

WEEDS OF NATIONAL SIGNIFICANCE

HYMENACHNE

(Hymenachne amplexicaulis)

Strategic Plan

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Supporting information about the National Weeds Strategy, Weeds of National Significance and progress to date may be found at www.weeds.org.au where links and downloads provide contact details for all species, their management committees and copies of the strategy.

This strategy was developed under the leadership of the Dept of Natural Resources, Queensland with full cooperation of all the States, Territories and Commonwealth of Australia.

Comments and constructive criticism are welcomed as an aid to improving the process and future revisions of this strategy.

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For further information contact:

John R Thorp, Project Manager

For the National Weeds Strategy Executive Committee

16 Flowers Court LAUNCESTON Tas. 7250

Telephone: (03) 6344 9657 Mobile: 0419 323 400 Fax: (03) 6343 1877

Email: jthorp@jta.com.au Web: www.weeds.org.au

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Dept of Natural Resources, Qld

Land Protection

Locked Bag 40

COORPAROO DC QLD 4151

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EXECUTIVE SUMMARY

Hymenachne (*Hymenachne amplexicaulis*) or olive hymenachne (NT) is a semi-aquatic grass introduced from South America in the early 1970's. It is planted in Queensland and the Northern Territory to provide 'ponded pasture' for cattle. Despite being a source of winter or dry-season cattle fodder in some areas, hymenachne has invaded natural wetlands and land used to grow sugar cane. Continued proliferation is expected to cause substantial losses to the sugar cane industry and serious damage to certain freshwater fisheries and conservation areas. Currently, at least 1000 ha are infested with hymenachne, primarily east of the Great Dividing Range in Queensland. Small infestations are starting to develop in the Northern Territory where it is also used in mimosa control programs as a competitive cover crop. The plant is in an early stage of population development and has considerable potential for spread within tropical and sub-tropical, coastal, freshwater wetlands. This strategy was developed in consultation with representatives from primary industries, conservation agencies and community groups. Major challenges for effective management of hymenachne include the continued planting of hymenachne for pasture, the high costs of control and the inaccessibility of many infestations.

The vision of the strategy is that:

The adverse impact of hymenachne is reduced to a minimum.

The strategy aims to deliver four primary outcomes:

1 The spread of hymenachne is prevented.

- Identify effective herbicides
- Seek NRA registration of effective herbicides
- Eradicate small 'satellite' infestations
- Prohibit inappropriate use of hymenachne
- Improve public awareness of possible impacts.

2 The adverse impact of hymenachne is minimised.

- Implement local control in areas where negative impacts are unacceptable to the local community
- Use declaration to support control on a catchment basis
- Quantify the positive and negative impacts of hymenachne
- Improve our understanding of the ecology and management of hymenachne
- Improve awareness of control methods.

3 National commitment to management of hymenachne is established and maintained.

- Establish a 'National Hymenachne Working Group' (HWG) to coordinate action
- Obtain funding for national strategy
- Promote WONS concept and national strategy
- Integrate hymenachne management into pest and natural resource planning framework
- Establish consistent policies and legislation at national level.

4 Ensure that this strategy does not trigger the introduction and use of additional species of non-indigenous ponded pasture species.

- Prevent introduction of additional ponded pasture species with weed potential
- Prevent release of potentially invasive ponded pasture species stored in 'Genetic Resource Centres' in Australia
- Improve public awareness of adverse impacts of introduced ponded pasture plants
- Develop codes of practice
- Develop and promote use of native hymenachne and other grasses.

The extent to which these outcomes are met will be evaluated as part of a five-year cycle of review and will determine the success of this plan.

THE CHALLENGE

Hymenachne, also known as olive hymenachne, is one of the few 'Weeds of National Significance' (WONS) that has both beneficial and detrimental impacts to different sections of the community. When grown as 'ponded pasture', hymenachne can provide dry-season cattle fodder in tropical areas and in sub-tropical areas that experience poor pasture production in winter. In the Northern Territory, it is also grown as a competitive replacement species in mimosa control programs on pastoral lands. Despite its use as a pasture plant, hymenachne has received national attention because of its ability to:

- invade low-lying sugar cane crops and block cane drainage ditches;
- contaminate irrigation storages;
- invade and destroy natural wetlands;
- degrade wetlands that act as nursery areas for commercially valuable fish such as barramundi.

Despite being released and planted with good intentions, it now appears that the plant's negative impacts could exceed its value as cattle fodder and as a competitive pasture. The "conflict of interests" between beef producers and other land users could make implementation of this strategy more difficult, but if effective, this strategy should play a significant role in resolving these sectoral conflicts.

Unwanted stands of hymenachne infest at least 1000 ha, primarily in the 'wet tropics' of coastal, north Queensland and coastal, Central Queensland. Growth is most vigorous in eutrophic wetlands affected by upstream agriculture. At present, there are very small infestations in the Northern Territory (c. 100 – 200 ha). Large areas of coastal and sub-coastal northern Australia appear to be climatically suitable for hymenachne. The plant is expected to thrive in many tropical, freshwater seasonal wetlands where the soil is inundated in the wet season and remains moist, but not dry, in winter. Since hymenachne is still in its early stages of population development, there is urgency to avoid further planting in high-risk areas. Prevention of spread is difficult once plants are established as dispersal occurs via floodwater and birds.

Implementation of this Plan will contain the spread of hymenachne and minimise its impact. In addition, the release of additional species of introduced ponded pasture species, which may have pest potential equal to or greater than hymenachne, will be prevented.



Hymenachne invading sugar cane near Babinda, Qld.

1 BACKGROUND

Hymenachne is a weed of national significance because of its potential impact on sugar cane production, natural wetlands, fisheries and irrigation storages. Most infestations occur along the east coast of Queensland; however, it poses a risk to many of northern Australia's coastal and sub-coastal seasonal, freshwater wetlands and riverbanks.

1.1 The biology of hymenachne

Hymenachne, *Hymenachne amplexicaulis*, is a stoloniferous, perennial grass. It is commonly known as "Olive hymenachne" or "Olive" in Northern Territory as "Olive" is the name of the commercially released cultivar. A relative, *H. acutigluma*, is native to the Northern Territory and north Queensland.

Hymenachne commonly grows to 1 – 2.5 m tall, the leaves are 10 – 45 cm long and up to 3 cm wide. It can be distinguished from other species of *Hymenachne* by its characteristic stem-clasping leaf bases. The plant's stems float on water. Roots are produced at each node along the stolons where they contact moist soil.

Flowers are arranged in cylindrical panicles, 20 - 40 cm long. Spikelets are lanceolate, upright and 3 - 5 mm long. Flowering can occur anytime between September and May, with most flowering between mid-April and May. Hymenachne produces large numbers of viable seeds that germinate readily on waterlogged soil. Trials suggest that seeds need to be sitting on waterlogged soil for at least 48 hours before germination occurs.

When growing in suitable habitat, hymenachne forms pure stands that exclude other plant species. Growth can be particularly vigorous in eutrophic wetlands that act as depositional areas for agricultural runoff high in nutrients and sediment. Hymenachne prefers low lying areas along the edges of permanent water bodies and within seasonally flooded areas where the soil is inundated in summer and moist, but not inundated, in winter (i.e., a moist sub-soil). It can tolerate areas that are flooded for most of the year and can withstand short periods of drought.

Graziers have planted hymenachne from seeds and from fragments of stolons. Once planted, secondary dispersal occurs when runoff water transports seeds or broken stolon fragments. Spread can be rapid and occurs every wet season. It is difficult to prevent floodwaters from carrying hymenachne downstream (although some pondage areas have been constructed in flood-free locations). There is anecdotal evidence that birds might carry stem fragments and seeds into new areas both through ingestion and in mud on their feet.



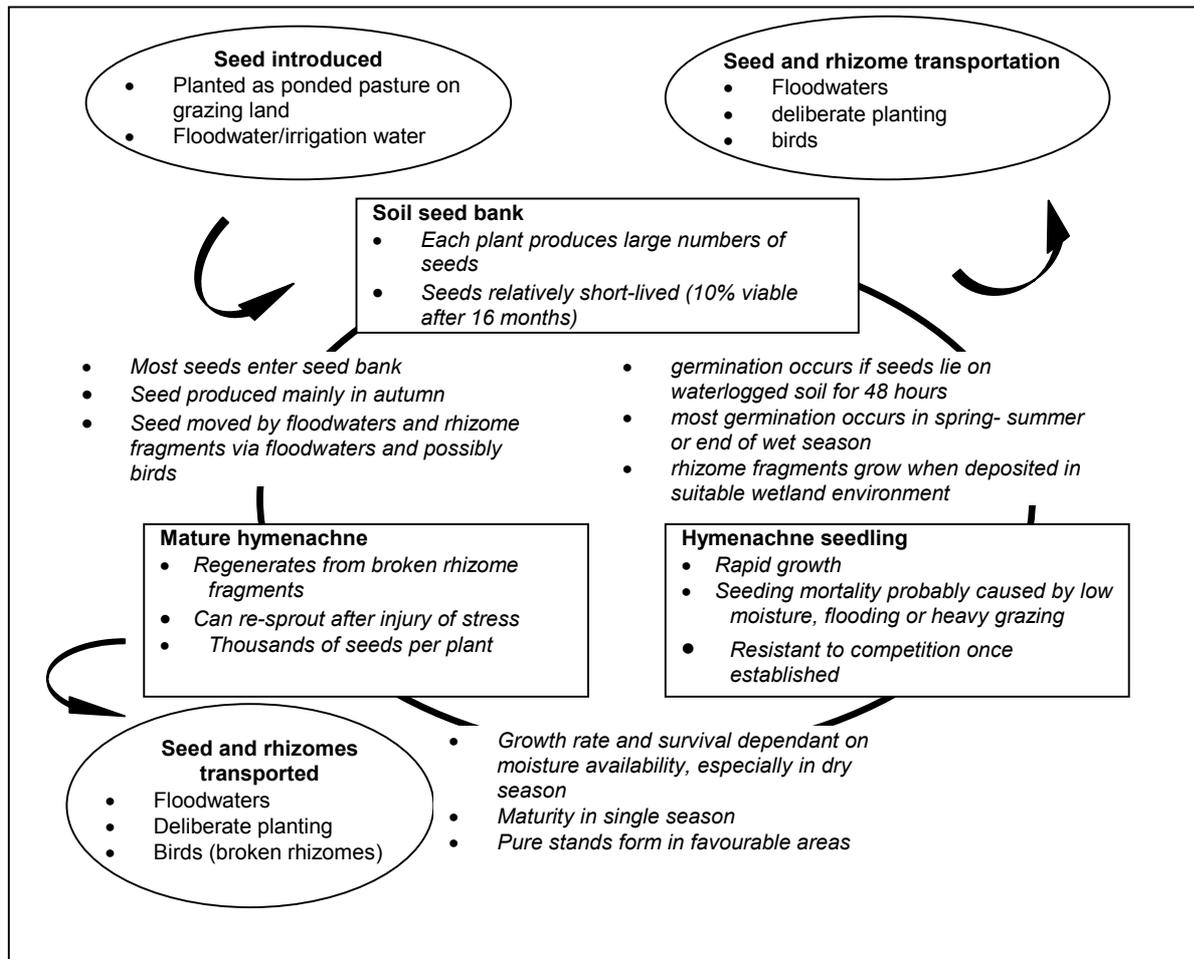
Infestation of hymenachne.



Flowers



Stolons and roots



1.2 History of spread

Hymenachne is native to seasonally flooded lowlands in tropical and sub-tropical South and Central America. It was imported by CSIRO in the early 1970's, together with another ponded pasture grass, aleman grass (*Echinochloa polystachya*). Its value as ponded pasture was assessed by QDPI. In August 1988, hymenachne (cv. 'Olive') and aleman grass (cv. 'Amity') were approved for release by the Queensland Herbage Plants Liaison Committee which recommended registration on the submission of the QDPI. One of the first reports of hymenachne invading cane-growing areas was in 1989 in the Lower Burdekin area of coastal, north Queensland. At that time, several graziers were planting hymenachne for cattle fodder in the area. By 1997, dozens of cane growers had reported that hymenachne was invading low-lying cane and drainage ditches in the 'wet tropics' region south to Ayr (Queensland). Small infestations, generally between 0.5 – 100 ha in size, are scattered through cane farms and natural wetlands in coastal and sub-coastal areas of Queensland. To date, at least 1000 ha have been invaded by hymenachne in Queensland.

During the 1990's small areas of hymenachne were sown on black, clay soils in the Northern Territory. Olive hymenachne is planted in the NT as a competitive grass species as part of *Mimosa pigra* control programs on pastoral land. Mimosa researchers have stressed the need to establish competitive species following mimosa control and olive hymenachne is easier to establish on some floodplain areas. In recent years, however, small infestations have developed in conservation areas adjacent to properties in the lower Mary River and Adelaide River systems (total infestation size estimated at 100 – 200 ha).

Runners of hymenachne were posted from Queensland to graziers in Western Australia in 1993 but it is not known if this species has established.

The potential distribution of hymenachne has been predicted (Csurhes *et al.* 1999) using CLIMEX based on the ecoclimatic characteristics of the areas of Central and South America where the plant grows naturally. Modelling suggests that hymenachne could form permanent

populations from coastal, northern New South Wales to the north-west of Western Australia (Figure 2). Within this region, hymenachne will be confined to suitable habitat, primarily seasonal, shallow, freshwater wetlands in coastal and sub-coastal areas. Abundance and survival within this zone will also be affected by various factors such as soil type, flooding regime, grazing pressure, nutrients and fire. Hymenachne is expected to form pure stands in many eutrophic, seasonal wetlands.

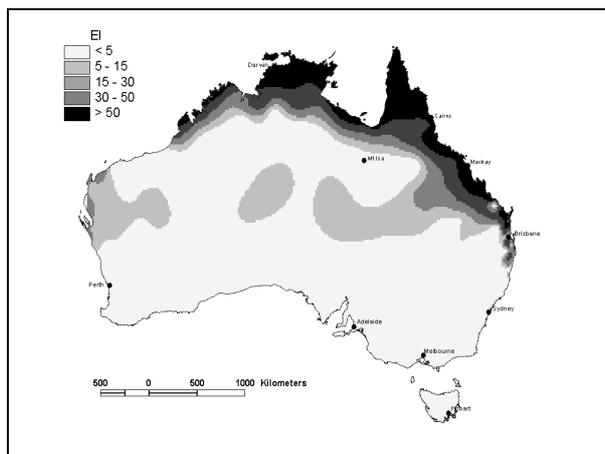


Figure 2. Potential distribution of hymenachne. (Data is splined from a CLIMEX prediction. EI = Ecoclimatic index: EI < 30 potential for permanent population low, EI > 50 potential very high).

1.3 A Weed of National Significance

Hymenachne's negative impacts can be summarised as follows:

Primary Production:

- Hymenachne has invaded sugar cane crops on low-lying, poorly drained land in north Queensland. Invasion causes crop contamination and increased production costs. Hymenachne can block drainage ditches and cause increased cane losses due to water-logging. Some cane properties currently lose up to \$100,000

per annum due to poor drainage. Although these properties are still free of hymenachne, such losses could increase substantially if hymenachne exacerbates drainage problems. Cane farmers will need to regularly remove hymenachne from drainage ditches, at considerable cost. The Queensland sugar industry was worth \$2B in 1999/00.

Water resources and infrastructure

- Hymenachne has invaded irrigation-water storage facilities within the Burdekin Irrigation Area (north Queensland). These facilities supply water, under contract, to cane and horticulture farms. To minimise spread, the Department of Natural Resources spent some \$200,000 spraying hymenachne within the Houghton Balancing Storage. This cost will be on-going as the facility will be re-invaded from up-stream sources. Similar storage systems are at risk.
- Major drainage construction works under the Commonwealth "Sugar Industry Infrastructure Package" could be of little use if they are blocked by dense hymenachne.
- Dense hymenachne is expected to modify water flow and watercourses. Floating mats of hymenachne become dislodged in floods and have the potential to damage low bridges.

Fisheries:

- The fishing industry is concerned that hymenachne could invade and modify natural wetlands currently utilised as nursery areas for juvenile barramundi. In addition, the construction of pondage banks, some of which have been planted with hymenachne, has alienated large areas of marine plains from saltwater influence. These areas play an important role as nursery areas for the juvenile stages of many estuarine species and as a nutrient source for adjacent estuarine areas. The average annual commercial catch of barramundi from the Queensland coastline between Cape Cleveland and Alva Beach was 91 tonnes and is conservatively valued at \$1.37M (M. Lightowler and M. Cappo, pers. comm. 1999). It is difficult to predict to what extent hymenachne may impact on this industry.

Conservation and tourism:

- Hymenachne can form pure stands that replace native wetland plants. Loss of native plant diversity will result in reduced diversity of dependent wildlife, such as birds. Although some native animals may adapt to utilise hymenachne, many will not.
- The impact of hymenachne is expected to be greatest in seasonal, freshwater wetlands up to 2 m deep. Loss of native birds and other wildlife could have a detrimental affect on tourism, Australia's largest source of income. Conservation authorities are concerned at the potential for hymenachne to invade areas with high conservation value, including parts of Kakadu National Park, parts of Lakefield National Park, the Cromarty wetlands and parts of Bowling Green Bay National Park. Kakadu attracts more than 220,000 visitors and generates some \$30M per annum. It is responsible for 6% of employment in the Northern Territory. Most visitors to Kakadu come to see the diverse bird life. If hymenachne degrades these areas, the losses could be substantial.

Beneficial uses:

- Hymenachne provides dry-season high-protein cattle fodder in ponded or seasonally inundated areas. It grows in deeper water than other pasture species.
- Used as a competitive species in mimosa control programs in the NT it provides useful fodder while also reducing mimosa re-establishment.
- Hymenachne can act as a filter trapping both sediment and nutrients thus reducing nutrient loads from polluted water catchments.

1.4 Legislative controls

At present, hymenachne is listed as a prohibited import in Western Australia. It is not a declared plant in any other State or Territory. Cairns City Council has listed the plant as a weed under local law and several other Local Governments in north Queensland are considering similar action. It is proposed for declaration in the new Land Protection Bill in Queensland (proposal involves declaration to prevent trade and distribution for the whole State and active

control along the tropical east coast from Cape York to Mackay).

1.5 Control to date

To date, control efforts have been limited primarily to physical removal of hymenachne from drainage ditches on cane farms and chemical control within the Haughton Balancing Storage (Burdekin Irrigation Area – Queensland). Repeat application of glyphosate, applied as a high-volume, foliar spray, has been used with some success to control a dense infestation in the Haughton Balancing Storage. Initial herbicide application caused above-ground stem and leaf material to turn brown and fall close to ground level. Once dry, this material was burnt. Prolific regrowth and seedlings were then sprayed again (J. Ready, *pers. comm.* 1999). During the 1999/2000 wet season, applications of glyphosate were used to control isolated stands of hymenachne in the Mary River National Park (Northern Territory).

Preliminary herbicide screening trials are being undertaken by QDNR. This work suggests that Verdict® is the most effective herbicide. However, Verdict® is currently not registered for use on hymenachne. Registration needs to be pursued so that an effective herbicide can be made available to landholders.

Mechanical removal is feasible but expensive. It is not practical in certain situations such as natural wetland, except for very small areas. Solar sheeting can kill the plant, but is only suitable for relatively small areas.

There do not appear to be any significant pests of hymenachne in Australia, although attack by a leaf roller (*Marasmia* sp.) can be noticeable in some years. Biological control has not been investigated.

Hymenachne prefers full sun and in some situations can be suppressed by shading with overhanging trees. Any form of defoliation or weakening of the plant, followed by flooding such that the plants cannot maintain leaves above water will kill hymenachne. Grazing by cattle can reduce the amount of standing dry matter, as can spraying, burning or mowing (including haymaking) where access permits.

1.6 Principles underlying the plan

This plan is based on the recognition and acceptance of four principles outlined by the National Weeds Strategy:

- Weed management is an essential and integral part of the sustainable management of natural resources and the environment, and requires an integrated, multidisciplinary approach.
- Prevention and early intervention are the most cost-effective techniques that can be employed against weeds.
- Successful weed management requires a coordinated national approach, which involves all levels of government in establishing appropriate legislative, educational, funding and coordination frameworks in partnership with industry, landholders and the community.
- The primary responsibility for weed management rests with landholders/land managers but collective action is necessary where the problem transcends the capacity of the individual landholder/land manager to address it adequately.

1.7 Process followed

The National Hymenachne Strategy is the product of a stakeholder workshop held in Townsville, Queensland, in January 2000. Forty workshop participants developed a

draft strategy that was circulated to 60 stakeholders in Queensland, the Northern Territory and Western Australia. Stakeholders provided comments that were considered when preparing the final draft. A steering committee, comprising representatives from the Queensland Local Government Association, 'Canegrowers' (Qld), 'AgForce' (beef) (Qld), Sunfish (Qld fishermen), Queensland Environmental Protection Agency, Western Australian Agriculture and the Parks and Wildlife Commission of the Northern Territory, provided advice on the consultation process and the final draft. This group will oversee implementation of the national strategy.

1.8 Relevance to other strategies

This plan has been established to provide a framework for coordinated management of hymenachne across the country. To date, most infestations are limited to coastal Queensland but there is considerable potential for spread in the Northern Territory and northern parts of Western Australia. The strategy can be linked to National, State and local pest management plans, strategies and initiatives as displayed in the matrix table below. Due to the use of hymenachne in mimosa control in the Northern Territory it is important that this strategy is closely linked to the national strategy for mimosa.

Scope/Scale	Natural Resource Management	Pest Management	Weed Species Management
National	The National Strategy for the Conservation of Australia's Biological Diversity National Strategy for Ecologically Sustainable Development	National Weeds Strategy	Weeds of National Significance Strategies for Hymenachne and Mimosa
State	Proposed Queensland NRM Strategy (QDNR) Queensland Wetlands Strategy Queensland Government policy on ponded pastures National Parks Plan of Management (Northern Territory)	Queensland Weed Strategy Northern Territory Weed Management Strategy Western Australian Weeds Strategy	
Regional	Regional NRM plans (eg. Burdekin, Queensland) Queensland Regional Coastal Management Plans (position papers) Mary River Land use Strategy (Northern Territory)		
Catchment	Catchment Management Strategies		
Local	Landcare plans	Local Government Pest	National Park Weed Management

	Shire Planning Schemes (Integrated Planning Act)	Management Plans (Queensland.)	Strategies (Northern Territory) Cairns Pest Management Plan
Property	Property Management Plans	Property Pest Management plans	Property weed management plans

2 STRATEGIC PLAN

VISION

The adverse impact of hymenachne is reduced to a minimum.

2.1 Prevent Spread

Desired outcome

The spread of hymenachne is prevented.

Background

Hymenachne is a valuable pasture species in some areas such as central Queensland. However, it is a significant threat to sugar cane production, fisheries, conservation, irrigation storage facilities and traditional aboriginal land use. If uncontrolled, extensive infestations are expected to develop in Queensland, the Northern Territory and Western Australia. Emphasis on preventing spread needs to be focussed on regions where it has the potential to cause the greatest problems and in 'high risk' catchments that are currently free from the plant.

Once hymenachne is established, downstream dispersal is usually rapid. Since it is difficult to prevent floodwaters carrying seeds and stolon fragments away from grazing land, emphasis needs to be placed on avoiding planting in the first place. As such, some form of enforced control and restriction on sale and planting is required in Queensland, Northern Territory and Western Australia.

A general principal of efficient pest management is to identify areas that are still free of the target pest and focus efforts on keeping these areas 'clean'. This form of management aims to detect and eradicate small 'satellite' populations before they have a chance to become very large infestations with major impacts. An important objective of the strategy, therefore, is to identify susceptible catchments that are currently free from hymenachne ('high risk' areas) and to put in place protocols for early detection and eradication for these areas.

An obstacle to early eradication is the lack of a registered herbicide capable of achieving 90-100% kill in a single application. Verdict® is showing promise as a suitable herbicide and registration needs to be pursued, for

both aquatic and land-based applications. Controlling hymenachne, via the issuance of 'control notices' to landholders, will be difficult without a highly effective, registered herbicide. Hence, priority is given to finalising existing herbicide screening trials using environmentally sensitive herbicides and seeking herbicide registration for effective and acceptable products.

Legislative restrictions are required to prevent the spread of hymenachne in areas where it has the potential to cause substantial problems. This can be achieved either under local law, for certain local governments, or under relevant State/Territory pest management legislation.

Enforced control will meet strong opposition unless landholders are aware of the importance of controlling this plant. Improved public awareness is needed to discourage further planting of hymenachne as both a pasture species and for weed control and to highlight the economic benefits of controlling the plant before it has a chance to spread. Awareness programs should also encourage the use of native hymenachne in areas to which it is suited. Since hymenachne is widespread and provides substantial economic benefits in Central Queensland, local Governments are unlikely to enforce control in this region. Enforced control is only likely to be effective in areas where the plant's deleterious impacts are unacceptable to the local community (ie. where its use is considered "inappropriate" by the community).

Information on the distribution of hymenachne, including areas where control works may have been completed, is critical to support planning and decision making. The degree of detail required would vary with the scale and purpose of the planning e.g. planning in eradication areas with scattered plants requires knowledge down to single plant level. QDNR has a GIS based information system, PESTINFO, which is being implemented and evaluated for community group use in Queensland. It will collate existing data on the present and historical distribution of hymenachne in Queensland and act as a means of tracking eradication efforts. This information should

be available on a local government or catchment basis. It is also desirable to have records of all sites across Australia where hymenachne has been detected and the

action taken. Collection of landholder mapping data will significantly add to the current data set.

Strategy	Actions	Responsibility	Rank
2.1.1 Identify effective herbicides	Complete screening trials on environmentally sensitive herbicides currently underway in Queensland.	QDNR	1
2.1.2 Seek NRA registration of effective herbicides	Make application for registration of effective herbicides for both aquatic and land-based environments (subject to completion of 2.1.1). Seek funding to complete any research required to achieve NRA approval to register a herbicide for hymenachne	QDNR, NTDPIF and AGWA. State agencies, local government, industry	1
2.1.3 Eradicate small 'satellite' infestations	Map hymenachne in Qld, NT and WA. Identify and prioritise small infestations that can be eradicated. Seek funding for eradication. Implement eradication. Identify susceptible catchments that are currently free from the plant and prevent spread of hymenachne into these areas. Establish an early detection/eradication protocol and assist land holders to identify the plant. Promote eradication, where it is feasible, through local government pest management plans.	State agencies (QDNR, NTDPIF, AGWA) in partnership with Local Governments and Local Government hymenachne action groups.	1
2.1.4 Prohibit "inappropriate use"⁽¹⁾ of hymenachne	Declare hymenachne in all States and Territories to prevent spread into "clean" catchments/regions and to prohibit sale, transportation and interstate movement. Delineate areas/regions where hymenachne is already widely planted and can continue to be grown by the grazing industry under guidelines, taking into account national and international obligations. ⁽¹⁾ Enforce control in regions where use of hymenachne is considered to be "inappropriate" by the local community (eg. "wet tropics" and Burdekin Irrigation areas of Qld).	State agencies AgForce, State agencies, cane growers State agencies, Local Governments	1
2.1.5 Improve public awareness of possible impacts	Produce brochures/posters/web site on identification, impact and control Improve awareness of identification of hymenachne and encourage public to report any infestations within susceptible catchments identified above. Ensure all National Parks rangers can identify the plant in the field and promote early control.	QDNR, QPWS, AGWA, NTDPIF, PWCNT and Local Governments State/Territory conservation agencies	1

2.2 Minimise impact

Desired outcome

The adverse impact of hymenachne is minimised.

Background

Within the coastal 'wet tropics' and the Burdekin irrigation region, hymenachne is causing much concern and has been the focus of considerable media attention. Public demand for declaration has been increasing.

In these areas, declaration and enforced control needs to be undertaken, where feasible. Responsibility for enforced control in Queensland rests with local Governments while in Northern Territory most plants occur outside local government areas and so must be managed by territory agencies.

Growth and spread of hymenachne can be very limited in some inland areas that experience relatively low rainfall and very dry winters. In these areas, enforced control may not be required. Hymenachne has

become well established and is beyond eradication in parts of Central Queensland, where it is most valued as ponded pasture. In these areas, its impact needs to be reduced where feasible and where landholders are willing to undertake control.

Small infestations need to be given priority in terms of enforced control, particularly in regions where hymenachne has the potential to cause substantial adverse impacts. Once infestations have become extensive, the costs of control may become prohibitive and many small landholders will be financially incapable of satisfying the requirements of control notices.

In cases where infestations have become extensive and the costs of chemical control prohibitive, landholders need information on control methods other than chemical. To date, no research has been undertaken to identify non-chemical control options.

Techniques such as shading (using either trees or plastic sheeting), drainage/water management, grazing by cattle and mechanical removal need to be investigated and extended to landholders if they prove to be effective. Non-chemical control options could help minimise the impacts of herbicides on natural systems and fisheries.

At present, most information on the impacts of hymenachne is anecdotal. Data on the positive and negative impacts of hymenachne need to be collected so that government agencies and other stakeholders can make sound management decisions. Research is also required on the plant's ecology, particularly conditions conducive and detrimental to its establishment.

There may be potential to consider restrictions on construction of new pondage areas under Shire Planning Schemes (Integrated Planning Act).

Strategy	Actions	Responsibility	Rank
2.2.1 Implement local control in areas where negative impacts are unacceptable to local community	Identify priority areas where control is feasible and desirable (consider size of infestation, sensitivity of area, economic feasibility of control). Implement control. Critically assess construction of new ponded pastures as part of Shire Planning Schemes (Integrated Planning Act).	QDNR, QDPI (including fisheries group), NTDPPIF, AGWA, Local Governments Local Governments	1
2.2.2 Use declaration to support control on a catchment basis	Declare hymenachne for areas where enforced control is essential. Implement enforcement in support of local control.	QDNR, NTDPPIF, AGWA, Local Governments.	1
2.2.3 Quantify the positive and negative impacts of hymenachne	Collate information on environmental and economic impacts.	QDNR, QPWS, QDPI (including fisheries group), AGWA, NTDPPIF	2
2.2.4 Improve our understanding of the ecology and management of hymenachne	Develop best practice management options, involving chemical, mechanical, biological and other options. Investigate seed biology Investigate effects of shading and competition by riparian vegetation and role of nutrients/fertiliser/sediment input on density and abundance of hymenachne. Define southern/inland limitations to spread and factors influencing establishment.	QDNR, QPWS, QDPI, NTDPPIF, AGWA, research bodies, government conservation agencies As above	1
2.2.5 Improve awareness of control methods	Develop extension material (posters, brochures, pest facts etc), issue press releases and conduct field days to demonstrate control options.	State agencies, Local Governments, Canegrowers, AgForce, Landcare.	2

2.3 Achieve national coordination

Desired outcome

National commitment to management of hymenachne is established and maintained.

Background

Hymenachne is well established in parts of Queensland. Elsewhere it is highly localised. In the Northern Territory and Western Australia it has been planted on a handful of properties and has not yet become widespread. Unwanted infestations of hymenachne exist in a number of local government areas and catchments across northern Australia so management of this plant requires a coordinated, community-based approach. The two major planning processes currently operating are the development of integrated catchment management plans and property management plans. Both processes involve community input and thus are a means of gaining community commitment as well as incorporating hymenachne management into a wider land management framework. In Queensland local government pest management plans are also important community forums. Projects addressing

issues such as conservation of biodiversity, protection of water resources and catchment management should consider hymenachne management. Ongoing consultation with stakeholders will be required to gaining wide community acceptance. This consultation should provide a forum for resolution of differences between industries and groups.

Substantial resources are required to prevent the spread of hymenachne and to minimise the impact of established infestations. There is a need to ensure that control resources are utilised in an efficient and effective manner. Achievements need to be documented as a measure of progress. Approaches for funding should be coordinated to maximise potential success. Application of a project management approach will assist in achieving efficiencies and coordination.

Strategy	Actions	Responsibility	Rank
2.3.1 Establish a 'National Hymenachne Working Group' (HWG) to coordinate action	Create National working group (membership from Federal, State, Local Government, beef industry, Canegrowers, fishing industry, conservation).	QDNR	1
2.3.2 Obtain funding for the national strategy	Identify funding sources Investigate links to other programs/funding sources Seek long-term funding	National working group All stakeholders	1
2.3.3 Promote WONS concept and the national strategy	Improve awareness of the national strategy and its objectives among key stakeholders by encouraging good communication. Gaining wide community (national) acceptance of strategy, to ensure community involvement & ownership	National working group As above	1
2.3.4 Integrate hymenachne management into pest and natural resource planning framework	Incorporate hymenachne management in: <ul style="list-style-type: none"> • Property or sub-catchment plans (landholder level); • Local Government pest management plans (local government level) • Natural Resource and catchment strategies (regional level) 	As above	1
2.3.5 Establish consistent policies and legislation at national level	Develop consistent government policies and legislation on hymenachne management in Qld, NT and WA.	State/Territory pest management agencies	1

2.4 Avoid release of additional ponded pasture species with weed potential

Desired outcome

Ensure that this strategy does not trigger the introduction and use of additional species of non-indigenous ponded pasture species.

Background

History has shown that when attractive or valuable plants are declared and prohibited from use, the proponents of those plants often search for replacements with similar attributes. If use and sale of hymenachne is restricted, there is a danger that proponents of ponded pasture species will simply import or release new and potentially more

aggressive species. We need to learn from past mistakes and ensure that any future releases of ponded pastures are subject to rigorous assessment of their potential impacts outside the grazing situation. The grazing industry currently has access to para grass, hymenachne (native and introduced species) and aleman grass. It could be argued that additional species are no longer required.

The native hymenachne, *H. acutigluma*, may not be suitable for much of Queensland due to its poor adaptation to temperatures below 30°C, therefore other species will be required in these areas to replace the olive

hymenachne. *Leersia hexandra* (swamp rice grass) is one such native species.

Hymenachne's use for mimosa control means that it is important that these two Weeds of National Significance strategies are not developed in isolation. The research, monitoring and mapping needs overlap between these strategies. It is important to note that if this species is removed from its uses in the NT then effective mimosa control may be affected. The search for, selection and propagation of alternative competitive species for mimosa therefore assumes importance in both this and the mimosa strategy.

Strategy	Actions	Responsibility	Rank
2.4.1 Prevent introduction of additional ponded pasture species with weed potential.	Apply the 'Weed Risk Assessment' (WRA) protocol to any new imports and proposed releases.	AQIS	1
2.4.2 Prevent release of potentially invasive ponded pasture species stored in Genetic Resource Centers'.	Assess proposed releases using the 'WRA' protocol and release species only if they pass this assessment.	Plant introduction agencies	1
2.4.3 Improve public awareness of adverse impacts of introduced ponded pasture plants.	Media exposure/campaign at local and state level; Exposure during national events (eg Weedbuster Week)	All stakeholders All state agencies	1 1
2.4.4 Develop code of practice	Develop 'codes of practice' for the use of hymenachne and the establishment and management of ponded pastures	Beef producer bodies, government agencies	1
2.4.5 Develop and promote use of native hymenachne and other grasses	Investigate the use of native hymenachne and other appropriate alternative and replacement species for use after the removal of hymenachne and for planting as part of mimosa management.	QDNR, QDPI, NTDPIF	1

3 MONITORING AND EVALUATION

This strategic plan will be subject to annual review. The 'National Hymenachne Working Group', will monitor implementation of the plan.

Monitoring will include review of actions outlined and undertaken in:

- State and Territory weed strategies,
- Project plans developed from the strategic plan
- Queensland Local Government pest management plans,
- Catchment management plans, and
- State of the Environment reporting processes.

Performance indicators for the plan include:

- Declaration of hymenachne in Qld, NT and WA,
- A national map of hymenachne completed,
- Increased awareness of hymenachne as a weed of national significance,
- Understanding of the negative impacts of hymenachne,
- Registration of an effective herbicide (for use in wetlands and waterways),
- Delivery of extension material specific to target groups and regions,
- Surveying and reporting of isolated infestations of hymenachne increases,
- Eradication of isolated infestations,
- Resources for on-ground actions increased,
- Action on hymenachne undertaken at all levels; property, catchment and regional,
- Progress is made on discouraging further planting of hymenachne,
- Appropriate alternative and replacement species found and used to replace hymenachne,
- Acceptance of the need to avoid importation of additional species of ponded pastures, and
- Awareness of control options available for hymenachne is delivered.

4 STAKEHOLDER ROLES AND RESPONSIBILITIES

Private landholders

To control hymenachne on their own lands by:

- Eradicating small infestations in the 'wet tropics' region (Qld), in the NT and WA.
- Being able to identify hymenachne.
- Being aware of the potential for hymenachne to escape from and spread onto downstream cane farms, fisheries and natural wetlands.

Cane growers

- Improve awareness of identification and control options (as they are developed), and
- Assist preparation of hymenachne management programs and source funds.

AgForce

- Develop codes of practice for beef producers, and
- Seek funding for management programs.

Conservation organisations

- Promote awareness of impacts on native wetlands, and
- Seek funding for management programs.

Local Governments (Queensland)

To ensure impacts of hymenachne are kept to a minimum throughout the Local Government area:

- Administering and enforcing the provisions of relevant State legislation (eg. Qld *Land Protection Act*), including issuing notices,
- Ensuring that pest management plans include hymenachne control activities,
- Mapping infestations and identifying infestations where eradication is still feasible,
- Liaising with State agencies and community groups to undertake control of hymenachne,
- Ensuring that control of hymenachne is undertaken on lands under Council control, and
- Ensuring that private landholders engage in control as necessary.

Government Departments in Queensland (includes Departments of Natural Resources, Primary Industries and Parks and Wildlife)

- Continue research on control
- Develop State-wide policy.
- Provide extension material to stakeholders,
- Support enforced control in areas where negative impacts exceed value as a pasture plant,
- Liaise with community and industry groups and local governments to coordinate control,
- Facilitate and coordinate eradication in areas of strategic importance,
- Support control on State-managed land.

Government Departments in NT and WA

- Ensure awareness programs are put in place to discourage planting,
- Investigate use of local native species as alternatives to 'Olive' hymenachne,
- Establish clear government policy on future promotion and control, including legislative actions and control where appropriate,
- Eradicate isolated infestations,
- Ensure 'Olive' hymenachne is included in weed management plans on all State/Territory land.

Commonwealth government

- Ensure quarantine controls on entry of hymenachne (AQIS)
- To ensure uptake by Departmental staff to restrict movement of weeds (agencies that manage land and travel on non-government land)
- To ensure hymenachne control is undertaken on all federally managed lands (Defence, Environment Australia and other Commonwealth departments/corporations that manage land)
- Oversee and manage federal funds including Natural Heritage Trust and National Weed Program (Environment Australia, Agriculture, Forestry and Fisheries – Australia).

5 ADDITIONAL READING

Csurhes, S.M., Mackey, A.P. and Fitzsimmons, L. (1999) 'Hymenachne (*Hymenachne amplexicaulis*) in Queensland', Pest Status Review Series, Land Protection, Department of Natural Resources, Brisbane.

Pittaway, P.A., Wildin, J.H. and McDonald, C.K. (eds). (1996) 'Beef production from ponded pastures'. Proceedings of a workshop held at Yeppoon, Queensland, April 1993. Tropical Grasslands Occasional Publication No. 7. Tropical Grasslands Society of Australia Inc., St. Lucia, Queensland.

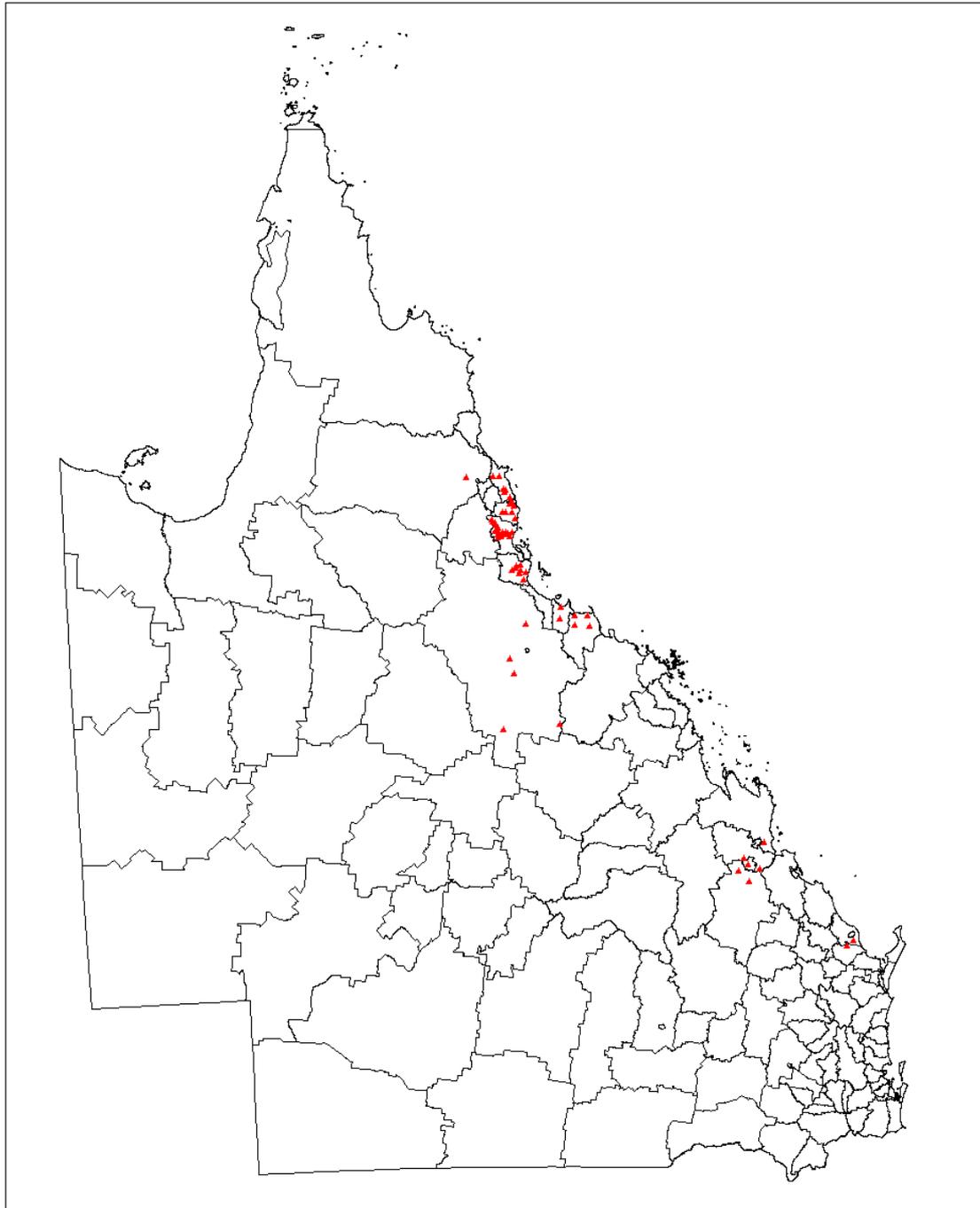
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6 GLOSSARY

AGWA	Agriculture Western Australia
AQIS	Australian Quarantine and Inspection Service
CLIMEX	Simulation modeling system developed by CSIRO
CSIRO	Commonwealth Scientific and Industrial Research Organisation
HWG	Hymenachne Working Group
NRA	National Registration Authority
NRM	Natural Resource Management
NT	Northern Territory
NTDPIF	Northern Territory Department of Primary Industries and Fisheries
Pestinfo	Queensland Department of Natural Resources' GIS-based information system
PWCNT	Parks and Wildlife Commission of the Northern Territory
QDPI	Queensland Department of Primary Industries
QDNR	Queensland Department of Natural Resources
QPWS	Queensland Parks and Wildlife Service
WONS	Weeds of National Significance

7 Appendix 1 Map of Hymenachne infestations in Queensland



Location of *Hymenachne amplexicaulis* in Queensland 1999

Legend

-  Infested Sites
-  Local Government Areas

Source of Data:
Lans Protection Officers,
Department of Natural Resources.
Map produced in May 1999 by Pestinfo
Map of Queensland May 17, 1999

Source of Data:
Lans Protection Sub-Program,
Resource Management Program.
Map Projection:
UTM central meridian 147 degrees.

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