being the focus of the analysis.

Achievement of marine protected area biodiversity conservation objectives

Overall, most of the state's MPAs were found to promote the conservation of biodiversity, as the abundance, diversity and/or biomass of fish and invertebrates were greater within MPAs than in the unprotected reference areas. Thus, the status for this GBF Target 3 provision is assessed as fair. A lack of time-series data for the effect of protection on biodiversity means that the trend is unclear. The confidence is rated as moderate due to the available data being contemporary and of high quality but lacking temporal breadth.

Effectively managed system of marine protected and conserved areas

State of the parks reporting evaluates the effectiveness of management within Victoria's MPAs. However, no new data have become available since 2021 resulting in status and trend assessments of unknown and unclear, respectively.

33: Nitrogen cycle

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB						
WP						
GL (Lake King)						
GL (Lake Victoria)						
GL (Lake Wellington)						

Data source(s)

Academic research
DEECA
Melbourne Water

Measure(s)

Eutrophication response
Denitrification efficiency
Ratio of nitrogen fixation to denitrification
Dissolved inorganic nitrogen concentrations

Why this indicator?

As each of Victoria's bays vary in their physical, chemical and biological characteristics, different processes govern nutrient cycling within these systems. Excess nitrogen influx to a system has the potential to promote eutrophication responses, like toxic algal blooms, growth of undesirable or nuisance algal growth, and low light conditions with flow-on effects to benthic plants and algae. These responses are exacerbated by excess organic loads. Understanding the unique factors which can lead to disruptions in nutrient cycling is, therefore, critical to maintaining the health of the state's bays.

Why this assessment in 2024?

Port Phillip Bay

The status is poor due to the combination of the 2022-23 results of the Eutrophication Index and the early results from the Seafloor Integrity Program which indicated that regions of the bay exhibit sediment eutrophication which risks its ability to process current nitrogen loads in the bay. The trend is assessed as deteriorating based on recent evidence of eutrophication responses which were not previously detected in the previous bay-wide study. Confidence is moderate given that the assessment is based partially on preliminary research findings.

Western Port

The status is good and trend stable due to the high ratio of nitrogen fixation to denitrification in most parts of Western Port. Confidence is low due to a lack of contemporary data.

Gippsland Lakes

The status and trend are based on inorganic nitrogen concentration assessments using thresholds derived from the framework established in the Australian and New Zealand Water Quality Guidelines. The status for each of the lakes ranges from poor to good based on whether concentrations were below or exceeded thresholds. Although high rainfall years resulted in a pattern of increased concentrations, there are no sustained trends, thus, the trends for the lakes are assessed as stable. Confidence is low due to a lack of contemporary data.

34: Seagrass

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						
MPA (Port Phillip Heads Marine National Park)				 [1]	 [1]	 [1]

Data source(s)	ARI DEECA PV
Measure(s)	Seagrass extent Seagrass condition Ramsar site limits of acceptable change

Why this indicator?

Seagrass meadows are critical habitat for many marine species, including fish targeted by commercial and recreational fishers, provide shoreline protection and store significant amounts of carbon. Changes in their condition can have environmental, social and economic effects.

Why this assessment in 2024?

Statewide

The statewide status for seagrasses is assessed as poor because most of the historic distribution of seagrass communities have collapsed more than 10 years ago while those seagrass beds that remain are in a moderate condition. This is further supported by the 2021 Index of Estuary Condition (IEC) results, which showed that the submerged vegetation of over half of the assessed estuaries is in a minimally to moderately modified state.

Over the last three decades, some of Victoria's catchments have been extensively modified due to urban or agricultural development resulting in increased nutrient and sediment inputs. This has led to declines in the overall extent of seagrass beds due to impacts on water quality. Therefore, the statewide trend is assessed as deteriorating.

The confidence is moderate because of variation in techniques used between historical and current seagrass mapping and the paucity of statewide data on the historical distribution of seagrasses.

Port Phillip Bay

The status for Port Phillip Bay is assessed as fair due to 73% of the historical extent of seagrass remaining and over half of the assessed estuaries having low IEC scores indicating that these estuaries are dominated by macroalgae.

The trend is assessed as deteriorating due to a decline in seagrass extent. The Port Phillip Bay (Western Shoreline) and Bellarine Peninsular Ramsar Site have also experienced losses of seagrass beds, although this decline does not exceed the limits of acceptable change (LAC).

The confidence is moderate due to variation in techniques used between historical and current seagrass mapping.

Port Phillip Heads Marine National Park

Recent investigations in seagrass ecosystems within Swan Bay and Mud Islands, which form part of the Port Phillip Heads Marine National Park, was undertaken by Parks Victoria where it was found that seagrass extent increased overall within Mud Islands between 1981 and 2021, while the extent within Swan Bay declined overall between 2001 and 2021. Thus, the trend is assessed as stable overall.

Previous (2005-2014) assessments of the condition of seagrass were also performed for Mud Islands, which found that seagrass cover, canopy height and epiphyte cover fluctuated but generally remained within limits of acceptable change, resulting in a good status.

The confidence is assessed as low due to the mapping capabilities at the time of each historical study, spatial breadth and age of the data used for assessing condition.

Western Port

The status in Western Port is considered fair because of the moderate level of disturbance experienced by the majority of assessed seagrass habitat and intermediate IEC scores. Despite a reduction in extent, there is evidence of recovery of seagrass beds and the implementation of seagrass restoration, thus, the trend is assessed as improving.

The confidence is assessed as moderate due to the variation in techniques used between historical and current seagrass mapping, a lack of recent LAC assessments for the Western Port Ramsar Site and only a single estuary having an IEC score.

Corner Inlet-Nooramunga

The status for Corner Inlet is considered fair due to all the assessed seagrass beds being found to have experienced moderate levels of disturbance and IEC scores ranging from moderate to high.

The 2020 LAC assessment for seagrass in the Corner Inlet Ramsar Site has been met. However, the biounit as a whole has experienced declines in seagrass extent resulting in a deteriorating trend assessment.

The confidence is assessed as moderate due to a variation in techniques used between historical and current seagrass mapping and a lack of information regarding the factors influencing seagrass dynamics.

Gippsland Lakes

The status of seagrass habitat in Gippsland Lakes is considered fair as all assessed beds were found to be in a moderately disturbed condition and IEC scores ranging primarily from moderate to high.

With declines in seagrass extent within the Gippsland Lakes biounit and Ramsar site, the trend is assessed as deteriorating but noting that the LAC was not exceeded.

The confidence is assessed as moderate based on a variation in techniques used between historical and current seagrass mapping.

[1] The basis for the 2021 assessment was limited to the Ramsar site, whereas the Statewide Marine Habitat Map was used in addition to Ramsar site limits of acceptable change assessments, thus direct comparisons cannot be made between SMCE reporting periods.
[2] The 2021 assessment is based on data from the State of the Parks 2018 Report, whereas the 2024 assessment focuses just on Phillip Heads Marine National Park, thus direct comparisons are inappropriate.

35: Shellfish reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						
Data source(s)	Academic research TNC					
Measure(s)	Extent of shellfish reefs Restoration success					

Why this indicator?

Shellfish reef ecosystems support unique assemblages of associated fauna and valuable ecosystem services, including fish production, coastal protection, erosion mitigation and nutrient cycling.

Why this assessment in 2024?

Status is assessed as poor in Port Phillip Bay, Western Port and Corner Inlet-Nooramunga biounits and at the statewide scale because of the significant losses in the historical distribution of shellfish reefs and a lack of natural recovery. Oysters and mussels generally occur in low abundance and lack functional reef structure. Healthy mussel reefs still exist in the Gippsland Lakes, albeit at a lower level than their historical distribution, thus the status is fair for this biounit.

The trend is improving at the statewide scale and for Port Phillip Bay and Gippsland Lakes as these regions have been the target of recent reef restoration initiatives that have proven successful in terms of natural recruitment of shellfish and restored ecological function (e.g. supporting biodiversity).

Confidence ranges from low to moderate due to no to minimal contemporary data on spatial extent of the remaining reefs.

36: Macroalgae on intertidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
MPA (SW)	N/A	N/A	N/A			
MPA (Point Addis Marine National Park)				–	–	–
MPA (Port Phillip Heads Marine National Park)				[1]	[1]	[1]
Data source(s)	PV					
Measure(s)	Percent cover Limits of acceptable change					

Why this indicator?

Macroalgae are an important source of food and habitat for many marine species and provide shoreline protection. Changes in this intertidal community (e.g. changes in macroalgal cover) may be a sign of other changes occurring in the marine environment that require management action.

Why this assessment in 2024?

In 2021, a statewide assessment was undertaken based on all marine protected areas (MPAs) having available data at the time, except for those parks and sanctuaries occurring within Port Phillip Bay which were evaluated under the Port Phillip Bay biounit. No statewide evaluation was undertaken as each marine national park included within Parks Victoria's Signs of Healthy Parks program was evaluated separately in order for the State of Marine and Coastal Environment reporting to align with this long-term monitoring program.

Point Addis Marine National Park

The status of intertidal macroalgae for Point Addis Marine National Park was assessed as good due to the percent cover of macroalgae being above the lower limits of acceptable change (LAC). Trend is assessed as deteriorating as macroalgae cover has declined overall and in 2019 — the most recent survey year. Confidence is considered low as the last survey was conducted in 2019 and lacked surveys of reference sites to determine if changes in macroalgal cover observed within the park are occurring more broadly.

Port Phillip Heads Marine National Park

The status of Port Phillip Heads Marine National Park was assessed as good, with the trend as stable, due to the percent cover of macroalgae being within the LAC and exhibiting little change over the recent survey period. Confidence is considered low as there has not been a macroalgae survey conducted in this MPA since 2019.

[1] This 2021 assessment was presented under the Port Phillip Bay biounit in the SMCE 2021 Report and collectively assessed all MPAs within the biounit. Only Port Phillip Heads Marine National Park was evaluated in 2024 to align with Parks Victoria's Signs of Healthy Parks long-term monitoring program.

37: Macroalgae dominated subtidal reefs

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB				–	–	–
MPA (SW)						
MPA (Discovery Bay Marine National Park)				–	–	–
MPA (Point Addis Marine National Park)				–	–	–
MPA (Port Phillip Heads Marine National Park)						
MPA (Point Cooke Marine Sanctuary)						
MPA (Jawbone Marine Sanctuary)						
MPA (Ricketts Point Marine Sanctuary)						
MPA (Wilsons Promontory Marine National Park)				–	–	–
MPA (Cape Howe Marine National Park)				–	–	–

Data source(s)	Deakin University PV
Measure(s)	Percent cover Limits of acceptable change

Why this indicator?

Macroalgal communities on subtidal reefs provide shelter, nurseries and feeding areas for reef fish and other marine species while canopy-forming macroalgae act as ecological engineers. Broken stems washed ashore as beach wrack forms part of marine food webs. Changes in the condition of macroalgal beds can have broad implications for marine and coastal species.

Why this assessment in 2024?

In 2021, a statewide assessment was undertaken based on all marine protected areas having available data at the time, except for the parks and sanctuaries occurring within Port Phillip Bay that were evaluated under the Port Phillip Bay biounit. No statewide evaluation was undertaken as each marine national park included within Parks Victoria's Signs of Healthy Parks program was evaluated separately for the State of Marine and Coastal Environment reporting to align with this long-term monitoring program.

Statewide

The status of subtidal macroalgae is assessed as poor based on recent research demonstrating that cover of the habitat- forming golden kelp and crayweed has declined severely across the Victorian coastline from 1998 to 2018. The trend is deteriorating as modelling results indicate that both golden kelp and crayweed will continue to decrease over 62% to 94% of their modelled distribution into the future (2090) in response to projected increases in climate change impacts and urchin density. Confidence is low given the lack of recent time-series data (2018 is the latest datapoint) and the trend being based exclusively on predictive modelling.

Port Phillip Bay

The status of subtidal macroalgae in Port Phillip Bay is assessed as poor as more than half of the sites surveyed between 2019 and 2020 had the presence of urchin barrens and all sites exceeded the thresholds necessary for natural kelp recovery to occur. Trend is deteriorating due to the continued decline in golden kelp percentage cover and increasing urchin densities. Confidence is moderate given that no bay-wide surveys have been conducted in recent years.

Discovery Bay Marine National Park

The status of subtidal macroalgae in Discovery Bay Marine National Park is assessed as good based on survey results which showed that, in 2021, subtidal reef communities dominated by canopy-forming macroalgal species, particularly crayweed and golden kelp, were prevalent within the park. These habitats were found to be in good condition and no pest species were detected. Trend is assessed as unclear due to a lack of time-series data. Confidence is assessed as low due to the low temporal and spatial breadth of the data.

Point Addis Marine National Park

The status of subtidal macroalgae in Point Addis Marine National Park is assessed as fair based on the proportional conformance with their limits of acceptable change as of 2018. Despite some increases in macroalgae cover, the trend is deteriorating as canopy-forming brown macroalgae have declined below their lower control limits. Confidence is low due to the last survey occurring in 2018.

Port Phillip Heads Marine National Park

The status of subtidal macroalgae in Port Phillip Heads Marine National Park is assessed as good due to the recovery of the most critical canopy-forming macroalgal species, with both having percentage cover within limits of acceptable change as of 2019. The trend is improving as the key canopy-forming species have increased in cover during the most recent survey years. Confidence is low due to the last survey occurring in 2019.

Wilsons Promontory Marine National Park

The status of subtidal macroalgae in Wilsons Promontory Marine National Park is assessed as fair as both canopy-forming macroalgae species were in fair to good condition as of 2020, although their percent cover has showed a slight decline in the last two survey years but has remained within its lower limit of acceptable change. The trend is deteriorating due to declines in percent cover among most macroalgal indicators, including the canopy-forming golden kelp. Confidence is moderate based on the last survey being conducted in 2020.

Cape Howe Marine National Park

The status of subtidal macroalgae in Cape Howe Marine National Park is assessed as fair overall as the canopy-forming crayweed was above its lower limit of acceptable change, however, encrusting coralline algae was below its lower control limit as of 2021. The trend is improving as both macroalgal species exhibited increases in percent cover, albeit this was slight for encrusting coralline algae. Confidence is high due to the assessment being based on contemporary data.

Other marine protected areas

No recent information was available regarding the percentage cover or condition of subtidal macroalgal reefs within Point Cooke, Jawbone and Rickets Point marine sanctuaries resulting in an unknown status and unclear trend.

[1] The 2021 assessment for Port Phillip Heads, Point Cooke Marine Sanctuary, Jawbone Marine Sanctuary and Ricketts Point Marine Sanctuary were presented under the Port Phillip Bay Biounit in the SMCE 2021 Report.

Pests and invasive species

38: Invasive marine species

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB						
WP						
CIN						
GL						
MPA (SW)						

Data source(s)	DEECA
Measure(s)	Diversity and abundance of invasive marine species Abundance and diversity of high-risk invasive species Impact of invasive marine species Achievement of management objectives

Why this indicator?

The establishment and subsequent spread of invasive species is widely recognised as one of the most threatening processes contributing to global biodiversity loss. Monitoring is critical to determine whether the range of invasive species is expanding, with new incursions requiring rapid management responses.

Why this assessment in 2024?

Statewide

The statewide status is assessed as poor due to only two regional ports being free of the 14 targeted invasive marine species and more than half of these species being found to occur in high abundance in at least one port. Four of the six invasive marine species of concern in Victoria occur in high abundances within six regional ports. Five of the six species of concern were also detected within commercial ports.

The trend is stable as no new incursions of high-risk invasive marine species have been detected within regional and commercial ports since the marine surveillance program was established in 2021.

Confidence is moderate due to the lack of abundance data for commercial ports, no information on impacts and surveys being conducted only within ports, thereby limiting our understanding as to whether invasive species have spread to other marine environments.

Port Phillip Bay

The status for Port Phillip Bay is assessed as fair based on two new invasive species that have been reported in the 2020-2025 period. The trend is deteriorating because of this increase in introduced species. The confidence is moderate due to the regular monitoring and reporting of introduced marine species.

Western Port

The status for Western Port is assessed as fair as few of the targeted invasive marine species occur in high abundance within its regional ports, although one species of concern was detected. Western Port's commercial port also had the lowest diversity of invasive species relative to other commercial ports, although four of the six species of concern were detected.

The trend is stable as no new incursions of high-risk invasive marine species have been detected within regional and commercial ports since the marine surveillance program was established in 2021.

Confidence is moderate due to the lack of abundance data for commercial ports, no information on impacts and surveys being conducted only within ports, thereby limiting our understanding as to whether invasive species have spread to other marine environments within the biounit.

Corner Inlet-Nooramunga

The status for Corner Inlet is assessed as fair due to four of the targeted invasive marine species occurring in moderate to high abundance within regional ports. Furthermore, two of the species of concern occur in high abundance.

The trend is stable as no new incursions of high-risk invasive marine species have been detected within regional ports since the marine surveillance program was established in 2021.

The confidence is moderate due to a lack of information on impacts and surveys being limited to ports, thereby limiting our understanding as to whether invasive species have spread to other marine environments within the biounit.

Marine protected areas

A total of 14 invasive marine species have been recorded across 15 of Victoria's marine protected areas (MPAs), representing more than 60% of the state's marine national parks and sanctuaries. The status for MPAs is considered fair based on the proportion of marine national parks and sanctuaries having invasive species present, the degree to which management objectives have been achieved and the reported level of impact. Furthermore, the invasive marine species management objective was met for 38% of relevant parks, with the level of threat being considered minor for approximately 30% of assessed MPAs.

The trend is stable as no new incursions have been reported since 2021.

Confidence is moderate as some data used in the assessment has not been updated since 2018.

39: Coastal invasive plants

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
CCMA				–	–	–
EGCMA				–	–	–

Data source(s)	CCMA DEECA EGCMA
Measure(s)	Area (ha) of treatment works to control weeds on land within 5 km of the Victorian coastline Number of locations where invasive plants have been detected within 5 km of the Victorian coastline Benefit minus cost of weed control Impact of weeds Threat of transformer weeds

Why this indicator?

Invasive coastal plants are a threat to Victoria's biodiversity as they can displace native vegetation, disrupt ecological processes and alter the genetic composition of native plant populations.

Why this assesment in 2024?

Statewide

The statewide status is assessed as fair due to the varying level of impacts of invasive plants across the state's coastal environment. Furthermore, nearly 300 sites are currently undergoing eradication programs to reduce or eliminate the threat of noxious weeds. A lack of time-series data has resulted in an unclear trend assessment. Confidence is moderate due to the spatial breadth of available information.

Corangamite Catchment Management Authority

The status and trend are assessed as good and improving, respectively, as weed control undertaken within 385 hectares along the Great Ocean Road resulted in an overall reduction in the diversity of weed species present across project sites while native species diversity increased. Confidence is low as the 3-year surveying period spanning 2021 to 2023 is insufficient to measure significant change in vegetative structure and dune health.

East Gippsland Catchment Management Authority

Although weed control has been undertaken within a total of 63 hectares within coastal areas within the East Gippsland Catchment Management Authority region, it is unclear how effective these works have been in reducing weed cover. Thus, the status is unknown and trend unclear.

Other Catchment Management Authority regions

Information on coastal invasive plants from other coastal Catchment Management Authorities was not available, therefore no assessments could be performed.

40: Coastal invasive animals

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
CIN				–	–	–
ScWo				–	–	–
SC				–	–	–
CCMA				–	–	–
GHCMA				–	–	–

Data source(s)

CCMA

DEECA

GHCMA

Phillip Island Nature Parks

Measure(s)

Area (ha) of treatment works to control feral cats, deer, foxes, feral goats, feral pigs and rabbits within 5 km of the Victorian coastline

Number of locations where pest animals have been detected within 5 km of the Victorian coastline

Benefit minus cost of pest animal control

Impact of pest animals

Why this indicator?

Pest animals that have established populations in Victoria include foxes, rabbits, feral pigs, feral goats, feral horses, deer and feral cats, with their impacts recognised through several listings under the *Flora and Fauna Guarantee Act 1988*.

Why this assesment in 2024?

Statewide

The statewide status is fair due to varying impacts of invasive animals along Victoria's coastline. A lack of time-series data resulted in an unclear trend. Confidence is low as minimal new information was available.

Corner Inlet-Nooramunga

The status is fair due to no fox predation on beach-nesting birds was detected during the fox surveillance program, however, evidence of foxes utilising areas that serve as suitable beach-nesting bird habitat was detected. Trend is unclear as no information was available regarding changes in fox densities or predation levels as a result of the fox control program. Confidence is low due to the limited information regarding the effect of fox control on fox densities.

Schanck-Woolamai

The status is good and trend stable as the island has remained fox-free since 2017, with only one fox trapped since that time. Confidence is high given the quality and temporal breadth of the data.

Shipwreck Coast

The status is good and the trend improving as the fox eradication program has been effective in reducing both the levels of little penguin predation and the number of foxes on the island. Confidence is assessed as moderate because of disruptions in monitoring due to COVID-19 and access issues.

Corangamite Catchment Management Authority

The status is good and trend improving due to evidence of reduction in fox predation as a result of pest animal control treatments covering 1,042 ha. Confidence is low due to the limited information regarding the effect of fox control on fox densities and native fauna responses.

Glenelg Hopkins Catchment Management Authority

The status is assessed as good due to a sharp decline in fox density as a result of the long-term fox control program and the higher rates of long-nosed potoroo and southern brown bandicoot colonisation and persistence exhibited at treatment sites. The trend is stable as fox densities remained consistently low at sites receiving control treatments. Confidence is high given the quality and temporal breadth of the data.

Climate and climate change impacts

41: Rainfall

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW				–	–	–
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			

Data source(s)	BoM CSIRO DEECA
Measure(s)	Rolling 30-year average of annual rainfall

Why this indicator?

Rainfall is an important factor in plant growth. The timing and intensity of rainfall can influence the severity of pluvial and riverine floods that have social and community impacts, and environmental impacts for sediment and pollutants that enter bays.

Why this assessment in 2024?

The status assessment of fair reflects the fluctuating pressure being exerted on the water resources and agricultural sectors by wetter years being interspersed in a predominantly drying climate.

The trend of deteriorating is based on most coastal locations in Victoria receiving between 5% and 15% less rainfall in the previous 30-year period than in the 30-year period from 1961 to 1990.

Confidence in the status and trend assessments is moderate because despite the high quality of rainfall data, knowledge of the impacts of rainfall on coastal settlements is continuously evolving.

A statewide assessment has been preferred to regional assessments because rainfall patterns are largely consistent across Victoria's coastal regions.

42: Air temperature

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
PPB	N/A	N/A	N/A			
PPB (Melbourne)				–	–	–
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL	N/A	N/A	N/A			
Other coastal locations				–	–	–

Data source(s)	BoM CSIRO DELWP
Measure(s)	Rolling 10-year average of annual mean maximum temperature compared with an indicative pre-industrial era period.

Why this indicator?

Air temperature is an important factor in beach usage – when it is warmer people tend to head to the beach and this affects the utility, and social and economic value of a beach, but also potentially accelerates degradation of the coastal environment if not appropriately managed. Air temperature is also a factor in staffing for surf life-saving. Air temperature increases the risk of heatstroke episodes and extreme heat can preclude many marine and coastal recreational activities.

Why this assessment in 2024?

Daily maximum temperatures in Melbourne are approaching a 1.5°C increase from an indicative pre-industrial era temperature. Eight of the most recent 20 years (i.e. during the period of 2003–2022) have been more than 1.5°C warmer in Melbourne than the indicative pre-industrial era temperature.

The warming in Melbourne has been greater than other coastal locations in Victoria. The warming in Sale, Wilsons Promontory, Cape Otway and Gabo Island has been between 0.7°C and 1.0°C from the baseline 50-year period (i.e. 1910–1959) to the most recent decade with data (i.e. 2013–2022).

The confidence in the status and trend assessments is rated as moderate because despite the high quality of temperature data, knowledge of the impacts of increasing temperatures is continuously evolving.

The only region-specific assessments in 2024 have been made for Port Phillip Bay (Melbourne). There have been generally consistent air temperature patterns across Victoria's other coastal locations.

43: Water temperature

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	BoM CSIRO
Measure(s)	Trends in sea surface temperatures (°C per decade)

Why this indicator?

Oceans play an important role in the global climate system, absorbing more than 90% of the excess heat trapped by greenhouse gases. Water temperature is important for all marine life that provides environmental (e.g. biodiversity), economic (e.g. commercial fisheries) and social (e.g. recreational fishing) services.

Why this assessment in 2024?

Sea surface temperatures have increased by more than 1°C since 1900 in the Southern Region that includes Victorian marine waters.

There has been an increasing frequency of marine heatwaves in Australia in recent years and these have permanent impacts on marine ecosystem health, marine habitats and species. These impacts include depleting kelp forests and sea grasses, a poleward shift in the distribution ranges of some marine species and increased occurrence of disease.

The status and trend are assessed as poor and deteriorating respectively due to the increasing sea surface temperatures in Victorian marine waters and the significant impacts from an increasing frequency of marine heat waves.

The confidence is assessed as moderate because, while the data quality of the measured sea surface temperatures is high, only limited research has been undertaken to understand the impacts of the effects of warmer sea surface temperatures along the Victorian coastline.

44: Ocean acidification

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW			 (status) (trend)			 (status) (trend)

Data source(s)	BoM CSIRO
Measure(s)	Change in pH of surface waters

Why this indicator?

The uptake of atmospheric CO_2 by the oceans affects the carbonate chemistry and decreases pH, a process known as ocean acidification. Ocean acidification is the consequence of rising atmospheric CO_2 levels and impacts the entire marine ecosystem—from plankton at the base through to the top of the food chain.

Why this assessment in 2024?

Ocean surface waters around Australia have increased in acidity by more than 30% from the 1880s to the 2010s. The increase in acidity has become more rapid in recent decades therefore the trend of deteriorating is made with high confidence due to the quality of ocean acidification data.

The status is assessed as fair because some impacts are observed. However, there are limited studies on the current impacts of ocean acidification around Victoria therefore the assessment is made with low confidence.

45: Sea level

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB						
WP						
CIN						
GL						

Data source(s)	BoM
Measure(s)	Annual mean sea level Projections for annual mean sea levels

Why this indicator?

Sea level rise is one of the most significant threats associated with climate change to coastal areas. Coastal communities in Victoria are already experiencing impacts associated with sea level rise. These impacts are expected to intensify this century and include:

- more frequent and extensive inundation of low-lying areas, with the impacts exacerbated by storm surges
- loss of coastal habitat, such as roosting and nesting sites for shorebirds and seabirds
- accelerated cliff retreat and shoreline recession
- altered saltmarsh and mangrove habitats.

Why this assessment in 2024?

A comparison has been made between mean sea levels in the 1990s and the 2010s as these are the only two decades in which sufficient data were captured at all monitoring locations in Victoria. Considering these decades, sea level rise has been between 0.3 cm per decade (Lakes Entrance) and 4.5 cm per decade (Point Lonsdale).

The status and trend assessments of fair and deteriorating respectively reflect the gradual but consistently increasing mean and maximum sea levels that are exerting pressure on human coastal settlements and infrastructure. These patterns are consistent at a statewide scale.

The data gaps across all decades except the 1990s and 2010s are the reason for the confidence rating of moderate in the assessments.

A statewide assessment has been preferred to regional assessments because the sea level patterns are largely consistent across Victoria's coastal regions.

46: Coastal inundation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB						
WP						
CIN						
GL						

Data source(s)	Academic research BoM DEECA
Measure(s)	Number of days of coastal flooding per year Projected number of days of coastal flooding per year

Why this indicator?

Coastal inundation is the flooding of low-lying land by seawater.

Some typical impacts of coastal inundation include flooding of roads and walking paths, limited beach access and flooding of parks and reserves. These can have both short- and long-term impacts. During the event, danger or inconvenience can be posed to people but in the longer term it can cause infrastructure and property to degrade more quickly than it otherwise would have and this can have economic consequences.

Why this assessment in 2024?

The status is assessed as fair because, although impacts are being observed, there is an average of five days of coastal flooding per year in Melbourne and most of the coastal flooding has a minor impact.

The trend is assessed as deteriorating because increases in mean sea levels have caused coastal floods to become more frequent in Victoria. Without successful flood risk mitigation, future increases in coastal flooding will lead to coastal floods occurring more often.

The confidence is rated as moderate because there are no impact-based thresholds for coastal inundation from tide gauge observations along the Victorian coastline.

A statewide assessment has been preferred to regional assessments because the evidence on the frequency and impacts of coastal inundation is largely consistent across Victoria's coastal regions.

47: Wave climate

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	?	?	?	?	?	?
PPB	N/A	N/A	N/A	?	?	?
Data source(s)	Academic research					
Measure(s)	Percent load on structures from meteorological and oceanographic forcing (combination of wind, wave and climate conditions)					

Why this indicator?

Waves are a dominant process along Victoria's coastline and near-shore regions. Understanding their characteristics and impacts is an important consideration for ecologically sustainable development of coastal and offshore infrastructure, and management of coastal resources and ecosystems.

Why this assessment in 2024?

The research used for this indicator assessment is a characterisation of current wave climate rather than an analysis of the impacts of a changing wave climate due to climate change. The status is unknown and the trend is unclear.

A statewide assessment has been preferred to regional assessments because there is an absence of available evidence on the current impacts of the wave climate along Victoria's coastline.

48: Coastal erosion

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A			
PPB	N/A	N/A	N/A			
WP	N/A	N/A	N/A			
CIN	N/A	N/A	N/A			
GL			(status) (trend)			
Other coastal regions			(status) (trend)	–	–	–

Data source(s)	Academic research DEECA
Measure(s)	Erosion Warning Index score ratings Area of coast defined as an erosion hotspot (e.g. where there has been a landward shift in shoreline position between 1986 and 2017 at a rate higher than 0.5 m per year) Area of coastline defined as highly or very highly vulnerable to erosion

Why this indicator?

Rising sea levels due to climate change are likely to cause accelerated erosion of many Australian coastlines. This is based on the expectation that many shorefaces will shift up and onshore to maintain an equilibrium with the waves and changing water level. This may result in tens of metres of erosion on many beaches – narrow beaches in front of cliffs and seawalls have the potential to erode entirely. This erosion has broad-reaching consequences for coastal infrastructure, communities, ecosystems and coastal leisure activities.

Why this assessment in 2024?

Several erosion assessments have been made across Victoria in recent years.

The results of a 2017 erosion vulnerability assessment have been used to guide the status assessment of poor for Gippsland Lakes, with more than 100 km of the Gippsland Lakes coastline rated as having a very high vulnerability to coastal erosion. This means that more than one-quarter of the entire Victorian coastline most at risk of erosion is located along the Gippsland Lakes.

The status elsewhere along the Victorian coastline is assessed as fair because of the high frequency of moderate risk ratings for both the 2017 erosion vulnerability assessment and the recent Erosion Warning Index (EWI) scores. These erosion assessments are point-in-time, therefore, the trend is unclear.

The confidence in the status assessments is high because the EWI scores are based on rigorous thresholds. However, confidence in the trend assessments is low.

The only region-specific assessments in 2024 have been made for the Gippsland Lakes. There are generally consistent erosion patters across Victoria's other coastal locations.

49: Seawater intrusion into coastal aquifers

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N/A	N/A	N/A	?	?	?
PPB		↘		–	–	–
Other coastal regions	?	?	?	–	–	–

Data source(s)	Academic research DEECA
Measure(s)	Vulnerability ratings for seawater intrusion into coastal aquifers

Why this indicator?

Sea water intrusion into aquifers presents a risk to future freshwater supply in coastal areas.

Seawater intrusion causes degradation of groundwater resources in coastal areas.

Why this assessment in 2024?

Port Phillip Bay

The status assessment of fair reflects the balance of some areas of Port Phillip Bay having higher salinities, while other areas have fresher groundwater that is more suitable for commercial and domestic irrigation purposes.

Rising water table hazards will impact on built assets in the coastal areas. Although these have been occurring over several decades and the trend is deteriorating, the occurrence is at a rate that allows planning towards longer-term management.

Confidence is low because limited information is available regarding impacts.

Other coastal locations

Evidence for assessing this indicator is minimal and more than five years old, therefore insufficient information is available to provide status and trend assessments.

50: Frequency and impact of fire on marine and coastal ecosystems

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
GL						
Other coastal regions				–	–	–
Data source(s)	Academic research DEECA					
Measure(s)	Fire extent within 5 km of coastline					

Why this indicator?

Research has shown that when the nutrients, ash, debris, sediments and metals released by bushfires are washed into waterways, these can remove the feeding and breeding areas of aquatic animals, clog the gills of fish and undermine the breathing of filter-feeding animals such as mussels.

Why this assessment in 2024?

Across the state, there has been a slight trend towards an increasing area of coastal land being burnt by fire. Dividing the past 50 years into two 25-year periods reveals that 15% more coastal land has been burnt from 1999 to 2023 compared to 1974 to 1998.

Similarly, Gippsland experienced a 15% rise in the annual frequency of dangerous fire weather days between 1950 to 1985 and 1985 to 2020.

Gippsland Lakes has a poor status due to the increased impacts experienced in that marine and coastal region during the past five years, specifically during 2019 to 2020. A 2022 review of the Gippsland Lakes Ramsar site found that the 2019 to 2020 bushfires affected water quality.

The confidence is assessed as moderate because, while the data quality of the area of coastal land being burnt is high, only limited research has been completed to understand the impacts of the effects of fire on Victorian marine and coastal ecosystems.

51: Climate change impact on marine and coastal infrastructure

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						
PPB						
WP						
GL						
Data source(s)	Academic research					
Measure(s)	Economic cost due to sea level rise and storm surges Number of properties exposed to a high risk of damage from sea level rise and storm surge					

Why this indicator?

Buildings and structures in the marine and coastal environment help communities and industries to function. These include port facilities, transport docks, jetties, boat ramps, paths, toilet blocks, picnic facilities, structures to maintain public safety, and buildings to enhance recreation opportunities such as clubs and cafes. Sea level rise, coastal erosion and storm surge will also affect seaside housing.

Why this assessment in 2024?

Research shows that by 2100, almost every community along Victoria's coastline will be affected by sea level rise and storm surges.

The impacts on land and property along the Victorian coast are predicted to reach a cumulative loss of $337 billion by 2100 (2.68% of the projected gross state product of Victoria), with a further loss of up to $105 billion for wetlands.

Given that estimated economic costs in the absence of mitigation are significant for 2040 ($122 billion), the status is assessed as poor to reflect that action needs to be taken in the immediate future to reduce impacts. The deteriorating trend reflects the economic impacts and number of properties at a high risk of damage increasing over time.

The confidence is assessed as moderate because the coastal inundation dataset underpinning the economic estimation is now 15 years old and may underestimate sea level rise by 2100. This means that the economic impacts estimated as part of the research may also be an underestimate.

A statewide assessment has been preferred to regional assessments because detailed information is available at the statewide scale.

Managing coastal hazard risks

52: Considering climate change risks in land use planning

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA
Measure(s)	Percentage of Victorian coastal councils assessed as having advanced or intermediate consideration of climate change in land-use planning.

Why this indicator?

Current and future climate change impacts on communities can be mitigated through coordinated planning that considers climate risk. This includes land-use planning that considers the impacts of sea level rise and increasing rainfall intensity including increased frequencies of inundation and erosion.

Why this assessment in 2024?

There are ongoing efforts to improve the consideration of climate change in land-use planning to help mitigate impacts on communities, though there are no updated data on this specific measure.

The status assessment of fair reflects that coastal councils were (in 2018) three times more likely to have an intermediate, high or advanced consideration of climate change in land-use planning than inland councils. However, 30% of coastal councils still were assessed as having no or basic integration of climate change into land-use planning. The trend is unclear because the most recent study was undertaken six years ago and represents only one point in time. The moderate confidence rating reflects that although local governments are increasingly producing climate change adaptation plans, there is no periodic (or recent) assessment of how effectively these are used to guide land-use planning decisions.

53: Climate change adaptation plans

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	CMAs DEECA
Measure(s)	Number of Catchment Management Authorities (CMAs) that have developed and are implementing climate change adaptation plans or strategies

Why this indicator?

Climate change impacts are expected to vary across Victoria and may occur incrementally or rapidly. Adaptation will need to be responsive to local conditions, values, risk appetite, risk exposure, capability and capacity.

Why this assessment in 2024?

The status assessment of fair reflects that considerable work is being done to adapt to climate change based on the best scientific information. For example, all ten CMAs across Victoria have developed and are implementing Climate Change Adaptation Plans or Strategies that were developed using the latest climate change projections by the Commonwealth Scientific and Industrial Research Organisation and in conjunction with key research organisations across Australia. The trend is improving because more guidance material to enable organisations to develop climate change adaptation plans has been published during recent years. The low confidence rating reflects that only a minimal amount of evidence is available to assess the development and implementation of climate change adaptation plans preparation.

54: Nature-based adaptation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	Academic research TNC
Measure(s)	Soil carbon stocks (tonnes of organic carbon per hectare) in saltmarsh, mangrove and seagrass ecosystems mapped across Victoria Potential carbon sequestration gains from 2020 to 2100 by restoring coastal wetlands in areas inundated by levee breaching and sea level rise Economic benefit of carbon sequestration

Why this indicator?

The Marine and Coastal Policy 2020 details marine and coastal ecosystem goods and services, which includes the regulation of natural processes by ecosystems that benefit humans. Climate regulation is the contribution of a marine or coastal ecosystem to the maintenance of a favourable climate.

Why this assessment in 2024?

Research indicates that saltmarshes, mangroves and seagrasses in Victoria are currently capturing a small percentage of the carbon that could be captured if coastal wetlands were able to retreat in response to sea level rise. The moderate confidence rating reflects that although high-quality data are available, the indicator relies on projections of future scenarios which, although informed by detailed studies, represent an emerging knowledge base. A more recent estimate of the carbon sequestered by saltmarshes, mangroves and seagrasses in Victoria suggests an increase compared to the previous estimate reported in the State of the Marine and Coastal Environment 2021 Report, although this likely reflects an improvement in methodology rather than growth in sequestration.

55: Emergency planning and preparedness

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	EMV
Measure(s)	As per the *Emergency Management Act 2013*, the State Emergency Management Plan contains provisions for: • the mitigation of, response to, and recovery from emergencies • specification of roles and responsibilities of agencies in relation to emergency management • maritime emergencies.

Why this indicator?

Emergencies that impact on the marine and coastal environment are wide ranging, including coastal flooding, bushfires, marine wildlife stranding and entanglements, oil spills, water contamination and outbreaks of invasive species. Many coastal hazards, including flooding and erosion, will increase in severity due to climate change. The dynamic nature of these risks needs to be incorporated into emergency management planning.

Why this assessment in 2024?

The status assessment of good reflects the existence of the State Emergency Management Plan that provides arrangements for an integrated, coordinated and comprehensive approach to emergency management at the state level. Previously reported anecdotal evidence of the Victorian Government's improving capability and capacity to plan, prepare and respond to emergencies (e.g. incident air monitoring) is positive, but there is a lack of recent specific information, so the trend is unclear. The moderate confidence rating reflects that there is adequate documentation to detail the extent of emergency management planning and preparedness for a range of emergencies that could impact the marine and coastal environment, but also that there is no information about the efficacy of such plans to improve emergency mitigation and response.

Communities

56: Coastal population (resident)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N	●	N	N	●

Data source(s)	ABS DTP VMaCC
Measure(s)	Resident coastal population growth rate Projected coastal population growth rate

Why this indicator?

Population change is an important indicator against which community well-being and environmental health can be understood. Human populations may represent a threat or an opportunity for environmental management.

Why this assessment in 2024?

Resident population growth remains high in specific locations along the Victorian coast.

Land use planning policies have channelled most of this growth into designated locations.

Detailed and rigorous data on population growth are available and the government can make projections of future growth.

While a vast quantity of data about resident populations is collected, the nature and scale of their environmental impacts will depend on many other factors such as peoples' values and behaviour, the use of infrastructure and technology to minimise impact, and the planning regimes that influence where people can settle. For this reason, a formal assessment of this indicator has not been undertaken. Instead, a narrative approach outlines the patterns of population change along the Victorian coast.



Children playing on beach at Wilsons Promontory National Park.
Credit: James Lauritz © Parks Victoria

57: Coastal population (visitors)

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N		N	N	

Data source(s)

ABS
City of Greater Geelong
DJSIR
Phillip Island Nature Parks
Tourism Research Australia
VMaCC

Measure(s)

Estimated winter vacancy rate
Tourist visitor numbers

Why this indicator?

Visitor populations can be as significant as resident populations in placing pressure upon marine and coastal environments. This indicator explores the nature of visitor populations and assesses potential management needs to produce positive and sustainable environmental outcomes.

Why this assessment in 2024?

Issues such as over-crowding and congestion are often related to visitor (rather than resident) populations.

In many areas, data on visitor populations are poorer than for resident populations.

Land use planning is less effective for visitor populations, which creates issues of people management rather than settlement planning.

The impact of population on the environment is not linear – it is dependent on behaviour, technology and the regulatory environment.

Data on visitor populations are not as robust as that collected for resident populations. The mobility of visitors makes such measurement inherently difficult. Even where data are available, the nature and scale of environmental impacts will depend on many other factors, such as peoples' values and behaviour, and the management regimes and infrastructure in place to minimise impact. For this reason, an assessment of this indicator has not been undertaken. Instead, a narrative approach outlines the nature and scale of visitor populations along the Victorian coast and the implications of this for environmental management.

58: Significant landscapes

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA DTP
Measure(s)	Number of permits for dwellings or other buildings in areas covered by a Significant Landscape Overlay (SLO) Consents granted for use, development or works on marine and coastal Crown land under the *Marine and Coastal Act 2018* Number of planning declarations of Distinctive Areas and Landscapes (DAL) Number of approvals for Statements of Planning Policy for DAL

Why this indicator?

This indicator aims to measure the number of new developments in areas of landscape significance and the types of planning controls which have been developed to protect landscape values.

Why this assessment in 2024?

Victorian Land Use Planning legislation is providing enhanced protection through declarations of distinctive areas and landscapes.

The status assessment of fair reflects that, on balance, planning controls are being enhanced to protect important landscapes, but there are no monitoring systems in place to determine whether the outcomes are being achieved in terms of protecting the qualities of significant landscapes. For the same reason it is not possible to assess trend.

Planning Permit data provide quantitative assessments of how many planning permits are being issued for residential development in areas subject to a SLO. However, they cannot show the degree to which qualitative aspects of building design are enhancing or impacting negatively on landscape quality; this is reflected in the moderate confidence assessment.

59: Coastal settlements

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N		N	N	

Data source(s)

ABS
AgVic
DTP

Measure(s)

Building approvals outside urban boundaries
Land use change outside urban boundaries
Vegetation removal outside urban boundaries
Development outside urban boundaries

Why this indicator?

Coastal settlements across some regions of Victoria have seen high growth since the early 2000s. This indicator will assess whether coastal towns are being planned and developed in a sustainable manner.

Why this assessment in 2024?

Settlements generally represent an urbanisation of land use through the building of structures (houses and commercial) and associated infrastructure such as roads and pathways.

This process represents a significant change in land use, potentially reducing natural habitat and introducing impervious surfaces. There may also be a significant change in landscape amenity as built form replaces, or is incorporated into, natural environments.

The rezoning of land from rural to urban uses may be tracked using amendment data, however, the dataset is difficult to use for monitoring as it was established to streamline amendment processes rather than as an analytical tool. Further work would be needed to enable the dataset to be used to track changes in urban and rural land use.

Although data that provide information on the growth of settlements in Victoria are available, it is not possible to make an overall assessment of status and trend for this indicator. For this reason, an assessment of this indicator has not been undertaken. Instead, a narrative approach outlines some key characteristics of coastal settlement growth.

While some people will view urbanisation as fundamentally damaging to the environment, the provision of housing is a basic element of human well-being and the availability of affordable housing a matter of social and environmental justice.

60: Cultural heritage

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	First Peoples – State Relations Heritage Victoria
Measure(s)	Number of items included on Aboriginal cultural heritage register Number of Cultural Heritage Management Plans Number of coastal heritage places included on the Victorian Heritage Register Number of coastal historical archaeological sites included in the Victorian Heritage Inventory Value of investment ($) through the Living Heritage program for coastal heritage Number of registered coastal heritage sites subject to threat from natural hazards

Why this indicator?

This indicator assesses the protection of cultural heritage (indigenous and non-indigenous). The protection of marine and coastal sites, objects and landscapes provides a source of learning and identity for both local communities and visitors.

Why this assessment in 2024?

Legislative protection is provided for a range of cultural heritage values on land and in marine environments in Victoria, for both Traditional Owners and non-indigenous Victorians. The legislation provides 'blanket' protection for all sites, including ones not currently known or recorded.

Data on the number of items registered as having cultural significance are available, subject to certain restrictions in the case of Aboriginal cultural heritage.

While various data are available, there are constraints in undertaking non-standard analysis of Heritage Victoria data (e.g. for GIS) which limits their potential use.

While cultural heritage can be assessed quantitatively (number of sites, etc.), it is important to monitor the qualitative status of sites and the degree to which investment is supporting their preservation and protection. Trend is assessed as stable, recognising the broad protection afforded, and the continuous listings of specific places over time.

61: Use of marine and coastal areas

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	PV VMaCC
Measure(s)	Activities undertaken while visiting the Victorian coast

Why this indicator?

Marine and coastal areas are used for many different purposes. This indicator aims to examine this range of uses, the community benefits that marine and coastal areas provide and potential environmental impacts that need to be addressed.

Why this assessment in 2024?

The assessment of this indicator is based on the social and economic benefits derived from the use of marine and coastal areas, rather than environmental impact (which is explored in other sections).

The status assessment of good reflects that Victorian coastal areas are used by a range of people for a variety of purposes. Many of these activities have positive health benefits and support economic activity in coastal communities. This trend is stable in that there is a long history of coastal sporting and cultural activities.

Appropriate management of people and their activities can minimise potential environmental impacts. This is of particular importance as population (resident or visitor) grows.

The moderate confidence rating reflects that this assessment relies chiefly on survey data that have not been updated since the State of the Marine and Coastal Environment 2021 Report.



Surfer on West Cape Beach, Cape Conran. Credit: Parks Victoria

© Parks Victoria

62: Tourism

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DJSIR PV Tourism Research Australia
Measure(s)	Visitor numbers and total spend for selected Victorian tourism regions Number of visitors to coastal and marine parks

Why this indicator?

The natural environment attracts tourists. While providing an economic benefit for many coastal communities, the number and behaviours of tourists can potentially have negative impacts on these environments.

Why this assessment in 2024?

Tourism is supported through government policy and is seen as a valuable source of jobs and revenue for Victorian coastal communities.

At present there appear to be limited links between tourism growth policies and visitor management or environmental management strategies. This has the potential to lead to management conflict and lack of policy coherence.

Tourism was significantly impacted by the COVID-19 pandemic but is returning to previous levels, and thus the trend is assessed as stable. The status assessment of fair reflects that some coastal visitation remains below pre-pandemic levels and the lack of information about the sector's measurement and management of environmental impacts.

While tourism data are available, these tend to be geographically broad and survey-based that makes detailed assessment of tourist impact very difficult. Furthermore, environmental certification schemes do not yet enable comprehensive assessment of tourism operators' environmental credentials. These are reflected in the moderate confidence rating.

63: Recreational boating and fishing contribution to the Victorian economy

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	BBV VFA
Measure(s)	Recreational boating and fishing contribution to the Victorian economy Revenue from license fees

Why this indicator?

Recreational boating and fishing provide substantial economic benefits to the Victorian community through supporting industries (equipment, tourism) and the jobs generated. This indicator will measure the benefits contributed by these recreational activities.

Why this assessment in 2024?

The assessment of this indicator is based on the economic and social benefits derived from these marine and coastal activities, rather than environmental impact (which is explored in other sections).

The status assessment of good reflects recent strong participation in recreational boating and fishing. The impact of COVID-19 pandemic restrictions led to a decline in the number of licenses and subsequent revenue from recreational fishing and boating, however this trend has stabilised.

The moderate confidence assessment reflects that while contemporary data are available for licence numbers and revenue, information on the contribution to the economy is somewhat older.

64: Recreational boating

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	BBV Safe Transport Victoria VFA
Measure(s)	Participation in recreational boating Number of boat license holders

Why this indicator?

Recreational boating is a popular pastime that requires appropriate management and education to control environmental risks such as pollution, or disturbance (e.g. erosion from boat wakes). This indicator will assess the degree to which such initiatives are occurring and supporting sustainable practices.

Why this assessment in 2024?

The status assessment of fair reflects that despite strong participation, environmental impacts are unknown, and it is unclear how environmental stewardship is promoted or practiced within the sector.

Licensing arrangements enable generally high-quality data on the scale and nature of participation in recreational boating and indicate a stable trend. However, impacts from boating on specific habitats and geographical areas are more elusive.

Surveys provide an opportunity to measure environmental awareness and stewardship behaviours, as undertaken in a recent survey of fishers, though not included in the most recent Boating Behaviour Study.

65: Recreational fishing

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	Academic research FRDC VFA
Measure(s)	Number of recreational fishers Environmental impacts of recreational fishing Preferred species Fish restocking programs (quantity) Hours spent undertaking recreational fishing Participation in stewardship activities

Why this indicator?

Recreational fishing provides a popular activity for people, contributing to their well-being. Increases in recreational fishing activity may lead to increased pressures on fisheries and the broader ecosystem. Management strategies and education are required to prevent such impacts.

Why this assessment in 2024?

The status assessment of fair reflects that different data sources provide different estimates of fishing participation — though these do indicate an increase in participation — and no data are available to connect our understanding of the overall impact on fish stocks and ecological well-being.

Increasingly, there are programs which aim to foster responsible fisher behaviour that enhances environmental outcomes. These include legislative, regulatory and compliance measures through to education and citizen science programs that involve anglers in environmental research.

The increase in participation and initiatives to promote and understand stewardship behaviours are reflected in the improving trend assessment.

While some data are available on recreational fishing, gaps in our understanding of the scale and impact remain. This is partly due to the dispersed nature of the activity and a reliance on survey-based data. This is reflected in the moderate confidence assessment, though a recent spatial analysis of creel survey data provides some insights into fisher behaviour.

66: Shipping and ports

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	AMSA BITRE DAFF DEECA Gippsland Ports Port of Melbourne Ports Victoria
Measure(s)	Volume of shipping Value of shipping Number of spills and pollution events Introduction of pest species through ballast and biofouling Channel dredging

Why this indicator?

Shipping is an important economic indicator for global trade. It requires an effective regulatory framework to minimise negative environmental impacts such as pollution or the introduction of pest species into marine and coastal ecosystems.

Why this assessment in 2024?

The good status and stable trend assessments reflect the continued importance of shipping as part of Victoria's transport system and that the associated trade flows make a positive contribution to the Victorian economy. While introduction of pest species remains a significant threat that could undermine environmental quality, monitoring since 2021 has detected no new high risk exotic pest species. Additionally, there have been no major oil spills in Victorian waters this century.

The moderate confidence assessment reflects that although volume and value of shipping data are available, some of the risks associated with shipping, for example oil spills, represent low probability–high consequence events that make it difficult to use past data to determine the likelihood of future events.

67: Commercial fishing

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	ABARES ABS Academic research DEECA FRDC
Measure(s)	Value of commercial fishing production Quantity of commercial fishing production Employment in fishing-related industries Cetacean entanglements

Why this indicator?

Most commercial fishing is reliant on healthy marine and coastal environments. It also provides valuable economic activity and employment. This indicator provides measures to assess whether the industry is ecologically, socially and economically sustainable.

Why this assessment in 2024?

Commercial fishing continues to be an important part of the Victorian economy (domestic and export).

Commercial fishing relies on healthy marine and coastal environments. Regulatory and management regimes aim to balance resource demand and environmental health.

Quantity and value of the sector has been relatively stable over recent years, notwithstanding a longer-term decline in quantity.

The status assessment of fair reflects the comparatively small contribution of the sector (compared to other sectors, and other jurisdictions) and considers the impact on non-target marine life such as cetaceans and seals. While Victoria's fisheries management systems are more effective than in many other parts of the world, there are still some threats evident such as: overfishing, illegal and unreported fishing, introduction of pests, bycatch and entanglements.

The moderate confidence assessment reflects that although annual data are available for quantity and value of the sector, broader economic data contributions are available less frequently and use different methodologies, and information on cetacean and other entanglements is limited.

68: Aquaculture

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	FRDC
Measure(s)	Value of aquaculture production Quantity of aquaculture production

Why this indicator?

Aquaculture has the potential to provide sustainable economic development through the farming of marine species. This indicator will assess growth of the industry and highlight the degree to which potential hazards and risks are being addressed.

Why this assessment in 2024?

Aquaculture is an increasingly important source of seafood in Victoria, both for the domestic and export market.

Both the status assessment of good, and improving trend assessment, reflect aquaculture's growing portion of Victorian fisheries production, regulatory oversight and generally small environmental impact of species farmed in coastal waters.

Abalone and blue mussels are the main species farmed in Victorian coastal waters. Guidelines and protocols are in place for these and other aquaculture species along with regulation and licensing systems to help prevent the spread of invasive marine species in the aquaculture industry. Monitoring of aquaculture farms is also undertaken by the Environmental Protection Authority Victoria.

As some farms grow much larger, there may be an increasing risk in relation to biosecurity and pollution. Countering this, however, is the concurrent improvement in biosecurity technology and management regimes.

The moderate confidence assessment reflects that while annual production and value data are available, broader economic and social analyses are only available periodically.

69: Resources and energy generation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DCCEEW DEECA DTP Resources Victoria (DEECA)
Measure(s)	Offshore oil production in Victoria (including both Victorian and Commonwealth waters) Gas production in Victoria (including both Victorian and Commonwealth waters) Electricity generated from renewable marine sources (wave, tidal, offshore wind)

Why this indicator?

With a move towards a low carbon economy, marine and coastal areas are providing new opportunities for energy generation. This indicator tracks such development and addresses the degree to which environmental objectives are being achieved.

Why this assessment in 2024?

Annual data for oil and gas production are available, as are contributions to electricity generation from wind and renewables.

Development of wind and solar energy has been increasing in recent years and more projects are planned as Victoria makes the transition to low carbon sources of energy.

Oil and gas production still contribute to Victoria's energy sector and export markets.

Victoria does not currently have any operating offshore wind generation, but proposals are currently being considered.

Some sources of energy such as wave, tidal and geothermal energy have been the subject of trials and research projects but none of these have yet emerged as major contenders in Victoria's energy production market.

While hydrogen power is not yet contributing to Victoria's energy generation, a pilot project (HESC) has demonstrated production and transport of liquid hydrogen from the Latrobe Valley, through the Port of Hastings, to Japan.

While there is an improving trend in the transition to renewable energy sources, the status assessment of fair reflects that contributions from marine and coastal environments remain limited chiefly to land based wind farms.

70: Agriculture

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	AgVic Melbourne Water
Measure(s)	Agricultural runoff – contaminants reaching marine and coastal ecosystems (nutrients/toxins) Change in land use from agriculture to residential and urban land uses Loss of agricultural land

Why this indicator?

Agriculture represents a major land use which has the potential to be undertaken in a sustainable way where farmers can provide stewardship of the land, economic benefits, and food for the wider community while maintaining soils, vegetation and other environmental features. This indicator assesses the degree to which such sustainability outcomes are being achieved and environmental damage minimised or reversed.

Why this assessment in 2024?

There are environmental risks involved in agriculture, such as the impact of water runoff, which may have high nutrient loads from fertiliser and animal effluent, or toxins from fertilisers. Limiting contaminated runoff is the focus for several policy initiatives that focus on recycling high nutrient water and managing the application of chemicals.

Although research in the Western Port catchment has shown the largest proportion of fine sediment load in catchment runoff is from grazing and cropping, this reflects the fact that it comprises a high proportion of catchment land use. In contrast, urban uses that comprise a smaller land area have higher impacts on runoff.

Agricultural land use change can be measured using land use data. This is providing a basis for protection of high-quality agricultural land through land use planning in areas where agricultural land is under threat from urban and residential uses.

The findings above are reflected in the fair status assessment, and stable trend assessment. The moderate confidence reflects that while the land use data are detailed and recent, information about environmental contaminants reaching marine and coastal ecosystems is limited.

71: Built and public benefit infrastructure

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA VAGO VMaCC
Measure(s)	Number of assets in coastal areas Built assets at risk of climate change (sea level rise) impacts

Why this indicator?

This indicator reports on the number and type of various infrastructure assets along the coast. The condition of these assets is important to limit negative environmental impacts. Potential threats such as climate change are also relevant for future construction and management.

Why this assessment in 2024?

The status assessment of fair reflects that owing to the legacy of built assets currently sited along the coast, it is evident that climate change presents a clear threat to coastal and marine infrastructure through rising seas levels and more extreme weather events. Notwithstanding, Siting and Design Guidelines have been developed for coastal infrastructure that is likely to strengthen the resilience of any new construction.

The trend assessment of stable recognises that although assets have been reviewed to improve their condition, there is a clear threat to many of these assets due to climate change. Thus, levels of improvement are likely to be balanced by the loss or degradation of some coastal infrastructure in coming decades.

The moderate confidence rating reflects that, while catalogue data on coastal protection infrastructure are available, condition data are older and more limited.

72: Recreational boating infrastructure

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	BBV Data Victoria DEECA VEAC
Measure(s)	Boating infrastructure upgrades Boating infrastructure with proximity to marine and coastal assets, Climate change impacts on boating infrastructure

Why this indicator?

Boating infrastructure is being reviewed across the state and identified for upgrade. Fish cleaning tables are a contentious issue as fish scraps effect the habitat balance in the immediate area (e.g. problem seals, pelicans) whilst boat cleaning facilities often facilitate run-off of oils and fuels into local water. The location of boat ramps around the bay and proximity to protected areas (e.g. Ramsar sites) will give an indication of current and future human interaction with sensitive areas.

Why this assessment in 2024?

The status assessment of fair recognises that coastal boating infrastructure remains at risk from sea level rise. Notwithstanding, the long-term funding and planning arrangements are well-placed to achieve improvements, as reflected in the trend assessment.

Good data are available on boating infrastructure location and upgrades.

The Better Boating Fund is a funding mechanism to enable upgrading of boating facilities along the Victorian coast. Over time, the effectiveness of this program will be able to be tracked.

In some cases, the location of boat ramps is in proximity to significant protected areas (e.g. Ramsar sites or national parks) and this requires close monitoring of management and potential impacts.

Coastal boating infrastructure remains under threat from climate change due to sea level rise and increasing frequency of severe weather events. This is considered in new proposals dealing with boating infrastructure.

73: Illegal activities

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	EPA Victoria OCR Safe Transport Victoria VFA
Measure(s)	Number of boating infringements Number of fishing infringements Number of environmental infringements

Why this indicator?

This indicator highlights levels of compliance with environmental protection regulations. Illegal activities related to fishing, boating, litter and pollution and environmental damage are examined.

Why this assessment in 2024?

Illegal activities affecting marine and coastal environments fall within the responsibility of many different agencies depending on whether they relate to fishing, boating, or environmental damage. It is therefore difficult to gain an overall picture of compliance or environmental impact even where data are available.

While high quality data are available for some illegal activities, other compliance data are affected by when and where compliance activities are undertaken. Hence, they may provide an incomplete picture of the character and prevalence of illegal activities. Where time-series data are available the trend is stable over recent years, although it is difficult to know whether this is simply a reflection of resources and effort applied. Notwithstanding, one may infer that such resource allocation is made in response to relevant trends.

The status assessment of fair reflects the ongoing occurrence of environmental infringements and likelihood that many may occur from a lack of understanding.

An important factor in achieving compliance is the role of engagement and education. Parks Victoria found that rules affecting Marine National Parks and Sanctuaries are not always understood by visitors. This finding suggests the need for further communication and engagement with users to explain, not only the existence of these rules, but the purpose behind them.

Stewardship and collaborative management

74: Stewardship						
Extent of information	**2024 status**	**2024 trend**	**2024 confidence**	**2021 status**	**2021 trend**	**2021 data quality**
PPB						
Data source(s)	DEECA					
Measure(s)	Marine and Coastal Stewardship Index (MCSI)					

Why this indicator?

This indicator will recognise the fundamentally important role of communities in promoting sustainable practices through stewardship of marine and coastal areas.

Why this assessment in 2024?

Data have been collected using the MCSI and are available for 2017 to 2022. This is beginning to provide stewardship information and appears to indicate an improvement towards more holistic distribution of activity types, as reflected in the trend assessment. The status assessment of fair also reflects this greater general balance but notably also very few comprehensive activities have been reported across all years.

The moderate confidence rating reflects that, although the implementation of the index provides high quality data, this is in its infancy and data for only a few time periods are available.



Bushwalking Victoria volunteers.
© Parks Victoria

75: Community connection to the coast

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA Ipsos/VMaCC VFA VNPA
Measure(s)	Values held in relation to marine and coastal environment Reasons for involvement in coastal activities (e.g. fishing)

Why this indicator?

There is a growing recognition of the importance of people being connected to nature. This indicator considers how people are connected to the marine and coastal environments and how that connection informs their sense of identity and sense of belonging. Community attitudes and behaviours shape how coastal and marine environments are managed.

Why this assessment in 2024?

The status assessment of good reflects the clear evidence provided by surveys that many Victorians value marine and coastal areas. This suggests a strong sense of connection with such environments. This trend is stable in that Australia has long had coastal environments as part of its cultural heritage, especially for many Traditional Owners. One challenge this raises is how to maintain important cultural aspects of the ocean or beach experience while protecting coastal and marine environments from being 'loved to death'.

Surveys such as the Ipsos 'marine and coastal community attitudes and behaviour report' have been periodically repeated and can provide insights into certain attitude and behaviour change over time. However, the moderate confidence rating acknowledges that the surveys relied upon in this assessment mostly predate the COVID-19 pandemic. This is not to suggest that recurring polls such as Ipsos ought to be undertaken more frequently, only that the intervening pandemic may have resulted in attitude and behavioural shifts that are yet to be captured.

76: Volunteering

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA
Measure(s)	Participation

Why this indicator?

Volunteers have various motivations and levels of capacity to protect, care for and responsibly use the marine and coastal environment. This indicator will highlight the importance of their work in achieving the vision of a healthy, dynamic and biodiverse marine and coastal environment.

Why this assessment in 2024?

Annual data on environmental volunteering have been maintained and published by DEECA since 2018–19.

Although overall volunteering rates have generally declined in recent decades and were further affected by COVID-19 pandemic restrictions, environmental volunteering in Victoria has increased in recent years. Participation in coastal areas has fluctuated and hours contributed have increased. These factors are reflected in the good status assessment and stable trend assessment. Many committed groups contribute to protecting, conserving and improving marine and coastal environments.

However, it is to be noted that maintaining and attracting volunteers is challenging in the modern era due to competing demands on peoples' time, and changing lifestyles and expectations.



Young person voluntarily collects waste on local beach. Credit: AscentXmedia

77: Citizen science

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA
Measure(s)	Citizen science participation Citizen science coastal programs

Why this indicator?

Citizen science involves community participation and collaboration in scientific research with the aim of increasing scientific knowledge. This indicator will examine the many types of citizen science activities that contribute to knowledge and management of marine and coastal environments.

Why this assessment in 2024?

Citizen scientists were involved in marine and coastal programs even during the COVID-19 pandemic lockdown when virtual projects enabled seal counts (via drone images called 'SealSpotter') and other activities to continue. The status assessment of good reflects that environmental volunteering has increased since the COVID-19 pandemic, and citizen science participation as a proportion of this has also increased, as has participation in coastal citizen science. While this indicates an improving trend, the trend assessment of stable also reflects the lower participation in 2024 (notwithstanding this being attributed to a change in reporting). A range of citizen science programs continue to provide many opportunities for participation in coastal citizen science.

Annual data on environmental volunteering, including citizen science have been maintained and published by DEECA since 2018-19. While this identifies participation, it does not provide an indication of how reliable or useful the collected data are, and this is reflected in the moderate confidence rating.



Junior Rangers activity, Point Cook Marine Sanctuary
© Parks Victoria

78: Planning and implementation

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N	N	N	N	N

Data source(s)	DEECA
Measure(s)	Progress in implementation of the Marine and Coastal Strategy Effectiveness of marine and coastal plans and policies

Why this indicator?

This indicator provides an outline of key progress in implementation of the Marine and Coastal Strategy.

Why this assessment in 2024?

Policy frameworks affecting marine and coastal planning may operate at international, national or state levels, and involve many different entities. This makes a single assessment of planning and implementation unrealistic and thus a narrative approach is taken.

In the past, Victoria's marine and coastal planning and policy arrangements were criticised for being overly complex and multi-layered, thereby limiting policy coherence.

The introduction of the *Marine and Coastal Act 2018* and the subsequent Marine and Coastal Policy 2020 have helped to streamline and clarify aspects of coastal policy. The identification and documentation of various legislation and policies relevant to Victoria's marine and coastal environments have provided a level of coherence.

The introduction of Victoria's first Marine Spatial Planning Framework is intended to provide overarching guidance and a process for achieving integrated and coordinated planning and management of the marine environment.

Ongoing monitoring and assessment will be important for understanding and improving on the effectiveness of recent initiatives for a process of continuous improvement and sustained clarity and coherence to be achieved.

79: Committees and councils

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N	N	N	N	N

Data source(s)	DEECA VAGO VEAC
Measure(s)	Area managed by coastal Committees of Management (CoMs) Effectiveness of coastal CoMs

Why this indicator?

Committees and councils enable constructive debate and collective decision making concerning the management and protection of coastal and marine environments. This indicator will highlight the role and responsibilities of such groups.

Why this assessment in 2024?

Marine and coastal planning and policy arrangements involve Committees and councils. In the past, the variety of different entities has attracted criticism, including from Victoria's Auditor General for being overly complex and lacking coherence for their purpose and governance arrangements.

The introduction of the *Marine and Coastal Act 2018* and the subsequent Marine and Coastal Policy 2020 have helped to streamline and clarify some aspects of coastal governance while inventories and assessments by the Victorian Environmental Assessment Council (VEAC) have also contributed to clarification about the number and nature of public land governing bodies and land managers.

It is too early to fully assess the effectiveness and success of these changes in achieving their intended environmental outcomes. For this reason, this section provides a narrative approach to explore the nature and purpose of relevant marine and coastal management agencies.

Ongoing monitoring and assessment will be important to maintain a coherent and workable system of governance that can support greater coordination and alignment of effort for marine and coastal environments. It is the aim of the Marine Spatial Planning Framework to promote this alignment.

80: Institutional knowledge and capacity

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	Academic research DEECA
Measure(s)	Effectiveness of knowledge management frameworks Number of users of CoastKit and the Feature Activity Sensitivity Tool (FeAST)

Why this indicator?

To be effective, management arrangements need to align responsibility with institutional capacity and expertise. Institutions also need to be appropriately resourced to fulfil their obligations. This indicator will explore the ways in which knowledge and capacity affect the outcomes for marine and coastal management.

Why this assessment in 2024?

Knowledge and capacity are recognised as being critical for effective environmental policy.

Following findings from the State of the Bays 2016 Report and State of the Environment 2018 Report, Victoria has put a Marine and Coastal Knowledge Framework in place to support the knowledge needs of planning for Victoria's marine and coastal areas.

The development of data systems for marine and coastal management is welcome and reflected in the improving trend assessment. However, the degree to which these tools are being used to inform and improve decision making has not yet been assessed, as reflected in the status assessment. The lack of such data is further emphasised in the low confidence rating.

81: Engagement, inclusiveness, and environmental justice

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW	N	N	N	N	N	N

Data source(s)	DEECA Engage Victoria
Measure(s)	Engagement processes undertaken for marine and coastal policies Environmental justice

Why this indicator?

This indicator recognises that transparent engagement allows for sound policy and strategies to be developed. Broad engagement also ensures that the final deliverables are representative of the diverse stakeholder voices.

Why this assessment in 2024?

Engagement processes are increasingly documented as part of policy development. Evaluation of engagement processes is sometimes undertaken and can provide a sound basis for continuous improvement.

A single assessment of engagement and inclusiveness is unrealistic because engagement processes are undertaken by different agencies for many different policies affecting marine and coastal planning. This section therefore takes a narrative approach to explore engagement and inclusiveness more broadly.

Environmental justice is concerned with how the impacts of environmental degradation may disproportionately affect certain groups within society (such as the elderly or poor) and may also have varying spatial outcomes. The impacts of climate change along Victoria's coastline may be similar in terms of physical effects but coastal communities vary greatly in their capacities to respond.

82: Delivery and accountability

Extent of information	2024 status	2024 trend	2024 confidence	2021 status	2021 trend	2021 data quality
SW						

Data source(s)	DEECA VAGO
Measure(s)	Effectiveness of delivery

Why this indicator?

This indicator examines the delivery of marine and coastal policy and highlights the important role of both internal and external assessments of effectiveness to ensure organisational accountability for implementation.

Why this assessment in 2024?

Victoria has several systems to ensure accountability for government performance and spending, including the Auditor-General's ongoing role to review the effectiveness of government activity and spending on behalf of the Victorian community.

The existence of these systems of accountability have led to the assessment of good for this indicator, while the improving trend reflects that departments are seeking to develop monitoring and evaluation systems which include policy effectiveness as part of their reporting.

Delivery and implementation are critical aspects of any policy or program. While the fact of delivery is often reported through corporate annual reporting processes, the evaluation of policy effectiveness is more difficult to determine; this is reflected in the moderate confidence rating.



Volunteers from Wilsons Promontory National Parks of the Prom.
© Parks Victoria

Commissioner *for* Environmental Sustainability Victoria

Abbreviations

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
AgVic	Agriculture Victoria
ARI	Arthur Rylah Institute
AusLM	Australian Litter Measure
AVG	abalone viral ganglioneuritis
BBV	Better Boating Victoria
BITRE	Bureau of Infrastructure and Transport Research Economics
BoM	Bureau of Meteorology
BRUVS	baited remote underwater video station
CBD	United Nations Convention on Biological Diversity
CCMA	Corangamite Catchment Management Authority
CES Act	Commissioner for Environmental Sustainability Act 2003
CIN	Corner Inlet-Nooramunga
CMA	Catchment Management Authority
CMMP	Coastal Marine Management Plan
CPUE	catch per unit of effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
DAFF	Department of Agriculture, Fisheries and Forestry
DAL	Distinctive Areas and Landscapes
DCCEEW	Australian Department of Climate Change, Energy, the Environment and Water
DE	denitrification efficiency
DEECA	Victorian Department of Energy, Environment and Climate Action (formerly DELWP)
DJSIR	Victorian Department of Jobs, Skills, Industry and Regions
DTP	Victorian Department of Transport and Planning
EGCMA	East Gippsland Catchment Management Authority
EMP	Environmental Management Plan
EMV	Emergency Management Victoria
EP Act	Environment Protection Act 2017
EPA Victoria	Environment Protection Authority Victoria
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERS	Environment Reference Standard
ETP	Eastern Treatment Plant
EVC	Ecological Vegetation Class

EWI	Erosion Warning Index
FeAST	Feature Activity Sensitivity Tool
FFG Act	Flora and Fauna Guarantee Act 1988 (Vic)
FRDC	Fisheries Research and Development Corporation
FTE	full-time equivalent
GBF	Kunming Montreal Global Biodiversity Framework
GDB	Glenelg-Discovery Bay
GH	Gabo-Howe
GHCMA	Glenelg Hopkins Catchment Management Authority
GL	Gippsland Lakes
ha	hectares
IEC	Index of Estuary Condition
IMOS	Integrated Marine Observing System
IPA	Indigenous Peoples' Protected Area
IPCC AR6	Intergovernmental Panel on Climate Change Sixth Assessment Report
LAC	limits of acceptable change
m	metres
MCKF	Marine and Coastal Knowledge Framework
MCSI	Marine and Coastal Stewardship Index
MKF	Marine Knowledge Framework
MPA	marine protected area
MSP	marine spatial planning
N	narrative
N/A	not applicable
NOAA	United States National Oceanic and Atmospheric Administration
PFAS	per- and polyfluoroalkyl substances
PPB	Port Phillip Bay
PPH	Port Phillip Heads
PPWCMA	Port Phillip and Westernport Catchment Management Authority
PV	Parks Victoria
RAP	Registered Aboriginal Party
SAFS	Status of Australian Fish Stocks
SC	Shipwreck Coast
ScWo	Schanck-Woolamai
SDG	Sustainable Development Goal

SEMP ..... State Emergency Management Plan

SHP ..... Signs of Healthy Parks

SLO ..... Significant Landscape Overlay

SMCE ..... State of the Marine and Coastal Environment

SoE ..... State of the Environment

SOP ..... Sustainable Oceans Plan

SW ..... statewide

The Commissioner ..... The Commissioner for Environmental Sustainability

TNC ..... The Nature Conservancy

TOLMA ..... Traditional Owner Land Management Agreement

TOS ..... Traditional Owner Settlement Agreements

TOS Act ..... Traditional Owner Settlement Act 2010 (Vic)

UN ..... United Nations

UNESCO ..... United Nations Educational, Scientific and Cultural Organization

UVC ..... underwater visual census

VAGO ..... Victorian Auditor-General's Office

VEAC ..... Victorian Environmental Assessment Council

VFA ..... Victorian Fisheries Authority

Vic ..... Victoria

VMaCC ..... Victorian Marine and Coastal Council

VNPA ..... Victorian National Parks Association

VRC ..... Victoria's Resilient Coast

WGCMA ..... West Gippsland Catchment Management Authority

WP ..... Western Port

WPW ..... Wilsons Prom West

WQI ..... Water Quality Index

WQIP ..... Water Quality Improvement Plan

WTP ..... Western Treatment Plant

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For further information contact:

Commissioner for Environmental Sustainability
Level 36, 2 Lonsdale Street
Melbourne Victoria 3000

Email: info.ces@ces.vic.gov.au
www.ces.vic.gov.au

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Level 36, 2 Lonsdale Street
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info.ces@ces.vic.gov.au
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