Chairman's Report AGM Friends of Lake Hayes, 23 August 2020

It has been another busy year for FOLH.

Summary of 2019-2020 Lake/Catchment health issues:

- The lake continues to display serious ceratium blooms and anoxia problems that lead to episodic fish kills.
- The lake suffered recreational cyanobacteria and e. coli limit breaches which resulted in closure of the lake twice this summer.
- The lake breaches the ORCs TP limit for lakes.
- Paddle boarder reported reasonably serious health issues after coming into contact with "green algae".
- Mill Creek and the Rutherford Rd spring are always in breach of the nitrate limit.
- Rain events continue to wash large amounts of sediment into the lake.
- Fishing activity remains low driven by continued pressure on trout numbers.

FOLH Progress to restoring Lake Health

We can report on good progress over the last 12 months:

- The lake buoy commissioned by ORC last year is functioning well and producing a lot of data. See appendix 1 for an example. It is providing a wealth of scientific data. For FOLH it will enable physical improvement options to be measured as we progress.
- QLDC Planners have proposed a new in the District Plan recognising the importance of the potential impact of land use changes on the health of Lake Hayes. See current QLDC Proposed DP policy below:

"Restrict the scale, intensity and location of subdivision development and use of land in the Lake Hayes catchment unless it can occur consistently with improvement to water quality in the catchment"

This policy is being challenged by developers in the Environment Court. FOLH see this as fundamental to protecting Lake Hayes and therefore will continue to defend this on behalf of our community.

- ORC have committed to updating the 1995 Lake Hayes Management Strategy in their 2020 Operating Plan. This document outlines the strategy around all the issues affecting lake health and will provide the framework for the ORC Regional Policy, water specific to Lake Hayes & Catchments. It currently also drives our working plans around physical improvements to both catchments and the lake.
- The ORC driven linear Study based around updating the 1999 Caruso study of non-point source nutrient load analysis throughout 10 sampling locations was completed at the end of June this year. This sampling study ran for 21 months. Data from this study will drive the update of the 1995 Management Plan and allow ORC to write a specific integrated water Plan for Lake Hayes & Catchment with the catchment element based on total nutrient/sediment load arriving at the Lake. This new plan will replace the current inadequate, non-cumulative concentration driven plan. It also will provide the data to support the catchment vision plan investment.
- FOLH commissioned a NIWA stud (jointly funded by ORC, DOC and QLDC to identify sources of pollution in the catchment. This work was completed and we are using this report to drive the next stage of this project identifying all existing wetlands that need protecting, creating a visionary catchment restoration plan, and detail design of the reconstructed wetland at the north end of the Lake between Mill Creek and

Rutherford Road. To facilitate this we have split the catchment into 9 sub catchments with associated land owners/stakeholders.

Sub- catchment	Owner/Stakeholder
North End Lake – Rutherford Road	DOC/QLDC
Lake – Ayrburn Farm	QLDC Reserve, Private Residents
Ayrburn – Waterfall Park	Waterfall Park Developments
Millbrook Resort	Millbrook
Millbrook – Roberts Property	QLDC Reserve, Private Residents
Coronet Forest	QLDC
Dagg Farm	Dagg Family
Coronet Peak	NZSki

See attached schematic on work agreed with stakeholders to date.

FOLH Community-Driven Action Plan.

FOLH was asked by the ORC to submit a prioritised Action Plan. This Plan is based on last year's ORC community consultation days and was submitted to the 2020 ORC Operations Plan. It is FOLH's view that implementing this plan in a measured way will result in shifting the Lake's health into improvement mode. Confirmation of success will be measured by continuing sampling of creek nutrient load and in the Lake measuring through both the buoy and monthly sampling.

Main Elements:

The first three elements of the Plan are around regulatory support, which will focus reducing the nutrient/ sediment loads going forward. The last three elements are about reducing current base load of nutrients to a level that the Lake can start to recover from naturally. This is a complex process with a lot of interrelated factors. Success of this plan will be measured and as we go forward and the plan modified to suit.

- 1. Refresh 1995 Lake Hayes Management Plan. See above.
- 2. ORC to deliver on Lake Hayes & Catchment load driven integrated Water Plan sitting within RPS, water as part of their requirement by the Minister of the Environment to have in place by 2023.
- 3. QLDC to include land use Policy within the QLDC DP to protect the health of Lake Hayes. (see above). This will need to be supported by mechanisms provided to developers to allow potential harm to be measured and removed in a way to "improve" the quality of the water arriving at the lake as set out in NPS-FM 2020 coming into effect 3rd September 2020. Through the support of the Morgridge Family FOLH will work with QLDC to provide consultancy support for options on how this may work. This will be provided through The Nature Conservancy (TNC). You can find out more about TNC at https://www.nature.org/en-us/about-us/where-we-work/asia-pacific/new-zealand/
- 4. ORC are currently reviewing Lake Hayes outlet flow and potential impacts of increasing the flow capacity to allow the lake height to be determined by the natural flow of the outlet creek. This forms part of the Plan identified in the LHMS to improve flushing of the Lake both naturally and by Arrow River augmentation at key times. Once this work is complete we will be able to progress the Arrow augmentation project which includes increasing the size of the outlet flow together with additional cool clean water from the Arrow River while maintaining the lake height in a defined operating height range.

5. Mill Creek Catchment Vision:

Restoring the health of the Mill Creek Catchment

With the generous support of the Sargood Bequest, Morgridge Family and members of FOLH we have been able to develop a visionary plan for the Lake Hayes catchment.

The objectives of the vision include:

To identify existing wetlands in the catchment that need protecting and if necessary improved through replanting etc.

To reduce nutrient/sediment load enough to start the healing process of Lake Hayes. Main elements of this Plan include

- Riparian improvements through run off management, planting, and creek shading.
- Sediment trapping throughout the catchment supported by regular maintenance to ensure that sediment build up flushed into the lake during rain events is significantly reduced. This extracted nutrient sediment will be supplied to the Wilding Compost turning a negative for Lake health into positive support for native reforestation project.
- Where possible reconstruct wetlands. FOLH have identified the first 2.8ha opportunity for rebuilding a wetland including sediment trapping at the north end of the lake between Mill Creek and Rutherford road. This area will be used to extract nutrients from both the creek and the Rutherford road spring and also house the final sediment trap before the creek hits the lake.
- Final detail design is under way which also include a focus on bird life habitat as well as improving the overall Lake Hayes Public amenity value.
- 6. Improving Lake Health through foodweb management

Sami Khan, PhD. student at Uni. of Otago Zoo. Dept. has recently completed a study under the supervision of Dr Marc Schallenberg. This work shows promise around opportunities to use this concept to assist in the improvement of Lake Hayes Health. Although his analysis is yet to be finalised he will present a taste of this promising work at our AGM.

I would like to thank all of the Executive of FOLH for the huge effort put in this year. We have been busy on many fronts but special note to Richard Bowman our secretary for continuing to produce excellent minutes and for researching and coordinating the many submissions made this year. Also thanks to Dep. Chair Jim Boult for support and advice. Thanks for the continued support from Dr Marc Schallenberg who provided technical support and advice in his own time throughout the year. Thanks also to Robyn La Roche who finds time to continue supporting our professional internet presence. Thank you to our Barrister Rob Enright and Solicitor Richard Allen support the Lake in the DP process, FOC. A special thanks to Alex Forbes, and all other ORC Councillors who have supported the Lake. Particular thanks to ORC staff Rachel Ozanne, Hugo Borges, Susan Wells and the sampling/gauging tram, Fiona Mangos, Gavin Palmer, Gwyneth Elson, Anita Dawe, and Sarah Gardner for recognising the importance of remediation of Lake Hayes & Catchment. Thanks also to Mike Theelen, Ian Bayless, Craig Barr, Ulrich Glasner, and Briana Pringle from QLDC and Geoff Owen from DOC.

Appendix One: Example of Lake Hayes Buoy data for last 12 months for 3 sensors.

Quote from Marc Schallenberg as an indication of what this data can be used for below. The data also clearly shows the lake stratifying as we come into spring. This also suggests that as well as flushing adding cool low nutrient water at this point would impact positively on lake health.

"The Secchi and Chla data that you graphed clearly illustrates the postulated bifurcating temporal pattern of water quality in Lake Hayes (Schallenberg & Schallenberg 2017). For example, 2018 was a year with consistently low Chla and high water clarity. In stark contrast, 2017 and 2019/2020 were bloom years. It will be very interesting to look at the effect of floods, climate, and Daphnia in relation to these different years. Sami's and Helen's work is building strong evidence that Daphnia and Ceratium are negatively correlated in the lake, but I suspect that floods (nutrient loads) and climate also play a role in determining whether we see a clear year or a bloom year in the lake. If Daphnia and floods turn out to be important, then we would have management levers (biomanipulation and catchment remediation) which could be used to improve the water quality of the lake more consistently over time.



Secchi depth since 2016 for ORC Lakes

Secchi

Water temperature (degC)





