

# **Hatea River Half Tide Weir Proposal**

## **Notes on Ecological Concerns**

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### **Introduction**

In its present form the proposal will involve the construction of a weir to the half-tide level across the Hatea River somewhere near or just above the Hatea River Bridge. These notes are intended as a brief to the investigation of ecological impacts. The area of the impoundment above the weir is almost entirely in the zone where the freshwater of the river and the incoming tide meet. It is therefore very complex ecologically with special importance in terms of fish movements between fresh and salt water. There are numerous fresh and salt-water fish species which at various times of their life cycle or regularly at some part of the tide cycle use this "mixing zone". There is a complex mixture of invertebrate species in the benthic (bottom) environment and mangrove system. These organisms are made up of species from both systems and species that specialize in this zone.

### **The Hydrological Questions**

Before the biological concerns can be investigated the basic hydrology of the proposed new system needs to be understood. The two questions needing to be answered which will determine the biological effects are:

1. How will the water behind the weir (at various stages of the tide cycle) be affected in terms of; salinity, dissolved oxygen, suspended solids, and how much mixing of salt & freshwater will occur.
2. Considering the above will water quality above the weir be better or worse over the seasons and across the different tide cycles? The key parameters are dissolved oxygen, suspended solids, and bacterial contamination. This is important because the present state of health of the river and upper estuary is a concern. If the project caused any further decline in water quality the project would probably be unacceptable as viewed by the RMA. and the community.

### **Siltation Dredging and Contaminants**

There are some further issues arising from various contaminants which are in the sediments of the proposed project area. During construction and as a result of any regular dredging activity, quantities of heavy metals and other pollutants will be going into suspension. The minimal data which is available on the "toxicity" of the upper harbor's sediments, does suggest this is an important consideration. Essentially this is an accumulated effect from stormwater inputs over years. An effect of this type created during construction would be temporary and could be reduced as much as possible and

would therefore probably be acceptable. However cleaning behind the weir and the removal of silt from the “pond basin” may need to be on a regular basis. This would then be an ongoing and significant problem to overcome as the sediments would be “disturbed” on a regular basis.

To deal with this issue a plan would have to be made to remove the sedimentation behind the weir. Work done by the Regional Council measuring sediment loads in the Hatea and current dredging volumes suggest that this would be a major concern of a project like this. Once the strategy was specified the degree of toxicity of the sediments could be clarified and the extent of the problem of contamination of the upper estuary could be estimated. Possibly sediments could be “trapped” upstream and regularly harvested and restored with a landbased system. This could put the project in a “net gain status” as sediments would not be going into the ecologically valuable tidal area at the rate they are now. Another possibility is that the project could be linked to initiatives which restore the riparian protection of the Hatea river and tributaries i.e. tree planting schemes and storm water diversions to sediment ponds and/or wetlands. The latter approach would also reduce sediments behind the weir and lead to “net gains” in water quality.

### **Biological/Ecological Effects**

As stated above the pivotal issue regarding the effects is water quality. Once this issue is clarified then there are some specific effects involved which would need to be explored.

1. The health of Mangrove system is a fundamental concern; most species present are interacting with or dependent on the Mangrove system. With the half-tide weir concept it seems reasonable to assume that the impoundment behind the weir would be brackish and have higher fresh water content as the low tide cycle passed. If Mangroves were permanently submerged in this water they would die. However with the weir at the half tide level the Mangroves would be exposed for the entire low tide as they normally are. Mangroves do not grow below the half tide mark. In this case during the high tide cycle the Mangroves would be inundated with predominantly salt water as the tide comes over the dam across its entire length. The result should be that the Mangroves would be unaffected by the proposed weir. This conclusion needs to be checked with other experience and with the details of the hydrological assumptions made here.

2. Fish passage is a concern and one with clear statutory requirements. Essentially the weir cannot impede fish movement in any way. This is not however likely to be a serious problem because many fish species tend to move up the estuary with the incoming and full tide which would flow freely over the weir. To assure that there was free passage during the low tide cycle a fish ladder structure could easily be incorporated in the design of the weir. There is very good technical understanding of the requirements of these structures and detailed design information is available from the Department of Conservation and N.I.W.A.
3. Looking at the proposal from the ecosystem view the major effect is that the area of the low tide impoundment behind the weir will be changed from intertidal habitat to a permanently flooded or brackish subtidal habitat. As a result some of the benthic species presently there would not persist and would be replaced by other species typical of the subtidal zone. Does this represent a net gain or net loss ecologically? This is a very difficult question to answer. Both habitats are valuable and very productive. Probably the key to this question lies in the water quality. If water quality could be improved the addition of more subtidal habitat could be very positive to the system, however if the opposite is the case the loss of the intertidal habitat would be much greater than the value of created subtidal habitat degraded and limited by poor water quality.
4. The various species of fish both fresh and salt that frequent this area or pass through would have to be looked at in terms of whether there would be any adverse effects. All these species are tolerant of a great range of salt/fresh water mixing. It is unlikely that changes in salinity would be a problem. Having said this the half tide weir does create an artificial fresh/salt water mixing pattern above the weir, so this aspect would have to be examined in some detail. It is possible, but dependent on water quality that there could be “net gains” for fish species because of the additional subtidal habitat created.
5. In addition to the aquatic effects there would be some minor effects on bird species. The waders such as pied stilt and oystercatchers would lose some intertidal feeding habitat, whereas the fishing bird species such as shags and herons would gain fishing territory in the gain of subtidal habitat.

## **Some Concluding Comments**

The comments offered here are limited to ecological values. Obviously this project has been conceived from a perspective of amenity and recreational values which because of the importance of this area to the community are of major importance. In the long run the amenity and recreational values sought will be dependent on the ecological health of the Hatea. It is also likely in the future that the community will be conscious of the important role that the water quality of the Hatea plays in the overall health of the Harbor system. I would suggest that to gain wide public support this project will need to achieve a net benefit for the river and/or harbor in ecological terms.

All the ecological issues identified above need to be considered in the context of the current state of health of the Hatea and this is not good. Visual clarity, bacterial counts, dissolved oxygen and heavy metal contamination is a real concern. Storm water issues need to be addressed and riparian vegetation restoration work done to the entire river system. A status quo situation for the river is dangerous as the river's current rate of sedimentation, nitrification and pollution will have cumulative and ever worsening effects if not addressed. As a community I would urge that we should begin work on the restoration of the Hatea. A restored river would be the focal point for the town and be a significant attraction in itself. Ironically the proposed half tide weir could be successful in a healthy stream/estuary, but could fail in a degraded one. Perhaps the restoration of the river itself needs to be a higher priority for the community than the half tide weir.