

The drain on the plain causes fish pain

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NSW Fishing Monthly May 2009 Edition

Imagine you're a juvenile bream – you've just been born on a coastal bar where the river meets the sea. Before you have a chance to figure out which way is up, the swirling, treacherous currents have swept you out to deeper waters. You wait for a flood tide and make your way back into the calm estuarine waters where you think you're safe, but many dangers are ahead.

We've already heard about the importance of seagrass meadows for juvenile bream (NSW Fishing Monthly March 2009), how a large proportion of these rich food beds have been lost and what is being done to protect what's left.

But what about other habitat that juvenile bream and other fish need in order to grow into fine fish?

Estuaries are characterised by areas of shallow calm waters with seagrass meadows, mangrove forests and saltmarsh flats. Fed by main stem rivers and feeder creeks they spill out onto rich floodplains and provide water to lush wetlands.

In their natural state, floodplains and wetlands provide bountiful food and safe refuges for growing bream and other fish. However, human settlement over the past 200 years has drained and cleared these naturally wet areas so that 60 % of bream's feeding and breeding habitat are now lost.



Tuckean Swamp on the Richmond River was a tidal wetland. When the barrage, lower left, was constructed in the early 1970s it restricted saltwater flows. By 1989 306 hectares of mangroves and 134 hectares of saltmarsh had been lost. Image I&I NSW.

With drainage came floodgates. These structures were first installed in the late 19th century to protect low-lying farmland from salty sea waters and to remove floodwaters from the land quickly. The consequences these structures would have on native fish and other animals and plants that needed these floodplains for survival, were not considered.

The floodgates act like one-way valves: on the incoming tide they close, and on the outgoing tide they open, draining water from wetlands and floodplains. The upstream water level becomes unnaturally low and rarely gets 'recharged' or 'refreshed' with new water from incoming tides.

These 'one-way' floodgates are no good for bream and other species because they prevent fish moving between breeding and feeding areas. Over 1200 floodgates in NSW restrict fish movement to thousands of kilometres of potential habitat – in fact there are not many coastal creeks that don't have a floodgate on them!

Less freshwater going into creeks and drains means that sediments gather smothering fish habitat, water temperatures may rise, oxygen levels are reduced, algae blooms, aquatic weeds flourish, the streambed is buried under sludge, and fish can't survive.

And then there's the acid! Acid sulfate soils are naturally occurring soils found in low lying areas along the coast and inland. When exposed to the air, through drought, excessive drainage or the installation of a poorly designed floodgate, sulfuric acid is produced. This acid can then wash into the water after rain or floods. When given a choice, juvenile bream actively avoid these acid waters, further affecting habitat use.

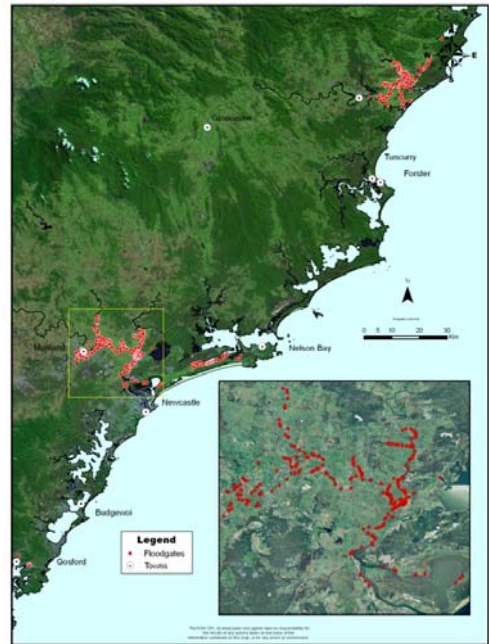
If they can't avoid the acid water, bream develop skin lesions (which can lead to red spot disease), and their fertility is reduced. Acid water can even kill the plants and animals that fish use for food, acid water is also a major problem for oyster farmers. Severe acid events cause fish kills.

Once coastal land is drained dryland grass species replace the water-tolerant grasses. The dryland species die when inundated with water. Bacteria that decompose these rotting plants use up oxygen in the water, this de-oxygenated water is often called 'black water' and it also causes fish kills.

As if black water isn't enough, flooding of drained land can also stir up toxic, gel-like sediment known as "mono-sulfidic black ooze" (MBO) which strips the remaining oxygen from the water. A teaspoon of MBO when mobilised during floods can strip all the available oxygen from 1 litre of water in 30 seconds. This is bad news for fish.

The Richmond River fish kill in January 2008 was caused by a combination of black water and MBO.

In an ideal world for bream and other fish, all coastal floodplains and wetlands would be restored, artificial drainage systems filled in and floodgates removed. However, in



Floodgates in the Hunter region, imagine how many more fish there would be if all these floodgates were actively managed! Map I&I NSW.

reality the 'simple' act of restoring what was once valuable habitat for bream, is not possible.



Actively managed winch gates can be fully removed from the water.



A simple float on a tidal floodgate allows water to flow and fish to pass through the gate with the rise and fall of the tide. Images I&I NSW.

But even in our less than ideal world we can make a difference.

Some land managers and farmers are starting to do just that. One such way is through active floodgate management.

The simple action of regulating the opening of a floodgate improves water quality, reduces the build up of weeds, keeps acid-sulfate soils waterlogged and allows fish to access habitat more frequently.

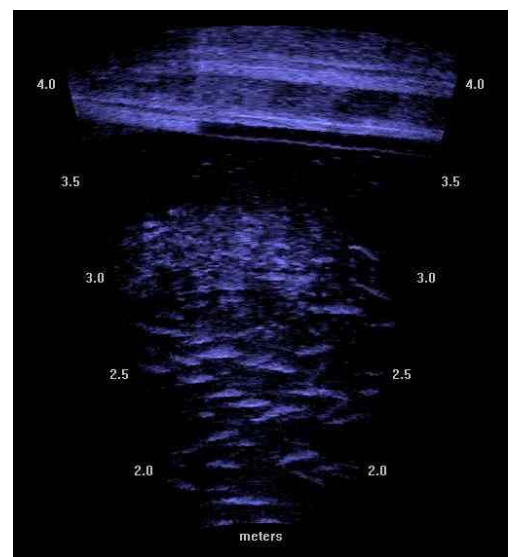
Landholders can use winches to lift the floodgate completely out of the water, sluices which have a sliding metal panel within the main gate, or tidal gates which have floats which open and close the floodgate with the rise and fall of the tide.

Monitoring on the Clarence floodplain on the NSW north coast has found that actively managed floodgate systems have five times more recreationally valuable fish species including bream, and nearly four times as many recreationally valuable crustaceans, compared with old-fashioned closed gate systems.

In addition, Australian bass, luderick, river garfish, freshwater catfish, short-finned eel, black sole and fork-tailed catfish are found *only* in the actively managed systems. Imagine how many more bream there would be if all floodgates were actively managed!

Recreational fishers are also improving fish habitat. 'Ecofishers' are using funding from the NSW Recreational Fishing Trusts Habitat Action Program to retrofit tidal floodgates in the Richmond River.

This is in addition to the 206 floodgates already under active management in NSW and this number is growing. It's a slow process but speeding up thanks to the involvement and participation of local Councils, fishers and the farming community.



A high-tech underwater sonar camera, known as DIDSON is allowing scientists to observe the movements of fish, such as these mullet, through actively managed systems without disturbing them. Image I&I NSW.