Waituna Lagoon health scorecard, Oct to Dec 2024

This document has been compiled by Whakamana te Waituna. It presents a selection of data sourced from Environment Southland, LAWA and Department of Conservation, indicating the water quality and ecosystem health of Waituna Lagoon.

Lagoon water quality and ecosystem health indicators		* Indicator levels		Data from ES (green = better than warning level, orange = worse than warning level, red = worse than critical level)			** Data from LAWA	
		Warning level	Critical level	Oct 2024	Nov 2024	Dec 2024	5 –year median	State and 10-year trend
Bacteria	***E. coli* (*Escherichia coli*)**	Prolonged level of *E. coli* > 260 CFU/100ml and not human source	Prolonged level of *E. coli* >1,200 CFU/100ml	29 CFU/100ml	7 CFU/100ml	<1 CFU/100ml	14 CFU/100ml	
Nitrogen	**Total nitrogen concentration**	≥ 0.75 and < 1.5 g/m^3	≥ 1.5 g/m^3	0.6 g/m^3	0.62 g/m^3	0.3 g/m^3	0.82 g/m^3	
Phosphorus	**Total phosphorus concentration**	≥ 0.05 and < 0.1 g/m^3	≥ 0.1 g/m^3	0.03 g/m^3	0.03 g/m^3	0.002 g/m^3	0.029 g/m^3	
Clarity	**Secchi disc depth**	≥ 0.5 m and < 1 m	< 0.5 m	0.88 m	0.88 m	No data	1.15 m	
Algae	**Chlorophyll *a***	0.012 - 0.06 mg/l	≥ 0.06 mg/l	0.04 mg/l	0.01 mg/l	0 mg/l	0.0027 mg/l	

Note: Environment Southland collects data from 4 lagoon sites each month. For the sake of simplicity, only data from Waituna Lagoon at Lagoon Centre is shown here.
Sources: * Indicator levels from Technical review of conditions for opening Waituna Lagoon (Robertson et al. 2024);
** Median, state and trend data from www.lawa.org.nz/explore-data/southland-region/lakes/waituna-lagoon/waituna-lagoon-lagoon-centre.

For additional environmental data, visit Environment Southland's Maps and Data website and select Waituna Buoy Data.

Indicator	Target *	Latest survey2024	Previous surveys (green = target achieved, orange = target not achieved) **															
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Lagoon closure	Lagoon closed over spring-summer	Lagoon open over summer																
Aquatic plant cover	>30-60% average % cover	2%																
Aquatic plant biomass index	>1000 average biomass index	53																
Macroalgae cover	<10% filamentous algae cover	<1																
***Ruppia* reproduc-tive success**	≥40% of *Ruppia* produced flowers	0																
Status of *Ruppia megacarpa*	≥20% of the sites record *Ruppia megacarpa*	0																

Note: Normally, DOC completes an aquatic vegetation survey only once a year, therefore the data presented each quarter remains the same for the entire year.
Sources: * Indicators and targets from Ecological Guidelines for Waituna Lagoon Waituna lagoon Guidelines v6-final.pages;
** Vegetation Status in Waituna Lagoon: Summer 2024.

Indicator	Explanation
Bacteria *E. coli* (*Escherichia coli*)	*E. coli* are bacteria commonly found in the gut of warm-blooded animals (including birds, livestock, dogs and humans). They are used as an 'indicator organism' to indicate faecal contamination including bacteria, viruses and protozoa. In water used for swimming and other recreation, low counts of *E. coli* are acceptable, but too much faecal contamination can cause gastroenteritis or infections of ears, eyes, nasal cavity, skin, and the upper respiratory tract.
Nitrogen Total Nitrogen	Nitrogen is a naturally occurring element, essential for growth. However, excessive nitrogen creates problems in freshwater as it can cause excessive growth of plants and nuisance algae. Some forms of nitrogen are toxic to aquatic life (fish and invertebrates) at high concentrations. Sources of nitrogen include wastewater, and industrial and agricultural runoff. Total nitrogen is the sum of all nitrogen types found in a sample. High total nitrogen can lead to eutrophication and algal blooms.
Phosphorus Total Phosphorus	Phosphorus is another naturally occurring element, essential for growth. High levels of phosphorus in freshwater can cause excessive growth of plants and nuisance algae. Sources of phosphorus include wastewater, household detergents and fertiliser. Total phosphorus includes all types of phosphorus found in a sample, including that bound to sediment. This is important in Waituna Lagoon as over time it can be released and become available for plant uptake. High total phosphorus can lead to eutrophication and algal blooms.
Clarity Total Suspended Solids	Clarity is important because it affects the ability of light to penetrate the water. Aquatic plants need light to grow. Water clarity is reduced by high levels of suspended sediment or algae in the water. As erosion occurs, tiny particles of clay, silt or small organic particles are washed into waterways. Particles that are tiny enough to be supported in the water current are termed suspended sediment. The faster the water is moving the larger the amount and size of suspended sediment particles it can carry. Soil type in the catchment can affect the amount of suspended sediment.
Algae Chlorophyll *a*	Large amounts of algae can decrease water clarity, change the colour and taste of water, reduce dissolved oxygen, alter pH, impact other organisms, and present a health risk to people and animals. Chlorophyll *a* is the green pigment in plants that is used for photosynthesis. The amount of chlorophyll *a* in a water sample provides an indication of the total amount of algae present. Algal blooms are a key indicator of severely eutrophic conditions.
Lagoon closure	Spring is when most *Ruppia* seeds germinate, and summer is when *Ruppia* plants grow, and produce flowers and seeds for the next season. For optimal *Ruppia* germination, growth and reproduction, the lagoon should be closed in spring and summer. When the lagoon is open, stressors to *Ruppia* include reduced habitat, desiccation of plants, inhibited germination, wind and wave disturbance, competition from slime algae that cope better with saline conditions and smothering by marine sediment.
Aquatic plant cover	*Ruppia* is the dominate aquatic plant in Waituna Lagoon and plays a key role in regulating water quality and providing habitat for animals. *Ruppia* cover is used as an indicator because it typically forms extensive beds in healthy ICOLLS (intermittently closed and open lakes/lagoons). We don't know precisely what a realistic minimum target is for aquatic plant cover, due to variability in sediment and exposure across the lagoon, and disturbance caused by lagoon openings that may limit the expansion and stability of aquatic vegetation. The Ecological Guidelines suggest the minimum target should be between 30 and 60%. This is based on international research and a recent review which recommended 50% coverage to ensure a clear water state.
Aquatic plant biomass	Aquatic plant cover measures only one aspect of the health and resilience of the aquatic plant community. Biomass of aquatic plants provides another useful measure. Plant biomass is estimated by an index of plant cover x height.
Macroalgae cover	Excessive growth of filamentous algae on the lakebed is an indicator of eutrophication. To remain in a mesotrophic state, the cover of filamentous algae should be less than 10%.
***Ruppia* reproductive success**	*Ruppia* can reproduce both vegetatively and by seed. It produces flowers and fruit in summer and autumn and most seeds germinate in spring.
Status of *Ruppia megacarpa*	There are two species of *Ruppia* in Waituna Lagoon. *R. polycarpa* is small and delicate. It commonly grows in shallower water and is better adapted to withstanding desiccation when water levels are low. Its seeds have the ability to germinate after they are covered in water again. *R. megacarpa* is large and robust with long, branching stems. It grows in deeper water and is more sensitive to desiccation. Good light penetration is important for *R. megacarpa*.