# FILE NOTE

Bay of Plenty REGIONAL COUNCIL

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**File Reference:**

**Date:** 20 March 2013

**Subject:** **Hornwort harvest Lake Rotoehu**

Hornwort (*Ceratophyllum demersum*) infestation of Lake Rotoehu likely occurred in the early 2000's, manifesting into large dense surface reaching beds in the southern end of the lake by 2004. Hornwort has been harvested from Lake Rotoehu in large quantities for the last five years after an initial trial began in 2006. Figure 1 displays the approximate nitrogen and phosphorous removal from the lake over that time.

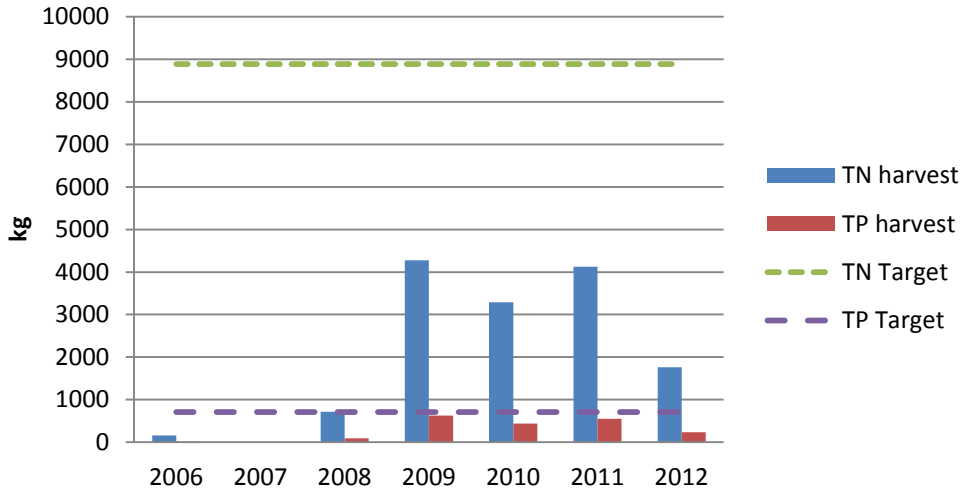


*Figure 1* *TN and TP removed from Lake Rotoehu with Hornwort harvesting (lake water column targets).*

Removal of Hornwort to vermiculture and landfill has achieved almost half of the Rotoehu Action Plan nutrient target for nitrogen in the previous three years of harvesting, Estimates show that over half the phosphorous target had been met 2009 to 2011, but for 2012 less than half the phosphorous target was achieved. For 2012 a less growth of hornwort, possibly due to climatic factors, has led to a reduced harvest and hence less nutrient removal (Figure 1).

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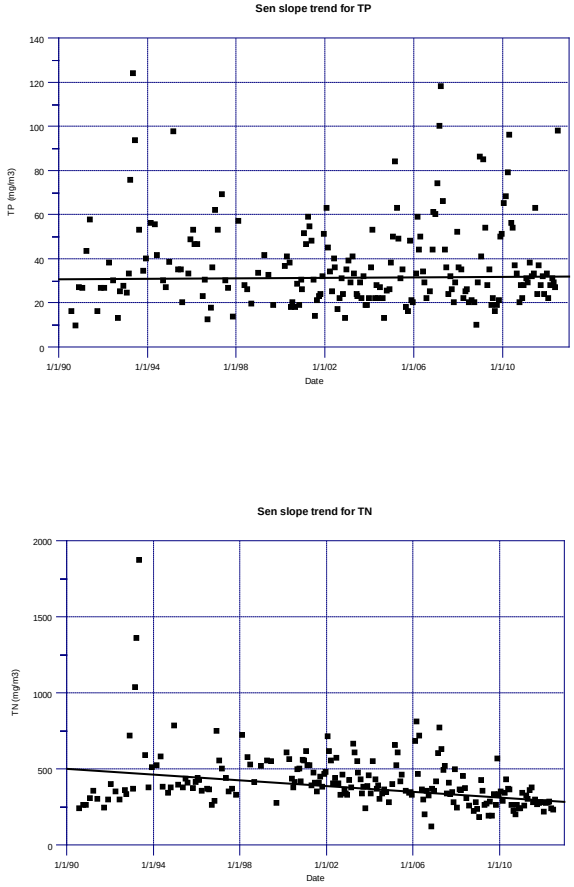


*Figure 2 Seasonal Kendall trend slopes for TP and TN, Lake Rotoehu.*

After five years of hornwort harvesting, no significant trend is apparent in TP concentrations within the lake. TN does show a significant long term downward trend ($p<0.001$) with TN concentrations in 2012 reaching similar levels to the early 1990s.

Dissolved reactive phosphorous continues to be released during summer periods of anoxia (Figure 3). A strong release occurring in summer 2009/2010, but a much weaker release in occurred in 2010/2011 although an extended period of stratification was recorded. Over the 2011/12 season the Rotoehu buoy only detected one event in February that almost reached full anoxic conditions at 10 metres depth. Hence, no strong DRP release was detected. Increased lake water levels and an inclement summer are likely to have suppressed periods of stratification and anoxia. Reduced phytoplankton uptake of soluble phosphorus along with intense rainstorms, predominantly over the summer, and turbulent conditions may explain the increase in average DRP concentrations since 2010.

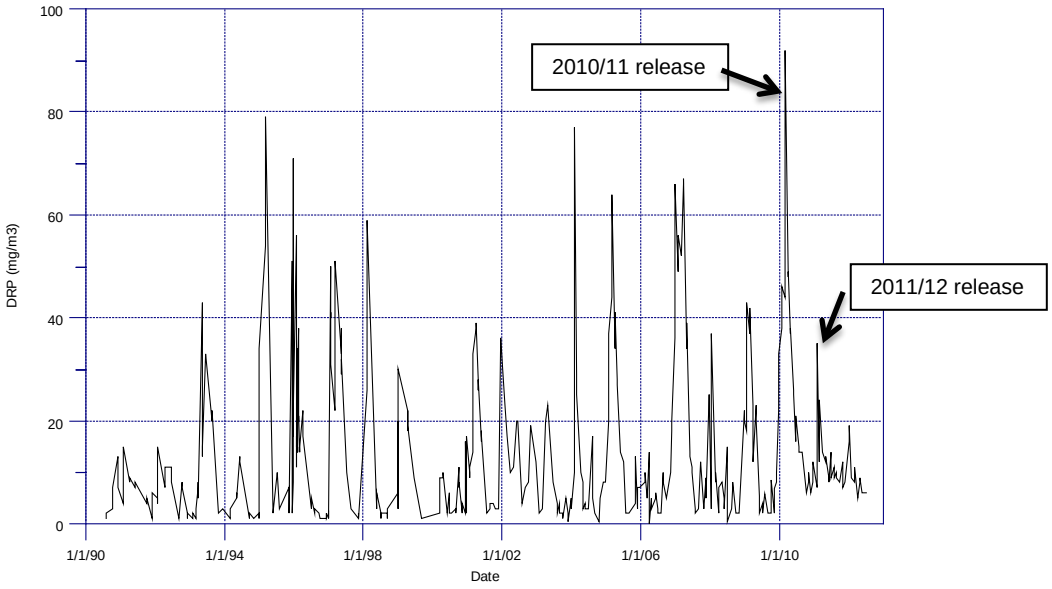


*Figure 3 DRP concentrations, Lake Rotoehu.*

An annual TLI of 4.16 for 2010/2011 and 2011/2012 is a large improvement in the lakes TLI, the best TLI in almost two decades. The reduction in nitrogen in the lake from hornwort harvesting does appear to having a positive impact on the lake's TLI and there has been a reduction in the intensity of cyano-bacterial blooms in the past two seasons (Figure 4).

The lake continues to see rafts of Hornwort throughout the lake which is likely to sustain a harvest programme in the next few years, although harvest volumes where down in 2012 possibly due to the increase in lake level and less favourable growing conditions.

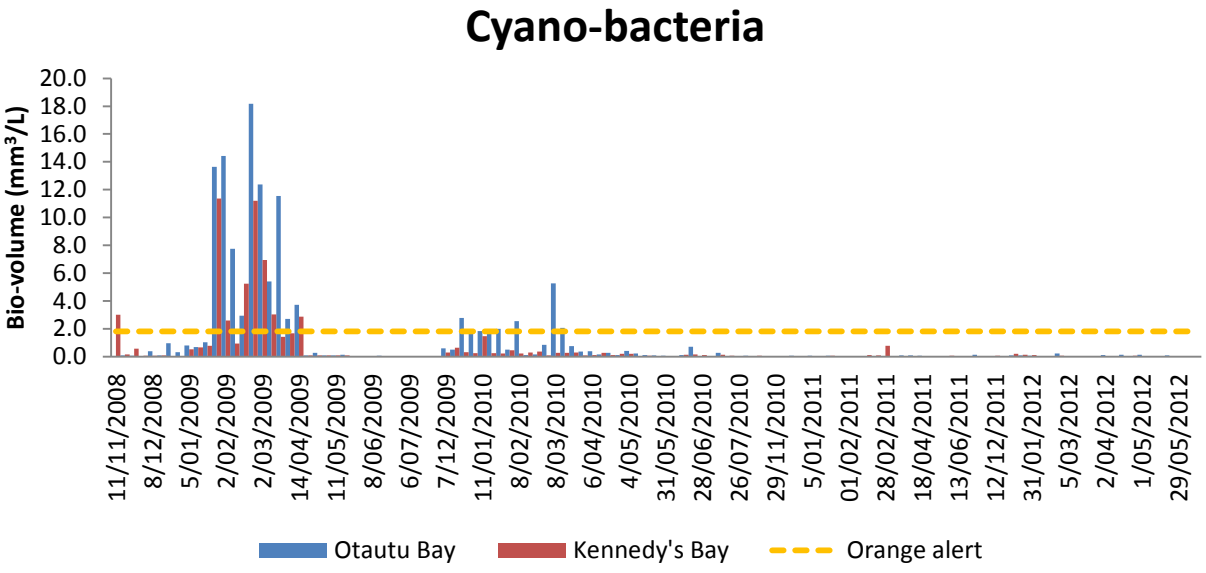


*Figure 4 Cyano-bacteria bio-volume levels.*

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