

# The Lakes Conundrum – Options for Lakes FMU

A summary prepared by the TLG for the CSG

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## Waikato-Waipā Lakes

The Waikato and Waipā river catchments contain 62 lakes (as 59 individual or in multiple lake complexes). Details and information about each lake is appended below. However, the current Lakes FMU agreed to by the CSG contains only 19 shallow lakes which have monitoring information available. Thirteen of these lakes are currently monitored by WRC. We have not explicitly dealt with the remaining lakes in FMU discussions to date and this creates something of a conundrum. The NPS-FM requires that all water bodies be included in FMU(s), but many of the lakes have limited monitoring data with which to assess Attribute states.

There are a number of options for addressing the lakes conundrum and these are highlighted below for discussion by the CSG. It is expected that following CSG discussions there may be a need for further technical information before a final resolution of how lakes across the catchment are dealt with in relation to FMUs.

## Existing lake Information

In the Appendix below are details of 59 lakes (three geothermal lakes have been excluded). The lakes can be classified into four types (dune, peat, riverine and volcanic). The peat lakes are the most numerous (35). They tend to be small, with 23 of the peat lakes less than 10 ha in area. All 35 peat lakes have catchments dominated by non-native vegetation. Eight are currently monitored by WRC. Most are estimated to have “high” levels of nutrient enrichment.

There are 4 dune lakes, all less than 10 ha in size and all with nearly 100% non-native vegetation. None are currently monitored by WRC, but three have historic data available. All four have been estimated to have “moderate” levels of nutrient enrichment.

The 15 riverine lakes include the largest shallow lakes in the catchment (Waikare, Whangape, Waahi). All have been assessed as having “high” levels of nutrient enrichment. Four of the lakes are currently monitored.

The five volcanic lakes in the catchment are relatively poorly known. Only two of the five have any environmental data available, but both of these have been assessed as having “high” levels of nutrient enrichment.

## FMU options for lakes

The table below sets out a number of options for CSG to discuss in relation to resolving the issue of lakes currently sitting outside an FMU.

Option	Pros	Cons
Lakes FMU include only the monitored lakes and their catchments	Maintain low number of FMUs, data available for assessing current state and trends, and to help define policies	The majority of lakes in the catchment are not explicitly recognised
Lakes within the river FMUs	Fewer FMUs, fewer monitoring sites, integrated management	Risk that small lakes are 'lost' within large FMU with potentially differing issues, some lakes not connected to rivers
One lake FMU for all lakes	Maintain low number of FMUs, consistent policy framework for lakes	Available monitoring data may not be representative of all lakes, may have to apply policies with limited evidence
One lakes FMU for monitored lakes that are in D band	Maintain low number of FMUs, targeted management of lakes in most need	Adds complexity, doesn't provide for un-monitored lakes that might be D band
4 lake FMUs (1 for each lake type – see below)	Opportunity to tailor management to specific lake types and issues	Adds complexity
Lake FMU/s based on management requirements (if that differs from the river FMU they're in)	Individual lakes can get the most specific and targeted management action	Adds complexity, most lakes will receive little attention

### Issues

- Is the current monitoring of lakes in the Lakes FMU representative of all lakes in the catchments? If not, what other monitoring would be required
- Could water quality of lakes be assessed by modelling or estimation?
- Are the monitored lakes' current states representative of all lakes in each type?
- Does the management of individual lakes or types of lakes or the management of River FMUs need to take account of:
  - lakes that discharge directly to the rivers compared to those that do not; in the latter a representative monitoring site at the lower end of the FMU will not include a direct discharge/contribution from the lake(s)
  - lakes fed by streams compared to those fed by ground water and rain
  - lakes with managed water levels
- Are there specific issues in un-monitored lakes that will need to be addressed by different implementation methods
- How will we know whether un-monitored lakes have improved over time?

**Appendix 1. Summary information for 59 lakes in the Waikato-Waipā catchment. Information provided to TLG by WRC. Orange cells are those that are included in the Lakes FMU that has been discussed with the community.**

LAKE NAME	LAKE TYPE	Size (ha)	Estimated catchment size (ha)	% native veg in catchment	Historic Monitoring (Y/N)	Current WRC Monitoring	Estimated Nutrient Enrichment	ID in WRP as a significant wetland (Y/N)
Rotoiti	Dune	1.2	41.93	0	N	N	?M	N
Puketi	Dune	6.4	114.1	1	Y	N	M	N
Otamatearoa	Dune	4.9	68.3	0	Y	N	M	N
Parkinson (Kohahuake)	Dune	1.9	107.72	1	Y	N	M	N
Opuatia	Peat	6-7	?	7	N	N	?	Y
Rotokawau	Peat	22	1804	34	Y	N	H	Y
Rotokaraka	Peat	c. 6-7	?	?	N	N	?H	N
Hotoananga	Peat	19	71	0	Y	N	?	Y
Pikopiko	Peat	6.4	94	0	N	N	?H	Y
Areare	Peat	33	262	0	Y	Y	high	Y
Kainui	Peat	25	132	0	Y	N	high	N
Komakorau	Peat	2.6	619	2	N	N	?high	N

Kaituna	Peat	12	580	1	Y	N	high	Y
Whakatangi	Peat	2.7	170	0	Y	N	high	N
Tunawhakaheke	Peat	6.7	100	0	Y	N	high	Y
Rotokauri	Peat	41.7	933	0	Y	N	high	N
Waiwhakareke Horseshoe	Peat	3	66	0	Y	Y	high	N
Rotokaeo	Peat	3.1	?	0	N	N	?	N
Rotoroa	Peat	55	258	3	Y	?	moderate	N
Koromatua	Peat	9.9	200	3	Y	N	high	N
Pataka	Peat	4.6	55	13	Y	N	?high	N
Posa	Peat	2.05	95	10	Y	N	?high	N
Cameron	Peat	3.4	31	0	Y	N	?high	Y
Mangahia	Peat	8.4	354	4	Y	N	high	Y
Milicich	Peat	2.2	54	5	Y	N	high	N
Henderson's Pond	Peat	0.88	31	0	Y	N	?high	N
Maratoto	Peat	18	88	25	Y	y	high	Y
Mangakaware	Peat	12.9	238	0	Y	y	high	Y

Ruatuna	Peat	13	190	0	Y	N	high	Y
Rotomanuka	Peat	12.3	479	11	Y	Yes (from 1995)	moderate	Y
Rotomanuka South	Peat	5.4	479	11	Y	N	high	Y
Ngarotoiti	Peat	3.4	504	0	Y	N	high	Y
Ngaroto	Peat	108	1846	1	Y	y	high	Y
Rotopiko Serpentine - N Lake	Peat	5.3	163	8	Y	y	Moderate	Y
Rotopiko Serpentine - E Lake	Peat	1.6	163	8	Y	N	Moderate	Y
Rotopiko Serpentine - S Lake	Peat	8.3	163	8	Y	y	Moderate	Y
Rotopotaka	Peat	2.8	76	1	Y	N	?high	N
Rotongata	Peat	5.3	144	0	Y	N	?	N
Rotokotuku	Peat	1.1	18.5	11	Y	N	high	N
Whangape	Riverine	1450	31767	8	Y	y	high	Y
Te Kapa	Riverine	1	?	?	Y	N	high	N
Waiwhata	Riverine	8.9	?	15	N	N	high	N
Rotongaroiti	Riverine	53	2105	2	N	N	?high	y

Rotongaro	Riverine	292	1950	2	Y	N	high	Y
Kopuera	Riverine	52	250	25	Y	N	?high	Y
Penewaka	Riverine	4	?	?	Y	N	high	y
Waikare	Riverine	3442	21055	8	Y	Yes (from 1996)	high	Y
Ohinewai	Riverine	16	347	3	Y	N	high	Y
Okowhao	Riverine	21	?	5	Y	N	high	Y
Kimihia	Riverine	58	1485	41	Y	N	high	N
Waahi	Riverine	522	9221	6	Y	Y	high	N
Hakanoa	Riverine	52	613	20	Y	Y	high	N
Te Otamanui Lagoon	Riverine	5.4	?	7	Y	N	?high	N
Te Koutu	Riverine	6	416	4	Y	N	high	N
Opouri	Volcanic	23.5	636	2	?	?	?	?
Rotokawa	Volcanic	62	1090	7	?	?	?	?
Ngahewa	Volcanic	8.4	746	5	Y	N	high	N
Tutaeinanga	Volcanic	3.1	501	1	Y	N	high	N
Orotu	Volcanic	?	582	30	?	?	?	?