



Appendix 21: Road barriers to fish passage

The following is an extract from the executive summary of the report *Reducing the Impact of Road Crossings on Aquatic Habitat in Coastal Waterways – Northern Rivers, NSW* (DPI 1006). The location of known road barriers to fish passage and the priorities for remediation are shown in **Figure 1**. A large format, detailed map showing the exact location of these barriers to fish passage is on the enclosed CD (**Figure 37**). Please refer to **Section 6.1.2** of the main report regarding the best way to view these maps. These maps were generated from the data provided in Appendix 1 of the fish road barriers report (DPI 2006).

It is acknowledged that there are hundreds of other fish barriers within the Northern Rivers area not detailed here. These include floodgates and weirs that sit across major watercourses. Examples in the Clarence area include Nymboida weir, Sportsmans Creek weir, Alummy Creek weir and Swan Creek weir. There are also areas where flood mitigation levees have isolated aquatic habitat from rivers or estuaries.

The highly modified nature of catchments in the Northern Rivers Region presents many challenges in the way we protect the environment and manage its natural resources. In particular, setting goals and targets for aquatic habitat conservation in the Region requires a clear understanding of the extent of aquatic habitat degradation and where we can achieve the best outcomes.

Within lotic systems, native Australian fish have evolved to be reliant on a variety of habitat types to complete their life cycle, thus requiring free movement within rivers and streams and between estuarine and freshwater environments. Unfortunately, riverine connectivity has been severely disrupted within Australia through the installation of numerous instream structures that impede the natural flow regime and act as physical, hydrological, and behavioural barriers to fish movement. Until recently, management of fish passage barriers has centred on the effects of weirs and dams, while little attention has been given to the extent of the impact of poorly designed road crossings.

Waterway crossings can affect the health of aquatic habitat and fish populations in several ways. Structures such as causeways and pipe and box culverts can prevent fish passage due to excessive head-loss (> 100 mm), increased flow velocities, and shallow flow depths (< 100 mm) that segregate upstream and downstream populations and habitats. Road crossings are also linked to increased sediment loads from point (unsealed roads) and diffuse sources (adjacent floodplains and slopes). Moreover, some structures can adversely affect fish by altering natural flow patterns, disrupting localised erosion and sedimentation processes, and affecting instream habitat condition.

Although current policy within NSW legislates for the incorporation of fish passage into the design of all *new* instream structures, a legacy of poorly designed road crossings exists that detrimentally affects fish migration. As a result, the NSW Department of Industry and Investment (Fisheries) initiated a comprehensive investigation funded by the NSW Environmental Trust to specifically address the impact of road crossings upon fish passage and stream connectivity in coastal catchments. Detailed environmental assessments were conducted for over 2500 waterway crossings in the Northern Rivers Catchment Management Authority region, with identified barriers prioritised in terms of their impact on aquatic biodiversity, benefits should the structure be remediated, and the ease of structural remediation. Additionally, management recommendations were put forth to remediate the barrier type(s) at each structure. The main findings from the investigation were:

- 1500 bridges were assessed, none of which were barriers to migrating fish species.
- 524 (20%) crossings were identified as obstructions to fish passage, with the majority of barriers being located in the Northern Rivers subregion.
- Pipe culvert crossings were the most common structure inhibiting fish passage in the region (51% of obstructions assessed).
- Causeways (28%) and box culvert (18%) crossings were also commonly found to restrict fish passage.



- Excessive head-loss (i.e. > 100 mm) was the most prevalent barrier type recorded at waterway crossings (64%), with a mean head-loss of 500 mm being recorded for barrier structures across the Region.
- High flow velocities (51%) and shallow flow depth (38%) were frequently observed at crossing barriers. Moreover, multiple barriers types (e.g. head-loss, high velocity, and shallow flow depth) were commonly recorded at a single site over the full range of hydrological flows.
- Grazing (74%) was the primary landuse recorded at crossings in the Northern Rivers CMA region, with crossings located in national parks, State forest, and rural (non-grazing) settings accounting for less than 25% of barriers identified.

A ranking scheme for waterway crossing sites was developed to determine remediation priorities for the improvement of fish passage in the Region. Crossings were ranked as either high, medium-high, medium, medium-low or low priority, with 63 high priority and 38 medium-high priority structures identified—the majority of which were found within the Northern Rivers subregion. Remediation recommendations for barriers identified in the report included:

- maintenance of sites (e.g. removal of sediment and debris blockages, improved floodgate management)
- modification of structures (e.g. retrofitting low-flow channels, installing fishways)
- complete replacement of structures (e.g. causeways replaced with bridges)
- permanent removal of redundant obsolete structures.

References

Department of Primary Industries (NSW) 2006, *Reducing the Impact of Road Crossings on Aquatic Habitat in Coastal Waterways – Northern Rivers, NSW*, Report to the New South Wales Environmental Trust. NSW Department of Primary Industries, Wollongbar, NSW. Available at: http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/186812/impact-of-road-crossings-northern-rivers.pdf

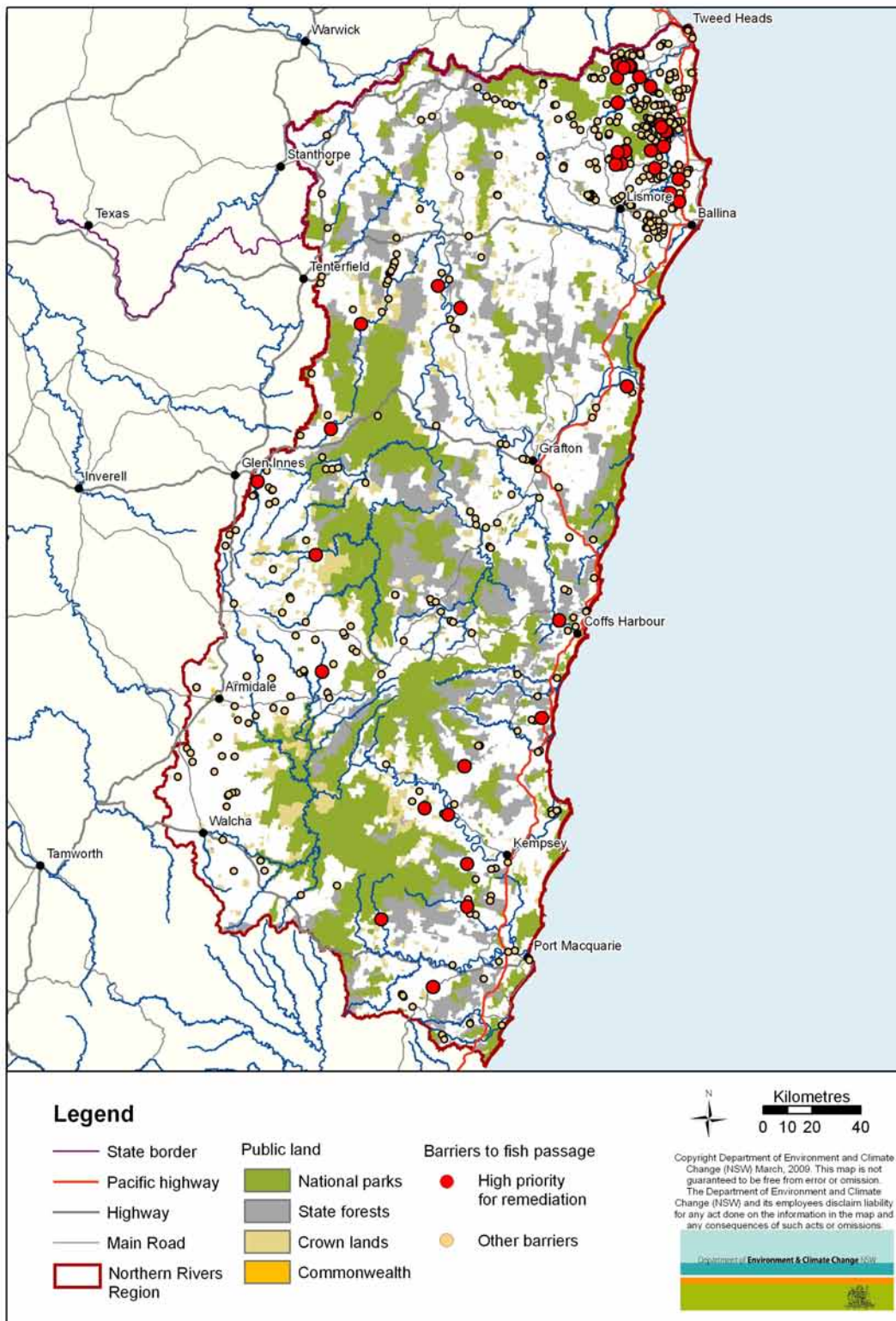


Figure 1 Road barriers to fish passage