Lake Onoke

Background

- Lake Onoke is a type of coastal lake called a "barrier-bar lake" or "intermittently closed and open lake/lagoon" (ICOLL).
- In a natural state these types of lakes are more often closed off to the sea than open to it and the water is generally fresh or brackish.
- Typically they have high ecological values due to variety of habitats present but are very vulnerable to changes in hydrological regime and increased inputs of sediment, nutrients and other contaminants.
- The mouth of Lake Onoke regularly blocks under natural conditions. Blocking of the lake mouth means that this lake is highly susceptible to issues associated with nutrient and sediment inputs. However, this susceptibility is reduced by the regular opening of the lake mouth for flood protection purposes.

Is the one main water quality monitoring site representative of water quality across the whole of Lake Onoke?

- One main water quality site has been monitored monthly since August 2009 at a point where the Ruamāhanga River discharges into the lake (Figure 1).

Figure 1: Location (black circle) of the water quality sampling site on Lake Onoke

- The location of this monitoring site means it is strongly influenced by flow conditions in the Ruamāhanga River (e.g. concentrations of nutrients and sediments typically increase with higher river flows).
- The influence of the Ruamāhanga River on lake water quality is expected to decrease with distance from the river mouth. Therefore, it is unlikely that this site is

representative of water quality across the whole lake. However, there is limited data available for other sites in the lake to understand how water quality may vary. What data is available from sites located further away from the Ruamāhanga River indicates that water quality can be better or worse (depending on the water quality parameter as well as wind and tidal conditions) than that recorded at the main site located near the Ruamāhanga River.

- Since July 2014 two additional water quality monitoring sites located upstream of Lake Onoke have been sampled monthly as a trial to better understand the influence of the Ruamāhanga River and Lake Wairarapa on the water quality in Lake Onoke. This data is not expected to be analysed until late this year.

Additional drivers of water quality at this main monitoring site (other than the Ruamāhanga River)

- In addition to flow in the Ruamāhanga River, water quality is also influenced by the tidal cycle, whether the Lake Onoke mouth is open or closed (e.g. when closed there is limited flushing by tidal water). The shallow nature of much of the lake means that re-suspension of lakebed sediments by wind/wave action can also influence lake water quality (e.g. reduces water clarity and can result in an increase in suspended sediment and total phosphorus concentrations).

Lake Vs. estuary

- As long as the lake mouth remains open, Lake Onoke is considered to function more like an estuary than a lake and hence monitoring and management also needs to encapsulate estuarine characteristics.

Sedimentation

- Preliminary analysis of bed levels in Lake Onoke indicate that between 1994 and 2010 the levels of sediment on the lakebed increased by around 200 mm (12.5mm/year on average) which is considered a very high rate of sedimentation.

Lake Onoke, Lake Wairarapa and the lower Ruamāhanga River

- Wairarapa Moana is a dynamic system and water quality in Lakes Onoke and Wairarapa and the Ruamāhanga River are intricately linked, not only in a downstream direction but also in an upstream direction. For example, saline water can move from Lake Onoke into Lake Wairarapa (due to tidal movements or when the Lake Onoke mouth is blocked) which can result in improvements in water quality (due to dilution by the cleaner salt water) in Lake Wairarapa.