



The science behind estuary openings

Painkalac Creek May 2022



The Corangamite Catchment Management Authority (Corangamite CMA) acknowledges the Wadawurrung and Eastern Maar as the Traditional Owners of the Painkalac Creek estuary. The estuary flows through both Wadawurrung Country and Eastern Maar Country.

What is an estuary?

An estuary is the place where the freshwater from the river meets the salt water of the sea.

Estuaries provide key spawning and nursery grounds for many species of fish, and drought refuge and critical breeding and foraging areas for birds. They also play a pivotal role in maintaining water quality through nutrient and sediment filtering.

Estuaries underpin key social, economic and cultural heritage values within our region. They are a significant drawcard for tourism and are highly valued by the local and broader communities for scenic beauty, recreational fishing, swimming, camping, bird watching and boating.

The estuaries in the Corangamite catchment are known as intermittently closed/opened lakes and lagoons (ICOLLS) which open from time to time as part of a natural process, this supports the estuarine ecosystems, including protected flora and fauna. When the estuary is closed, increased water levels can bring significant environmental benefits including flooding adjoining wetlands and fringe vegetation. There are also benefits of an open estuary, such as exposed mudflats for wading birds and allowing fish to migrate out to sea.

When would an estuary be artificially opened?

Artificially opening an estuary occurs when a Permit Holder requests Corangamite CMA's authorisation due to water levels beginning to impact human assets including roads and buildings, or inundation of property.

Estuaries in the Corangamite catchment are not artificially opened for environmental purposes as recent studies show that there is no environmental requirement to, and artificial openings can put environmental values at risk. To read more about this, refer to the Aire Valley estuary floodplain project (2020) and the Anglesea River and Estuary Environmental Flow Study (2021), on the Corangamite CMA Knowledge Base website.

All artificial estuary openings are undertaken by Permit Holders consistent with the relevant policies of the Victorian Waterway Management Strategy (VWMS). Policy 13.3 in the VWMS states that a risk-based assessment considering the environmental, social and economic values of an estuary will be conducted when making a decision whether or not to open an estuary. This includes risk to human assets and safety.

Who is permitted to open the estuary?

Surf Coast Shire Council (SCS) currently holds the permit to artificially open the Painkalac Creek estuary mouth. Corangamite CMA and SCS have a collaborative approach to assessing the risks associated with artificially opening the estuary and consider several factors to determine when an artificial opening may be required.

If there is an actual or imminent threat to safety, health or property an opening may be conducted under emergency provisions in accordance with *By-law No. 4 Waterways Protection 2014* and the *Emergency Management Act 1986*. In such circumstances, a permit is not required.

What is the process of artificially opening the Painkalac Creek estuary?

SCS monitor water levels in the estuary in partnership with Corangamite CMA. When the estuary begins to reach a level that may lead to impacts on human assets and the threat of flooding is not imminent, SCS (the Permit Holder for Painkalac Creek) submits a request to Corangamite CMA to artificially open the estuary. In response to this, Corangamite CMA works with SCS to undertake an environmental risk assessment as per the permit conditions, before making a decision whether to approve the request as per policy 13.3 in the Victorian Waterway Management Strategy. The Corangamite CMA's risk assessment considers the environmental, social and economic values of the estuary, including the use of the Estuary Entrance Management Support System (EEMSS), scientific reports, weather conditions, recent water quality data, the amount of freshwater inflows, presence of birds (such as Hooded Plovers) and the ability to support the opening with a release of water from the Painkalac dam, as well as any new scientific information as it becomes available. The decision to authorise an estuary opening is also based on risks to human assets and safety.

Once Corangamite CMA has issued approval based on the risk assessment, SCS then arranges for earth-moving equipment to dig a channel from the estuary mouth towards the ocean to allow for the water to flow out, Permit conditions include measures that can reduce risks to environmental values, such as:

- the prohibition of unnecessarily deep excavations
- timing the opening in the afternoon where possible (when oxygen is higher in the water column) to reduce risk of fish kill events
- ensuring machinery is clean prior, to prevent the spread of weeds, as well as that no oil, chemicals or any other substances enter the waterway or ocean
- minimise disturbance to dunes, riverbanks and vegetation and any areas disturbed must be restored to pre-works condition

Why undertake a risk-based assessment?

Where conditions and time permits, a complete risk-based assessment is conducted to ensure a consistent process is used when making the decision whether or not to authorise an estuary opening request. It also ensures that the decision considers the environmental, cultural and socio-economic values of each estuary.

How does the Painkalac dam and environmental flows affect the estuary?

With advice from Corangamite CMA, Barwon Water releases water for the environment (called environmental water) from the Painkalac dam throughout the year to mimic natural flows as much as possible. Because there are physical limitations to how much water can be released from the dam at one time, releases will never exactly match pre-dam flows unless it is full.

The releases are important to maintain water and habitat quality, as well as allowing nutrient and fish movement. Water coming into the estuary can leave the estuary through evaporation and groundwater connection, as well as through an open estuary mouth. When a larger volume of water is released (called a 'fresh') at the same time as an artificial opening, it can help sustain an open estuary and lower the risk of fish kills and other adverse impacts by attempting to maintain water quality.

What can cause fish death in an estuary?

The water in an estuary has two layers; an oxygen-rich freshwater layer on top and an oxygen-poor saline layer on the bottom. During an artificial opening the oxygen-rich surface layer flows out first, leaving behind water with potentially critically low oxygen levels. When this occurs, there is a high likelihood of fish kills. A natural opening is unlikely to pose this risk as it will be supported by freshwater flows (which is how the mouth breaks open on its own), this fresh water can mitigate poor water quality.

If you notice dead or dying fish, crustaceans or eels in an estuary, please contact the Environment Protection Authority in the first instance on **1300 372 842**.

How are fish deaths avoided?

If it is deemed necessary to artificially open the estuary mouth then the Corangamite CMA may liaise with Barwon Water to determine if a "fresh" can be released from the Painkalac Dam to coincide with the opening to aid in prolonging the opening.

The "fresh" can ensure sediments and biofilms move down the creek to maintain the water's quality. This additional water moving down the creek can also reduce the likelihood of a fish kill event by topping up the system with fresh, oxygenated, water.

Who do I contact if I am being affected by high water levels in the estuary?

Contact Surf Coast Shire Council on **5261 0600**.

If property inundation is likely contact the VicSES on 132 500 for emergency assistance.

What is EstuaryWatch and how can I get involved?

EstuaryWatch is a community water quality monitoring program where locals monitor the condition or 'health' of the estuary. This can be as simple as taking a photo of the estuary, or as involved as recording scientific measurements of turbidity, salinity and algal concentrations.

To join EstuaryWatch, contact the CCMA at: **estuarywatch@ccma.vic.gov.au** or phone **1800 002 262**. Or alternatively visit the EstuaryWatch website www.estuarywatch.org.au/

How do I find more information?

Using the camera on your mobile phone (Android or iPhone), scan the QR Codes below.

The first QR Code will direct you to the CCMA Estuary Management page and the second will direct you to a PDF of the Victorian Waterway Management Strategy, go to chapter 13 to see the estuaries chapter.

