RMCG

AUGUST 2023

Corangamite Outcomes Monitoring Framework

Monitoring needs, data sources and information gaps relevant to the implementation and delivery of the Regional Catchment Strategy

Updated Final Version 3.2 (with additional indicators)

Corangamite Catchment Management Authority

5/16 Gilbert Street, Torquay Victoria 3228
PO Box 620, Torquay Victoria 3228
rmcg.com.au — ABN 73 613 135 247 — RM Consulting Group Pty Ltd
Victoria — Tasmania — ACT — NSW

Table of Contents

Acknowledgements

ACKNOWLEDGEMENT OF COUNTRY

The Corangamite catchment region includes the traditional lands, coast and waterways of the Eastern Maar and Wadawurrung peoples.

The traditional land of the Eastern Maar Traditional Owners of the south-west of Victoria extends as far north as Ararat and encompasses the Warrnambool, Port Fairy and Great Ocean Road areas. Eastern Maar is the name adopted by the people who identify as Maar, Eastern Gunditjmara, Tjap Wurrung, Peek Whurrong, Kirrae Whurrung, Kuurn Kopan Noot and/or Yarro waetch (Tooram Tribe).

The country of the Wadawurrung Traditional Owners stretches from the Great Dividing Range of Ballarat to the coast from the Werribee River to Aireys Inlet, including Geelong, the Bellarine Peninsula and Surf Coast.

We acknowledge the Eastern Maar and Wadawurrung people as the Traditional Owners of the Country about which this report was written. We recognise their continuing connection to land, waters and culture and pay our respects to their Elders past and present.

Moreover, we express gratitude for the knowledge and insight that Traditional Owners and other Aboriginal and Torres Strait Islander people contribute to our shared work.

CONTRIBUTORS

The authors would also like to thank the staff from the Corangamite Catchment Management Authority and other stakeholders (as listed in Appendix 1) who also contributed to this report through their participation in a series of discussions on indicators, and data availability and suitability.

Executive Summary

This report provides the basis for using the Victorian Regional Catchment Strategy (RCS) Outcomes Framework to monitor and measure the delivery of outcomes of the Corangamite Regional Catchment Strategy 2021-2027.

The *Catchment and Land Protection Act 1994* requires Catchment Management Authorities to identify procedures for monitoring the implementation of their Regional Catchment Strategy (RCS). A state-wide Outcomes Framework has been developed, providing a consistent approach to monitoring and reporting on the delivery of RCSs across Victoria's 10 catchment management regions.

The Corangamite Catchment Management Authority (CMA) will adopt this framework as the basis for reporting annually on catchment condition, and on progress towards its Regional Catchment Strategy outcomes.

The Corangamite RCS 2021-2027 outlines 25 medium-term outcomes to be achieved by 2027, across the five themes of Water, Land, Biodiversity, Communities, and Coast and Marine. Each theme is also associated with an aspirational long-term outcome to be achieved by 2040. These regionally specific outcomes are to be monitored with regionally relevant direct measures and indirect indicators, in addition to standard reporting on progress towards the Victorian government's state-wide outcomes and condition indicators.

In this report we have:

- analysed the use of the state-wide reporting framework
- reviewed and analysed relevant data resources that relate to the Corangamite region
- categorised data and its relationship to informing the condition and trends for each of the RCS themes
- identified any data gaps.

In summary, we have found that:

1. Progress towards some of the RCS medium-term outcomes can be monitored using the Victorian government's regional indicators, but supplementary data collection is recommended to fully capture the extent to which the outcome has been delivered. Furthermore, for some regional indicators, data collection methods are yet to be established and developed.
2. Progress towards six of the Corangamite RCS's medium-term outcomes under the 'Water' theme, and one within the 'Community', theme cannot be monitored using the Victorian government regional indicators. Monitoring and reporting progress towards these outcomes requires alternative information sources or collection of additional data by the Corangamite CMA or partner organisations.
3. Meaningful, regionally relevant reporting requires qualitative and quantitative information from a range of data sources which, when assessed collectively can answer the following key evaluation questions:
    - What, if any, unanticipated positive or negative changes or other outcomes have been observed in the catchment during the 2021-2027 RCS period?
    - To what extent were the changes directly or indirectly produced by RCS implementation activities?
    - To what extent have the medium-term outcomes set out in the strategy been achieved?
    - To what extent has RCS implementation contributed towards the long-term outcomes set out in the strategy?

This report provides a summary of the available data and identifies gaps therein. Where there are gaps, opportunities for additional data collection are also recommended. Furthermore, this report recommends appropriate baselines, which are critical for measuring the impact of RCS implementation. The framework has been designed to streamline monitoring and reporting efforts while ensuring that meaningful progress is being documented with a strong evidence base. This will help to justify efforts and investments to improve the condition and trends of the catchment across the five themes.

In this report we have also identified number of opportunities to work with other CMAs in developing more consistent approaches to state-wide data collection and monitoring that will be directly relevant to measuring the medium and long-term outcomes of the Corangamite RCS. This includes the recent work by the Australian Government in developing a new program for standardising and strengthening Australia's monitoring of natural resource management programs[1].

Since completing the original report in 2022, we were requested by the Corangamite CMA to address a number of the identified data gaps across six of the RCS medium-term outcomes. This additional work, which reviews and recommends the data and methods required by the Corangamite CMA and/or its partners to address 10 of the identified RCS indicators (success criteria), has been captured as an attachment in Tables A-1 to 10 in Appendix 2.

Figure E-1: Skenes Creek catchment in the Otways

[1] DCCEEW (2022)

1 Introduction

1.1 PURPOSE AND STRUCTURE

The *Catchment and Land Protection Act 1994* requires CMAs to identify procedures for monitoring the implementation of their Regional Catchment Strategy (RCS). A state-wide Outcomes Framework has been developed, providing a consistent approach to monitoring and reporting on the implementation of RCSs across Victoria's 10 catchment management regions.

The state-wide framework identifies a set of standard indicators that align with Victorian and Australian Government policies, thereby improving the way RCSs reinforce, promote and support government policy and objectives and thus improvements in environmental outcomes.

The implementation of the Corangamite RCS 2021 - 2027 and the nine other Victorian RCSs will support the delivery of state and national outcomes for catchment management. The monitoring, evaluation, reporting and improvement (MERI) process for RCSs requires mid-term and final assessments, and this RCS Outcomes Framework has been developed to support that process.

The Corangamite CMA must ensure the availability of appropriate and suitable information sources to complete the required monitoring and reporting for both the RCS and for annual catchment condition reporting. Robust baselines, and data collected consistently and at regular intervals are required to determine the extent to which medium and long-term outcomes of the RCS have been achieved (e.g., to measure change in the condition of biophysical, social, economic and/or institutional assets).

The purpose of this document is to assist Corangamite CMA in understanding the degree of alignment of these RCS outcomes, annual catchment condition reporting of standard outputs, state-wide outcomes and condition indicators, as well as, the gaps in the available data.

In the sections that follow, relevant sources of spatial, temporal, and qualitative data relevant to both RCS outcomes reporting and catchment condition reporting for the Corangamite CMA region are identified. These data sets will be referred to for both mid-term (3-year) and final (6-year) RCS evaluation and for the CMA's annual catchment condition reporting. Potential data availability and quality issues are identified, and the extent to which state-wide and regional indicators capture each of the five Corangamite-specific medium-term outcomes is explained. Where data gaps are identified, recommendations are provided to address these requirements. This includes collaboration with regional delivery partners where relevant.

1.2 BACKGROUND

The Corangamite CMA is responsible for monitoring and reporting on the RCS. Under section 19B of the *Catchment and Land Protection Act 1994*, the Corangamite CMA is also required to annually report on the condition and management of land and water resources in its region.

The Victorian Government's Outcomes Framework provides a consistent way to design and measure outcomes. This approach helps to drive collaboration across government and identify shared aspirations and areas of work. Applying the Victorian Government's Outcomes Framework to develop an RCS Outcomes Framework enables all CMAs to demonstrate how regional outcomes align with state, national and international aspirations (Figure 1-1). The RCS Outcomes Framework (Figure 1-2) has been developed in conjunction with CMAs, the former Victorian Catchment Management Council and the Department of Energy, Environment and Climate Action (DEECA).

Figure 1-1: Policy context of the Regional Catchment Strategy.

In line with the Corangamite RCS, a set of state-wide outcomes and associated condition indicators have been combined with a further set of regionally specific indicators to form the Corangamite RCS outcomes and monitoring framework (this report) based on the following five RCS themes:

- Water
- Land
- Biodiversity
- Community
- Coast and Marine.

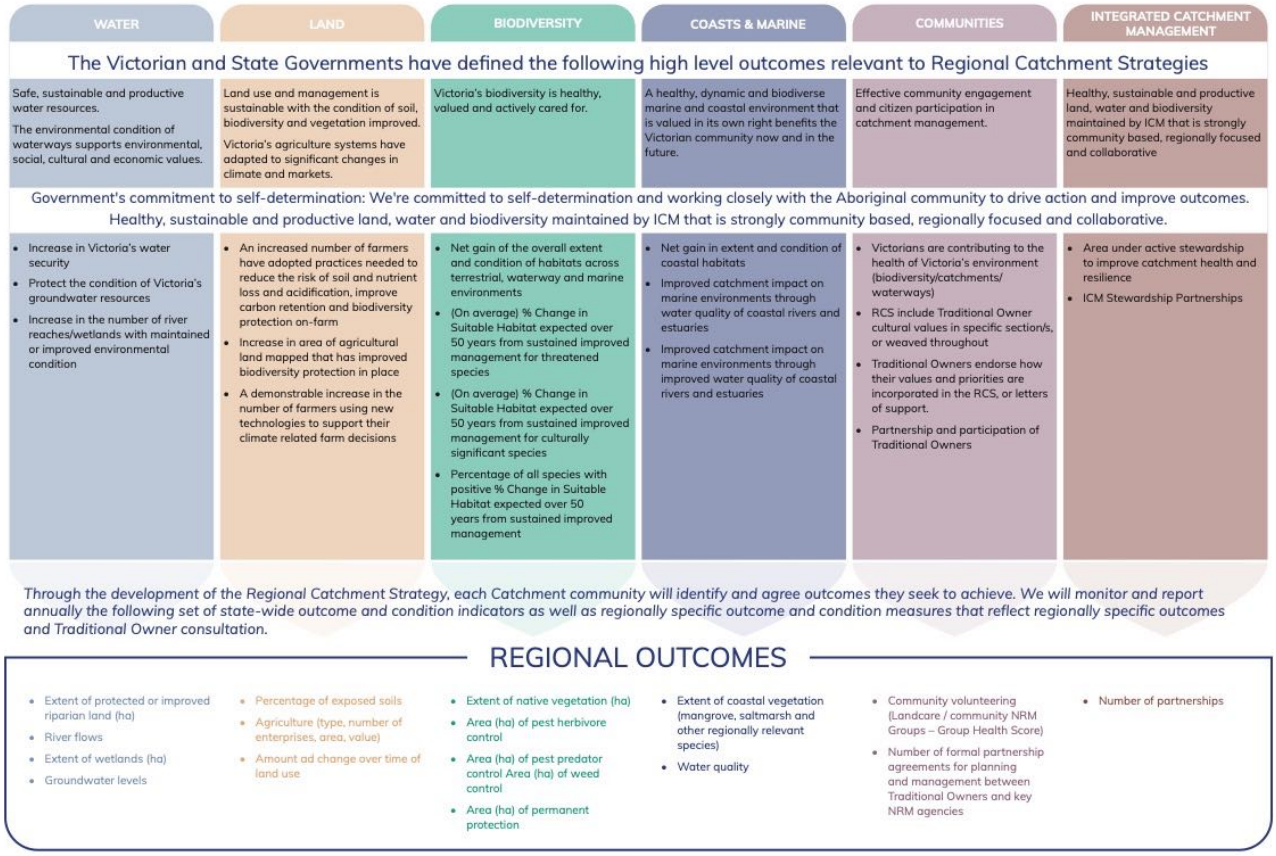


Figure 1-2: The Victorian government's high-level, state-wide outcomes and condition indicators by theme.[2]

The Corangamite RCS is a long-term, whole-of-region strategy for natural resource management, cutting across nine local areas or landscape systems (Figure 1-3) and contributing towards long-term outcomes to 2040. Monitoring change across these types of spatial and temporal scales can be challenging, and assessing the contribution of the RCS towards these outcomes is more difficult still. Victoria's RCS Outcomes Framework (Figure 1-2) establishes a good starting point to address this challenge by providing consistency and alignment with established datasets and monitoring protocols, but additional, more regionally specific data are also required to meaningfully capture condition and trends across the nine landscape systems of the catchment.

[2] https://www.water.vic.gov.au/waterways-and-catchments/our-catchments/regional-catchment-strategies/regional-catchment-strategies

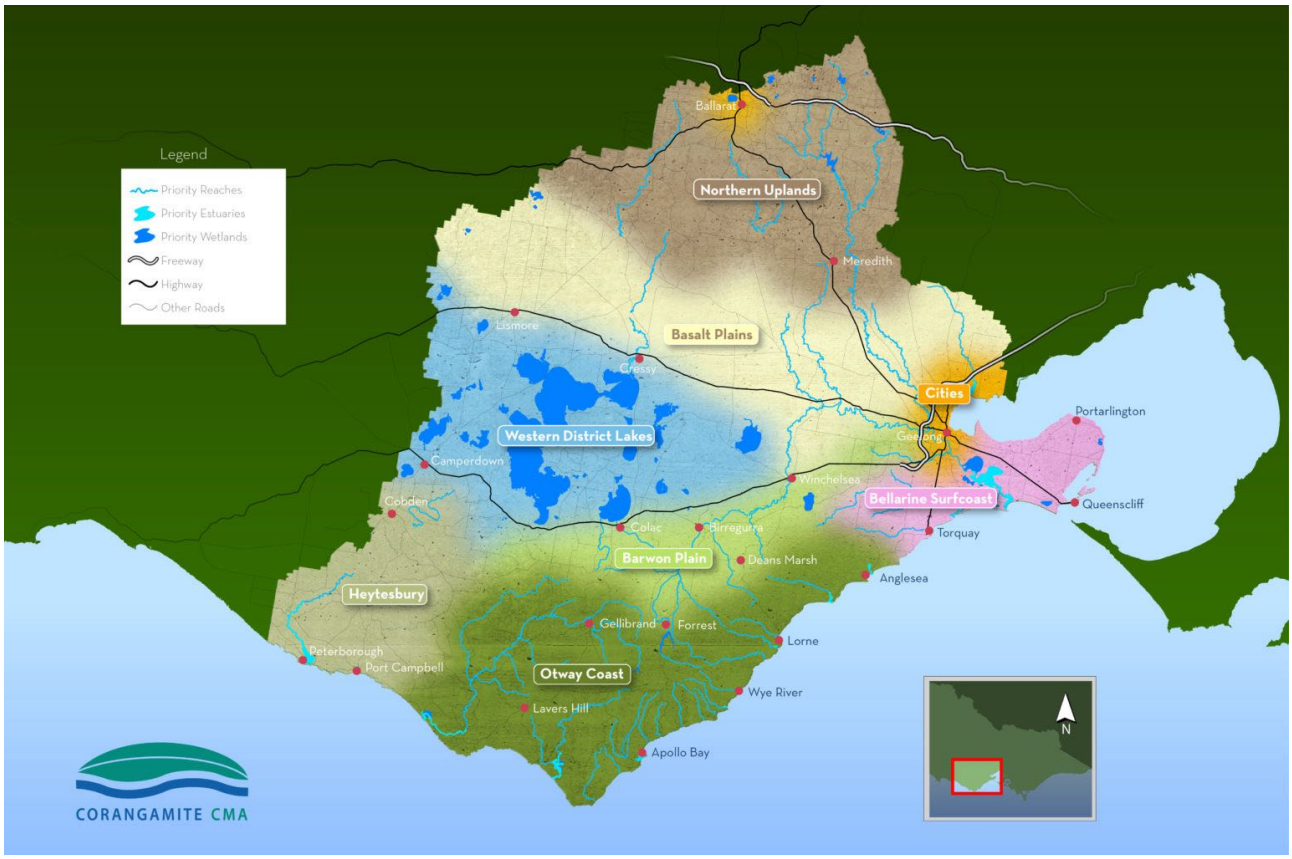


Figure 1-3: Map of the Corangamite region, showing nine RCS landscape systems.[3]

Figure 1-4: Anglesea River in the Bellarine – Surf Coast Local Area

[3] Image source: Corangamite Regional Catchment Strategy

2 Data availability and quality considerations

2.1 IDENTIFYING INFORMATION SOURCES

For each medium-term outcome of the RCS, it is important to determine:

1. Can the condition be captured by one or more of the Victorian government's standard regional indicators?
   - If so, are there existing data sources for these regional indicators(s) that can be used to measure changes over time and to identify trends? Are any components of the outcome not comprehensively captured by the standard Victorian regional indicators?
   - If not, are there locally relevant direct measures or indirect indicators of condition that have been collected by the CMA or delivery partners, for which existing data set(s) are accessible?
2. What is the quality (e.g. resolution, duration of collection/reporting, frequency of collection/reporting) of the available data, and what level of confidence can be assigned to the condition and trends determined by analysing these data?
   - If the available data is of sufficiently high quality, is it possible to determine the extent to which changes detected over time can be attributed to RCS implementation?
   - If the available data is of poor quality, or if there is no relevant data available, how could a baseline measure of condition be acquired? Does the CMA or a delivery partner have capacity to develop a methodology for monitoring?
3. Is there an established methodology for collecting, reporting on and analysing the available, good-quality data? Which of the following applies to the data available for this outcome?
   - Tier 1: an established methodology exists, and data is widely available
   - Tier 2: indicator is conceptually clear, established methodology is available, but data are not available
   - Tier 3: an established methodology is yet to be developed, but the measure or indicator is clearly defined
   - There is no established methodology, and there is no clearly defined measure or indicator.
4. Can a meaningful baseline – from which the impact of management activities/strategy implementation can be measured – be identified, or is baseline establishment an urgent priority?
5. If there are gaps in the available data, is additional data collection (either by the CMA or by delivery partners) viable and worthwhile?

2.2 SPATIAL INFORMATION

Spatial accuracy and resolution are important for reliable and robust outcome monitoring and reporting; at a minimum, any uncertainty associated with the underlying data sets must be clearly identified when reporting on condition and progress towards outcomes.

Uncertainty in spatial information – typically captured as point features, grids, lines, and polygons – can arise from geographic error (e.g., when delineating boundaries of a given area) or inadequate resolution to describe the phenomenon of interest. Variable levels of uncertainty should be clearly described in monitoring and reporting efforts, and the level of confidence in the condition and trend reported should be adjusted accordingly. Where boundaries are mapped differently or where resolution is not uniform across multiple data sets, there may be challenges in overlapping or combining different types of spatial data to provide a comprehensive assessment of condition or progress towards an intended outcome.

2.3 QUALITATIVE INFORMATION

Information collected through program participant surveys, feedback forms, and interviews can provide insights into the impact of RCS implementation on the catchment's communities and particular stakeholder groups, such as agricultural landowners; it is important that this data is collected both before and after the implementation activity and, if possible, collected repeatedly at regular intervals through the life of the RCS.

It is recommended that surveys be designed to be quick and simple for the participants, to avoid survey fatigue. Targeted interviews may be considered to replace surveys where appropriate.

Figure 2-1: The Barwon River in the Geelong Cities RCS Local Area

3 Information sources for monitoring progress towards RCS outcomes

This section primarily focuses on the information sources relevant to monitoring progress towards the medium-term outcomes identified in the Corangamite RCS 2021 - 2027. The key considerations that have informed the approach to this monitoring framework are:

1. The relatively high number of medium-term outcomes in the RCS (25 in total), combined with a recognition that resources for monitoring, data collation and processing are limited.
2. The range of different types of outcome statements. For some medium-term outcomes, assessment of achievement is simple and easily quantified (e.g. *By 2027, 4,500 hectares of new permanently protected area on private land is established*). By contrast, other medium-term outcomes require multiple lines of evidence or types of data from several sources (e.g., *By 2027, the increased capacity of Traditional Owner Groups enables their increased involvement in decision making that affects their Country).*
3. The use of the agreed state-wide outcome and condition indicators and associated RCS Indicators Guidance Notes[4].

Recommendations are made for all 25 RCS medium-term outcomes. This includes single recommendations for the simpler type of outcomes, for which success is easily measured. The outcomes for which measuring success is more complex are broken down into component indicators or success criteria, and therefore multiple recommendations are provided.

For the purposes of more detailed monitoring of medium-term outcomes, a combination of two indicator types is suitable:

1. Indirect catchment-wide measures/indicators where contributing activities are broad and widespread (e.g., change in extent of native vegetation).
2. Direct project-specific measures/indicators, where contributing activities are primarily focused within individual projects.

The status of long-term outcomes ('By 2040'…') should ideally be assessed during mid-term and end of RCS review processes, through a process facilitated by the CMA. This process should involve a discussion between all delivery partners to decide the appropriate status and trend for the outcome.

The Corangamite CMA has developed and intends to use the web-based Corangamite Natural Resource Management Portal (NRM Portal)[5] within its online Knowledge Base[6] as the basis for collecting data and reporting on works and activities (as regional outputs in line with the DEECA Standard Outputs) to be delivered under the Corangamite RCS. The NRM Portal is an innovative approach to collaborative, integrated catchment management by providing users (communities, landholders, and agencies) with a pathway to find information to make natural resource management decisions at a scale relevant to their needs.

Where relevant to spatial data capture of outcomes and outputs delivered under the RCS, we have also recommended where the NRM Portal should be used for data collection and reporting.

---

4 RCS Indicators Guidance Notes (NECMA, 2022)

5 https://www.ccmaknowledgebase.vic.gov.au/nrmpp/

6 https://www.ccmaknowledgebase.vic.gov.au

3.1 WATER

A catchment-scale approach to monitoring and reporting on progress towards the desired outcomes for regional waterways may be unrealistic, as each water body is a unique ecological system with its own water source(s), threats, pressures, and surrounding Ecological Vegetation Classes. The Corangamite RCS therefore focuses on priority waterways.

Long-term outcome: By 2042, regional waterways (rivers, wetlands, lakes, estuaries and groundwater) are more resilient to the impacts of climate and land use change.

Victorian standard 'regional indicators' of success:

- Increase in the number of rivers reaches/wetlands with maintained or improved environmental condition
- The environmental condition of waterways supports environmental, social, cultural and economic values.
- Increase in Victoria's water security
- Protection of the condition of Victoria's groundwater resources.

Table 3-1: Data sources for monitoring progress towards the medium-term outcomes within the Water theme

MEDIUM-TERM OUTCOME	SUCCESS CRITERIA ('BY 2027,')	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
There is an improvement in riparian extent and condition, hydrological regime and water quality compared to 2022 baselines in priority waterways defined in the Corangamite Waterway Strategy.	Change in length of riparian protection and extent (e.g. extent (length km) of riparian land along priority waterways) Improved condition of riparian zones in priority waterways	Extent of protected or improved riparian land (ha) (direct, Tier 3)	---	Victorian Water Program Investment Framework (VWPIF) standard output reporting to DEWLP Custodians: – DEECA – CMA	2021 baseline specified using existing VWPIF reports/ reported annually Includes outputs on fencing, weed control, revegetation, and pest control.	**Collate and report on data collected derived from standard output reporting** Establish baseline in 2021 based on existing VWPIF datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/) **Note:** Riparian condition and native vegetation extent monitoring for 'Water' is catchment-wide; the same data is used to monitor progress towards a 'Land' outcome but is refined to a subset (riparian areas on agricultural land only)
	Improvement in the hydrological regimes for selected waterways: 1. Barwon 2. Moorabool Changes to the availability and delivery of water to meet environmental objectives	River flows (Tier 1 indirect measure)		Annual river inflow estimates by Australian National University's Centre for Water and Landscape Dynamics (ANU-WALD)	Annually and at the end of the RCS	**Collate and report on data collected -** the relationship between river inflows/runoff and climate conditions, i.e. rainfall, can be explored in a descriptive manner**.** **Refer also additional information in Appendix 2 - Table A-1: Environmental flows** **Additional regional data to be used** – refer water for the environment reporting measures below
			Surveillance monitoring of flow data at selected sites based on the Corangamite CMA Flow Data map	Corangamite CMA Flow Data map (link)	Annually and at the end of the RCS	**Refer also additional information in Appendix 2 - Table A-1: Environmental flows**
			Increase in volume of environmental water entitlements	Victorian Water Register (link)/ VEWH/ DEECA CMA environmental flow data (link)	2022 baseline based on existing environmental entitlements At the end of the RCS – timing aligns with SWS Action 10.1 – five yearly assessment.	**Establish baseline and regional targets based on:** ▪ Increase in volume of environmental water entitlements in line with Central and Gippsland Sustainable Water Strategy (SWS) water recovery targets from 2022 levels (Policy 8.1, 8.2 and 8.3) **Refer also additional information in Appendix 2 - Table A-2: Environmental flows**
			Impact of watering actions delivered under annual Seasonal Watering Plans	VEWH Reflections document (link) Seasonal Watering Plan/ annual flow data/ VEWH Annual Seasonal Watering proposals / CCMA VEFMAP – Moorabool / DEECA ARI	Baseline TBD/ report on planned watering activities Annually and at end of the RCS At the end of the RCS	**Refer also additional information in Appendix 2 - Table A-3: Environmental flows** ▪ Delivery of high priority actions of the Victorian Seasonal Watering Plan relevant to Barwon and Moorabool catchments as reported on in VEWH Reflections ▪ Please note: the impact of watering actions delivered under annual Seasonal Watering Plans - data can be supplemented by state-wide monitoring where appropriate under Victorian Environmental Flows Monitoring and Assessment Program (VEFMAP).

MEDIUM-TERM OUTCOME	SUCCESS CRITERIA ('BY 2027,')	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
	Increase in wetland vegetation extent at priority wetlands	Extent of Wetlands (ha): *Change in the extent and spatial distribution of wetlands and associated vegetation on public and private land in Victoria.*	Extent of wetland vegetation works	DEECA Biodiversity Division - Land covers including: ▪ Wetland – perennial ▪ Wetland- seasonal ▪ Water (for reference).	2015–19 data/ five-yearly reporting	**Further refinement of method required:** Assess capacity for locally refined mapping of wetland extent based on existing VWPIF datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/) ▪ Note that the same land use/land cover data set is used to monitor progress towards 'Land' and 'Biodiversity' outcomes
	Improved water quality in priority waterways	Indicator exists but applies to marine waters outside CMA region.	Regionally specific water quality monitoring sites at agreed priority waterways: Surveillance and response-based monitoring (examples based around salinity, turbidity and dissolved oxygen as relevant)	DEECA Water Measurement Information System (WIMS) https://data.water.vic.gov.au CMA Waterwatch http://www.vic.waterwatch.org.au CMA Estuary Watch http://www.estuarywatch.org.au CMA Flow data map (link)	Annually and at end of the RCS	**Refer also additional information in Appendix 2 - Table A-4: Water quality** **Setup surveillance-based monitoring to monitor water quality trends at a sample of key sites along priority waterways :** Suggested sites include: ▪ Barwon River at Geelong, Moorabool River at Morrisons, Lower Barwon Wetlands, Anglesea River at Hordenvale, Gellibrand River at Princetown and the Anglesea River. **Establish response-based water quality (health or environmental) thresholds for key waterways that require a management response, examples could include:** ▪ Blue Green algae in the lower Barwon ▪ Acid events in Anglesea ▪ Low dissolved oxygen in the Aire River.
The efficiency of consumptive water use from our priority waterways will be improved though use of cost-effective alternative water sources and demand management strategies.	Cost-effective alternative water sources have been identified Demand management strategies have been articulated Demand management strategies have been implemented	Groundwater levels (Tier 3 direct measure)	---	Level monitoring by the State Observation Bore Network (SOBN); data housed by DEECA	2014	**Potential additional measures should this be pursued further (information held by Southern Rural Water):** ▪ WLs - Groundwater levels m (AHD) ▪ Groundwater quality (salinity); TDS ▪ No. Groundwater licences over a given year/ season ▪ No. of water trades ▪ Groundwater usage data.
			Progress against water corporation water strategies	▪ DEECA ▪ SRW ▪ Barwon Water ▪ Wannon Water ▪ Central Highlands Water	At the end of the RCS	**Refer also additional information in Appendix 2 - Table A-5: Reduction in consumptive demand** **Work with project delivery partners to define methodology for consumptive water:** Work with project delivery partners Barwon Water, Central Highland Water, Southern Rural Water and DEECA to investigate additional data for alternative water sources and demand management strategies (with reference to the Western Region Sustainable Water Strategy (DSE, 2011), Central and Gippsland Region Sustainable Water Strategy (DELWP, 2022) and the Long Term Water Resource Assessment of Southern Victoria (DELWP, 2020).
Waterway amenity will be improved for high priority urbanised waterways to enhance the user experience and connection to the natural landscape, compared to 2021 baseline.	Improved waterway amenity ratings for targeted waterways (current to desired): ▪ Yarrowee ▪ Lower Moorabool ▪ Lower Barwon	---	Waterway Amenity Mapping Pilot Project: Rubric for assessing Waterway Amenity	Yarrowee River through Ballarat	2021 baseline specified; once at the end of the current RCS	**Adopt established rubric for assessing waterway amenity for target waterway corridors:** ▪ Kitjarra- dja-bul Bullarto langi-ut (Barwon and Moorabool River corridors) ▪ Yarrowee River through Ballarat – Naturalness (vegetation, physical form, water quality/ flow – Use (recreation and facilities)
The condition of Ramsar listed wetlands and other priority wetlands identified in the Corangamite Waterway Strategy will be maintained and improved compared to 2021 baseline.	Ramsar remain within its Limit of Acceptable Change (LAC)	---	Ramsar Limits of Acceptable Change	DEECA, developing a Monitoring Evaluation Reporting and Improvement (MERI) framework for the management of Ramsar sites across Victoria	2016 LAC assessment baseline specified for Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar site. 2011 LAC assessment baseline specified baseline specified for Western District Lakes Ramsar site.	**Refer also additional information in Appendix 2 - Table A-6: Condition of Ramsar listed wetlands** **Adopt established method for assessing limits of acceptable change:** The Ecological Character Description (ECD) of Ramsar sites is determined based on the identification and description of critical components, processes and services (CPS). The mechanism against which change in ecological character is assessed is via comparison with Limits of Acceptable Change (LAC). Key recommendations: ▪ Work with DEECA on the development of an approach to monitoring the ecological character of Ramsar sites, through a specific monitoring, evaluation and reporting framework that aligns to existing site management plans and Limits of Acceptable Change. ▪ Support Ramsar Rolling Reviews, which are intended to take place every three years to assess the status of the ecological character of each Ramsar site by comparing the condition of the critical elements against the Limit of Acceptable Change.

MEDIUM-TERM OUTCOME	SUCCESS CRITERIA ('BY 2027,')	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
The water quality of priority estuaries is maintained or improved, compared to index of estuary condition 2019 baseline.	Index of estuary condition improved on 2019 baseline	---	Index of estuary condition (IEC)	IEC: DEECA CMA Estuary Watch http://www.estuarywatch.org.au/	2019 baseline specified.	**Further refinement of method required**: Confirm whether ongoing data collection for estuary condition is feasible. Although ideal as a snapshot of state-wide estuarine condition, the IEC is not intended for monitoring changes through time or attributing causes for change. Index of Estuary Condition: for each priority estuary, scores out of 10 for each sub-index (Physical Form, Hydrology, Water Quality, Flora, and Fish) were combined using an inverse weighted method to give a best possible IEC score of 50. **Explore the use of Estuary Watch data:** The EstuaryWatch citizen science groups provide water quality data for eleven estuaries within the Corangamite catchment region.
Wadawurrung and Eastern Maar Traditional Owner rights to access and manage water will be acknowledged and respected including a strong Traditional Owner voice on: ▪ **All water planning activities which have the potential to provide water for Traditional Owner cultural or economic purposes;** ▪ **The timing and quantum of all environmental water releases;** ▪ **Minimum environmental flows required for a healthy river;** ▪ **Land management activities contributing to a healthy river system;** ▪ **Knowledge and education on Traditional Owner values of water and connection to Country; and** ▪ **Development activities which may impact culturally significant water and riparian assets.**	Increased mapping of culturally sensitive areas (with maintenance of the privacy of spatial information) Increase in number of water strategies that incorporate Traditional Owner knowledge and priorities Traditional Owner voices feature in planning and on-ground delivery and are supporting Aboriginal self-determination	There is no established methodology	Number of water related strategies and plans that incorporate Traditional Owner knowledge and priorities Number of waterway projects focussed on Traditional Owner values	Corangamite CMA WTOAC and EMAC – Country Plans DEECA: Areas Cultural Heritage Sensitivity (ACHS): https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity	2022 baselines to be established; once at the end of the current RCS	**Further refinement of local method required and establishment of baselines in consultation with Eastern Maar and Wadawurrung Traditional Owner representatives:** Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) and Eastern Maar Aboriginal Corporation (EMAC). Additional potential measures could include: ▪ The no. of cultural values assessments undertaken ▪ Increase in language, stories or cultural practice adopted in Areas Cultural Heritage Sensitivity (ACHS) ▪ No. of Areas Cultural Heritage Sensitivity (ACHS) where Traditional Owners have an advisory or co-management role. It is recommended that the Kitjarra- dja-bul Bullarto langi-ut masterplan project for the Barwon and Moorabool River corridors is explored as a means to measure improvements for this outcome.
There is an increased understanding of floodplain management in relation to ecological and cultural values and mechanisms to mitigate the risk of flooding.	Increased understanding of floodplain/flood risk mitigation	---	The number of updated Municipal Flood Emergency Response Plans / planning schemes from flood studies Adoption of actions under the Corangamite Floodplain Management Strategy Number of workshops/webinars/ educational events offered to key stakeholders, and participation counts	Corangamite CMA	2021 baseline to be established from progress with Corangamite Floodplain Management Strategy (2016); collect again at end of RCS period	**Further refinement of method and baseline required.** This might include development of standardised survey questionnaire to capture data on knowledge/understanding of event participants in relation to floodplain management.
The community's understanding and awareness of the environmental, social and economic values of water will be increased compared to 2022 baseline.	Community increasingly values water	---	Number of workshops/webinars/ educational events offered to the community	Corangamite CMA: VWPIF reporting data and local surveys DEECA: My Victorian Waterways: Social research	2021 baseline to be established; collect again at end of RCS period	**Further refinement of method and baseline required.** This might include, in addition to the My Victorian Waterways survey data, the development of standardised survey questionnaire to capture data on awareness and understanding of event participants in relation to the social and economic values of water. Other suggestions include:

MEDIUM-TERM OUTCOME	SUCCESS CRITERIA ('BY 2027,')	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
				to understand the community's connection to Victorian waterways (2022)		VWPIF reporting data, such as: ▪ Partnership agreements with private landholders to undertake waterway health and resilience works e.g. via River Health Incentives program) ▪ WaterWatch participation and event data ▪ Landcare / community NRM groups (project data)
There will have been an increase in the extent of in-stream habitat compared to 2021 baseline in priority waterways for resilience of threatened native fish and waterway dependent species.	Reaches identified as severely depleted or highly depleted of in-stream woody habitat have a trajectory towards natural levels	---	Increased extent (m along waterway) of in-stream habitat	Corangamite CMA and OzFish (delivery partner)	2021 baseline specified; collect again at end of RCS period	**Note:** The Australian Government's 'Fisheries Habitat Restoration Program' is being implemented in the Barwon River and Curdies Estuary. It involves the installation of snags ("fish hotels") in the Barwon River and Curdies Estuary using native timber. Fish hotels will provide habitat for threatened Australian Grayling and other aquatic wildlife, including frogs, platypus, water rats, insects and birds. Post-installation species surveys (e.g., electrofishing and platypus surveys) detect a greater diversity of native fish and waterway dependent species than pre-installation survey.

3.2 LAND

Achievement of the two medium-term outcomes for this theme is complex. Information sources for each outcome are therefore presented in separate tables with recommended, measurable success criteria.

Agriculture Victoria (AgVic), Southern Farming Systems and Meat and Livestock Australia are key delivery partners for the outcomes within the Land theme.

Long-term outcome: By 2042, the region's land is managed within its capacity as climate change impacts increase.

Victorian standard 'regional indicators' of success:

- Victoria's agricultural systems have adapted to changes in climate and markets.
- Land use and management is sustainable with the condition of the soil, biodiversity and vegetation improved.
- Increase in area of agricultural land mapped that has improved biodiversity protection on-farm.
- An increased number of farmers have adopted practices needed to reduce the risk of soil and nutrient loss and acidification, improve carbon retention and biodiversity protection on-farm

Table 3-2: Data sources for monitoring progress towards the medium-term outcomes within the Land theme.

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
Land manager capacity in effective management practices is increased to address the range of threats and market changes.	**Land managers building knowledge and skills in sustainable management (general)**		▪ CCMA agricultural event participant counts (quantitative Tier 1 direct measure) and feedback forms measuring skills, knowledge and confidence (qualitative Tier 1 direct measure) ▪ Landholder participation in the 'Small Blocks, Big Dreams' program and in the four programs for large farms to improve soil biodiversity	**Agriculture Victoria**: pre- and post-event knowledge assessments and farmer self-assessments.	2021-2022 baseline; annual data collection	**Refine methodology.** Record Corangamite CMA event dates, participant counts, and feedback each time they are run on a central, shared spreadsheet. Consider developing a standardised participant survey questionnaire to capture data on change in awareness, knowledge, skills, adoption etc. **Liaise with delivery partners**, AgVic, to plan delivery of and collect data from biosecurity workshops, 'Best Wool Best Lambs' monthly group meetings, Farm Planning courses, etc.
	Land managers building knowledge and skills in land management for carbon farming		▪ Number of farms undertaking carbon audits of their businesses ▪ Number of farms in the region registered with the Australian National Registry of Emissions Units (indirect indicator)	Meat and livestock Australia: https://carbon-calculator.mla.com.au/ Australian Dairy Carbon Calculator: https://www.dairyaustralia.com.au/resource-repository/2023/01/30/australian-dairy-carbon-calculator-2023 Carbon calculators compared for Australian grain growers: https://graingrowers.com.au/news/carbon-calculator-report-launched	Establish early RCS baseline; report again in 2026-2027	**Refer also additional information in Appendix 2 - Table A-7: Land manager capacity** Assess levels of use of these tools among land managers in the region: ▪ Meat and livestock Australia: https://carbon-calculator.mla.com.au/ ▪ Australian Dairy Carbon Calculator: https://www.dairyaustralia.com.au/resource-repository/2023/01/30/australian-dairy-carbon-calculator-2023 ▪ Carbon calculators compared for Australian grain growers: https://graingrowers.com.au/news/carbon-calculator-report-launched

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
	Land managers building knowledge and skills to <u>manage for soil health</u>		▪ Soil health test results from 100 monitoring 1m cores		Soil tests since 2012; annual collection	**Collate and analyse data collected to date** **Establish baseline** to enable change to be tracked through time. **Refine methodology.** Consider developing standardised survey questionnaire for program participants to capture data on change in awareness, knowledge, skills, and adoption of new practices.
	Land managers undertaking formal <u>farm planning</u>		▪ Number of drought plans written by landowners with AgVic since 2021-2022 (direct measure) ▪ Number of 'My Property' action plans, skills & knowledge audits ▪ Number of dairy effluent plans and Fert-Smart plans through Sustainable Dairies project (direct measure) ▪ Number of farmers who have attended 'Whole Farm Science Based Consideration of the Soil' workshops ▪ Number of farmers receiving one-on-one support from any of these projects	**Agriculture Victoria** **Sustainable Dairies [Corangamite CMA Project]** Whole Farm Science Based Consideration of the Soil' [**Corangamite CMA** project delivered in partnership with **Southern Farming Systems** and **Meat & Livestock Australia** and funded through the Australian Government's National Landcare Program]	Early RCS baseline; report again in 2026-2027 2021-2022 baseline; annual collection	**Liaise with delivery partner** (Agriculture Victoria) **Establish baseline.** Establish baseline ASAP and record Sustainable Dairies's plans (date and landowner name) continuously on a central, shared spreadsheet
	Change in gross value of agricultural production per hectare over time	Agricultural commodities (Tier 1 indirect indicator)	---	**Australian Bureau of Statistics** Value of commodities data **ABARES** Catchment scale land use of Australia	2021-2022 baseline; commodities reported annually Land use data updated in 2020	**Monitor and report; refine to be regionally meaningful:** Calculate gross value per hectare by dividing the total Agricultural Commodities gross value reported the ABS by the area (ha) of agricultural land use per commodity reported by ABARES for the appropriate year range. Productivity varies year-to-year based on climate, weather events, price of inputs, etc. and is not a direct reflection of land manager capacity. This regional indicator should not be elevated for focus.
There is a 20% increase (compared to 2022 levels) in private agricultural landholders engaging in sustainable land management practices.	**Reduction in the percentage of exposed soils area (i.e., no groundcover) throughout a given year**	Percentage of exposed soils (Tier 1 direct measure) Amount and change of land use over time (Tier 1)	Area (ha) in rotations that include a cover crop	**CSIRO /Australian National University -** GEOGLAM RaPP Map https://map.geo-rapp.org/#australia **DEECA, Biodiversity Division** Land cover time series **ABARES** Catchment scale land use of Australia **CCMA** Cover Cropping and Sub-soil Improvement Project [delivered in partnership with Southern Farming Systems and funded through the Australian Government's National Landcare Program]	Baseline 2021-22 End of project and or end of RCS Land cover: 1987-1990, 1990-1995, 1995-2000, 2000-2005, 2005-2010, 2010-2015 and 2015-19 Land use data updated in 2020 Cover cropping: 2021-2022 baseline; annual collection	**Refer also additional information in Appendix 2 - <u>Table A-8</u>: Land manager engagement** Corangamite usually sits at about 98% groundcover, so a change in this indicator would be very small; therefore, additional Corangamite-specific data (e.g., integration of cover crops into rotation, etc.) are necessary to meaningfully monitor progress towards this outcome. Because of this, the proposed method is to identify monitoring sites based on land uses where there is a known risk of expose soil: **1. Annual cropping** – monitoring rationale is that if minimum or no till farming is being used, then groundcover post-harvest should be higher. Method: ▪ Identify a specific area to monitor and identify the time of year (e.g. January, post-harvest) when groundcover would be lowest. ▪ Use GEOGLAM RaPP Map mapping tool to compare groundcover in the key month(s) against the baseline **2. Dryland grazing** – monitoring rationale is that improved land (grazing) management will result in more groundcover at key times of year (e.g. late summer). Method: ▪ Identify a specific area to monitor and identify the time of year (e.g. February) when groundcover would be lowest. ▪ Use GEOGLAM RaPP Map mapping tool to compare groundcover in the key month(s) against the baseline

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
	Change in area of agricultural land with biodiversity protection(s) on-farm		▪ Riparian protection fencing on-farm (km) ▪ Revegetation on-farm (ha) and/or number of trees planted ▪ Weed control on-farm (ha) ▪ Permanent protection from DEECA section 64, Trust for Nature Covenant and section 173 local government (ha)	**DEECA** Standard Outputs **DEECA, Biodiversity Division** Land cover time series	Baseline 2021-22 End of project and or end of RCS	**Refer also additional information in Appendix 2 - Table A-9: Land manager engagement** Measurement of this outcome will be based on data from an area that was targeted for land management practice change. Therefore, achieving the outcome will be based on the % increase among the targeted landholders (not all landholders in the region). Select an agricultural production landscape that has been targeted under a project, for management changes that impact biodiversity within the agricultural landscape (e.g. protection or enhancement of native vegetation, protecting riparian areas and waterways). Survey the target group to identify the proportion who, as of 2021-22, had already engaged in a specific set of 'sustainable land management practices'. These practices would be the management changes that are the subject of the project that is operating in that landscape. E.g. if the project aims to protect paddock trees and remnant grassy woodlands, then the baseline is the proportion of the target landholder group that (as of 2021-22) had already taken these types of actions.
	Completion of pilot projects testing the viability of modernised on-farm water capture technologies and improved water use efficiency		▪ Recommended actions from pilots through the 'Protecting the Environment via On-farm Water Efficiency' Project	**Our Catchments Our Communities** – Victorian Government project delivered jointly by the Corangamite CMA, industry, government and community stakeholders	Once – on completion of the project	**Collate 1and analyse data collected to date**

3.3 BIODIVERSITY

Long-term outcome: By 2042, (1) 90% of the region's ecosystems are biodiverse and resilient to the challenges of climate and land use change; (2) a regional net improvement across all native species – with a priority on threatened species and ecological communities – is achieved (as measured by Change in Suitable Habitat); and (3) a regional net gain of the overall extent and condition of habitats across terrestrial, waterway and marine environments is achieved.

Victorian standard 'regional indicators' of success:

- Victoria's biodiversity is healthy, valued, and actively cared for
- Net gain of the overall extent and condition of habitats across terrestrial, waterway, and marine environments.
- (On average) % change in suitable habitat expected over 50 years from sustained improved management for threatened species and culturally significant species specifically, and for all species.

Table 3-3: Data sources for monitoring progress towards the medium-term outcomes within the Biodiversity theme.

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
There is a 10% increase in the regional community valuing biodiverse landscapes, planning for climate change adaptation and actively contributing to their protection, enhancement, and restoration.	Proportion of strategic plans (e.g. 'landscape system plans') that incorporated community engagement in their development and implementation.	---	▪ Relevant local strategies/ plans that incorporate community engagement (values, objectives, priorities) in their development and implementation	Corangamite CMA	Baseline to be established for 2021, data to be captured as strategies are developed	**Refine methodology:** engage with delivery partners to identify relevant strategies and establish a baseline and develop protocol for capturing information on community engagement in the planning process. *We note that this outcome has been interpreted as community participation in NRM planning and implementation.*
90% of biodiversity planning, decision making, monitoring and data access is based on state-wide biodiversity decision tools and complemented by local specific information.	Where appropriate, state-wide decision support tools and models (NatureKit, Strategic Management Prospects, and NaturePrint) are being utilised in biodiversity planning, decision making, monitoring and data access.	---	▪ Number (and proportion) of strategic plans, programs and projects that utilise state-wide biodiversity decision tools. ▪ SMP cost-effectiveness rating of locations with biodiversity investment	Corangamite CMA	90% benchmark needs to be defined - planning needs to refer to those guidelines	**Refine methodology**: explicitly capture data on the use of biodiversity decision-support tools in new plans, programs and projects. **Capture information on application/usefulness of particular decision support tools**: – record data on SMP characteristics of biodiversity investments
There is an overall net gain of habitat for all flora and fauna species within the region.	▪ Reduction in area (ha) of native vegetation cleared annually ▪ Increase in area (ha) of native vegetation restored ▪ Increase in the area (ha) of permanent protection	Extent of native vegetation	▪ Area (ha) of native vegetation cleared annually ▪ Area (ha) of native vegetation restored	DEECA, Biodiversity Division; Victorian Government Open Data http://services.land.vic.gov.au/SpatialDatamart/dataSearchViewMetadata.html?anzlicId=ANZVI0803005976&extractionProviderId=1 need regionally specific data	2015-19 baseline; data reported 5-yearly	**Report as per standard outputs; refine to be regionally meaningful** Need to avoid duplication of effort where the same data set is required for reporting on outcomes across different themes, such as for outcomes that involve riparian restoration. Only the data on the following land cover classes should be considered: ▪ Treed native vegetation ▪ Scattered native trees ▪ Native shrubland ▪ Native pasture/grassland ▪ Natural low cover ▪ Water (for reference)
		Area (ha) of permanent protection	---	Australian Government Department of Agriculture, Water and the Environment https://www.dcceew.gov.au/environment/land/nrs/science/capad	2020 baseline; reported every 2 years	**Monitor and report as usual:** Waterways, wetlands, coastal and marine systems are not classed under native vegetation output reporting to DEECA. A method to monitor and report habitat gain for these ecosystems could be a specific project (to develop in collaboration with DEECA).

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
Threats to biodiversity from pest species are recognised and appropriately controlled in priority locations across all land tenures.	Increase in recognition of threats pest species pose to biodiversity	---	Number of social media posts and education events informing residents of pest threats	Corangamite CMA		**Refine methodology:** Assess value of social media as potential data source; consider developing a protocol for gathering data on awareness-raising events (e.g. number of events focused on pest plants and animals, number of participants, participant feedback etc).
	Increase in area (ha) under sustained threat control programs at priority locations	Area (ha) of weed control	Area requiring on-ground treatment over time (measure of 'sustained effort')	Corangamite CMA stored by DEECA; AgVic and Parks Victoria	2021 baseline, reported annually	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
		Area (ha) of pest herbivore control	'Catch and effort' change over time (i.e. number of animals removed per hour of control effort) – measure of 'sustained effort'	Corangamite CMA stored by DEECA; AgVic and Parks Victoria	2021 baseline, reported annually	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
		Area (ha) of pest predator control	'Catch and effort' change over time (i.e. number of animals removed per hour of control effort) – measure of 'sustained effort'	Corangamite CMA stored by DEECA; AgVic and Parks Victoria	2021 baseline, reported annually	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
120,000 hectares in priority locations are under sustained herbivore control.	At least 120,000 ha under sustained herbivore control	Area (ha) of pest herbivore control	'Catch and effort' change over time (i.e. number of animals removed per hour of control effort) – measure of 'sustained effort'	Corangamite CMA stored by DEECA; AgVic and Parks Victoria	2021 baseline, reported annually	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
20,000 hectares in priority locations are under sustained predator control.	At least 20,000 ha under sustained cat and/or fox control	Area (ha) of predator control	'Catch and effort' change over time (i.e. number of animals removed per hour of control effort) – measure of 'sustained effort'.	Corangamite CMA stored by DEECA; AgVic and Parks Victoria	2021 baseline, reported annually	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
20,000 hectares in priority locations are under sustained weed control.	At least 20,000 ha under sustained weed control	Area (ha) of weed control	Area requiring on-ground treatment over time (measure of 'sustained effort')	Corangamite CMA stored by DEECA; AgVic and Parks Victoria	2021 baseline, reported annually	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
4,500 hectares of revegetation in priority locations for habitat connectivity is established	Habitat connectivity priority locations identified At least 4,500 ha of revegetation	Extent of native vegetation (ha)	Change in connectivity between native vegetation patches in priority locations (supporting movement of native birds)	DEECA, Biodiversity Division; Victorian Government Open Data http://services.land.vic.gov.au/SpatialDatamart/dataSearchViewMetadata.html?anzlicId=ANZVI0803005976&extractionProviderId=1	2015-19 baseline; data reported 5-yearly	**Report as per standard outputs; refine to be regionally meaningful:** Establish baseline in 2021 based on existing datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)
4,500 hectares of new permanently protected area on private land is established.	Increase in the area (ha) of permanent protection –may be formalised by DEECA through section 64, Trust for Nature Covenant and section 173 local government	Area (ha) of permanent protection	---	**Australian Government Department of Agriculture, Water and the Environment** Collaborative Australian Protected Areas Database https://www.dcceew.gov.au/environment/land/nrs/science/capad	2020 baseline; reported every 2 years	**Report as per standard outputs; refine to be regionally meaningful**: to specify priority revegetation areas for habitat connectivity.

3.4 COMMUNITIES

Long-term outcome: By 2042, communities are empowered to collaborate, connect and protect the region's natural assets.

Victorian standard 'regional indicators' of success:

- Effective community engagement and citizen participation in catchment management
- Victorians are contributing to the health of Victoria's environment (biodiversity /catchment /waterways)
- Partnership and participation of Traditional Owners
- Traditional Owners endorse how their values and priorities are incorporated in the RCS, or letters of support
- RCS include Traditional Owner cultural values in specific sections/s or weaved throughout

Table 3-4: Data sources for monitoring progress towards the medium-term outcomes within the Communities theme.

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
Communities have the knowledge, skills and capacity to actively participate in and contribute to management of the region in a range of ways.	Community NRM Groups are thriving and active within the region	Community volunteering (Landcare/community NRM groups - Group Health Score) – Tier 1 indirect indicator	---	Corangamite CMA stored by DEECA, Landcare	2021 baseline; reported annually	**Report as per standard outputs; refine to be regionally meaningful**: Assess additional data sources for non-volunteering capacity
Communities (local, new and visitor) are encouraged, educated and enabled to further connect with and responsibly care for the natural environment.	A range of community engagement activities are run with the aim of increasing connection with and responsibility for caring for the natural environment.	---	Number of community engagement activities aimed at increasing connection to nature (e.g. with active, on-ground component) Number of event participants	Corangamite CMA stored by DEECA, Landcare	Data collected for all community engagement events	**Refine methodology**: identify relevant community engagement activities (across all relevant delivery partners) and establish the level of data collection at present. Develop protocol to gather and collate standardised data across all partners (utilising DEECA Standard Outputs where possible).
Communities (local, new and visitor) have an increased awareness and understanding of the connection between human activities and impacts on the environment.	A range of educational community engagement activities are run with the aim of increasing awareness and understanding of the connection between human activities and impact on the environment	---	Number of educational community engagement activities Number of event participants	Corangamite CMA stored by DEECA, Landcare	Data collected for all educational community engagement events	**Refine methodology:** assess educational outreach programs run by delivery partners, e.g., for new residents and for visitors. Develop a standardised survey questionnaire for event participants, designed to capture data on change in awareness/understanding about human impacts on the environment.
			Feedback survey for event participants	Corangamite CMA stored by DEECA, Landcare	Desirable from all educational community engagement events	
The increased capacity of Traditional Owner Groups enables their increased involvement in decision making that affects their Country.	Traditional Owner Groups are actively involved in decision-making on Country.	There is no established methodology	Number of NRM related strategies and plans that incorporate Traditional Owner knowledge and priorities Number of NRM projects focussed on Traditional Owner values	Corangamite CMA WTOAC and EMAC – Country Plans DEECA: Areas Cultural Heritage Sensitivity (ACHS): https://discover.data.vic.gov.au/dataset/areas-of-cultural-heritage-sensitivity	2022 baselines to be established; once at the end of the current RCS	**Further refinement of local method required and establishment of baselines in consultation with Eastern Maar and Wadawurrung Traditional Owner representatives:** Wadawurrung Traditional Owners Aboriginal Corporation (WTOAC) and Eastern Maar Aboriginal Corporation (EMAC). Additional potential measures could include: ▪ The no. of cultural values assessments undertaken ▪ Increase in language, stories or cultural practice adopted in Areas Cultural Heritage Sensitivity (ACHS) ▪ No. of Areas Cultural Heritage Sensitivity (ACHS) where Traditional Owners have an advisory or co-management role.

3.5 COAST AND MARINE

Victoria's marine environment is defined in the *Marine and Coastal Act 2018*. It includes all private and public land and waters between the outer limit of Victorian coastal water and five kilometres 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 paragraph (a) above from time to time.
c) The biodiversity associated with the land and water referred to in paragraphs (a) and (b).

The definition includes bays, inlets and estuaries.

Spatial data sets relevant for delineating key boundaries include:

- Victorian coastline - DEECA - line file representing the coastline, as defined with -- 0-m elevation from Digital Elevation Model.
- Great Ocean Road Coast and Parks Authority (GORCAPA) boundaries - Great Ocean Road Coast and Parks Authority – Coastal land managed by GORCAPA.
- Victorian estuaries - DEECA/Deakin University - areas of estuarine waters derived and updated by Deakin University as part: "Linking catchments to the sea: Understanding how human activities impact on Victorian estuaries."

Long-term outcome: By 2042, an increase in the extent and condition of coastal habitats, together with improved water quality flowing into the marine environment, contributes to building a healthy, dynamic and biodiverse marine and coastal environment.
Victorian standard 'regional indicators' of success:
- •A healthy, dynamic and diverse marine and coastal environment that is valued in its own right benefits the Victorian community now and in the future.
- •Net gain in extent and condition of coastal habitats
- •Improved catchment impact on marine environments through improved water quality of coastal rivers and estuaries.

Table 3-5: Data sources for monitoring progress towards the medium-term outcome within the Coast and Marine theme

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	NOTES/ RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
Proactive management of coastal ecosystems by land managers and the community results in a net gain in the health and resilience of the region's highly valued marine and coastal environment.	Catchment management actions improve trend in coastal vegetation extent and condition	▪ Extent (ha) of coastal vegetation (mangrove, saltmarsh and other relevant communities) (Tier 1 indirect measure) ▪ Trend (direction of change) in coastal vegetation extent		**DEECA**, Biodiversity Division Victorian Land Cover Time Series Housed in Victorian Open data - https://discover.data.vic.gov.au/dataset/victorian-land-cover-time-series	2015-19 baseline; data reported 5-yearly	**Refer also additional information in Appendix 2 - Table A-10: Coastal management** Link in with existing biodiversity indicators (refer Section 3.3 and table 3.3 above), but highlight biodiversity outputs undertaken within a coastal environment as defined by the Marine and Coastal Act 2018. The biodiversity associated with the land and water referred to in paragraphs (a) and (b). **Collate and analyse data collected to date** The RCS regional indicator provides estimates of the overall rate of change in the extent and spatial distribution of coastal vegetation on public and private land in Victoria. This indicator can reflect land clearing or protection and revegetation efforts at regional and local scales. The following data sets should be considered where they intersect with coastal land (refer definition above): mangrove vegetation, saltmarsh vegetation The dataset does not provide an indication of the quality of native vegetation classes.
			Victorian Water Program Investment Framework (VWPIF) standard output reporting to DEWLP: ▪ Area (ha) of pest herbivore control ▪ Area (ha) of predator control ▪ Area (ha) of weed control ▪ Extent of native vegetation (ha)	CMA and DEECA existing VWPIF reports/ annual: ▪ Includes outputs on revegetation.	2021 baseline; reported annually:	**Collate and report on standard output data collected** Establish baseline in 2021 based on existing VWPIF datasets, and information collected in the NRM planning portal (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/) Use standard output for vegetation (2.1) within coastal areas (refer definition) where vegetation has been established (e.g. revegetation, buffers), modified (e.g. supplementary planting) or maintained (e.g. thinning, slashing or mulching).

MEDIUM-TERM OUTCOME ('BY 2027,')	SUCCESS CRITERIA	EVIDENCE		DATA CUSTODIAN /SOURCE	BASELINE / FREQUENCY OF COLLECTION	NOTES/ RECOMMEMENDATION(S)
		STATE-WIDE RCS INDICATORS	OTHER			
	Index of estuary condition improved on 2019 baseline	---	Index of estuary condition (IEC)	IEC: DEECA CMA Estuary Watch http://www.estuarywatch.org.au	2019 baseline specified.	**Refer also additional information in Appendix 2 - Table A-10: Coastal management** **Further refinement of method required**: Confirm whether ongoing data collection for estuary condition is feasible. Although ideal as a snapshot of state-wide estuarine condition, the IEC is not intended for monitoring changes through time or attributing causes for change. Index of Estuary Condition: for each priority estuary, scores out of 10 for each sub-index (Physical Form, Hydrology, Water Quality, Flora, and Fish) were combined using an inverse weighted method to give a best possible IEC score of 50. As an alternative, select at least two estuaries to undertake surveillance monitoring, based on the following example management objectives: ▪ Coastal salt marsh extent ▪ No. of estuary mouth openings ▪ Fish surveys ▪ Water quality. Examples could include the Gellibrand, Aire and Anglesea estuaries where the Corangamite CMA and its partners have a significant role in their management, including artificial estuary mouth openings. **Explore the use of Estuary Watch data:** The EstuaryWatch citizen science groups provide water quality data for eleven estuaries within the Corangamite catchment region. Select two estuaries to undertake surveillance monitoring, based on the following example management objectives: ▪ Coastal salt marsh extent ▪ No. of estuary mouth openings ▪ Fish surveys ▪ Water quality.

4 Knowledge gaps and recommendations

In this section, potential data/information gaps are identified. Filling these gaps will support more meaningful monitoring and reporting for both mid-term (3-year) and final (6-year) RCS evaluation and the CMA's Annual Catchment Condition Reporting.

4.1 ALIGNMENT BETWEEN REGIONAL INDICATORS AND RCS OUTCOMES

The following RCS medium-term outcomes are not captured by any of the standard Victorian regional indicators:

Water theme

1. By 2027, waterway amenity will be improved for high priority urbanised waterways to enhance the user experience and connection to the natural landscape, compared to 2021 baseline.
2. By 2027, the condition of Ramsar listed wetlands and other priority wetlands identified in the Corangamite Waterway Strategy will be maintained and improved compared to 2021 baseline.
3. By 2027, Wadawurrung and Eastern Maar Traditional Owner rights to access and manage water will be acknowledged and respected including a strong Traditional Owner voice on:
   - All water planning activities which have the potential to provide water for Traditional Owner cultural or economic purposes;
   - The timing and quantum of all environmental water releases;
   - Minimum environmental flows required for a healthy river;
   - Land management activities contributing to a healthy river system;
   - Knowledge and education on Traditional Owner values of water and connection to Country; and,
   - Development activities which may impact culturally significant water and riparian assets.
4. By 2027, there is an increased understanding of floodplain management in relation to ecological and cultural values and mechanisms to mitigate the risk of flooding.
5. By 2027, the community's understanding and awareness of the environmental, social and economic values of water will be increased compared to 2022 baseline.
6. By 2027 there will have been an increase in the extent of in-stream habitat compared to 2021 baseline in priority waterways for resilience of threatened native fish and waterway dependent species.

Biodiversity theme

7. By 2027, there is a 10% increase in the regional community valuing biodiverse landscapes, planning for climate change adaptation and actively contributing to their protection, enhancement, and restoration.
8. By 2027, 90% of biodiversity planning, decision making, monitoring and data access is based on state-wide biodiversity decision tools and complemented by local specific information.

Communities theme

9. By 2027, communities (local, new and visitor) have an increased awareness and understanding of the connection between human activities and impacts on the environment.

4.2 INFORMATION GAPS

The incorporation of Aboriginal cultural heritage and Traditional Owner values – and the representation of these values as geographic information – is considered a major information gap. When looking to fill these gaps, it is essential to partner with the Eastern Maar and Wadawurrung Traditional Owners to ensure an approach is based on the principles of self-determination, and that Indigenous data sovereignty is recognised and supported.

Any missing areas of high ecological value, especially when outside of designated parks, sanctuaries and reserves, should be identified by Corangamite CMA staff. This could include, for example, modelled spatial distributions of key species of conservation interest.

It is important to map and classify the potential for release of pollutants or contaminants into waterways from stormwater, pressures from tourism and coastal development, and the explicit measures taken to curb this potential.

Information on the spatial distribution and duration of harmful blue-green algal blooms is an important indicator of how activities in the catchment are impacting riverine, marine and coastal environments (such as at the Barwon River through Geelong).

4.3 DATA REFINEMENT

The collection of locally relevant data will improve the quality of monitoring and reporting. If spatial data can be attributed to the nine landscape systems of the catchment, condition assessments and trends can be compared across the systems to flag any that may be lagging.

The language used in the standard Victorian state-wide and regional indicators is broad as to be relevant across the State. However, reporting on these indicators may require local interpretation. For example, one state-wide indicator for biodiversity states: "*(On average) % change in suitable habitat expected over 50 years from sustained improved management for (a) threatened species, (b) culturally significant species, (c) all species."* Any area under native vegetation may be considered suitable habitat for "all species;" however, specification is needed as to which threatened species and culturally significant species habitats are being monitored. It is important to determine which Ecological Vegetation Classes (EVCs) within the Corangamite Catchment are considered suitable habitat for these taxa.

4.4 ADDITIONAL DATA COLLECTION

Where additional data collection is needed to monitor and report on progress towards the RCS Outcomes and for Annual catchment condition reporting, as flagged in the Recommendations column of Section 3, partner organisations may be engaged to help fill the gaps.

4.5 STATE-WIDE DATA COORDINATION

There are several data sets, where a coordinated and collective state-wide approach by CMAs to data acquisition is recommended. These include:

- Real-time high-quality satellite data on land use and vegetation cover change over time. This could be used to refine monitoring of:
  - wetland vegetation extent at priority wetlands
  - coastal vegetation extent
  - the reduction in area of native vegetation cleared annually
  - increase in area of regional native vegetation restored
  - increase in the area of permanent vegetation protection.

- Standardised water quality indicators (e.g. water quality index score) for priority catchments outside at locations in Port Phillip Bay, Western Port and the Gippsland Lakes. These should be linked to the Environment Reference Standard 2021 (ERS) under the Environment Protection Act 2017.

4.6 STANDARDISED NATIONAL ENVIRONMENTAL MONITORING DATA AND SYSTEMS

The Australian Government is progressing a program to improve environmental monitoring and evaluation of their national NRM investment programs, as well as promoting improved environmental monitoring and evaluation in Australia more broadly[7].

To implement the program, they have commenced a series of projects to help evaluate the NRM investment program under the National Landcare Program (NLP), and to build and adopt improved tools and data collection protocols to support future national NRM programs. These projects have the potential to provide valuable data and information for regional NRM organisations as they report on both project progress and achievements of strategies like the RCS. Four of the projects are briefly described here.

Key components of this program include:

1. **Standardising on ground monitoring**

   The Australian Government is working with Australia's Terrestrial Ecosystem Research Network (TERN) to co-design a set of national monitoring protocols (i.e. standardised ecological monitoring protocols and data exchange system) that will be used to support future NRM programs that benefit the environment, agriculture and communities.

2. **Centralised data input and management**

   - **Biodiversity Data Repository**

     In parallel to the National Monitoring Protocols, the Australian Government is also working with TERN to develop an Australian Biodiversity Information Standard to support better access and reuse of data from environmental projects. This new Biodiversity Data Repository will help share information between NRM proponents, regulators and the community based on the international agreed principles of FAIR (finable, accessible, interoperable and reusable).

   - **Threatened Species Index (TSX)**

     The Threatened Species Index (TSX) will provide reliable and robust measures of change in the relative abundance of Australia' s threatened and near threatened species at national, state and regional scales.

3. **Telling the Story**

   Given the large NRM investments by government, industry, organisations and the community, it is important to measure whether these interventions can deliver outcomes that are cost effective, resilient and sustainable within a changing climate.

[7] DCCEEW (2022).

- **MER Network Pilot**

  As the first initiative to tell this story, the Australian Government has established a MER Network Pilot (between policy makers, practioners and researchers) to target ecological management questions at a national scale.

- **Australian Ground Cover Map**

  The second component will the involve the use of an online Australian ground cover map to capture nationally consistent and updated ground cover information. This tool will provide live access to time series data on vegetation cover and the condition other environmental indicators. Currently this tool is used by the Australian Government as a national and regional indicator in sustainable agricultural outcomes related to maintaining and improving ground cover (refer the reduction in the percentage of exposed soils area throughout a given year) under the Land theme above in Section 3-2 and Table 3-2 of this report.

4. Engagement and Training

To support these standardised national monitoring, data collection and evaluation improvements, the Australian Government is also working with NRM regions to develop a best practice outreach program through use of a knowledge broker. It is also investing in a comprehensive online training package for NRM practioners and Australian Government staff.

These Australian Government monitoring initiatives will have direct relevance for the Corangamite CMA and in its partners, particularly in the delivery of nationally funded regional projects under NLP 2 and the Regional Land Partnerships (RLP) program.

It is recommended that the Corangamite CMA continues to work with other Victorian CMAs, other national regional NRM partners, and DEECA on transitioning to these new standardised monitoring and data systems. This will have particular relevance for measuring medium-term outcomes under the Biodiversity theme of the RCS (refer Section 3-3 and Table 3-3 above of the Outcomes reporting framework report).

References

DCCEEW (2022). Long-Term Monitoring Program – Standardising and strengthening Australia's Natural Resource Management, Commonwealth Department of Climate Change, Energy, the Environment and Water, Canberra, ACT.

DELWP (2022). DELWP Output Data Standard: Core Standard for Natural Resource Management Reporting. Department of Environment, Land, Water and Planning, East Melbourne, Victoria.

DELWP (2022). Regional Catchment Strategies Outcomes Framework. Department of Environment, Land, Water and Planning, East Melbourne, Victoria. (https://www.water.vic.gov.au/waterways-and-catchments/our-catchments/regional-catchment-strategies/regional-catchment-strategies)

CMA (2022). Corangamite Regional Catchment Strategy 2021 - 2027. Corangamite Catchment Management Authority, Colac, Victoria. (https://corangamite.rcs.vic.gov.au)

CMA (2022). NRM Natural Resource Management Portal. Corangamite Catchment Management Authority, Colac, Victoria. (https://www.ccmaknowledgebase.vic.gov.au/nrmpp/)

NECMA (2022). RCS Indicators Guidance Notes, North East Catchment Management Authority, Wodonga, Victoria.

Appendix 1 - Engagement

The following provides a list of the key CMA staff and stakeholders engaged through this project:

AGRICULTURE VICTORIA

- Ralph Cotter

ARTHUR RYLAY INSTITUTE

- Chris Jones

CORANGAMITE CATCHMENT MANAGEMENT AUTHORITY

- Amy Leith
- Chris Pitfield
- Chelsea Agg
- David Windle
- Karen O'Keefe
- Leigh Dennis
- Stephanie Rosestone
- Wayne McLaren.

DEPARTMENT OF ENERGY, ENVIRONMENT AND CLIMATE ACTION

- Paul Reich

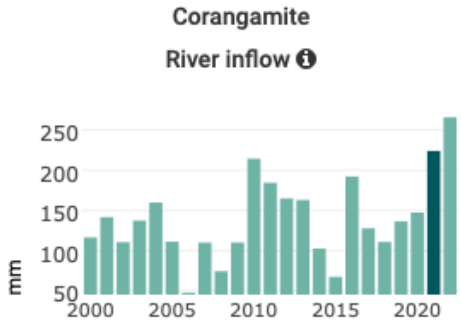
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

- Lachlan Thomas.

Appendix 2 – Additional indicators

The following provides a list of the additional indicators:

Table A-1: Environmental flows

WATER THEME		
Medium-term outcome *There is an improvement in riparian extent and condition, hydrological regime and water quality compared to 2022 baselines in priority waterways defined in the Corangamite Waterway Strategy.*		
Key success criteria *Improvement in the hydrological regimes for selected waterways: Barwon and Moorabool*		
Data	**Data Custodian /source**	**Baseline / frequency of collection**
Annual river inflow timeseries data. Can be exported in ASCII format by NRM region. https://www.wenfo.org/aex/ -/2021/Runoff/Region/Actual/NRM_Regions/bar,options/-38.12/169.93/3/Corangamite/Roadmap/Opaque	**Custodian:** Australian National University (ANU) – Centre for Water and Landscape Dynamics **Source:** Australia's Environment Explorer, Australian Government (www.wentfo.org)	Annually and at the end of the RCS
Surveillance monitoring of flow data at selected sites based on the Corangamite CMA Flow Data map	**Custodian:** Corangamite CMA **Source:** https://ccma.vic.gov.au/waterways/waterway-management/water-for-the-environment/environmental-flows/	Annually and at the end of the RCS
 **Figure A-1: River inflow time series data for Corangamite CMA[8]**		
Notes / recommendations: Please note: the first regional level data source provides aggregate data on stream flows for the Corangamite CMA region on an annual basis, which are subject to variables such as climate, topography and vegetation cover. While it can be used to provide broad climatic trend data on regional stream flows, it does not provide a basis for addressing the RCS medium-term outcome: "*improvement in riparian extent and condition, hydrological regime and water quality compared to 2022 baselines in priority waterways defined in the Corangamite Waterway Strategy*", nor the Success Criteria: "*Improvement in the hydrological regimes for selected waterways: Barwon and Moorabool*". It is recommended that the following data outlined in Tables A-2, A-3, and A-4 for flows and water quality be used instead.		

[8] https://www.wenfo.org/aex/ - /2021/Runoff/Region/Actual/NRM_Regions/bar,options/-38.12/169.93/3/Corangamite/Roadmap/Opaque

Table A-2: Environmental flows

WATER THEME		
Medium-term outcome *There is an improvement in riparian extent and condition, hydrological regime and water quality compared to 2022 baselines in priority waterways defined in the Corangamite Waterway Strategy.*		
Key success criteria *Changes to the **availability** and delivery of water to meet environmental objectives*		
Data	**Data Custodian /source**	**Frequency of collection**
Increase in volume of environmental water entitlements: 1. Progress in the implementation of the 2022 Central and Gippsland Sustainable Water Strategy (SWS) 2. Changes in entitlement volumes/ measures in the Victorian Water Register (for example): ▪ **WSE000129** - Moorabool River Environmental Entitlement ▪ **WSE020002** - Upper Barwon River Environmental Entitlement.	**Custodian:** DEECA **Source:** ▪ 2022 Central and Gippsland SWS - five yearly assessment (Action 10.1) ▪ Victorian Water Register https://www.waterregister.vic.gov.au/water-entitlements/bulk-entitlements	At the end of the RCS – timing aligns with SWS Action 10.1 – five yearly assessment.
Notes / recommendations: The five yearly assessment and any changes to the water register provide an indication of progress with the delivery of water recover y policy under the Central and Gippsland Sustainable Water Strategy by 2032: ▪ Policy 8.1: Return up to 6.5 gigalitres to the Moorabool River west branch to improve waterway health ▪ Policy 8.2: Return up to 700 megalitres to the Moorabool Yulluk (Moorabool River) east branch ▪ Policy 8.3: Return 5 gigalitres of water for the environment in the Barwon River to improve waterway health Please note: this indicator does not provide sufficient data on improvement in the hydrological regime to meet specific environmental objectives.		

Table A-3: Environmental flows

WATER THEME

Medium-term outcome

There is an improvement in riparian extent and condition, hydrological regime and water quality compared to 2022 baselines in priority waterways defined in the Corangamite Waterway Strategy.

Key success criteria

- *Deliver on ##% the environmental watering actions at planned sites based on annual Seasonal Water Plans*
- *Impact of watering actions delivered under annual Seasonal Watering Plans*

Data	Data Custodian	Source	Frequency of collection
Suggest the use of a traffic light report based on success of meeting annual Tier 1 and Tier 2 flow objectives being met (e.g.): ▪ Flow target met (Tier 1 or 2) ▪ Flow partially met ▪ Flow not delivered.	Victorian Environmental Water Holder (VEWH)	▪ Seasonal Watering Plan/ annual flow data/ ▪ Reflections	Annually and at end of the RCS
	Corangamite CMA	▪ Annual Seasonal Watering proposals	
Monitoring of Aquatic and River Bank Vegetation	DEECA/ ARI	▪ VEFMAP - Moorabool	At the end of the RCS

Example report from the Moorabool River Seasonal Watering Proposal 2022-23

Table 7. Hydrological flow compliance against flow FLOWS study recommendations for years 2002-3 to 2022-23 at Morrisons

Flow component	Hydrological achievement of flow components over time	2002 – 03	2003 – 04	2004 – 05	2005 – 06	2006 – 07	2007 – 08	2008 – 09	2009 – 10	2010 – 11	2011 – 12	2012 – 13	2013 – 14	2014 – 15	2015– 16	2016 – 17	2017 – 18	2018 – 19	2019 – 20	2020 – 21	2021 – 22	2022 – 23	Ecological outcomes/observations relating to the achievement of the flow recommendation/ Priority watering action (PWA) in 2022-23
Summer/Autumn	Low flow															E	E	EO	EO	EO U	EO	EO	Summer/autumn low flows have been or will be met through a combination of Corangamite CMA managed environmental water releases, passing flow and unregulated flow.
	Freshes															E	E	(E)	E	E	EO U	E	The three recommended freshes for a wet/average year are expected to be met by managed CMA environmental water releases. Corangamite CMA released a fresh in January 2023, with the other two planned for March and April 2023.
Spring/Winter	Low flow															U	U	OU	OU	EO U	EO U	EO U	Winter low flow for a wet/average year (10ML/d) met 100% of the time in 2022. Achieved through natural and passing flow, including a spill. Provision has been made to release winter low flow in June 2023 if not met naturally.
	Freshes															U	E	E	E U	EU	OU	OU	All three freshes and more achieved naturally. Multiple events from May to August at aspirational durations and volumes. Multiple events from September to November also at aspirational durations and volumes.
	High flow															U	X		U	U	U	U	High flow freshes recorded every month from August to November (largest peak was 14,370 ML/day in November 2022).

Figure A-2: Hydrological flow compliance against flow FLOWS study recommendations for years 2002-3 to 2021-22 at Morrisons[9]

Notes / recommendations:

Please note: the impact of watering actions delivered under annual Seasonal Watering Plans - data can be supplemented by state-wide monitoring where appropriate under Victorian Environmental Flows Monitoring and Assessment Program (VEFMAP).

https://www.ari.vic.gov.au/research/rivers-and-estuaries/assessing-benefits-of-water-for-the-environment

https://www.ari.vic.gov.au/__data/assets/pdf_file/0036/489654/VEFMAP-Stage-6-brochure-results-2016-2020.pdf

9 Moorabool River Seasonal Watering Proposal 2022-23 (Corangamite CMA, 2023)

Table A-4: Water quality

WATER THEME			
Medium-term outcome *There is an improvement in riparian extent and condition, hydrological regime and water quality compared to 2022 baselines in priority waterways defined in the Corangamite Waterway Strategy.*			
Key success criteria *Improved water quality in priority waterways*			
Data	**Data Custodian**	**Source**	**Baseline / frequency of collection**
Regionally specific water quality monitoring sites at agreed priority waterways: *Surveillance and response-based monitoring (examples based around salinity, turbidity and dissolved oxygen as relevant)*	DEECA	▪ Water Measurement Information System ▪ https://data.water.vic.gov.au	Annually and at end of the RCS
	Corangamite CMA	▪ Flow data map ▪ https://ccma.vic.gov.au/waterways/waterway-management/water-for-the-environment/environmental-flows/	
Notes / recommendations: 1. Setup surveillance-based monitoring to monitor water quality trends at a sample of key sites along priority waterways, examples could include: ▪ **Barwon River at Geelong (Site No. 233217):** water level, streamflow (ML/d), conductivity (salinity), dissolved oxygen (DO), turbidity and temperature ▪ **Barwon River U/S Lower Barrage of Geelong Wetlands (Site No. 233269):** water level, conductivity, DO and temperature ▪ **Reedy Lake at Connewarre (Site No. 233603):** water level, conductivity, DO and temperature ▪ **Hospital Swamps at Connewarre (Site No. 233604):** water level, conductivity, DO and temperature ▪ **Aire River at Hordenvale (Site No. 235283):** water level, conductivity, DO and temperature ▪ **Gellibrand at Princetown (Site No. 235269):** water level, conductivity, DO and temperature ▪ **Anglesea River at the Great Ocean Road Bridge (Site No. 235278):** pH (acidity/ alkalinity), water level, conductivity, DO and temperature ▪ **Moorabool at Morrisons (Site No. 232204):** water level, discharge (ML/d), conductivity, DO and temperature. 2. Establish response-based water quality (health or environmental) thresholds for key waterways that require a management response, examples could include: ▪ Blue Green algae in the lower Barwon ▪ Acid events in Anglesea ▪ Low dissolved oxygen in the Aire River.			

Table A-5: Reduction in consumptive demand

WATER THEME

Medium-term outcome

The efficiency of consumptive water use from our priority waterways will be improved though use of cost-effective alternative water sources and demand management strategies.

Key success criteria

- *Cost-effective alternative water sources have been identified*
- *Demand management strategies have been articulated*
- *Demand management strategies have been implemented*

Data	Data Custodian /source	Baseline / frequency of collection
Progress against water corporation water strategies	▪ DEECA ▪ SRW ▪ Barwon Water ▪ Wannon Water ▪ Central Highlands Water	At the end of the RCS

Notes / recommendations:

Under the Central and Gippsland Sustainable Water Strategy and urban water strategies, regional water corporations are tasked with delivering efficiency, compliance and substitution measures to deliver long term water security and the protection of environment.

Central and Gippsland SWS – progress on key actions for Chapter 3: Transitioning to manufactured water

"As our population grows and river water becomes scarcer, the Central and Gippsland Region will need to reduce its reliance on river water. While water efficiency measures and better use of existing supplies are important, these alone will not meet future demand. Instead, a transition to using more manufactured water (desalinated water, fit-for-purpose recycled water and treated stormwater) will be required to supply our cities and towns.

Barwon Water's Water for our Future's Strategy also aims to:

- *Put 1,000 million litres of recycled water to productive use*
- *Save 1,000 million litres of drinking water*
- *Return 3,700 million litres of water to rivers – to support environmental and cultural values.*

Better accounting and reporting – Central and Gippsland SWS

Tracking progress of recycled water and stormwater use is important for increasing the use of stormwater and recycled water in some localities, because it demonstrates the benefits that can be important for a region's prosperity, liveability and productivity. Importantly, using these new decentralised sources can free up drinking water and reduce extraction from already stressed rivers, helping to preserve these supplies for future generations and creating opportunities to return river water to Traditional Owners.

Progress against this medium-term outcome and success criteria should be focussed on working collaboratively with DEECA and the four regional water corporations (as regional deliver partners) to assess progress with water efficiency, compliance and substitution measures (use of manufactured water, i.e. desalinated water, fit-for-purpose recycled water and treated stormwater) in line with the Central and Gippsland SWS and respective urban or corporate strategies as follows:

- Urban Water Strategy 2022 (Central Highlands Water)
- Urban Water Strategy 2022: Water for our Future (Barwon Water)
- Urban Water Strategy 2022: (Wannon Water)
- Corporate Strategy 2022: (Southern Rural Water)
- Central and Gippsland Sustainable Water Strategy 2022 (DEECA).

Table A-6: Condition of Ramsar listed wetlands

WATER THEME

Medium-term outcome

The condition of Ramsar listed wetlands and other priority wetlands identified in the Corangamite Waterway Strategy will be maintained and improved compared to 2021 baseline.

Key success criteria

- *Limits of acceptable change*

Data	Data Custodian /source	Baseline / frequency of collection
Limits of Acceptable Change (LAC) data	▪ Refer Table 17 of the Site Management Plan for details the monitoring requirements for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.	At the end of the RCS

Notes / recommendations:

The mechanism against which change in ecological character is assessed is via comparison with Limits of Acceptable Change (LAC). LAC are defined by Phillips (2006) as:

"...the variation that is considered acceptable in a particular measure or feature of the ecological character of the wetland. This may include population measures, hectares covered by a particular wetland type, the range of certain water quality parameter, etc. The inference is that if the particular measure or parameter moves outside the 'limits of acceptable change' this may indicate a change in ecological character that could lead to a reduction or loss of the values for which the site was Ramsar listed. In most cases, change is considered in a negative context, leading to a reduction in the values for which a site was listed".

Limits of acceptable change have been assessed in 2016 for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan[10] under Table 4 on page 26, and include the following critical components:

- Hydrology
- Seagrass
- Saltmarsh
- Mangrove
- Freshwater vegetation
- Waterbird abundance
- Waterbird breeding
- Threatened species

Table 17 of the Site Management Plan, details the monitoring requirements for the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

Under Table 27 (page 88-89) of the Western District Lakes Ramsar Site Ecological Character Description[11], the following critical components have been identified for assessment of Limits of Acceptable Change.

- Hydrology
- Salinity
- Threatened flora
- Waterbirds.

Recommended measures:

- Work with DEECA on the development of an approach to monitoring the ecological character of Ramsar sites, through a specific monitoring, evaluation and reporting framework that aligns to existing site management plans and Limits of Acceptable Change.
- Support Ramsar Rolling Reviews, which are intended to take place every three years to assess the status of the ecological character of each Ramsar site by comparing the condition of the critical elements against the Limit of Acceptable Change.

[10] Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan, (DELWP, 2018)

[11] Western District Lakes Ramsar Site Ecological Character Description, (DSEWPC, 2011)

Table A-7: Land manager capacity

LAND THEME		
Medium-term outcome *Land manager capacity in effective management practices is increased to address the range of threats and market changes*		
Key success criteria *Land managers building knowledge and skills in land management for carbon farming*		
Data	**Data Custodian /source**	**Baseline / frequency of collection**
Farms using industry-based carbon calculators	▪ Agriculture R&D Corporations	Establish early RCS baseline; report again in 2026-2027
Notes / recommendations: Assess levels of use of these tools among land managers in the region: ▪ Meat and livestock Australia: https://carbon-calculator.mla.com.au/ ▪ **Australian Dairy Carbon Calculator:** https://www.dairyaustralia.com.au/resource-repository/2023/01/30/australian-dairy-carbon-calculator-2023 ▪ Carbon calculators compared for Australian grain growers: https://graingrowers.com.au/news/carbon-calculator-report-launched		

Table A-8: Land manager engagement

LAND THEME		
Medium-term outcome *There is a 20% increase (compared to 2021-22 levels) in private agricultural landholders engaging in sustainable land management practices*		
Key success criteria *Reduction in the percentage of exposed soils area (i.e., no groundcover) throughout a given year*		
Data	**Data Custodian /source**	**Baseline / frequency of collection**
GEOGLAM RaPP Map https://map.geo-rapp.org/#australia Frequency (in percentage values: 0-100) of Total Vegetation cover lower than or equal to 95% in the month of Jan in all years on record (2001-present)	▪ CSIRO	Baseline 2021-22 End of project and or end of RCS
Notes / recommendations: Identify monitoring sites based on land uses where there is a known risk of expose soil: 1. Annual cropping – monitoring rationale is that if minimum or no till farming is being used, then groundcover post-harvest should be higher. Method: ▪ Identify a specific area to monitor and identify the time of year (e.g. January, post-harvest) when groundcover would be lowest. ▪ Use GEOGLAM RaPP Map mapping tool to compare groundcover in the key month(s) against the baseline 2. Dryland grazing – monitoring rationale is that improved land (grazing) management will result in more groundcover at key times of year (e.g. late summer). Method: ▪ Identify a specific area to monitor and identify the time of year (e.g. February) when groundcover would be lowest. ▪ Use GEOGLAM RaPP Map mapping tool to compare groundcover in the key month(s) against the baseline.		

Table A-9: Land manager engagement

LAND THEME		
Medium-term outcome *There is a 20% increase (compared to 2022 levels) in private agricultural landholders engaging in sustainable land management practices*		
Key success criteria *Change in area of agricultural land with biodiversity protection(s) on-farm*		
Data	**Data Custodian /source**	**Baseline / frequency of collection**
Proportion of landholders who have completed sustainable land management actions (based on a specific list of actions)	▪ **DEECA** Standard Outputs ▪ CCMA	Baseline 2021-22 End of project and or end of RCS
Notes / recommendations: Measurement of this outcome will be based on data from an area that was targeted for land management practice change. Therefore, achieving the outcome will be based on the % increase among the targeted landholders (not all landholders in the region). Select an agricultural production landscape that has been targeted under a project, for management changes that impact biodiversity within the agricultural landscape (e.g. protection or enhancement of native vegetation, protecting riparian areas and waterways). Survey the target group to identify the proportion who, as of 2021-22, had already engaged in a specific set of 'sustainable land management practices'. These practices would be the management changes that are the subject of the project that is operating in that landscape. E.g. if the project aims to protect paddock trees and remnant grassy woodlands, then the baseline is the proportion of the target landholder group that (as of 2021-22) had already taken these types of actions.		

Table A-10: Coastal management

COAST AND MARINE THEME			
Medium-term outcome *Proactive management of coastal ecosystems by land managers and the community results in a net gain in the health and resilience of the region's highly valued marine and coastal environment*			
Key success criteria *Index of estuary condition improved on 2019 baseline*			
Data	**Data Custodian**	**Source**	**Baseline / frequency of collection**
Estuaries Surveillance data: ▪ Coastal salt marsh extent ▪ No. of estuary mouth openings ▪ Fish surveys ▪ Water quality.	▪ Corangamite CMA	Local monitoring – based on established baselines: ▪ Coastal salt marsh extent ▪ No. of estuary mouth openings ▪ Fish surveys ▪ Water quality.	Baseline 2021-22 End of project and or end of RCS
Estuary condition change	▪ DEECA	Index of Estuary Condition (IEC)	End of the RCS reporting period (if relevant)
Coastal biodiversity	▪ DEECA ▪ Corangamite CMA ▪ Agriculture Victoria ▪ Parks Victoria	▪ Area (ha) of pest herbivore control ▪ Area (ha) of predator control ▪ Area (ha) of weed control ▪ Extent of native vegetation (ha)	Annually and at the end of the RCS.
Notes / recommendations: **Estuaries** Select at least two estuaries to undertake surveillance monitoring, based on the following example management objectives: ▪ Coastal salt marsh extent ▪ No. of estuary mouth openings ▪ Fish surveys ▪ Water quality. Examples could include the Gellibrand, Aire and Anglesea estuaries where the Corangamite CMA and its partners have a significant role in their management, including artificial estuary mouth openings. **Coastal biodiversity management** Link in with existing biodiversity indicators (refer Section 3.3 and table 3.3 above), but highlight biodiversity outputs undertaken within a coastal environment as defined by the Marine and Coastal Act 2018: ▪ Includes all private and public land and waters between the outer limit of Victorian coastal water and five kilometres inland of the high-water mark of the sea, including: – The land (whether covered by water or not) to a depth of 200 metres below the surface of that land. – Any water covering the land referred to in paragraph (a) above from time to time. – The biodiversity associated with the land and water referred to in paragraphs (a) and (b).			

This report has been prepared by:

RM Consulting Group Pty Ltd trading as RMCG

5/16 Gilbert Street, Torquay Victoria 3228

PO Box 620, Torquay Victoria 3228

(03) 5261 6105 — rmcg.com.au — ABN 73 613 135 247

Offices in Victoria, Tasmania, ACT and NSW

Key RMCG contact

Trent Wallis

0400 540 706 — trentw@rmcg.com.au

Document review and authorisation

Project Numbers: 1635 and 2007

Doc Version	Final/Draft	Date	Author	Project Director review	BST QA review	Release approved by	Issued to
1.0	Working draft	24/8/2022	C. Fuller C. Feniuk T. Wallis	S. Annett	E. Kelly	S. Annett	L. Dennis CCMA
2.0	Draft	14/10/2022	C. Fuller T. Wallis	S. Annett	E. Kelly	S. Annett	L. Dennis CCMA
3.0	Final	14/11/2022	T. Wallis D. Prentice	S. Annett	-	S. Annett	L. Dennis CCMA
3.1	Appendix 2 – additional indicators	21/08/2023	T. Wallis S. Annett A. Tranter	S. Annett	-	S. Annett	D. Windle / L. Dennis CCMA
3.2	Updated final	29/08/23	T. Wallis	S. Annett	-	S. Annett	CCMA