Rotorua Te Arawa Lakes Health Summary 2019/2020

Bay of Plenty Regional Council, Rotorua Lakes Council and Te Arawa Trust.
Working as one to protect out lakes with funding assistance from Ministry for the Environment

Lake Statistics (Water Quality Attributes)

Lake	Trophic Level Index		National Policy Statement for Freshwater Management (NPS-FM) Lakes Attributes				10 Year Trends (Improving / Indeterminate / Worsening)				Contact Recreational Attributes		
	TLI 2019/20^ (TLI Target)	TLI 3 Year Avg	2019/20 Total Nitrogen Median	2019/20 Total Phosphorus Median	2019/20 Chl-*a* Median	2019/20 Chl-*a* Max	Total Nitrogen	Total Phosphorus	Chl-*a*	Water Clarity	Blue-green health warning	Cyano-bacteria Biovolumes 2017-20	Swimming water quality – faecal[2]
Ōkāreka	3.0 (3.0)	3.3	A	A	B	A	Indeterminate	Worsening	Indeterminate	Indeterminate	N/A	N/A	Good
Okaro	4.5 (5.0)	5.0	C	C	C	B	Improving	Indeterminate	Indeterminate	Improving	Yes	C	Good
Ōkataina	2.6 (2.6)	2.7	A	A	A	A	Indeterminate	Worsening	Indeterminate	Indeterminate	N/A	N/A	N/A
Rerewhakaaitu	3.6 (3.6)	3.9	B	A	B	A	Indeterminate	Indeterminate	Worsening	Indeterminate	N/A	N/A	Good
Rotoehu	4.4 (3.9)	4.8	B	B	C	C	Worsening	Worsening	Worsening	Worsening	Yes	C/D	N/A
Rotoiti	3.7 (3.5)	3.8	B/B	C/C	C/B	B/B	Indeterminate	Worsening	Indeterminate	Indeterminate	Yes	A	Excellent
Rotokakahi*	*3.5 (3.1)*	*3.6*	*B*	*B*	*B*	*B*	Worsening	Improving	Improving	N/A	N/A	N/A	N/A
Rotomā	2.2 (2.3)	2.3	A	A	A	A	Indeterminate	Worsening	Indeterminate	Worsening	N/A	N/A	Excellent
Rotomahana	3.6 (3.9)	3.8	B	B	B	A	Indeterminate	Indeterminate	Indeterminate	Indeterminate	N/A	N/A	N/A
Rotorua	4.1 (4.2)	4.2	B/B	B/B	C/C	B	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Yes	A	Poor
Tarawera	2.7 (2.6)	2.8	A	A	A	A	Indeterminate	Indeterminate	Indeterminate	Indeterminate	No+	N/A	Excellent
Tikitapu	2.8 (2.7)	2.9	B	A	B	A	Worsening	Indeterminate	Worsening	Indeterminate	N/A	N/A	Good

*Italicised figures are based on Te Wairoa Stream monitoring and a three-parameter TLI (no Secchi disk).
^ No sampling occurred for March to May 2020 due to COVID lockdown; an average of February and June is used to supplement this missing data.
[2] NPS-FM Human contact attribute based on 95 percentile E.coli during the bathing season.
+ Lake Tarawera is not routinely monitored, however ad-hoc samples collected in response to public concern, has resulted in health warnings in past seasons.

What is The Trophic Level Index?

The Trophic Level Index is a number used to indicate the health of lakes in New Zealand. As a general rule of thumb the higher the number, the worse the water quality in the lake.

The number is calculated using four separate water quality measurements – total nitrogen, total phosphorous, water clarity, and chlorophyll-*a*.

National Policy Statement for Freshwater Attributes

To protect ecosystem and human health, attributes are measured to help determine the extent to which specific values are provided for. There is a range of different physical, chemical, microbiological and ecological attributes, and one attribute may apply to more than one value.

Attributes are graded A-D (E), with the National Bottom Lines set for some attributes. 'A' indicated ecosystems are healthy and resilient, or low risk to human health; to 'D' aquatic communities are in a persistent degraded state, or risk to human health from contact recreation is high.

Contact Recreation

Bathing and contact recreation sites are monitored during Summer throughout the Rotorua Lakes, to inform the public when and where it is safe to interact with the water. Not all lakes, or all bathing sites can be monitored, so popular and culturally significant sites are prioritised. Sites can be graded from Poor to Excellent based on attribute statistics in the NPS-FM.

Cyanobactreria are monitored in lakes with a history of algal bloom activity. Health warnings are issued by Toi Te Ora based on the volume of potentially harmful cells in the water, and sites are graded according to the NPS-FM.

A	Excellent
B	Good
C	Fair/Moderate
D	Poor

ROTORUA TE ARAWA LAKES PROGRAMME

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Lake Statistics (Ecological Attributes)

Lake	Lake Submerged Plant Index[1]				Kōura		Kākahi		Catfish	
	LakeSPI	LakeSPI Native Index	LakeSPI Invasive Index	Invasive Submerged Plants Present	Abundance	Trend	Abundance	Trend	Abundance	Trend
						Improving	Stable		Worsening	
Ōkāreka	High	B	C	d	Moderate[3]		Present[5]	N/A	Absent[5]	N/A
Okaro	Moderate	C	C	c	Absent[3]		Absent[5]	N/A	Absent[5]	N/A
Ōkataina	Moderate	B	C	c,d	Abundant[4]	N/A	Present[5]	N/A	Absent[5]	N/A
Rerewhakaaitu	Moderate	C	C	b,c,d	Present[4]	N/A	Present[5]	N/A	Absent[5]	N/A
Rotoehu	Moderate	C	C	a,c,e	Moderate[2]		Moderate[5]	N/A	Absent[5]	N/A
Rotoiti	Poor	C	C	a,b,c,d	Moderate[1]		Abundant[1]		Abundant[1]	
Rotokakahi*	Moderate	C	C	c	Moderate[4]	N/A	Abundant[5]	N/A	Absent[5]	N/A
Rotomā	High	B	B	d	Abundant[3]		Abundant[5]	N/A	Absent[5]	N/A
Rotomahana	Moderate	C	C	a,b,e	Absent[4]	N/A	Absent[5]	N/A	Absent[5]	N/A
Rotorua	Moderate	C	C	a*,b,c,d	Moderate[1]		Abundant[1]		Common[1]	
Tarawera	Moderate	C	C	a,b,c,d,f	Abundant[3]		Abundant[5]	N/A	Absent[5]	N/A
Tikitapu	Moderate	C	C	d	Moderate[4]	N/A	Absent[5]	N/A	Absent[5]	N/A

[1]*based on 2018 and 2019 LakeSPI survey data.*
Invasive Submerged Plants: a) Ceratophyllum; b) Egeria; c) Elodea; d) Lagarosiphon; e) *Potamogeton crispus*; f) *Ranunculus trichophyllus*
[1] Seasonal monitoring; [2] Spring and Summer monitoring; [3] 5-10 yearly monitoring; [4] Baseline survey only; [5] Observational data only
* Anecdotal evidence suggests that hornwort has established in Lake Rotorua, although it has not been picked up in LakeSPI surveys.

Lake Submerged Plant Index (Lake SPI)

The LakeSPI programme monitors macrophytes (aquatic plants) which are used to classify the ecological condition of lakes. The ecological status of a lake can be characterised by the composition of native and invasive plants.

'LakeSPI' index is a synthesis of components from both the native condition and invasive impact condition of a lake, and provides an overall indication of lake condition. The higher the score the better the condition.

Kōura and Kākahi Monitoring

Kōura and Kākahi monitoring is carried out by Dr Ian Kusabs of Kusabs and Associates Ltd. Kōura monitoring is undertaken on all the Rotorua Te Arawa Lakes.
Regular kākahi monitoring surveys are carried out in Lakes Rotorua and Rotoiti to monitor the long-term effects of lake restoration initiatives on kākahi populations in the shallow littoral zone of these lakes.

Catfish Monitoring

Catfish were first detected in Lake Rotoiti in March 2016 and in Lake Rotorua in December 2018. Surveys have been undertaken to detect their presence in the other lakes. So far they are limited to Lakes Rotorua and Rotoiti.

A	Excellent
B	Good
C	Fair/Moderate
D	Poor

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