

**From:** Mark James <markj@aquaticsciences.co.nz>  
**Sent:** Wednesday, 18 November 2020 9:42 a.m.  
**To:** Natasha Pritchard  
**Subject:** RE: Lake Onslow monitoring plan  
**Attachments:** memo re monitoring plan review.docx

Hi Natasha

See attached for comments on the Lake Onslow monitoring plan. As noted I would have expected more details on the methods used and why. There are much better, more scientifically accepted methods that should be considered but they may not be practical in this case.

Regards  
Mark

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# Memo

**To:** Natasha Pritchard  
**From:** Mark James  
**CC:**  
**Date:** 18-Nov-20  
**Re:** Lake Onslow variation – review of monitoring plan

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## Introduction

Aquatic Environmental Sciences (AES) was asked to provide a technical review of the Draft Lake Onslow Monitoring Plan (the **Plan**) and specifically to:

- identify whether it includes sufficient details;
- confirm whether the technical information provided in support of the draft plan is robust including being clear about uncertainties and any assumptions; and
- highlight any questions/concerns with what is being proposed.

Documents that were provided by the ORC were the covering letter from Landpro Ltd, draft AEE, conditions and Plan.

The conditions require that the consent holder monitor Lake Onslow in accordance with the LOMP and must comprise under draft condition A1, but not be limited to:

- a) A minimum of one baseline monitoring round in February 2021; and
- b) A minimum of two post baseline monitoring rounds. The monitoring rounds must occur in February for two years in succession when the minimum lake level is 682.5 metres above mean sea level or lower in the previous 12-month period. The 12-month period must be from 1 February of the previous year to 31 January of the current year.

Within two months from the completion of each monitoring round, a report prepared by a suitably qualified ecologist detailing the results must be prepared and submitted to the Consent Authority and the Otago Fish and Game Council.

## Review

The Plan provides the aim, background and methods to be used for sampling biota in the lake and angler catches, as recommended in my earlier review of the application.

Overall, the Plan is relatively superficial, not scientifically robust and does not contain all the information required of a monitoring plan. The general approach is appropriate and as noted it is critical to assess change in the light of natural variation, weather etc.

### *Macrophytes*

As stated in the background in the Plan adverse effects of the proposed change may be small enough to be undetectable. Thus, the methods used need to be robust enough to detect if there are small changes. The weed beds (should be referred to as macrophytes) are of concern because of their role as refuge and a substrate for invertebrates and refuge and habitat for trout and other fish in the lake. Thus, it is important that the extent and cover of these plants is adequately surveyed so that changes, if they did occur would be detectable.

It is important that the macrophyte species are identified to separate out invasive from native species (if present) and the importance of turf communities versus the taller vascular plants. The provider must be able to identify the macrophyte species.

I have not seen the sites but I would expect plot intervals in the vertical axis to be closer than 20 m in steeper areas to adequately cover the changes in extent (if using diver surveys?). What are the “means” to record cover and extent? There are no details on the method i.e diver records, grab samples from a boat or some other method? Diver surveys are the accepted method but if not appropriate, eg because of visibility, then grab sampling or echo sounding with spot grab samples for ground-truthing of species can be used.

### *Macroinvertebrates*

Macroinvertebrates such as mayfly, caddis and chironomid larvae are an important source of food for trout and changes in the species composition and abundance can significantly affect trout populations and condition.

The methods need further explanation and should include kick samples and sediment cores around the macrophyte beds (source of chironomid larvae etc). It is not clear what the “rocky shoreline” is but if this is cobbles then they should use surber samplers to get a quantitative count, if solid rock then a quadrat type of sampler could be used.

There are standard methods for sampling macrophytes beds and turf communities using large sampling bags put over macrophytes and removed for counting invertebrates. These methods should be investigated rather than just kick samples. However, these may not be practical depending on the characteristics of the littoral zone.

It will be important to identify macroinvertebrates to the lowest level possible including species of Mollusca and insect larvae (at least for caddis, mayfly and stonefly and suborder for chironomids). This should be made clear in the Plan.

### *Fish*

Small bullies and other fish provide an important food source for trout and there needs to be an adequate programme to assess their abundance, at least qualitatively. A basic netting programme would be best or at least qualitative observations for the likes of bullies.

The angler surveys, use of experienced anglers and observations around mouth of spawning streams (including photo points) is all appropriate and will be important additional information.

### *Other information*

The Plan should include how the data will be analysed and plotted to show whether the changes are meaningful and adverse. Expert opinion will likely be important for assessing whether ecological change is meaningful because of natural variation.

The plan should include a clear indication of the duration of levels below 2.5 m from maximum operating level that would result in a survey eg two weeks or more in middle of summer or winter will have very different effects to a few days in autumn.

### **Summary**

In summary the following further information is required to ensure the plan is robust and fit-for-purpose:

- Additional data to be used including weather conditions and lake levels in recent months leading up to the sampling;
- The Plan needs more detail on methods for macrophytes and macroinvertebrates, as discussed above, including whether dive or boat operated surveys will be undertaken, and should at least investigate better methods for macrophyte beds (eg echo sounding) and clarify “rocky shorelines” and the best way to sample. There needs to be more detail on why the methods were chosen if the alternatives discussed here are not practical;
- The Plan needs to be very clear on when repeat surveys are to be undertaken, what would be considered an adverse effect in subsequent assessments and how uncertainties and natural variation will be taken into account; and
- I agree that two baseline surveys should be carried out if practical, as interannual variability can be very important.