

Native Fish in Coastal Victoria

HEALTHY COASTAL CATCHMENTS – HEALTHY COASTAL FISH

Fish habitat: **Salt Wedges**



Estuary Perch – photo courtesy of Melbourne Museum

What are salt wedges?

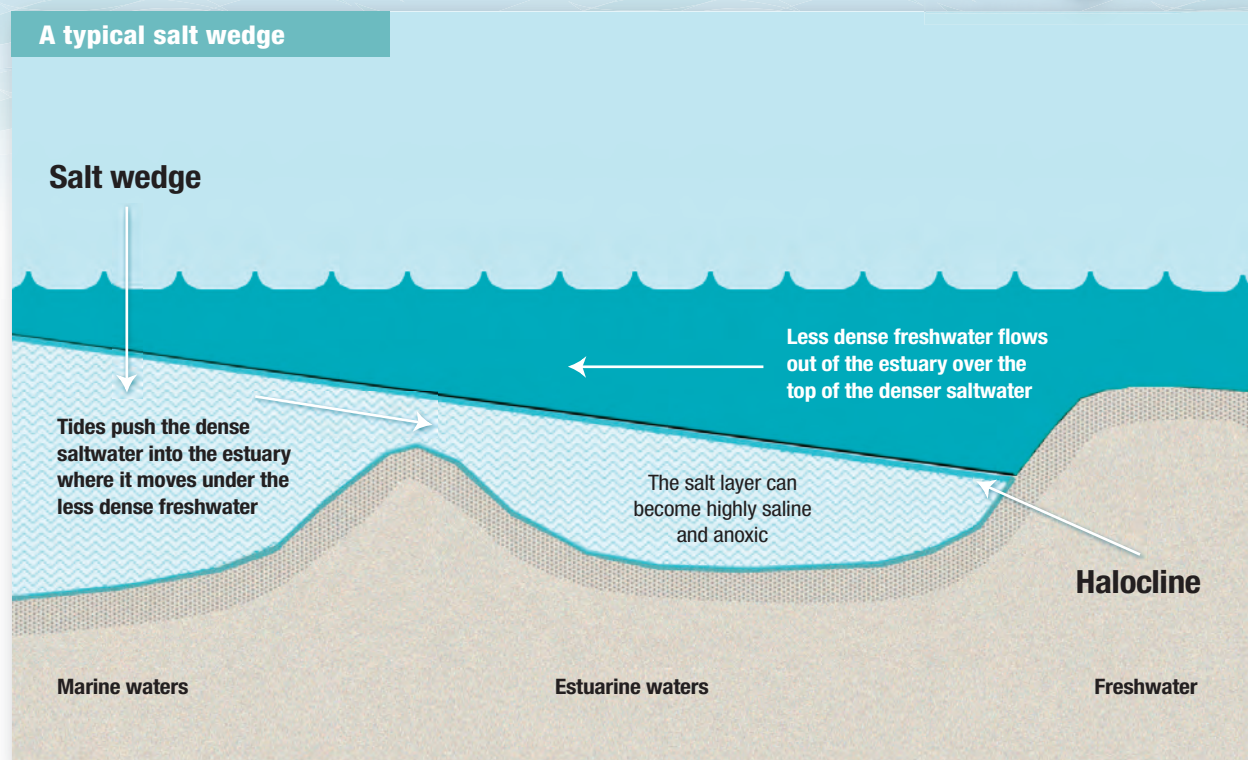
Many Victorian estuaries have a naturally forming phenomenon, called a salt wedge. The salt wedge is essentially a layer of saltwater below a layer of freshwater, which is pushed into an estuary by tides.

As the saltwater is denser than the freshwater, it tends to move up the estuary below the less dense freshwater, creating a wedge-shaped layer of saltwater (see diagram below).

The varying density and limited mixing of the salt and fresh water results in two distinct layers and the creation of the wedge. The wedge can move up and down the estuary and dissipate according to the tidal action and the volume of freshwater flow. In Victorian estuaries, the wedge will typically form in late spring when freshwater flows decrease. The wedge often remains throughout summer and autumn and begins to move back out to sea when higher riverine flows commence in winter and early spring.



Black Bream –
photo courtesy of Rudie Kuitert



A typical salt wedge – Halocline: the interface between the saltwater and freshwater layer. This becomes more pronounced as the wedge stagnates in summer. The halocline will move according to the relative influence of the tide or freshwater flows.

SALT WEDGES

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Why is the salt wedge important to fish?

The wedge is a unique habitat area for a number of estuarine species. The wedge acts as a barrier that prevents semi-buoyant eggs and larvae from entering the upper seaward flowing water and being flushed out to the ocean. Species such as Estuary Perch (*Macquaria colonorum*), Black Bream (*Acanthopagrus butcheri*) and Common Freshwater Shrimp (*Paratya australiensis*) are all dependent on this habitat to retain juveniles in the estuary. The wedge can also provide an area in the estuary where there is a plentiful food supply for many fish species.

The wedge, however can represent a hazard for some species, particularly in estuaries impacted by high nutrient loads. In highly stratified estuaries, where the wedge is very distinct and there is little mixing between the layers, water in the lower half of the wedge can become severely depleted in oxygen (anoxic). Sedentary species such as mussels or other benthic invertebrates can suffer high mortality levels depending on the duration of the anoxic environment. More mobile species such as fish can usually escape the impact of the anoxic layer. However, when the estuary river mouth is suddenly opened, the sudden loss of the oxygen rich upper freshwater layer can cause anoxic water to fill the entire estuary causing the mass death of fish and other aquatic fauna that cannot escape the estuary.



Photo courtesy of Tarmo Raadik



Photo courtesy of Paul Tinkler

What estuaries typically form salt wedges?

Coastal rivers that have a high river discharge and a relatively weak tidal current or small tidal range can form salt wedges as there is little mixing of the fresh and salt water. The tidal range in Victoria is typically considered small compared to other regions in Australia and globally and hence all Victorian estuaries have the potential to form salt wedges. However, the size of the river mouth and other physical parameters such as frequency of river mouth opening will all influence the formation of a salt wedge. Examples of rivers which commonly form a salt wedge in Victoria include the Hopkins, Glenelg, Barwon, Barham and Kennett Rivers in the west of the state and the Yarra and Werribee Rivers near Melbourne.



Estuary Perch – photo courtesy of Tarmo Raadik