

Lagoon of Islands Nutrient Management Strategy



Photograph courtesy of David Bluhdorn

1 INTRODUCTION

Hydro Tasmania is committed to improving the water quality in Lagoon of Islands (Lol) and has adopted a Nutrient Management Strategy that combines scientific and engineering approaches. This strategy will be implemented over the next 20 years and will address the present algal bloom in the short term, and reduce total phosphorus (TP) concentrations over the long-term.

The purpose of this paper is to present the Nutrient Management Strategy for Lol which aims to:

- achieve long term environmentally sustainable operation of the lagoon;
- deliver water of acceptable quality for riparian and irrigation use from the lagoon to downstream water users; and
- comply with Hydro Tasmania's Environment and Sustainability Policies.

2 BACKGROUND

Lol is managed by Hydro Tasmania as a water storage to provide 5,000 - 6,000 megalitres per year to Ouse and Shannon River irrigators and riparian water users downstream (Figure 1). Due to high nutrient input water quality conditions in the lagoon have deteriorated resulting in protracted algal blooms which render the water unfit for purpose.

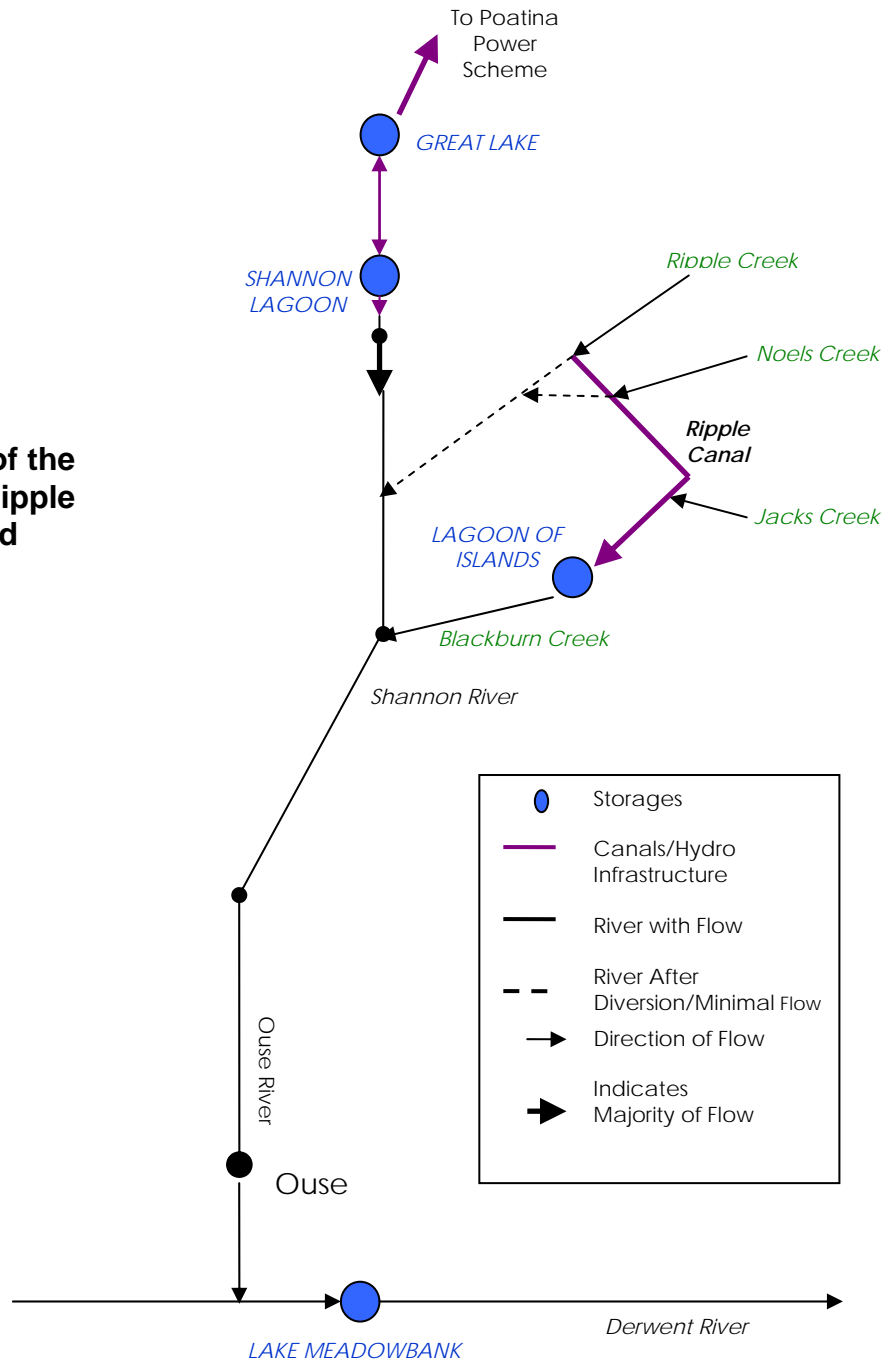
Considerable research has been done on Lol to understand the underlying causes of, and to determine the most appropriate solutions to, the poor water quality conditions. It is Hydro Tasmania's intention to use the benefits of past and future research to improve water quality in Lol.

3 AIM OF THE LAGOON OF ISLANDS NUTRIENT MANAGEMENT STRATEGY

The overarching aim of the Lol Nutrient Management Strategy is the improvement in water quality and ecosystem health. Achieving this aim will require the effective management of algal blooms in the short term and the reduction in total phosphorus (TP) concentrations over the long-term in the lagoon. Attaining the target TP concentration of 0.01 mg/L will facilitate restoration of a 'clear water state' in Lol. If

the target TP concentration in Lol is not achieved, there is unlikely to be a substantial improvement in ecological health in the lagoon.

Figure 1
Schematic diagram of the
Lagoon of Islands, Ripple
Canal and Associated
Waterways



4 THE NUTRIENT MANAGEMENT STRATEGY

A suite of implementation actions comprise the Lol Nutrient Management Strategy. The actions are:

- Management of Lol outflows and utilisation of Great Lake water.
- Remediation of Ripple Canal.
- A biomanipulation pilot study, with full scale biomanipulation implementation if the pilot study shows it to be feasible.
- Stakeholder engagement and communication.
- Continuation of water quality and algal toxicity monitoring.
- Development and implementation of an overall Environmental and Operational Management Plan for Lagoon of Islands and Ripple Canal.
- Investigation and development of alternative storages.

A description of these actions is provided in the following sections.

4.1. Management of Lol outflows and utilisation of Great Lake water

Hydro Tasmania is legally obliged to provide water to irrigators and riparian water users along the Shannon and Ouse Rivers. Historically, Great Lake and Lol water have fulfilled the demand, together providing 10,000 - 12,000 megalitres per annum for this purpose. While the algal bloom persists Lol water will be mixed with Great Lake water to improve the water quality received by downstream users. However, if water quality monitoring results indicate that the bloom has become toxic, Lol will be closed and Great Lake water only will be used to meet downstream irrigation requirements.

4.2. Remediation of Ripple Canal



High sediment inputs from bank erosion in Ripple Canal have been identified as a significant contributor to nutrient levels in the Lol. Approximately 300 m³ of sediment is being introduced into the lagoon each year. Remediation of the canal banks is expected to greatly reduce sediment and nutrient loads in both the canal and lagoon.

The long-term target TP concentration for Lol has been established as 0.01 mg/L. To achieve this, the Ripple Canal inflow will need to have an annual average maximum TP concentration of 0.016 mg/L. Recent investigations have indicated that baseline phosphorus inflows to the canal from its catchment area may be higher than that of the target value. To address this it is proposed that one of the key remediation actions is the construction of a wetland on Ripple Canal to filter inflows into the lagoon and Woods Lake. In addition to the wetland the remediation actions identified below have been chosen to maximise the likelihood of achieving the target concentration. These include:

- riprapping the canal;
- revegetation of the canal banks;
- fencing unfenced sections of the canal; and

- installing a turbidity meter and automated butterfly valve in Ripple Canal, set to operate when turbidity levels are too high.

It is clear that without effectively addressing nutrient inputs from Ripple Canal the cycle of poor water quality in the Lol will continue.

4.3. Biomanipulation

Biomanipulation is currently considered the only viable intervention technique to address the algal bloom in the short term. Biomanipulation, which involves the mass removal of fish to reduce predation pressure on zooplankton in the lake, thus allowing zooplankton to consume more phytoplankton (algae), is being investigated. The hypothesis is that the fish in the lake (especially juvenile fish) are consuming zooplankton to the extent that zooplankton are unable to control phytoplankton.

While biomanipulation is still largely an experimental technique, expert advice has indicated that biomanipulation is an appropriate management option provided enough fish can be removed from the lagoon. It is anticipated that biomanipulation will require up to two summers of fish removal. A pilot study, involving the Inland Fisheries Service (IFS), stakeholders and national experts will be undertaken in the 2006-07 summer to test the hypothesis. If the results of this study show that it is feasible, biomanipulation will be undertaken when conditions are optimal for success during the summer of 2007-08 and 2008-09. If the pilot study does not find biomanipulation feasible or effective, alternative solutions will be explored.

4.4. Stakeholder engagement and communication

Engagement and communication are essential for Hydro Tasmania to promote shared understanding and co-operation between stakeholders as the Nutrient Management Strategy is implemented. It is intended that irrigators, farmers, the community, recreational fishermen, IFS, eel harvesters and others will be involved in addressing Lol and Ouse River issues. Discussions and negotiations with stakeholders will be undertaken as the Environmental and Operational Plan is implemented. It is also envisaged that an appropriate forum for stakeholders to get

together and begin to work collaboratively will be established. Proposed plans and activities will be presented via newsletters, information and media briefs, the website, and public presentations.

4.5. Water quality monitoring

Continued monitoring of water quality conditions is essential to ensure that Hydro Tasmania is alert to changes in conditions in the lagoon. High algal cell counts have persisted over the 2006 winter indicating that regular monitoring will be required until the bloom abates. Monitoring will be continued and, if necessary, increased in the lagoon and the Ouse and Shannon rivers. In the short term a turbidity meter will be installed in the top end of Ripple Canal for continuous turbidity readings and a buoy will be utilised to install water quality monitoring probes in the lagoon.

4.6. Environmental and Operational Management Plan

An Environmental and Operational Management Plan will be developed and implemented to coordinate and ensure continuity of all actions and operations over the long term. The plan will be incorporated into Hydro Tasmania's Environment and Sustainability Management System (ESMS), updated annually and revised every 5 years. Issues to be addressed under such a management plan will include:

- annual management actions;
- regular review and reporting of the effectiveness of management actions in moving Lol toward a clear water state;
- revision of operational procedures of Ripple Canal to ensure maximum benefit to Lol;
- guidelines for, and implementation of, hydrological management of the lagoon water levels and retention times for environmental purposes;
- stakeholder engagement and consultation plan;
- a foreshore management plan which will address threatened vegetation species, Aboriginal heritage, recreational use and fire management of the lagoon, and be complementary with the surrounding landowner plan for sustainable forestry in the Lol catchment; and

- development of contingency plans for the range of management options undertaken.

4.7. Alternative storages

A number of sites have been identified for potential off-stream storage to provide additional alternative capacity for the supply of water to the Shannon / Ouse irrigators. Off-stream storage would minimise the use of Great Lake water and could be utilised to capture Lol water released out of season, thereby increasing Lol effective yield. Development opportunities will be pursued.

5 TIME FRAME

The timeframe for reducing nutrients and achieving sustainable conditions in the lagoon is uncertain as it is dependant on ecosystem responses to the management actions undertaken over the next five years. Preliminary calculations suggest 20 years for restoration to a clear water state following successful remediation of Ripple Canal. During this time it is expected that the lagoon will remain susceptible to algal blooms.

The broad time frame for implementation of the Lol Nutrient Management Strategy over the next 18 months is as follows:

- Biomanipulation pilot study is planned to occur in the 2006-07 summer.
- Management of water retention time in the lagoon (i.e. inflow, outflow and lake level) is planned to commence 2007-08 and continue until a clear water state is reached.
- Biomanipulation is scheduled to commence in the 2007-08 summer with the first stage being completed by the 2008-09 summer.
- Remediation of Ripple Canal will be initiated in 2007 for completion in 2008-09.

6 INDICATORS OF SUCCESS

Indicators to assess the success of the strategy have been identified. The process will be carefully managed and monitored to determine the success of the strategy. Progress will be reported.

7 CONCLUSION

The Lol Nutrient Management Strategy initiates a new era for Lagoon of Islands. The strategy aims to improve water quality and ecosystem health, to maintain water yield and to retain both Lagoon of Islands and Ripple Canal as functional components of Tasmania's hydro-electric system. Achieving sustainable conditions will depend on ecosystem responses to the management actions planned for the next five years. Progress will be closely monitored and appropriate actions taken as issues arise.

8 FURTHER INFORMATION

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