Main Points from East Otago Taiāpure Management Committee submission on Port Otago Limited resource consent applications.

Introduction

1. Taiāpure – local fishery is a statutory fisheries area management tool and is a key component of the customary (non-commercial) fisheries settlement redress. The object for taiāpure is to make "better provision for the recognition of rangatiratanga and of the right secured in relation to fisheries by Article II of the Treaty of Waitangi" (Fisheries Act 1996, s174). A Taiāpure is over areas that "have customarily been of special significance to any iwi or hapū either – (a) as a source of food; or (b) for spiritual or cultural reasons" (Fisheries Act 1996, s174).
2. The East Otago Taiāpure was formally gazetted in 1999. Kāti Huirapa ki Puketeraki chooses to exercise their rangatiratanga, further guaranteed by the gazettal of the East Otago Taiāpure, through the East Otago Taiāpure Management Committee (EOTMC). The EOTMC is comprised of 50% representatives from Kāti Huirapa Rūnaka ki Puketeraki and 50% representatives from customary, commercial and recreational fishers, local environmental groups and the University of Otago. The members of the EOTMC are gazetted by the Minister of Fisheries to exercise rangatiratanga.
3. Importantly the EOTMC is an affected party, and has points of similarity but also difference from the views of Kāti Huirapa Rūnaka ki Puketeraki and Te Rūnaka o Ōtākou. This is not reflected in the CIA (as discussed in our submission at section 4.2), the AEE or the Planners Report. The EOTMC has a gazetted

mandate and authority to represent multiple sectors of the community, of which Māori is one aspect.

4. The proposed disposal of 7.2 million cubic metres of spoil near the Taiāpure has the potential to have a significant impact on the fishery, and on the EOTMC's gazetted, and legislatively guaranteed rangatiratanga.

Likely impact proposed disposal of sediment to fisheries and ecosystems

1. Sediment from the proposed disposal site could negatively affect key habitats that provide the base of ecosystems and fisheries within the Taiāpure and the wider Blueskin Bay area.
2. Rocky reefs that only cover a small proportion of the seabed but provide a dominant contribution to the functioning of ecosystems and fisheries in Blueskin Bay through provision of food and habitat are particularly at risk. Any reduction in the extent of these habitats resulting from smothering by sediments from dredge spoil is likely to have significant and irreversible impacts on fisheries within and surrounding the Taiāpure.
3. Rocky reef habitats are sensitive to relatively low levels of sedimentation and even small amounts of new sediment from the proposed activities present a major risk to the sustainability of fisheries within and surrounding the Taiāpure. Localised accumulation of sediments is likely to have greater impacts in certain areas.
4. The Taiāpure and surrounding coast is characterised by very turbid water with low light penetration (Hepburn et al. 2011; Pritchard et al. unpublished data). Any reduction in the amount of light reaching primary producers due to suspended

sediments from the disposal could have major implications for critical rocky reef habitats and flow-on effects to coastal food webs and fisheries within and surrounding the Taiāpure.

5. *Macrocystis pyrifera* (giant or bladder kelp) forests make up an estimated 8% of the outer coast area of the Taiāpure and have important and roles within and surrounding the Taiāpure. Kelp forests within the taiāpure and further north, have national importance. Sediment has been identified as critical factor in the loss of *Macrocystis* forests in California.

6. Recent work has shown that kelp productivity provides the majority of food for finfish within and surrounding the Taiāpure (Win 2011). Local anecdotal evidence has shown that loss of kelp forests has resulted in local collapses of commercial fisheries.

7. The East Otago Taiāpure was proposed to restore local pāua (*Haliotis iris*) fisheries. Juvenile pāua habitat is particularly sensitive to sedimentation and the major source of mortality at juvenile life-stages.

8. Sites within and surrounding the proposed disposal site could provide feeding and breeding areas for finfish and other mobile species that migrate from the Taiāpure during certain times.

9. Ecosystems within the Taiāpure do not exist in isolation and impacts on habitats further out to sea and along the coast will have implications for fisheries within the Taiāpure and vice versa.

10. The proposed dredging provides a major challenge to the restoration of fisheries within the Taiāpure and the sustainability of ecosystems and fisheries within the wider Blueskin Bay area.

11. "No level of species' protection or reserve status will be effective if water quality, coastal run-off, increased sedimentation, and contamination impact the ability of giant kelp to survive and thrive" (Foster and Schiel 2011)

Concerns surrounding hydrodynamic model to predict fate of dredged sediment

Background

1. The main concern with the off-shore Hydrodynamic model being presented by the Port is that not enough in known about the dynamics of the currents north of the proposed dump site, adjacent to the Taiāpure.

2. A question associated with this concern is if sediment is transported into the inshore regions of the Taiāpure, particularly deep into Blueskin bay, what mechanisms if any will transport it out? i.e. Is Blueskin Bay a "silt trap"?.

3. On disposal suspended material will be transported by currents and a small surface layer by prevailing wind. Once settled, dependent on depth and wave length, swell waves will stir up bottom and then currents will transport material

4. The nautical chart NZ661, "Approaches to Otago Harbour", contains three relevant pieces of information. It indicates the presence and strength of the Southland current. It indicates a southward flowing current into Blueskin Bay. It

indicates the presence of sand waves in Blueskin bay. Sand waves are associated with strong tidal currents and a source of sand.

5. The Southland current is documented in several publications, flow in a NE direction and has a strength of 2 knots at Cape Saunders. It does have both spatial and temporal variability.

6. Associated with the Southland current is a counter clock-wise headland eddy in Blueskin Bay. While there is firm evidence of the existence this eddy the only measurements of the currents associated with this eddy are at the western edge near Warrington Beach and the southern edge near Taiaroa head. These measurements were conducted by the port using a bottom mounted S4 current meter and give an indication of the strength of the current at the southern edge of the eddy near the disposal site.

7. The dominant wind directions are SW associated with cold fronts, and NE especially over summer. This will move a small layer of water at the surface in the direction of the wind.

Computer modelling

1. Computer modeling is one of the three methods used in Physical Oceanography. Computer modeling is useful as there are situations where it is not practical or cost effective for direct observation. However computer models have various aspects to them that people need to be aware of.

2. Assumptions - That depart the model from reality such as those inherent in physical equations. These can be buried in a model.

3. Elasticity - A computer model needs to be flexible enough to cover many scenarios. For example if a model for Dunedin's weather produced only mean results, then there would be no such thing as storms or fine days.

4. Calibration. - Models need to be tested against reality.

5. Errors – Errors can be amplified in a computer model. If the input data is incorrect, so will the output.

6. Scale. - Is the model being used appropriate for the geographic scale in question. Is a model used for regional scale appropriate or too general to make predictions on a local scale.

What we are being told the model suggests

1. The general picture the port is painting is that once disposed the suspended material will transported away in a N/NE direction and very little will end up in the Taiāpure.

2. The picture they paint is that the eddy is weak and will have little effect on the transported predictions to the NNE. This is based on measurements near the disposal sites (A1 & A2) and deep within Blueskin Bay (B1), and a net prediction of the location and strength of the eddy from their computer model.

What we don't know

1. They have no measurements of the currents in the NNE region where this material is predicted to be transported to and the only measurements of the eddy currents are at the extreme west and southern edges.

2. The spatial and temporal dynamics of the counter-clock-wise headland eddy in Blueskin Bay

3. Specifically the strength of the current flowing N to S parallel to the Taiapure boundary down into Blueskin Bay.

4. The extent of the entrainment area into this eddy system.

5. The mechanism that will move silt out of the inshore areas of Blueskin Bay.

LandSat Imagery

1. This imagery is taken from NASA'a LandSat program *(*http://glovis.usgs.gov/*)*

2. There is approximately one photo opportunity every two weeks over the Otago Peninsula.

3. Imagery shows ocean surface currents due to sediment in the water.

4. Shows if anything that the currents associated with the eddy are very dynamic.

Concluding statements

1. High sediment loads already compromise habitats and fisheries within and surrounding the Taiāpure and we are unable to predict what impact more sediment might have on values surrounding these systems. One thing we can be sure of is that additional sediments will not be positive and could be catastrophic for the values provided by ecosystems within the Taiāpure and Blueskin Bay.
2. We are not convinced by scientists who believe they can predict the final resting place of highly mobile sediment that will be re-suspended in a system as complicated as the Blueskin Bay Gyre.
3. The Port presents a scenario of a weak eddy system that is constant and will transport material away to the N/NE, based only on three current measurements at the southern and western edge of this eddy and a computer model.
4. Satellite imagery however shows this eddy system to be both spatially and temporally very dynamic.
5. A lack of funding has hampered our challenge of the legitimacy of the scientific arguments provided by the applicant in such an inaccessible and voluminous manner. This underlying inequality prevents a voluntary group like the East Otago Management Taiāpure Committee from taking a more active role in challenging the science surrounding this application and we believe this undermines the whole application process.
6. We believe that the fragility of the ecosystems as well as the cultural, social and economic importance of the Taiāpure will be adversely affected by proposed volume and location of the proposed deposition of spoil at site AO. The interaction of these multiple components will have a cumulative effect on the

cultural, social and economic wellbeing of the East Otago Taiāpure and the communities who draw on the East Otago Taiāpure and surrounding areas.

7. We ask if the values provided by marine ecosystems within the Taiāpure and the wider Blueskin Bay area are outweighed by the inconvenience and cost of disposing of sediment elsewhere?

8. E kore te Pātiki e hoki ki tōna puehu. A flounder will not go back to the mud it has stirred up.

Additional references to those in our written submission

Hepburn C.D, Pritchard, D.W., Cornwall, C.E., McLeod R.J., Beardall, J.B., Raven, J.A. and C.L. Hurd. (2011). Diversity of carbon use strategies in macroalgal communities. Implications for a high-CO_2 ocean. Global Change Biology: DOI: 10.1111/j.1365-2486.2011.02411.x

Win, R.E. (2011)The importance of macroalgae on rocky reefs: A critical aspect for fish and epifauna of the East Otago Coastline. MSc Thesis. University of Otago 192pp