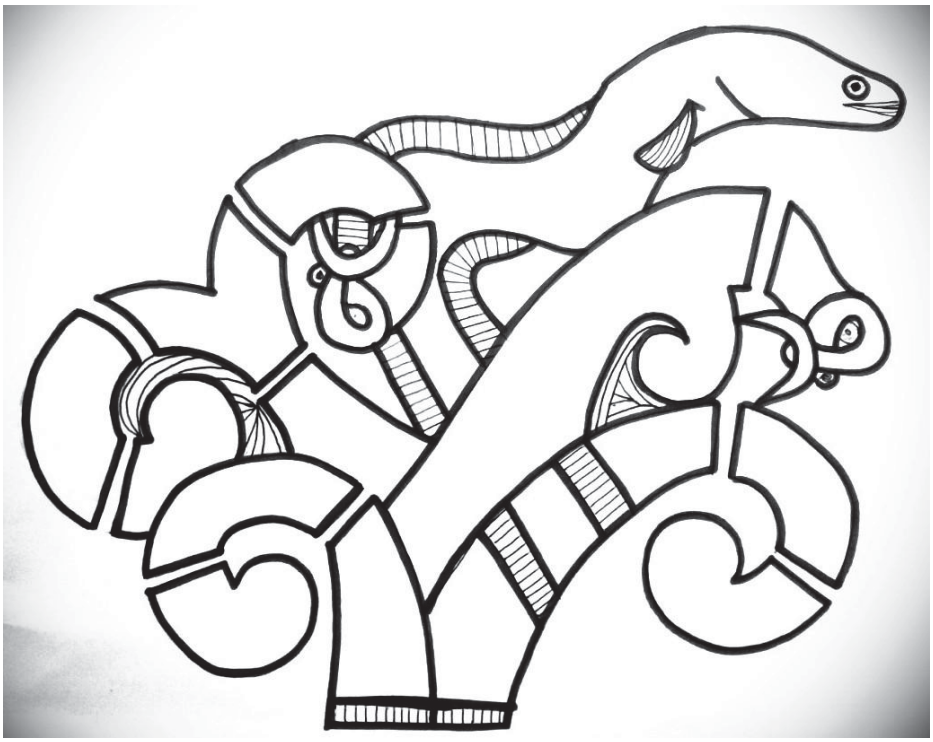
Restoring connectivity for migratory native fish:

investigating the efficacy of Fish Friendly Gates



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ABSTRACT

Stream connectivity and habitat diversity are key components of healthy river ecosystems. Human modification of natural flow regimes disrupts natural connectivity, and results in physical, chemical, and biological changes that impair natural river function. Such changes can be detrimental to freshwater species, particularly those which have evolved to be reliant on a variety of different habitats throughout their life cycles. Consequently, restoring connectivity has become a major restoration goal in freshwater ecology.

Tide gates, a man-made coastal structure designed to protect low-land infrastructure from flooding, can negatively impact freshwater ecosystems. Through disrupting connectivity, tide gates impede the movement of aquatic biota and degrade upstream habitats. It is thought that the vast majority of tide gates in New Zealand and worldwide could be modified to enhance connectivity and fauna passage through the installation of Fish Friendly Gates (FFG's). This study is the first to investigate these claims.

FFG's increased both the duration and distance that tide gates were held open over a tide cycle. These operational changes reintroduced some tidal fluctuation to upstream habitats but water levels remained within safe levels for infrastructure. FFG influence enabled upstream passage for giant bully and adult inanga, for which tide gates were otherwise impassable. Furthermore, upstream passage of whitebait (migratory galaxiid juveniles) and common bully were significantly increased when aided by FFG's. Although rapid and sustained increases in migratory species richness of resident populations were observed following FFG installation, due to small sample sizes these changes could not be regarded as statistically significant. Additionally, evidence of rehabilitation of degraded sites was limited and suggests care should be taken when restoring connectivity to poor quality habitat.

Overall, this study demonstrated that FFG's can enhance upstream fish passage at tide gates while maintaining adequate flood protection. Whether FFG's can provide ecological benefits to degraded habitats requires supplementary research. Provided the limitations of FFG's are recognised and they are only installed where tide gate removal is not feasible, FFG's are an effective tool for facilitating fish passage through tide gates in New Zealand and worldwide.

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