Memorandum

For Your Information

To: Alexandra Smith – Senior Consents Officer

From: Ash Rabel
Team Leader - Aquatic Ecosystems

CC: Karen Wilson & Nick Ward

Date: Wednesday, 20 November 2024

Subject: *Advice on impact to CMA from Waituna opening*

Message:

Purpose:
This memo is provided to give further advice to the potential effects of discharges from Waituna Lagoon to the Coastal Marine Area during and after an opening event. The advice provided is anticipated to provide further context around what may be occurring during these events and is supplied in generalised way due to each opening event occurring under varying environmental conditions. It intends to answer the following questions:

- During an average (median?) lagoon opening event, what is the volume of water discharged from the lagoon to the coastal marine area, and what is the concentration of contaminants in the lagoon water being discharged?
- How does this compare to other sources of discharge to the CMA (i.e. Mataura River, or other example)?
- How do coastal processes at the Walkers Bay site function, and how would this influence the dispertion (dilution?) of lagoon water discharged?

General comment on an opening event:

When Waituna Lagoon is opened to the ocean it is usual to see changes in water colouration and appearance in the coastal and marine area immediately area near the opening location. This plume is largely different in appearance to the receiving waters due to a number of factors, including tannins within the lagoon water, higher suspended solids than the ocean, and the mechanical shifting of sediments near the opening location being caught up in the discharge. Satellite imagery shows that during low tide there appears to be ongoing discoloured water forming a plume. The cause of this discolouration is uncertain, but from satellite imagery appears to be humic like the water found in Waituna Creek. It also appears similar in colour to the water in the upper reaches of Awarua bay, where Waituna Wetland complex is a major, natural, source of freshwater discharges to the bay. The ongoing water volume being discharged into the CMA is comparatively low as the major surface water source for the lagoon, Waituna Creek, typically has the lowest flow (mean 1.57m^3/s) of the monitored streams in our region.

The impacts of water quality discharged from Waituna Lagoon to the CMA are a bit more complicated than volumes and visible plumes. We can, by utilising water quality parameters of the lagoon prior to opening and

modelled volumes of water discharged from the lagoon during the September 2024 opening event, get an indication of the discharged nutrient loads (using TN as an example). In this case they were higher than most Southland estuarine environments, except New River. However, this is calculated for the ~30hours during which the lagoon is draining and does not reflect ongoing discharged loads after the drainage event, which are expected to be lower. We cannot predict the specific concentrations of contaminants in the water on the day of discharge but can anticipate that they would be reflective of previous sampling results (as shown on LAWA: https://www.lawa.org.nz/explore-data/southland-region/lakes/waituna-lagoon). This will be caveated by the potential for changes to occur as fringing areas are de-watered rapidly alongside hydrologic disturbance potentially re-suspending any deposited sediments and associated contaminants, which we are unable to quantify.

We do not specifically monitor water quality in the coastal marine area, so it is difficult to infer what is occurring to the marine ecosystem in the mixing or dispersal zones. There is limited understanding of water movement within the bay, but due to beach morphology and charted near shore depth, it is expected to be a relatively high energy environment with high water movement.

It is likely, given that opening events have been ongoing on an almost annual basis for the past 80+ years, and no reports of marine algal blooms or otherwise have been received, that the discharges are having little lasting effect in the water column of the CMA. We have not investigated the benthic environment around the bay so cannot comment on what may be occurring there.