Assessing ^the^ habitat values ^of^ stormwater drains *in coastal areas*

Stormwater infrastructure is essential for quality of life, safety and health in urban environments. It is also increasingly recognised that open stormwater systems can provide environmental benefits and habitat for aquatic plants and animals. Improving the quality of stormwater can also reduce the pollution of downstream receiving waters and improve in-stream habitat for native fish.

This is the first of four factsheets in a series designed to inform drain managers how stormwater drains can be managed to improve their habitat value and to assist in implementing the National Recovery Plan for the endangered Oxleyan pygmy perch (*Nannoperca oxleyana*), a small native fish which inhabits wetlands in coastal NSW. The other factsheets are:

- **Managing coastal stormwater drains for fish habitat (#2)**
- **Retrofitting drains using *Water Sensitive Urban Design* (WSUD) principles (#3)**
- **Preparing a stormwater drain management plan in coastal areas (#4)**

Features of healthy aquatic habitat

Healthy aquatic habitat has:

- natural water flows and good water quality
- bank (riparian) vegetation and in-stream structure
- connectivity to other aquatic habitats.

Water

What 'good' water flow and quality is depends on the conditions and parameters found naturally in the area. In coastal areas of the Northern Rivers for example, low-lying floodplains have naturally acidic water with relatively low flows, interspersed with large floods.

The Oxleyan pygmy perch has specific habitat requirements such as acidic water (measured as pH between 3 and 7) and very low salinity levels.

Drains that mimic these habitat values may provide valuable habitat for this threatened fish species.

Vegetation and structure

Plants in the water, at the water's edge and overhanging a drain, as well as submerged roots and dead timber ('snags'), leaf litter, ledges, boulders and gravel beds all provide habitat structure within a waterway. Fish use these structures for feeding, shelter and spawning.

Oxleyan pygmy perch are typical of a lot of small, native fish and are most abundant where there is a range of structural habitat. They prefer habitat with in-stream native aquatic vegetation, with steep or undercut banks fringed with semi-submerged branches and roots of riparian vegetation.

Connectivity

Fish need to be able to move between habitat areas, either for breeding, to find food or because an area is becoming uninhabitable – drying out, for example.

While floods can provide an opportunity for fish to migrate, it is essential that natural systems of connected creeks, backswamps, wetlands and rivers are maintained. Structures and other mechanisms that alter natural flow regimes of rivers and streams are listed as a key threatening process to several threatened species listed under the NSW *Fisheries Management Act 1994*.

This is typical of the coastal floodplain habitat where Oxleyan pygmy perch can be found: slow flowing, acidic water with overhanging riparian vegetation. Photo: I&I NSW

Stormwater infrastructure

Stormwater infrastructure includes the drains, gross pollutant traps, sediment traps and weirs used to capture, channel and filter water run-off from urban and industrial areas.

The key issues that impact upon native fish are:

- sediment load, particularly in areas where there is bare or disturbed ground. Increased sediment loads to waterways can be detrimental to native fish and aquatic habitat, often leading to:
  - smothering of fish eggs and aquatic vegetation
  - clogging of gills
  - increased stress levels and disease
- 'gross' pollution (for example: plastic bags and bottles, packaging and cigarette butts), particularly where the water is run-off from roadways, densely populated areas or illegal dumping areas
- nutrient pollution, particularly where the water is associated with sports fields, golf courses, intensive agriculture or unmaintained septic systems
- volume and rate of flow, particularly where the water is being collected from a large area covered by impermeable surfaces and / or concrete drains.

For design principles that minimise these issues, see Factsheet #3 *Retrofitting drains using Water Sensitive Urban Design (WSUD) principles*.

An example of the out-dated approach to stormwater management which removed all habitat features from drainage systems. Photo: I&I NSW

Assessing habitat values

Best practice stormwater drainage systems should mimic what would be found occurring naturally in an unmodified aquatic ecosystem. In coastal floodplains of the Northern Rivers, this means:

- water that is neutral to acidic
- areas of slow or low flow
- periodic flushing with flood waters
- abundant native vegetation both in the water (emergent and submerged), on the banks (riparian) and overhanging
- dead timber (snags) fully and partially submerged
- wetlands, backswamps and creeks connecting with each other and with major waterways.

The extent to which a stormwater drainage system mimics these natural features will depend on its design, age and condition, how it is maintained and its proximity to other urban infrastructure.

The extent to which an existing stormwater system is providing habitat for fish can be assessed by looking for the features listed here and by monitoring fish populations.

By retrofitting existing drainage systems, habitat values can be improved (see Factsheet #3). Habitat values can also be improved by implementing maintenance regimes that mimic what occurs naturally and / or minimises the disruption to habitat at critical times (see Factsheet #2 *Managing coastal stormwater drains for fish habitat* and Factsheet #4 *Preparing a stormwater drain management plan in coastal areas*).

For more information and technical advice:

Industry and Investment NSW
Fisheries Conservation and Aquaculture Branch
Wollongbar Primary Industries Institute
Telephone: 02 6626 1200
www.dpi.nsw.gov.au/fisheries