

Protecting Lakefield's wetlands – strategic eradication of *Salvinia molesta* in upstream sources

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ABSTRACT

A large scale salvinia eradication project in the upper reaches of the Laura River on Cape York Peninsula aims to remove the threat this weed poses to a series of ecologically significant wetlands downstream in Lakefield National Park. The project commenced in 2008 and represents one of the largest salvinia eradication attempts in Queensland. Now close to completion the project has so far successfully removed salvinia from a 240 hectare irrigation supply dam and over more than nine kilometres of downstream waterways. This paper provides an overview of this eradication attempt and documents some of the key lessons learnt.

Key Words: Salvinia, Eradication, Weeds of National Significance.

INTRODUCTION

Salvinia (*Salvinia molesta*) is a free floating aquatic plant often described as one of the world's worst aquatic weeds. Native to South America it has since spread to and naturalised in other countries through its use as an ornamental plant. It has prolific growth rates and under ideal conditions can double in size in three days (van Oosterhout 2006). In ponded or slow moving waterways salvinia forms dense floating mats across the waters surface, which causes considerable ecological impacts including the complete displacement of aquatic flora and fauna. Salvinia is a Weed of National Significance and is a Class 2 pest under the *Land Protection (Pest and Stock Route Management) Act 2002*.

In 1998 a salvinia infestation was discovered in Honey Dam, a 240 hectare irrigation supply dam located in the upper reaches of the Laura River near the township of Lakeland. This was only the second known incursion in Cape York but was highly significant as it threatened Lakefield National Park, located 68km downstream. Lakefield, the second largest National Park in Queensland, features an extensive series of valuable wetland systems that are home to a wide range of native flora and fauna, including the endangered cotton pygmy goose (*Nettapus coromandeliandus*) (Stephan 2006).

BACKGROUND

Following the detection of salvinia in Honey dam initial control works by the Cape York Weeds and Feral Animals Program and local stakeholders were successful in reducing the severity of the outbreak and destroying the original source of the infestation, a gully above the dam. The CYWAFAP also developed the Cape York Salvinia Management Plan with a long term goal to eradicate salvinia from the catchment.

In 2008, despite the initial response efforts, salvinia remained in Honey dam and had spread 9km further downstream along Bullhead Creek and into a second dam. At this stage there were strong concerns that the infestation was likely to continue its downstream spread and eventually reach Lakefield NP. In response to these concerns a stakeholders meeting was convened in April 2008 to discuss future options for management. The main

outcomes were a consensus that eradication should still be pursued but suitable investment be sought to commence an eradication program. Key stakeholders present at the meeting included South Cape York Catchments, National Aquatic Weeds Management Group, Cook Shire Council, Queensland Parks and Wildlife Service and local landholders.

Pursuing eradication was ambitious, particularly given the size of the infestation. Despite salvinia reproducing only through vegetative growth eradication is considered difficult due to its aquatic nature and rapid growth rates. The Salvinia Control Manual states there are very few situations where eradication is possible and these are normally restricted to enclosed water bodies less than 1 ha in size (van Oosterhout 2006). However, most stakeholders agreed there were a number of exceptional circumstances with the Lakeland infestation that warranted an eradication attempt. These included:

- biological control agents, although providing effective site control, would not prevent eventual further downstream spread and subsequent invasion of Lakefield NP
- the significant and irreversible ecological damage to the parks wetlands that would result from a salvinia invasion
- the low risk of salvinia reintroduction into the catchment
- the limited distance salvinia had spread since its invasion, despite annual wet season flooding and flushing
- Honey dams use for irrigation supply meant water levels were significantly lowered during the dry season, providing favourable conditions for salvinia control.

In 2008/09 approximately \$90,000 was secured from the Caring for our Country program by South Cape York Catchments to commence the eradication project. An additional \$150,000 of Caring for our Country funding was sourced over the following two years to continue efforts. Significant in-kind support for the project was provided by the Laura Indigenous Rangers, Queensland Parks and Wildlife Service, NAWMG, Cook Shire Council, CYWAFAP, Biosecurity Queensland and local landholders. This included labour, supply of herbicides, loaning equipment and expert advice.

METHODS

Salvinia management requires site specific consideration with priorities dependent on the climate, nature and use of the water body, and extent of the infestation (van Oosterhout 2006). During the project planning phase consideration was given to exploit site characteristics that aided in salvinia eradication, such as the lowering of the dam, and to also overcome the site specific management challenges. Key challenges included:

- the size and extent of the infestation, which crossed approximately 270 hectares and 9km of waterways, with varying degrees of accessibility
- extensive undergrowth and reed beds across the site, which provided ideal harbourage areas for salvinia to hide, potentially compromising eradication efforts
- a series of permanent spring fed gullies, each of which provided a persistent source of salvinia fragments and were difficult to treat due to their muddy nature.

In response to the challenges posed by the sites size and diversity a staged approach to control was developed, using the following separate management units.

1. Honey dam - 240ha irrigation supply dam and the upstream limit of salvinia.
2. Bullhead Creek upper– a 2km stretch of stream above a creek causeway to Honey dam, including twelve surrounding swamps, springs and an off stream dam.
3. Bullhead Creek lower – a 2km stretch below the causeway to Laura River, including four swamps.

4. Laura River– 5km of waterway downstream from the Bullhead Creek and Laura River junction to the downstream limit of salvinia.

The staged approach involved concentrating the intensive treatment efforts in the upstream management unit until all salvinia was removed, after which the intensive efforts then moved to the adjoining downstream unit. Management at downstream units was limited to biological control to suppress salvinia and reduce the risk of further spread.

The intensive treatment program involved an integration of the following methods.

1. initial fortnightly herbicide treatments of salvinia infestations using herbicide Weedmaster duo ® (glyphosate 360g/L) under minor use permit
2. removal of all vegetation acting as harbourage areas
3. draining of salvinia infested dams (where present)
4. fortnightly monitoring of the management unit and hand removal of small salvinia regrowth following intensive herbicide treatment
5. use of containment booms in Honey dam.

To undertake the control works the project utilised a full-time contractor with part time support from SCYC employees and the other project stakeholders.

RESULTS & DISCUSSION

Honey Dam

Control efforts commenced in May 2009 with biological control releases on Honey dam and other downstream sites. Intensive control efforts commenced in September the same year with initial fortnightly spraying of salvinia in the dam from boat or quad-bike around the dam edge. Herbicide treatments destroyed the bulk of the salvinia and subsequent hand removal from canoes or by foot removed the remaining plant fragments. Booms were deployed in the upper dam reaches to trap the salvinia reappearing in the spring fed gullies until such time each gully could be treated. Spraying with both herbicide and salt successfully destroyed the remaining fragments in these muddy gullies. By May 2009 all salvinia fragments had been destroyed in Honey dam with no regrowth detected since.

The treatment program in Honey dam was aided by: biological control, which greatly restricted the density of salvinia; the lowering of Honey Dam, which stranded and desiccated much of the salvinia and reduced the treatment area; and the south easterly trade winds, which helped push much of the salvinia to the highly accessible north-west corner of the dam.

Bullhead Creek Upper

Intensive control efforts commenced in October 2009 and initially focused on clearing harbourage areas for salvinia. A combination of spraying, fire and slashing was successfully used to clear reed beds, woody debris and other vegetation that potentially hid salvinia across a 33 ha area. This provided clear access to much of the site, which allowed successful treatment of any salvinia present through herbicides and hand removal. In addition an off stream dam infested with salvinia was siphoned to desiccate salvinia trapped riparian vegetation. By January 2010 all salvinia was destroyed in this management unit with no regrowth detected since.

Bullhead Creek Lower & Laura River

Intensive control efforts in the remaining 7km of the Bullhead creek and Laura River units commenced in 2010. Efforts concentrated removing some off stream infestations as wet

season flushing had removed salvinia from the main channel. Although there were a few reoccurrences of salvinia in areas previously thought clear recent surveys have been encouraging, with no salvinia found since March 2011.

CONCLUSION AND KEY LESSONS LEARNT

Since its implementation in 2008 the salvinia eradication project has proved to be highly successful and is close to completion. Currently only the only salvinia present at the site is the odd re-occurrence of small salvinia fragments in the downstream reaches despite frequent monitoring of the entire project site. In addition, regular surveys have found no salvinia in either Lakefield National Park or in the 59km of the Laura River between the park and the project site. Regular monitoring across the site will continue with eradication only to be considered when three years passes without a detection of a salvinia fragment.

The project has demonstrated some key lessons for eradicating salvinia, which have implications for salvinia managers across the country. These are briefly discussed below.

1. With sufficient planning and resources, and providing salvinia can be successfully contained, eradication of salvinia is possible on larger scales than previously thought.
2. Eradicating such a large salvinia infestation would not have been possible without the use of biological control - the high levels of control provided by the salvinia weevil substantially reduced both the cost of herbicide treatments and the risk of further downstream spread.
3. Reed beds, woody debris and other vegetation acts as harbourage areas for salvinia. Their removal is extremely labour intensive but essential if salvinia is to be eradicated.
4. Several alternative control methods were trialled without success. These included use of flame throwers and geofabrics to burn or shade salvinia trapped in mud.
5. Glyphosate proved to be a highly useful herbicide for eradicating salvinia and its registration for use against salvinia should be pursued. In addition, salt proved effective in treating salvinia trapped in mud.
6. When using herbicides across the large expanses of water the use of a marking dye helped avoid double ups and missed patches.
7. Manipulation of water levels in infested dams greatly aids eradication efforts.
8. Although time consuming manual removal by hand is essential for successful eradication. Involving people with different builds and sequestration techniques in survey and hand removal increases the likelihood of remaining plants been found.

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REFERENCES

Stephan, K. (2006). Draft Cape York Peninsula Salvinia management plan 2007-2011. Cape York Weeds and Feral Animals Program, Cooktown.

van Oosterhout, E. (2006). Salvinia control manual – management and control options for salvinia (*Salvinia molesta*) in Australia, NSW Department of Primary Industries, Orange.