

Fins not Fur:

Why Fish Need Friends Too

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Impacts Associated with Linear Developments

DIRECT DISTURBANCE AND LOSS OF HABITAT COMPLEXITY

Direct disturbance of aquatic habitats is likely to trigger avoidance behaviour and potentially disrupt migratory or spawning behaviour of aquatic fauna. Complex habitat elements (such as large woody debris, overhangs, macrophyte beds, etc) are ecologically important habitat components and territory markers for many turtles, fish and macroinvertebrates. Decrease in stream roughness, decline in habitat diversity, reduction in the number of pools available as refuge habitat in the dry season, and loss of pool habitat as a result of deposition of fine sediments are each likely to impact aquatic fauna communities.

INDIRECT HABITAT DEGRADATION

Activities such as vegetation clearing and earthworks can result in increased turbidity. Increased turbidity can reduce the respiratory and feeding efficiency of fishes and macroinvertebrates, and photosynthesis of submerged macrophytes, phytoplankton and benthic micro-algae.

LOSS OF CONNECTIVITY

Poor crossing design and construction can obstruct fauna passage, and can negatively impact fauna habitat values of upstream reaches. Poorly implemented rehabilitation may lead to erosion and loss of channel definition – as a result downstream flow may be decreased.

Importance of Connectivity in Ephemeral Streams

Environmental values of ephemeral waterways and wetlands are primarily determined by the presence, flow and quality of water. With very low flows and loss of connectivity, water quality can deteriorate, and water bodies eutrophy. Only fish and macroinvertebrate species that are tolerant of varying and often harsh conditions can survive in these water bodies. Many of the fish native to ephemeral systems of central and western Queensland migrate up and downstream and between different habitats at particular stages of their lifecycle, loss of connectivity can have a major impact on their long term survival. Ephemeral waterways play a critical role in triggering spawning of adults and the dispersal of fry – important to maintaining genetic diversity as well as sustainable populations.

Mitigation

Impacts may be avoided, minimised or mitigated via a range of management strategies based on an appropriate understanding of the ecosystems involved.

Issues to be considered include the:

- scope and scale of both disturbance and rehabilitation of bank and bed habitat
- proximity of the development to other linear development and waterway obstructions, and the
- dimensions of crossings (particularly culverts), to ensure adequate water depth, water velocities and light.

Solutions commonly involve:

- choosing the optimal location and alignment for the linear development, to avoid impacts to large trees stabilising the banks, productive marine plant communities or high quality instream habitats
- off-sets for habitat loss, including wetland creation and/or rehabilitation
- the use of best-practice erosion and sedimentation control plans during construction rehabilitation of bed and bank habitat, and stabilisation of the banks with erosion control matting or similar

Conclusions

Of the potential impacts of linear developments, the construction of creek crossings (which can directly and indirectly affect riparian and aquatic habitat, and fish movement), poses the greatest threat to aquatic ecosystems. The scope and scale of potential impacts can be substantially reduced through effective environmental management based on sound ecological understanding.

frc **environmental** is a leader in the field of aquatic ecological impact assessment, management and monitoring.

Aquatic Aspects of Assessing and Managing Impacts Associated with Linear Development

Linear developments, including the construction of roads, rail-lines and pipelines, can impact aquatic ecosystems (fresh and estuarine) through:

- direct disturbance and loss of habitat
- indirect impacts to water and habitat quality resulting from for example, vegetation clearing, erosion and altered water quality, and
- restriction of longitudinal passage through altered gradients, velocities and patterns of flow.

This poster presents an overview of some of our recent work on linear developments, and highlights the importance of addressing aquatic ecological issues in conjunction with terrestrial ecology.



The World Through Different Eyes

frc **environmental** recently completed an aquatic habitat assessment along the proposed Boonah – Beaudesert road re-alignment. Upon arrival at a site we looked one way, while all the engineers were looking the other way! We typically look upstream and downstream to determine the connectivity and to assess the value of aquatic habitat. In contrast, the engineers look at the approaching slopes to assess the potential runoff and to help determine the hydraulically appropriate sized culverts to be installed. By the end of the day, the group of scientists began working as one team, discussing the engineering and ecological perspectives at each potential watercourse crossing.

At frc **environmental** we understand the value of synergy and are always keen to embrace a truly multi-disciplinary approach to 'problem solving'.

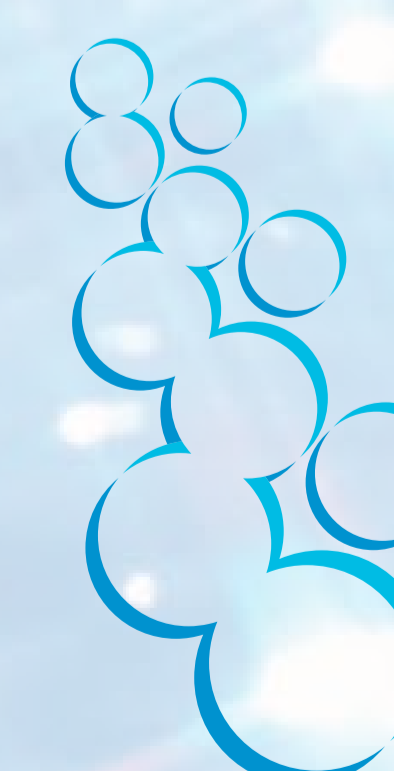
Estuarine Ecosystems

To support the proposed Port of Brisbane Motorway upgrade, we are assessing the likely impacts the road may have on intertidal and aquatic fauna, and are providing recommendations to minimise or mitigate impacts through both design refinements and effective environmental management. As the Motorway is adjacent to the Moreton Bay Marine Park and Moreton Bay Ramsar site, we are also ensuring the project complies with relevant legislation, and are assessing the potential impacts to fisheries productivity and fauna of conservation significance.

frc **environmental** ecologists have a strong understanding of current legislation, regulation and policy, enabling them to confidently scope studies that exceed agency expectations.

Freshwater Ecosystems

We are currently working on numerous pipeline projects in central Queensland. These pipelines are commonly hundreds of kilometres in length and cross several catchments. Experienced gained from the survey of hundreds of crossings, together with a detailed understanding of local ecosystems enables us to readily identify waterways that justify focused conservation efforts. We are then able to work with project engineers to develop crossings that meet particular performance specifications, or to design fishways or turtle lifts that ensure ongoing access to upstream reaches.



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