JAMES COOK UNIVERSITY School of Engineering and Physical Sciences

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The following material is based principally on *Culvert Fishway Planning and Design Guidelines*, which provide designers with a basis for planning, design and implementation of fish passage facilities at road crossings and other small waterway structures.

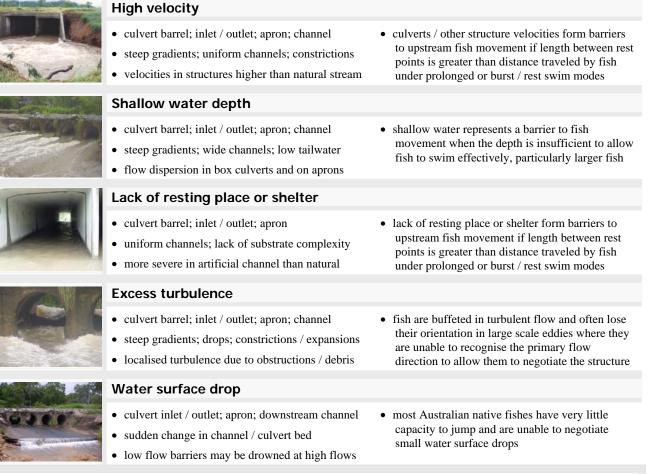
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Date	April 2010 – VER2.0		
Available from	www.jcu.edu.au/fishpassagedesign/		

School of Engineering and Physical Sciences

Hydraulic barriers to fish migration at waterway structures

Road crossings and other small waterway structures (e.g. culverts, causeways, grade control) may represent barriers to upstream fish migration if hydraulic conditions at the structures are more severe than swim capabilities of fish attempting to pass through. Fish migration barriers will usually occur as a result of major changes to natural waterway conditions at the structure, and may include the following hydraulic conditions within the culvert barrel / inlet / outlet, on aprons and in channels and other hydraulic zones: <u>high</u> velocity; reduced flow depth; lack of resting place or shelter; excess turbulence; water surface drop.

Provisions for fish passage at road culverts and other waterway structures should address these adverse hydraulic conditions, not only within the culvert barrels, but throughout the full structure length and adjoining waterway sections, to enable fish passage through all hydraulic zones from downstream to upstream at the site.



Common occurrence of principal hydraulic barriers to fish migration within particular zones of culverts / waterway structures								
Hydraulic barrier type		Zone D: Culvert inlet and upstream channel	Zone C: Culvert barrel	Zone B: Culvert outlet & downstream apron	Zone A: Downstream channel			
High velocity		\checkmark	\checkmark	\checkmark	\checkmark			
Shallow water depth		\checkmark	\checkmark	\checkmark				
Lack of resting place		\checkmark	\checkmark	\checkmark				
Excess turbulence		\checkmark	\checkmark	\checkmark	\checkmark			
Water surface drop		\checkmark		\checkmark	\checkmark			
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