Reduction in estuary water levels

On many occasions the Fairhaven Creek Estuary experiences dramatic reductions in water level during summer. This occurs at times when the estuary is closed to the sea with little or no river flows entering the estuary for an extended period.

The reductions in water level in the estuary during summer are due to evaporation; the increase in salinity sometimes observed during this period also indicates evaporation is the main driver in water level reductions.

Considering the shallowness, substrate colour, slight turbidity and salt spring effect on the estuary's edges are likely to increase evaporation rate. It is conceivable water level reductions are due to evaporation, the increase in salinity sometimes observed during this period also indicates evaporation is the main driver in water level reductions.

EstuaryWatch is a community based estuarine opportunity to the community in estuarine management decisions to protect and restore the estuary's environmental, social and economic values.

A healthy and functioning estuary system allows a multitude of uses to be enjoyed and sustained. Indigenous communities have a long association with the Fairhaven Creek Estuary. The Fairhaven Creek has also supported generations of social and economic uses and users, from European settlement and pastoralism through to new forms of social and economic uses and users, since European settlement.

The Painkalac Creek Estuary environment includes a range of bird, plant, reptile, frog, small mammal and fish communities that depend on the estuary’s dynamic variable nature, e.g. river flow, flooding, salinity variations and salt wedge movement. The summary of estuary data will assist the community to improve their understanding, and estuary managers to make informed management decisions to protect and restore the estuary’s environmental, social and economic values.

Where can you find more information?

Corangamite Catchment Management Authority
www.corangamite.org.au

EstuaryWatch
www.estuarywatch.com.au

CMA Information Hotline 1300 213 400

EstuaryWatch volunteers collect data at six locations in the Painkalac Creek Estuary that they enter on the EstuaryWatch website: www.estuarywatch.com.au

Summary

This is a summary of the key elements of a Corangamite Catchment Management Authority Fairhaven Creek Estuary Data report. It includes analysis of data from the EstuaryWatch databases and local rainfall and catchment river flow data.

EstuaryWatch is a community based estuarine monitoring program, designed to:

- raise awareness and provide additional opportunities for the community, in estuarine environmental, and mobly community activities;
- better inform decisions making on estuarine health;
- reduce the risk of further decline in estuarine health.

Since 2007, when the EstuaryWatch program was set up, on the EstuaryWatch program 415 data records have been stored on the EstuaryWatch database. It includes analysis of data from the EstuaryWatch database and local rainfall and catchment river flow data.

PAINKALAC CREEK ESTUARY

An interpreted summary of data

Extract from Painkalac Creek Estuary Data Analysis and Interpretation 2001-2013

An interpreted summary of data

Where can you find more information?

EstuaryWatch Monitoring site P3. Photo: Corangamite CMA

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In a closed estuary, salinity stratification and subsequent available dissolved oxygen (DO) can have severe impacts on estuarine-dependent fish species. The generation of a halocline, a boundary between freshwater and saltwater, can result in the bottom waters becoming depleted of DO. This depletion of DO can have severe impacts on fish species, as low DO levels can cause fish to suffocate.

The Painkalac Creek Estuary is an example of an estuary that is frequently closed to the sea due to low river flows and high water levels. When the estuary is closed, stratification occurs, creating a halocline that separates the freshwater and saltwater layers. This stratification can result in the bottom waters becoming depleted of DO, as the oxygen is consumed by aerobic bacteria that break down organic matter. The Painkalac Creek Estuary has experienced this stratification process on many occasions, with DO levels dropping as low as 0mg/l.

The Painkalac Creek Estuary is predominantly closed to the sea much of the time. This is mostly due to very low river flows, which prevent seawater from entering the estuary. In a closed estuary, the salinity stratification and subsequent depletion of DO can have severe impacts on estuarine-dependent fish species. Fish species that depend on estuarine environments are able to confine their activity to the upper layers of the water column, while other fish species that depend on freshwater environments are able to move between the layers to more favorable conditions.

Unfavorable DO conditions are generally less than 5mg/l and to lower levels can be fatal to fish. Habitat preference and the generation of anaerobic conditions or environments free of oxygen, occurs predominately in the bottom waters. Habitat preference and developing and recruiting salt marsh communities.

Artificial estuary opening

Artificial estuary openings occur when there is a threat of floodwaters inundating houses on the Painkalac Creek Estuary’s natural flood plain and the Great Ocean Road. These openings occur due to rising water levels and are closely monitored along with many other factors. They are often classified as an emergency opening. Artificial opening can also regulate water quality in the estuary, and not necessarily in a bad way. As water flow in the estuary is less from the ocean and more from the river, estuary salinity is lower. The scale of reduction in dissolved oxygen levels in the bottom waters is determined by the duration of the stratified layer. Artificial opening reduces seawater inflow, allowing freshwater to enter the estuary.

Upon opening the estuary, the freshwater layer is the first layer drained off out to sea. The reintroduction of seawater into the estuary on the returning high tides results in a stratification breakdown in the estuary and re-oxygenates the water column. Additionally, the artificial estuary mouth opening alters the degree and duration of floodplain inundation, and associated salt marsh communities, impacting on the habitat salt marsh communities creates when flooded. The consequences of altering natural processes, flooding and drainage of tidal flats is likely to impact on native fish species flowering and recruitment and developing and recruiting salt marsh communities.

Estuary Closure and Openings

The Painkalac Creek Estuary is frequently closed to the sea much of the time. This is mostly due to very low river flow, where the estuary is closed the low oxygen conditions see water enter the estuary from the ocean. Artificial estuary openings occur when there is a threat of floodwaters inundating houses on the Painkalac Creek Estuary’s natural flood plain and the Great Ocean Road. These openings occur due to rising water levels and are closely monitored along with any other factors. They are often classified as an emergency opening. Artificial opening can also regulate water quality in the estuary and not necessarily in a bad way. As water flow in the estuary is mostly from the ocean and more from the river, estuary salinity is lower. The scale of reduction in dissolved oxygen levels in the bottom waters is determined by the duration of the stratified layer. Artificial opening reduces seawater inflow, allowing freshwater to enter the estuary. After approximately two weeks, dissolved oxygen levels in the bottom waters are generally lower, which can negatively affect fish. Artificial opening is a natural process and in the Painkalac Creek Estuary these conditions would have occurred repeatedly prior to European settlement. The return of river flows usually determines the duration of the stratified layer. A significant increase in river flow is a trigger for artificial estuary mouth opening due to potential flooding of houses and other infrastructure such as the Great Ocean Road.

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