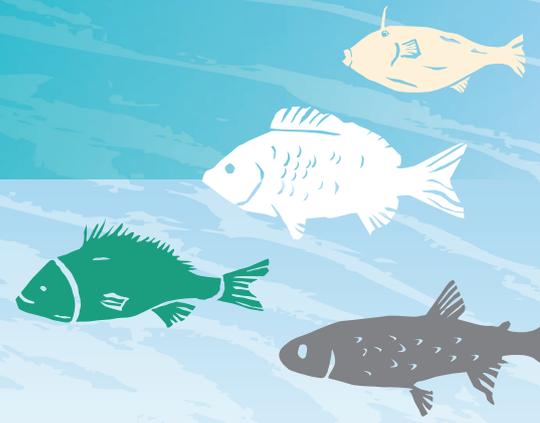


Introduction



1. How to use this manual

The EstuaryWatch Community Estuarine Monitoring Methods Manual is a guide for individuals and groups that belong to the community monitoring component of EstuaryWatch. It provides EstuaryWatch volunteers with all the necessary information needed to start monitoring an estuary. The manual explains the relevance of each parameter monitored, procedures and the order that monitoring should take place in. It also explains sampling procedures, equipment maintenance, safety considerations and quality control procedures.

The manual is presented in sections in a ring-bound folder to allow you to insert or remove updates and local adaptations to methods.

The information presented in this manual follows the procedures as recommended by instrument and test kit manufacturers, as well as by experts in the estuarine monitoring field. This information should be used to supplement training and information your EstuaryWatch Coordinator provides.

In addition to the use of this manual, your EstuaryWatch Coordinator will develop a monitoring plan for your estuary of interest. This will provide guidance for where and when monitoring should take place, giving consideration to the particular estuary and community involved in monitoring. If a plan has already been developed for your estuary of interest you will find it at Appendix A.

A channel has been set up on the *You Tube* website, where instructional videos which complement this manual will be uploaded. To view these videos visit <http://www.youtube.com/user/corangamiteCMA>

If you have any questions regarding the contents of this manual, or would like further information about the EstuaryWatch Program, please contact the EstuaryWatch Coordinator at your relevant Catchment Management Authority (CMA):

<u>Corangamite CMA</u>	<u>Phone (03) 5232 9100</u>
<u>East Gippsland CMA</u>	<u>Phone (03) 5152 0600</u>
<u>Glenelg Hopkins CMA</u>	<u>Phone (03) 5571 2526</u>
<u>Melbourne Water</u>	<u>Phone (03) 9235 7100</u>
<u>West Gippsland CMA</u>	<u>Phone 1300 094 262</u>

2. Estuaries

What is an estuary?

Estuaries are semi-enclosed bodies of water where saltwater from the sea mixes with freshwater flowing from the land. They are important and productive parts of the coastal region.

Victoria's estuaries

More than 120 rivers, streams and creeks enter the sea along Victoria's coastline. This includes those that run into major embayments like Port Phillip, Western Port and Corner Inlet, as well as riverine sub-estuaries of the Gippsland lakes, Victoria's largest estuary. Ninety-five of these systems have been identified as having distinct estuaries.

A general description of each of Victoria's catchment region's estuaries is provided below.

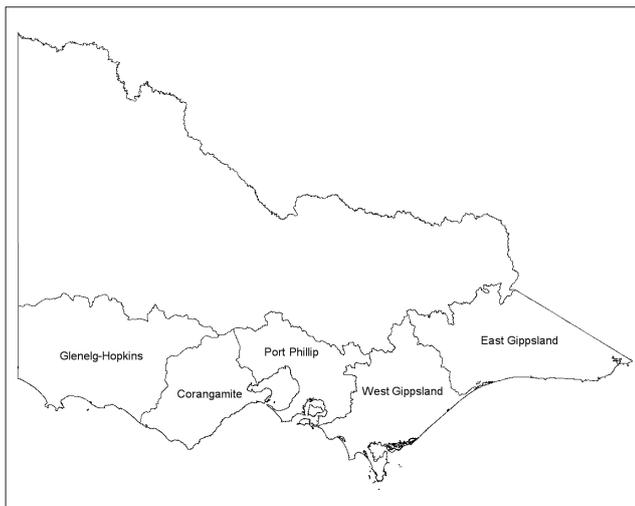


Figure 1. Victoria's coastal catchment management authority regions

East Gippsland region

The East Gippsland region stretches from the Gippsland lakes to Mallacoota in the far east of the state. The estuaries of East Gippsland are among the healthiest in the state. The National Land and Water Resources (NLWR) Audit has classified all the estuaries in the Far East Gippsland Basin as either in near pristine or largely unmodified condition. Most of the land in East Gippsland is in public ownership (about 87%), comprising mainly State Forests and National Parks. Most estuaries in east Gippsland are south facing, have relatively larger and steeper catchments and are influenced by a less seasonal rainfall pattern than other estuaries in the State.

West Gippsland region

The West Gippsland region extends from Kilcunda in the west to the Gippsland Lakes in the east. The estuaries in the region are mostly wave-dominated with the greatest proportion being near-pristine estuaries in the NLWR Audit. One tide-dominated estuary is present in this region (Corner Inlet). These estuaries are generally within steep catchments and are influenced by winter-dominated rainfall.

Port Phillip and Western Port region

The Port Phillip and Western Port catchment region has over 15 estuaries including the significant embayments of Port Phillip Bay and Western Port. Many of the estuaries are sub-estuaries, sometimes called 'child' estuaries, draining into these embayments. The catchments are heavily urbanised with over 4 million people living in Melbourne and the surrounding suburbs. Many rivers and creeks run through urban and industrial developments and have been modified into drains.

Corangamite region

The Corangamite Region extends along the coast starting adjacent to Avalon, south to Barwon Heads and then west to Peterborough. Within this area there are 40 estuaries in a wide range of sizes and shapes. Those estuaries along the Great Ocean Road which face to the east tend to be small and have small and steep catchments with short pulses of freshwater flows. Those along the open coast west of Cape Otway predominately face west and tend to have larger, flatter catchments. All 40 estuaries except the Barwon



River are intermittent estuaries. This means that they have sandbars that periodically close their connection to the ocean. Many of these estuaries also have intermittent freshwater inflows, making them more variable in the medium term than many other kinds of estuary.

Glenelg Hopkins region

The Glenelg Hopkins catchment region extends from west of Peterborough to the South Australian border. There are eight estuaries within the Glenelg Hopkins region, six of which are seasonally closed, while two, the Moyne estuary and the Fawthrop Lagoon, are maintained permanently open through engineering works. The Glenelg River is the second-longest estuary in the state at 68 km, but only has a water area of 5km² reflecting its narrow, riverine shape. Some of the major issues facing the region's estuaries include inappropriate artificial river mouth openings, reduced freshwater inflows and reductions in water quality.

3. What is EstuaryWatch?



In 2006, in response to a groundswell of public interest in estuary health and in an effort to meet estuary manager's information needs, EstuaryWatch was initiated as part of the *Large Scale River Restoration Initiative – Managing our Great Ocean Road Estuaries*, a program coordinated through the Corangamite Catchment Management Authority. Following the successful implementation of the EstuaryWatch Program in the Corangamite Region the program was expanded in 2010 to enable other interested communities throughout Victoria to participate in the program.

EstuaryWatch is a community based estuarine monitoring program. The guiding vision for the program is two-fold:

- **raise awareness and provide educational opportunities to the community in estuarine environments**
- **enable communities and stakeholders to better inform decision making on estuarine health.**

An important part of achieving this vision is through a framework for community monitoring and assessment of estuary health. This manual outlines how to undertake this monitoring.

The EstuaryWatch Program also undertakes liaison, promotional and educational activities aiming to:

- raise community awareness of estuaries and their links to catchment and coast
- provide opportunities for community engagement
- facilitate better communication between communities and government on estuarine health issues.

4. EstuaryWatch monitoring

What is monitoring?

Monitoring can be defined as the continuous or repeated observation, measurement, and evaluation of health, environmental or technical data for defined purposes, according to prearranged schedules in space and time, using comparable methods for sensing and data collection.

Confused? In a nutshell, monitoring means observing what is happening to different aspects of the environment over time in a coordinated and scientific manner.

Why monitor?

There are a lot of things we do not know about the estuaries of Victoria. Many of our estuaries have never had any long-term data collected about their condition or processes. Long-term data is used to develop a picture of the health of an estuary, over time and in relation to other comparable systems. A healthy estuary is defined as one which retains the major ecological features and functioning of the estuary prior to European

settlement and can sustain these features into the future.

Estuaries are important and productive parts of the coastal region. Given they are at the receiving end of catchments and popular places for settlement, estuaries are systems that are often at risk of major impacts from human activities. They are also very dynamic systems with variability over time, from hours to decades. Understanding when and how these changes happen and which changes are caused by human impacts is crucial for managing estuaries for the future. Some changes are visible, for example, destruction of habitat, but many are long term, gradual or not visible to the human eye. To understand how these systems work and to detect problems requires regular monitoring of indicators that can be clearly interpreted.

EstuaryWatch monitoring is a means of gathering information about the condition or 'health' of an estuary and to understand changes that may be occurring. It consists of a combination of observations or measurements of the characteristics of the water itself, of the shoreline and bed of the estuary, and also of the animal and plant life in and around the water.

By monitoring an estuary over the long term, the status of indicators can be determined (i.e. whether they are stable, improving or declining) and early changes can be detected. Without monitoring it would be very difficult to prove or gauge the amount of change.

For more information on estuaries, their structure and function and how to interpret the data collected through EstuaryWatch monitoring, see the publication *Interpreting Estuary Health Data, EstuaryWatch Victoria*. This document is supplied with this manual at Appendix E to all active EstuaryWatch volunteers or can be found at <http://doiop.com/EstuaryWatch/interp>

5. How will EstuaryWatch monitoring data be used?

Data collected through EstuaryWatch monitoring will enable us to build an understanding of what the natural processes, ecology and community values of an estuary are. It will form a database for Victoria's estuaries that will act as a baseline and allow changes in the estuaries to be analysed through time. This will be a valuable long-term source of information that can support other estuary health information being gathered for monitoring, evaluating and managing estuaries.

EstuaryWatch Coordinators will regularly evaluate data through comparison with appropriate reference values. If at any stage monitoring results indicate a possible threat to estuarine health, the appropriate authorities will be notified immediately and action taken to investigate the issue. EstuaryWatch monitors will be kept fully informed of any actions taken in this instance. It should be noted that management responses to EstuaryWatch monitoring data may not be instantaneous due to the prioritisation of works in the region.

Monitors will be able to assess their monitoring data for outstanding trends and patterns using the graphing features available on the EstuaryWatch online database (EWOD) at: www.estuarywatch.com.au. The document *Interpreting Estuary Health Data, EstuaryWatch Victoria* supplied to EstuaryWatchers with this manual can also be used to obtain information from data collected.

The data is public information and as such may be used by a number of individuals, groups and organisations, including:

- community members and school groups involved in EstuaryWatch
- the general community, who can gain access to community monitoring information through the EWOD
- researchers
- government and community bodies involved in different aspects of estuarine management, including the Department of Sustainability and Environment, Catchment Management Authorities, the Environment Protection Authority, Parks Victoria, local governments and coastal committees of management.



Some specific examples for application of the data are:

- Index of Estuary Condition (IEC). The IEC provides a consistent statewide assessment of the environmental condition of estuaries every six years. The collection of long-term EstuaryWatch data sets will assist in understanding conditions within an estuary during different hydrological states and weather conditions and will add to the data sets required by the IEC.
- Estuary Entrance Management Support System (EEMSS). EEMSS provides estuary managers with a tool to account for likely risks involved in artificially opening an estuary mouth. EstuaryWatch provides baseline data that can assist and refine the EEMSS information and help with understanding the processes within an estuary which will mitigate risks.
- Estuary Environmental Flows Assessment Methodology (EEFAM). EEFAM defines a flow regime which will maintain the ecological health of an estuary. EstuaryWatch is effective in collecting regular data that is suitable to both the calibration of the EEFAM hydrodynamic model and gaining a greater understanding of the dissolved oxygen conditions that persist during a range of flow conditions.
- Estuary Management Plans (EMPs). EMPs describe a vision for an estuary and strategies to undertake over a five-year timeframe. EstuaryWatch data can be of assistance in the development of EMPs.
- Future Coasts Program. Future Coasts is a program that focuses on the physical impacts of sea level rise as a result of climate change. At a local scale, EstuaryWatch assists in understanding the impacts surrounding a particular estuary over the longer term.

6. Being a good EstuaryWatch ambassador

Most likely you have got involved in EstuaryWatch because you live near an estuary you value and care about. It is also important to respect other people who value and use estuaries in different ways.

When you are out in the field undertaking EstuaryWatch monitoring you are representing the EstuaryWatch Program. Take this opportunity to be a good ambassador for EstuaryWatch and the estuary itself! The following are some general tips on ethics and courtesy for EstuaryWatch:

1. Be considerate with data use. Do not use results to single out individuals or a business that may be contributing to a perceived problem, as they may be unaware they are doing so. Always report data to the EstuaryWatch Coordinator in the agreed manner. If you have any concerns regarding the implications of the data please first discuss this with the EstuaryWatch Coordinator.
2. Do not rush out and make comments about ecosystem health to the media or local community based on just a few monitoring tests. This is a quick way to discredit the EstuaryWatch Monitoring Program. Remember, it may require several years of data to paint an accurate picture of what you are monitoring.
3. Let local landholders, authorities and businesses know why, when, where and how you are monitoring – even better, involve them.
4. Never enter private property without the prior permission of the landowner.
5. Always remove your rubbish.
6. Always leave any gates as you found them – open or closed.