Hunter Regional Hygrophila Management Plan 2017 - 2022

Hygrophila *(Hygrophila costata)*. Photograph by Sheldon Navie.

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1. Introduction

Hygrophila (*Hygrophila costata*) is a highly invasive aquatic weed which can out-compete native plants found in wetlands, dams, rivers and other waterbodies. It can grow up to 1.5m in height and form dense infestations which dominate native vegetation and alter the natural habitats of fauna. Hygrophila can also restrict access to waterways for recreational activities such as boating, kayaking and fishing.

2. Purpose

The purpose of this plan is to provide clear objectives and strategies for a collaborative approach to the management of hygrophila within the Hunter region of New South Wales.

3. Scope

This plan applies to the Hunter region of New South Wales which consists of the local government areas of Cessnock, Dungog, Lake Macquarie, Maitland, MidCoast, Newcastle, Port Stephens, and Upper Hunter County Council. The plan covers the period from December 2017 to November 2022.

4. Objectives

Consistent with the Hunter Regional Strategic Weed Management Plan 2017 – 2022, the objectives of this plan are:

1. To eliminate the risk posed by hygrophila in the Hunter region by preventing spread and destroying infestations with the aim of eradication.
2. To ensure that land managers in the Hunter region meet their legislative requirements in relation to the management of hygrophila.
3. To provide clear guidelines on the best-practice management of hygrophila in the Hunter region.
4. To establish a detailed surveillance program to identify and monitor hygrophila infestations in the Hunter region.
5. To increase the awareness and skills of weeds professionals, volunteers and landholders on the impacts of hygrophila, and how to identify and report infestations.

5. Legislative Requirements

Under the Biosecurity Act 2015, *Hygrophila costata* is regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk it may pose. Any person who deals with this plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

6. Regional Recommended Measure

Hygrophila has been classified as an “eradication” category weed based on a regional weed risk assessment undertaken as part of the Hunter Regional Strategic Weed Management Plan 2017 - 2022. Eradication species are present in the region to a limited extent only and the risk of re-invasion

is either minimal or can be easily managed. They also have a high to very high weed risk and high feasibility of coordinated control.
As a result, the following Regional Recommended Measure has been assigned to hygrophila for the Hunter region:

"Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found".

7. Distribution

Hygrophila is native to the Americas ranging from southern Mexico to Argentina, and has naturalised throughout the world in many other tropical and subtropical regions. It is thought that hygrophila was imported and cultivated in Australia for use as an aquarium plant. In New South Wales hygrophila has become invasive in the far north coast, central coast and greater Sydney regions. Infestations are also present in southeast Queensland. In the Hunter region, hygrophila is known to occur in only two Local Government Areas; Port Stephens and Maitland. In both cases these are single, isolated infestations.

7.1 Port Stephens Local Government Area

In Port Stephens the hygrophila infestation is approximately 1ha in size and is situated in two reserves in Raymond Terrace. One site located in Boomerang Park has undergone intensive control and has been eradicated. The second site is located in Ross Walbridge Reserve, which is densely infested with hygrophila (see appendix 1). This reserve is a Port Stephens Council owned and managed property consisting of a waterbody and small islands surrounded by established terrestrial vegetation. The reserve is also a roosting site for a state significant population of the Grey-headed flying fox (*Pteropus poliocephalus*) which is listed as vulnerable in NSW under the Biodiversity Conservation Act 2016. As a result, Port Stephens Council has obtained a licence to undertake maintenance works including weed control activities at this site under stringent protocols.

7.2 Maitland Local Government Area

The hygrophila infestation in the Maitland LGA originates in Two Mile Creek within a privately owned property on Raymond Terrace Road, East Maitland (see appendix 2). The hygrophila spreads downstream in small isolated patches through Easts Leisure & Golf Club and into Tenambit Wetlands. The wetland forms part of a large Crown reserve, of which Maitland City Council is the trustee. The total infestation covers an area of approximately 5ha.

8. Ecology

Hygrophila grows all year round, but most rapidly during summer. It is an erect emergent perennial herb which can reproduce vegetatively (by stem fragments) and also by seed. Plant fragments and seed are dispersed via water, wind, animals, machinery and watercraft/vehicles. When dispersed stems come into contact with soil, they will develop roots at the node and establish a new plant. Hygrophila seeds become sticky when wet which increases the risk of spread on vectors.

9. Identification

The key identification features of hygrophila are as follows:

- Leaves are hairy, in opposite pairs and tapering at the base. They can be up to 18 cm long and 3 cm wide. They have prominent veins and a distinct midrib.
- Stems can be red to purple in colour. Upper stems are 4-angled, erect and rarely branched. The lower stems are prostrate and root at the nodes.
- Flowers are white, tubular and inconspicuous (10mm in length). They occur in whorls in the leaf axils.
- Fruit capsules are about 7 mm long, spindle-shaped and inconspicuous containing 12 – 18 seeds. Seeds are about 0.3 mm wide, pale brown, flattened and round.

10. Impact

Hygrophila can have a significant impact on important environmental assets such as freshwater wetlands and waterbodies, as well as the banks of rivers and creeks. This weed has the potential to form dense stands and exclude all other vegetation. This would have a severely detrimental effect on the biodiversity of an infested site. Spread can be rapid and difficult to contain, due to the large number of water-dispersed seeds that it produces.

11. Management Principles

A collaborative effort using a variety of key management principles will be required to achieve the long-term aim of eradicating hygrophila from the Hunter region.

11.1 Identify the source of infestations

The sources of all hygrophila infestations in the region must be identified. Management of the hygrophila should start from the most upstream infestation. Ensure that associated waterways and nearby dams or other waterbodies are inspected for additional infestations.

11.2 Containment of infestations

It is crucial that known hygrophila infestations are contained and the potential for spread to other areas is minimised. Booms can be used to minimise the risk of downstream spread and contain the hygrophila to the original infestation. Good weed hygiene practices are essential in preventing the spread of hygrophila to other areas.

11.3 Weed hygiene

There are a number of potential vectors for the spread of hygrophila seed and stem fragments, many of which are unmanageable such as animals and water. However, good hygiene practices need to compliment the control treatments to prevent the spread of hygrophila via boats, vehicles, machinery and equipment used for weed control. All equipment must be thoroughly washed down before leaving an infested site.

11.4 Seasonal timing

Seasonal timing can affect the success of control methods used to manage weeds. The most appropriate timing for controlling hygrophila in the Hunter region must be implemented in the management of the weed. Herbicide treatments should occur four times per year commencing in

September with further treatments in November, January and March. If physical removal is an option, this can be undertaken in the cooler months.

11.5 Surveillance

Early detection with rapid response is the most cost effective form of aquatic weed management and increases the likelihood of successful containment or eradication. This approach also reduces costs by treating the incursion when it is small and not widely distributed. Failure to detect hygrophila infestations early will severely limit the ability to implement effective management. Early detection inspections should be carried out annually on sites which have a high risk of hygrophila infestations occurring. These sites will include properties which are adjacent, linked or downstream to known infestations. These high risk sites should be inspected in spring and summer and following heavy rainfall or flooding. Treated infestations will also require regular monitoring, as there is a chance of re-infestation even if it appears that the hygrophila is eradicated.

11.5 Monitoring

Treated infestations will need to be monitored to determine the effectiveness of the control techniques. Photographic monitoring points and detailed mapping of the hygrophila will help record the condition, size and extent of the infestations prior to and following treatments. Detailed records of all treatments must be kept and (in the case of local control authorities) uploaded to the Biosecurity Information System (BIS) on a monthly basis.

12. Control Options

Control options for hygrophila are currently quite limited. There are no biological control agents available for release at present. Mechanical removal would be difficult and is likely to be detrimental to the aquatic environments which it is found in. Manual removal of small, isolated infestations is possible, but not practical in the current larger infestations found in the Hunter region. Planting native plants as competition for hygrophila is an option, however natural regeneration, growth and spread of suitable native species is likely to occur as the hygrophila is reduced in density. As a result, chemical control is currently the best control method for hygrophila.

12.1 Herbicide use

APVMA permit number PER14729 allows for persons trained or experienced in the preparation and use of agricultural chemicals to use herbicides containing glyphosate (360 g/L) or metsulfuron-methyl (600g/kg) to treat hygrophila. This can be undertaken in aquatic and semi-aquatic situations, providing it is in a non-potable water area. It is recommended that the herbicide used for treating the hygrophila is alternated between glyphosate and metsulfuron-methyl. This will minimise the risk of herbicide resistance developing, and will also allow for four treatments to occur per year, rather than three (as stated in the permit for metsulfuron-methyl only).

13. Education & Awareness

One of the most effective actions that can be taken to control and prevent the spread of Hygrophila is to raise awareness of the related issues. This will increase the likliehood of the community:

- Being aware of and understanding the significance of Hygrophila
- Identifying Hygrophila and reporting it to local control authorities

- Not engaging in behaviour that contributes to the spread of Hygrophila
- Participating in activities to control Hygrophila, if found on their property

Hygrophila education and awareness opportunities exist in the Hunter region via the following:

- Environmental education events
- Rural shows and field days
- Landholder engagement
- Volunteer group meetings (e.g. Landcare)
- LCA websites
- Nursery and aquarium industry engagement
- Market inspections
- Online inspections
- Hunter Regional Weeds website
- Media releases

14. Costs

The predicted costs associated with the actions contained in this plan are listed below in table 1.

Table 1. Predicted costs associated with the hygrophila action plan.

Financial Year	Organisation	Treatment costs per year $	Inspection costs per year $	Education costs per year $	Total cost $
2017/18	Port Stephens Council	2737	995	500	4232
	Maitland City Council	8016	2684	500	11200
2018/19	Port Stephens Council	2737	995	500	4232
	Maitland City Council	8016	2684	500	11200
2019/20	Port Stephens Council	2463	995	500	3958
	Maitland City Council	7214	2684	500	10398
2020/21	Port Stephens Council	2463	995	500	3958
	Maitland City Council	7214	2684	500	10398
2021/22	Port Stephens Council	1915	995	500	3410
	Maitland City Council	5611	2684	500	8795
	Total cost $	**48386**	**18395**	**5000**	**71781**

15. Action Plan

Objective 1: To eliminate the risk posed by hygrophila in the Hunter region by preventing spread and destroying infestations with the aim of eradication.

Action	Timing	Responsibility	Performance Indicators
Treat all known infestations of hygrophila using alternating herbicides (glyphosate and metsulfuron-methyl) under Permit 14729.	Four times per year in September, November, January and March for the life of this plan (2017 – 2022).	LCA or other land manager with Hygrophila infestations present.	Hygrophila inspection and treatment records uploaded to BIS on a monthly basis (for LCAs). Treatment progress provided to HWTT via member reports. Inspection reports – including size and extent of infestations.
Prevent spread from known infestations using best-practice vehicle and machinery hygiene. Install weed booms where required.	Ongoing.	LCA or other land manager with Hygrophila infestations present.	Inspection reports – including size and extent of infestations.

Objective 2: To ensure that land managers in the Hunter region meet their legislative requirements in relation to the management of hygrophila.

Action	Timing	Responsibility	Performance Indicators
Treat all known infestations of hygrophila using alternating herbicides (glyphosate and metsulfuron-methyl) under Permit 14729.	Four times per year in September, November, January, March for the life of this plan (2017 – 2022).	LCA or other land manager with Hygrophila infestations present.	Hygrophila treatment records uploaded to BIS on a monthly basis. Treatment progress provided to HWTT via member reports.
Prevent spread from known infestations using best-practice vehicle and machinery hygiene. Install weed booms where required.	Ongoing.	LCA or other land manager with Hygrophila infestations present.	Inspection reports – including size and extent of infestations. Number of new infestations identified in properties adjacent to known infestations.
Enforce appropriate action by landholders where hygrophila infestations occur.	Ongoing.	LCA where infestations occur.	Inspection reports – including size and extent of infestations. Number of controlled infestations.

			Number of Biosecurity Undertaking and Biosecurity Directions issued in relation to hygrophila infestations.

Objective 3: To provide clear guidelines on the best-practice management of hygrophila in the Hunter region.

Action	Timing	Responsibility	Performance Indicators
Provide up-to-date and correct identification, treatment and reporting information to landholders where hygrophila is present on or at risk of infesting their property.	Annually, in conjunction with hygrophila inspection program and as required/requested.	LCA where hygrophila infestations occur or are at risk of occurring.	Hygrophila extension records uploaded to BIS on a monthly basis. Number of landholders provided with best-practice guidelines. Progress provided to HWTT via member reports.

Objective 4: To establish a detailed surveillance program to identify and monitor hygrophila infestations in the Hunter region.

Action	Timing	Responsibility	Performance Indicators
Inspect all known hygrophila infested sites. Map and collect accurate infestation data.	Annually, each Spring/Summer and following a flood event.	LCA where hygrophila infestations occur.	Hygrophila inspection records uploaded to BIS on a monthly basis (for LCAs). Inspection numbers provided to HWTT via member reports. Inspection reports – including size and extent of infestations.
Inspect all associated properties, waterways, dams and other waterbodies that are at risk of hygrophila infestation.	Annually, each Spring/Summer and following a flood event. Inspections of any suspected or reported hygrophila infestations should be undertaken immediately.	LCA where hygrophila infestations occur or are at risk of occurring.	Hygrophila inspection records uploaded to BIS on a monthly basis (for LCAs). Inspection numbers provided to HWTT via member reports. Inspection reports – including size and extent of infestations.

Objective 5: To increase the awareness and skills of weeds professionals, volunteers and landholders on the impacts of hygrophila, and how to identify and report infestations.

Action	Timing	Responsibility	Performance Indicators
Provide hygrophila live samples, factsheets, posters, identification and treatment information in weeds displays.	During all relevant community weeds events held in the Hunter region.	LCA where event is occurring.	Feedback from the community. Number of potential hygrophila infestations inspected as a result. Data provided to HWTT via member reports.
Provide up-to-date and correct identification, treatment and reporting information to landholders where hygrophila is present on or at risk of infesting their property.	Annually, in conjunction with hygrophila inspection program and as required/requested.	LCA where hygrophila infestations occur or are at risk of occurring.	Feedback from landholders. Number of potential hygrophila infestations inspected as a result. Data provided to HWTT via member reports.
Provide up-to-date and correct identification, treatment and reporting information to Landcare volunteers in LGA where hygrophila is present or at risk of infesting.	Annually, in conjunction with Landcare events.	LCA where hygrophila infestations occur or are at risk of occurring.	Feedback from Landcare volunteers. Number of potential hygrophila infestations inspected as a result. Data provided to HWTT via member reports.
Provide up-to-date and correct identification and treatment information to weed professionals in LGA where hygrophila is present or at risk of infesting.	Annually, in conjunction with hygrophila inspection program and as required/requested.	LCA where hygrophila infestations occur or are at risk of occurring.	Feedback from weed professionals. Number of potential hygrophila infestations inspected as a result. Data provided to HWTT via member reports.

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Appendix 1. Map of Port Stephens Hygrophila Infestation

Appendix 2. Map of Maitland Hygrophila Infestation