invasivespecies Ireland

New Zealand Pigmyweed (*Crassula helmsii*) Invasive Species Action Plan

1. Introduction

The risk assessment undertaken as part of the Invasive Species Ireland project prioritised *Crassula helmsii* for preparation of an Invasive Species Action Plan. *C. helmsii* has negative impacts on the environment, biodiversity, native flora and fauna, tourism and transport. This species acquired a score of 19 out of a possible 25 from stage 1 of the risk assessment process owing, in part, to its potential impact on protected habitats and species leading to non-compliance with EU legislative obligations under the Water Framework and Habitats Directives.

2. Aim of plan

The aim of this Invasive Species Action Plan is to prevent further spread of *C. helmsii* in Ireland and put in place mechanisms to prevent new introductions to the island. This plan sets out actions required for successful implementation and guidance on methods for eradication/control of *C. helmsii* populations in Ireland. This can be achieved through the implementation of control options, raising awareness of this species, developing policy and identifying actions needed to deal with further spread.

3. Key priorities

3.1. Prevention of further spread

- Restrict the sale of *C. helmsii* through garden centres, supermarkets, aquarists and other retail outlets.
- Raise public awareness of the economic and environmental impacts *C. helmsii* could have in Ireland in combination with education efforts targeted at key stakeholder groups linked to the import and spread of this and other aquatic plant species.
- Encourage the removal and proper disposal of domestic plantings in ponds and aquaria and promote the use of native species.
- To inform management by recommending methods to gather accurate baseline distribution of this species. This can be achieved by encouraging recording of the plant by the general public, gardeners, naturalists and water course users such as agriculturalists, anglers and canoeists.

3.2. Eradication

- Guide the eradication of the plant at its known wild populations.
- Engage with stakeholders to provide advice and help, where appropriate, to eradicate populations in private gardens.

4. Invasion history

C. helmsii was introduced to Britain in 1911 from Tasmania. It was first sold as an oxygenating plant in 1927 by Perry's Hardy Plant Farm in Enfield. The first recorded natural occurrence was at Greensted Pond in Essex in 1956. In recent years it has spread much more widely and rapidly due to the increased availability of the plant at Garden Centres and Aquatic Nurseries (Centre for Ecology and Hydrology, 2004). It has spread to most parts of England and Wales since it's introduction but it is still considered rare in Scotland and Ireland (Lockton, 2009).

The first record of this species in Ireland was in 1984 from an artificial pond in Gosford Forest Park, County Armagh, where it had probably been deliberately planted. The first report from a wild habitat dates from 1985 from the flooded Glastry Clay Pits in the Ards Peninsula, County Down (Habitas, 2009).

5. Nomenclature

Common name: New Zealand Pigmyweed

Also known as: Australian Swamp Stonecrop

Synonyms: *C. recurva, Tillaea recurva, Tillaea helmsii*

6. Identification features

The plant grows on the muddy margins (Figure 1A) of ponds where it forms carpets with 100% cover, or semi-submerged in deeper water, or totally submerged with elongated stems. It does not die back in winter. The shoots are rather stiff, carrying narrow parallel-sided leaves in opposite pairs, each leaf being about 4 - 24mm (Figure 1B). Small white flowers with four petals (Figure 1C) are produced in summer on long stalks arising from the upper leaf axils. The flowers are always above water. The plant is able to absorb carbon dioxide at night and store it for use by day in photosynthesis (Habitas, 2009).

A. **B.** **C.**

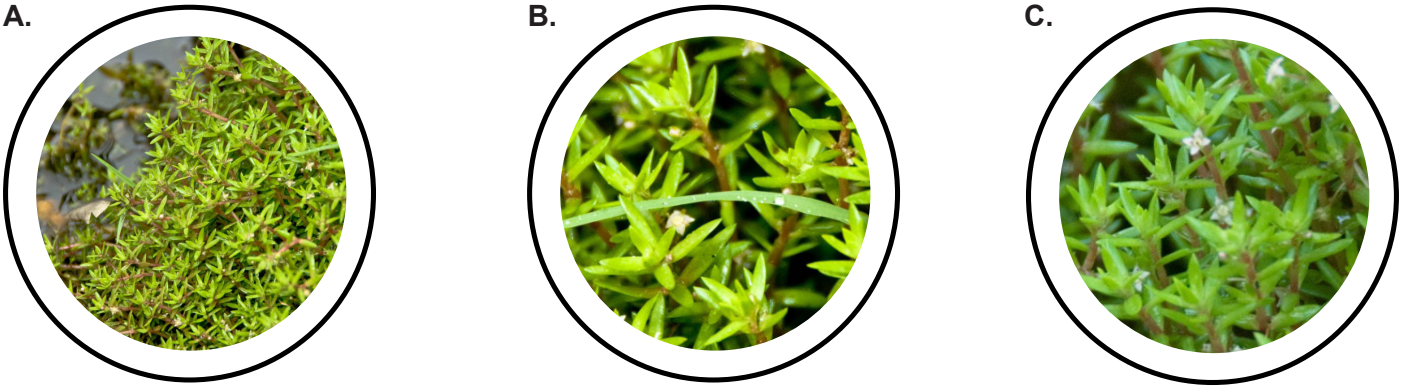


Figure 1: A. *C. helmsii* growing along margin; **B.** Close up of *C. helmsii* leaves; **C.** Small white flowers. Photos courtesy of the GB Non-native Species Secretariat.

7. Impacts

The impact on flora is not easily predictable. A study in NW England suggests that there is no net reduction of the numbers of plant species, but there is a reduction of germination rates of native species, an increase in the proportion of emergent or marginal species and a reduction in aquatic species of open water. Smaller marginal plants such as some water starworts (*Callitriche* spp.) are likely to be smothered, and competition for space seems likely to cause a reduction in stoneworts (charophytes) (Habitas, 2009).

Mats formed by the plant choke ponds and drainage ditches. Strongly invaded waters lose their attractiveness for recreation and flooding may be caused. The mats can be dangerous to pets, livestock and children who mistake them for dry land (EPPO, 2004). Loss of biodiversity is also reported. Dense mats formed by this species reduce the conservation value of nature reserves by the reduction or displacement of native (and rare) species.

The European and Mediterranean Plant Protection Organization recommends that, owing to the risk of establishment of *C. helmsii* in waterways, and of its interference with their vegetation and use, and ecosystem changes justifies the identification of management options should to prevent further introduction and spread of this plant in the EPPO region (EPPO, 2004).

There are other possible implications for wildlife — one study in England has shown a significant reduction in the population of a diatom *Synedra delicatissima* caused by *C. helmsii*, although the precise mechanism of this impact is unclear. Since freshwater algae provide food for many invertebrates, this kind of effect may have a serious impact on freshwater invertebrate populations (Habitas, 2009).

8. Distribution and spread potential

C. helmsii is known to be dispersed through natural and human mediated vectors such as gardening, the horticulture trade, recreational and industrial boats, clothing and equipment, animals and water currents. Single fragments of this plant are capable of colonising an entire water body within a few years. The known distribution of *C. helmsii* in Ireland is shown in Figure 2.

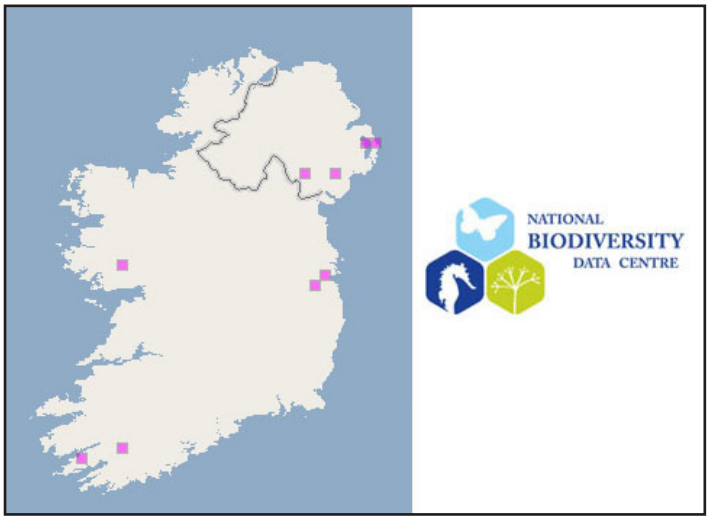


Figure 2: June 2009 known distribution of *C. helmsii.* For up-to-date maps, please refer to the National Biodiversity Data Centre www.biodiversityireland.ie.

The plant will grow around the damp margins of ponds and in water up to 3m deep. It forms very dense stands. It first appears as a small light green tussock on the sediment. These tussocks grow and spread rapidly to form a dense mat of vegetation. Suitable habitat for this species is wide spread in Ireland and island wide establishment is likely. This conclusion is due in part, to the experience in England and Wales and the recommendations in the EPPO Report of a Pest Risk Analysis.

Predictions based on our current knowledge of the habitats most susceptible to invasion will allow us to identify priority areas for control and prevention. Proximity to known populations of *C. helmsii* should be used to prioritise local preventative measures but on a national scale, remote and isolated populations are likely to occur at geographically distant sites due to the vectors and pathways associated with this species.

If eradication is the ultimate goal all locations must be known. Plants left untreated/removed will facilitate reintroduction. If a site is chosen for *C. helmsii* eradication or management other invasive species should be included in the plan.

Action 1. Establish accurate baseline distribution

In order to progress action on the ground, it is essential to have information on its distribution easily available. Recording programmes for invasive species should be encouraged on an annual basis and records should be submitted to the National Invasive Species Database and made readily available through the two biodiversity record centres on the island of Ireland. The biodiversity record centres should be resourced to gather information on invasive species and disseminate this information on request and/or online methods to key stakeholders for example, Local Biodiversity Officers and site managers.

9. Prevention of new introductions and spread

Action 2. Enforcement and raise awareness of legislative powers

Legislation is already in place to prevent the release of invasive species in both Northern Ireland and the Republic of Ireland:

> Northern Ireland - under Article 15 (2) of The Wildlife (Northern Ireland) Order 1985 (under review) if any person plants or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9, he shall be guilty of an offence.
>
> Republic of Ireland - under Section 52 (7) of The Wildlife (Amendment) Act 2000 any person who plants or otherwise cause to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora except under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.

Action 3. Amend existing legislation

Legislation should be strengthened to ensure a total ban on import and possession of *C. helmsii*. To this end:

- *C. helmsii* should be added to Schedule 9 Part II of the Wildlife (Northern Ireland) Order 1985.
- The Minister of the Environment in the Republic of Ireland has power to prohibit the possession or introduction of any species that may be detrimental to native species. *C. helmsii* should be brought to the attention of the Minister and the required prohibition enacted.

Action 4. Highlight, support and promote Invasive Species Codes of Practice

A key priority to prevent the spread and release of invasive species is to promote the uptake of the Invasive Species Codes of Practice and support these with literature and information leaflets for both industry and the general public.

Action 5. Public sector bodies adopt Invasive Species Codes of Practice

All public sector organisations should lead by example and adopting invasive species Codes of Practice in their relevant work areas. This is a key priority to the success of each of the codes. Government agencies should also incorporate the sentiment of the codes into tenders and procurement procedures and ensure that suppliers are abiding by the codes, where possible.

10. Eradication and control

Action 6. Prioritise sites for eradication across the island of Ireland and initiate programme of measures

C. helmsii has a relatively restricted distribution across the island of Ireland (Figure 2) when compared to that of England and Wales. We are still at an early stage of colonisation and action is needed sooner rather than later to prevent widespread economic impacts, loss of biodiversity and a need for large scale and expensive programmes in the future. State agencies and local authorities should prioritise sites for eradication based on a transparent framework to guide a co-ordinated eradication programme. It would be cost effective to undertake this for all the high risk invasive aquatic plant species identified in the Invasive Species Ireland risk assessment

10.1 Best practice management guidance

The available information on management of this species suggests that managers are faced with a difficult but not impossible task. A combination of the chemical and environmental control options as outlined below is recommended. In general, programmes should spray the plant material with glyphosate and attempt to treat marginal areas with light proof barriers. Managers should always take measures to reduce the risk of non-target spray of herbicide onto native flora and into water bodies. Follow up and repeat programme will be required to deal with regrowth. Managers should also consider sharing their experiences of this species through websites such as the Invasive Species Ireland website.

A range of different methods have been used to control and eradicate *C. helmsii* from water bodies in Europe and Australia. The most successful treatments combine mechanical and chemical controls and the former approach is considered to be best practice by the Aquatic Plant Management Group based at the UK Government's Centre for Ecology and Hydrology (CEH, 2004).

Note: Care should be taken not to inadvertently spread fragments attached to clothing or equipment. Strict cleaning protocols should be adapted and adhered to. Correct disposal of plant material is also essential.

10.2 Physical control

The Centre for Ecology and Hydrology recommends against practicing just physical control on this plant. The fragments that are produced by cutting and tearing can regrow and spread the infestation downstream or re-infest the treated area. Fragments as small as one node (5mm) can regrow. Mechanical removal of dead plant material which has been treated with herbicides is recommended to reduce oxygen depletion by decomposing plant material.

10.3 Environmental control

C. helmsii is tolerant of shade for long periods. It is frost tolerant, desiccation tolerant and cannot easily be controlled by any method of environmental control. Covering with sheeting such as black plastic or UV sheeting can effectively eliminate small patches. The shade material should remain in place for long periods of time - 6 months or greater.

10.4 Chemical control*

C. helmsii is only really susceptible to herbicide formulations containing diquat and glyphosate. Diquat has been withdrawn from aquatic use by the EU, but the products are the subject of appeals for an exemption for use for this species. In place of this on submerged material, use dichlobenil as Midstream GSR applied in February or March when the plant is still completely submerged.

The Centre for Ecology and Hydrology recommends that at least 70% of dense infestations is treated at one time to reduce recolonisation from untreated areas. Treatment of the remaining 30% should be carried out after 1 week. The dead material should be removed two to three weeks after treatment if possible, but can remain in the waterbody if necessary. This should be undertaken in compliance with the Pesticide Product Label.

Glyphosate can be applied to any emergent material, either on the bank or in the water, as long as it is dry. Only formulations of glyphosate which are specifically recommended for use in aquatic situations should be used. Re-treatment after an application of glyphosate is not usually necessary except to treat parts which were missed in the first application. Glyphosate should be applied from April to the end of November, when

* When considering chemical control options always refer to the Invasive Species Ireland policy on this management procedure. A brief statement on this policy can be found in Section 11. For a more detailed outline of the policy please refer to the Invasive Species Ireland website.

the majority of the plant is emergent. The adjuvant, TopFilm, can be used to increase effectiveness of the glyphosate treatment.

Note: Prior to undertaking any spraying operation in or near water in Northern Ireland the NIEA Water Management Unit must be contacted. It is essential that the user is fully trained to the required pesticide spraying level (e.g. PA1, PA6 aw). The user must fully comply with the Pesticide Product Label. In the UK the use of Pesticides is regulated by the Pesticide Safety Directorate (PSD). The Pesticide Control Service (PCS) of the Department of Agriculture and Food is responsible in Ireland. Historically several pesticides have been available for aquatic use in the UK and Ireland. It is expected that certain chemicals will be subject to restrictions in the near future. Please refer to PSD website (https://secure.pesticides.gov.uk/pestreg/ProdSearch.asp), the PCS website (http://www.pcs.agriculture.gov.ie/pest.asp?searchType=functCrop) or contact the relevant organisation directly for the most up-to-date list of herbicides approved for aquatic use.

11. Invasive Species Ireland: Policy statement on chemical control

1. The Invasive Species Ireland Steering Group do not support unjustified general, non-specific chemical control of aquatic invasive species due to potential impacts on non-target species; residual impact and persistence in the environment; the lack of associated rigorous monitoring to appraise effectiveness of control methods; and the potential noncompliance with the Water Framework Directive.
2. Targeted and appraised chemical control does have a role to play in management of aquatic invasive species, but should be seen as a last resort; after all other alternative control options have been thoroughly considered and assessed.
3. Before undertaking a chemical control programme, a transparent cost/benefit analysis identifying the risks associated with intervention options and risks of non intervention must be carried out.
4. A transparent cost/benefit analysis of management options should include the following:
   - Knowledge of the invasive species occurrence/distribution at and around the location.
   - Thorough knowledge of the invasion ecology and life history of the species.
   - An assessment of the potential impacts based on invasive history elsewhere and similarity of Irish habitats. This should include the identification of:
     - The sensitivity of native species, habitats and ecosystems present in respect to international, European and domestic legislative obligations and concerns.
     - Impacts on economic and amenity values
     - Potential impact of both the invasive alien species and the proposed control methodology.
     - Other human, animal and plant health issues.
   - The need for appropriate assessments.
   - Efficacy of control and eradication methods available based on assessment of experience elsewhere and on site, if applicable.
   - Assessment of known impacts of potential control methods on non-target species and residual impacts in the environment.
   - Due consideration of the legal status of the options considered.
   - A planned schedule of works with disposal procedures for waste predetermined.
   - The identification of competent authority with the capacity and budget to complete the programme.

5. If the analysis concludes that other control options are not sufficient the Invasive Species Ireland Steering Group recognise that in these circumstances, chemical control has a role in the management of the aquatic invasive species.

12. Resourcing the plan

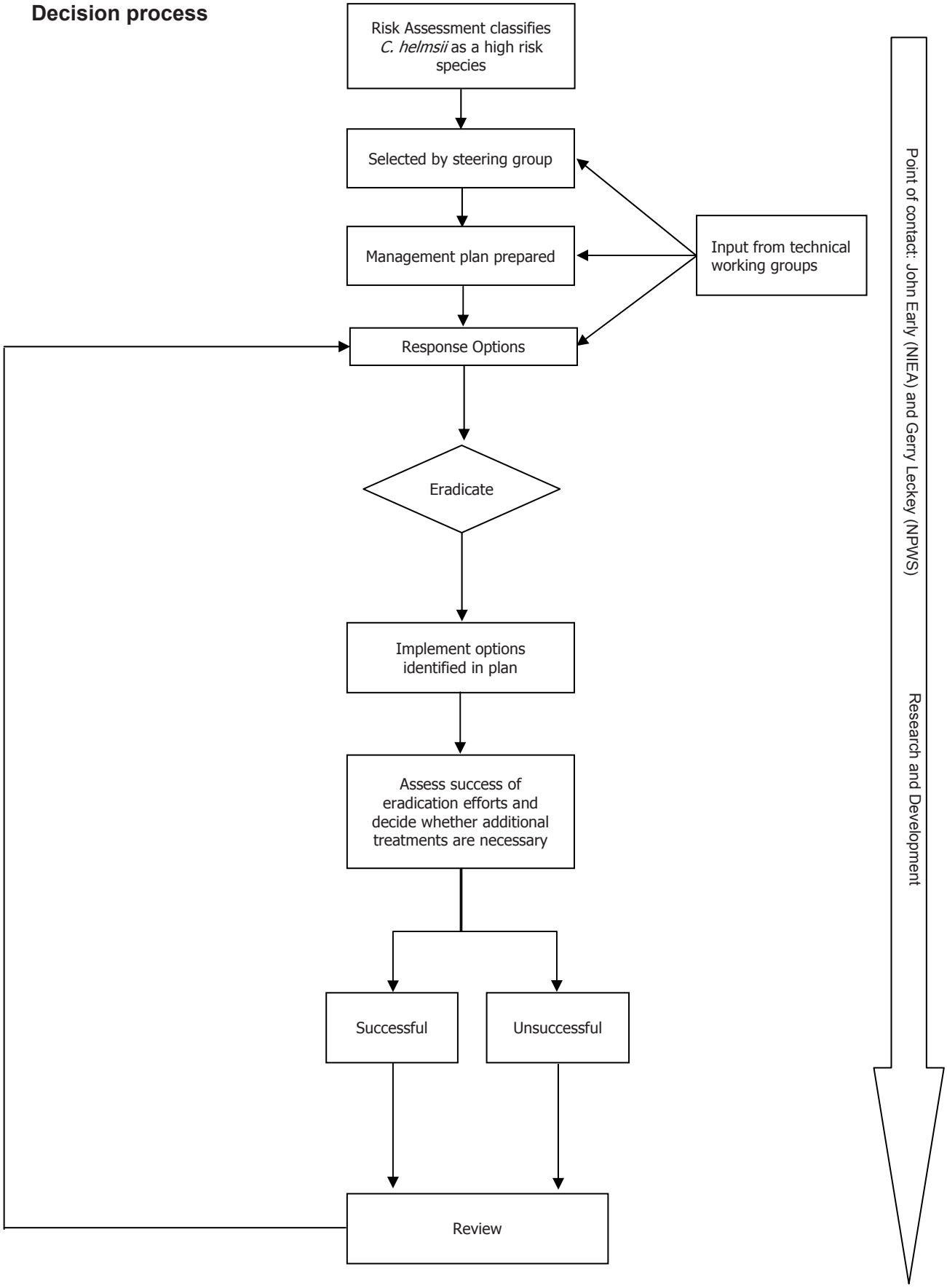
Action 7. Ensure adequate resources are in place to facilitate implementation of this plan

Small scale control programmes for this species i.e. garden ponds are estimated to cost less than £500. Larger ponds or river systems will required additional funding on a continuous basis until eradication is achieved. This is estimated to cost up to £5,000 annually. Should a lake, canal, or river system become colonised, costs associated will increase and are estimated to fall between the £50,000 - 100,000 in the first year. If funds are dedicated early in the invasion of a system this will reduce the overall cost of the programme and provide the greatest value for money in terms of commitment of resources and preventing economic impact in Ireland.

13. Recommended actions and timetables

No.	Action	Responsibility	Timescale
1	Establish accurate baseline distribution	Government Agencies in partnership with the National Biodiversity Data Centre, Cedar and other stakeholders engaged in the collection of biodiversity data	Annual programme required. Programmes should aim to build on that of the 2009 Invasive Species Survey co-ordinated by the National Biodiversity Data Centre
2	Enforcement and raise awareness of legislative powers	State agencies in partnership with relevant stakeholders	Initiate in 2009
3	Amend existing legislation	State agencies	2009 - 2010
4	Highlight, support and promote Invasive Species Codes of Practice	State agencies, Invasive Species Ireland, relevant stakeholders	Initiate in 2009
5	Public sector bodies adopt Invasive Species Codes of Practice	All public bodies	2009
6	Prioritise sites for eradication across the island of Ireland and initiate programme of measures	NPWS, NIEA, local authorities in partnership with local authorities and other relevant stakeholders	2009/2010
7	Ensure adequate resources are in place to facilitate implementation of this plan	NPWS, NIEA local authorities and relevant stakeholders	Immediately after successful completion of Action 6

14. Decision process



15. Template management plan

Use this template to help formulate a management plan outlining how you are going to proceed and what you will need.

Site Manager(s)/Owner(s): _____
Site Name(s): _____
Central grid reference: _____

License to proceed with plan acquired? **Yes** ☐ **No** ☐

Site details

Address:	
Telephone:	
Email:	
Agencies/persons involved:	
Date:	
Species of concern:	

Invasion history

Date of introduction:	
Original location of introduction:	
Date of first report to competent authority:	
Method of introduction:	
Additional information on introduction event:	

Site information

Total site area:	
Total area colonised:	
Total area of relevant habitats:	

Designation	**On site**	**Near site**	**None present**
Details: Establish if there is a requirement to apply for a license/notify before proceeding with plan.			

Rare and threatened species	**On site**	**Near site**	**None present**
Red Data Book or BAP species:			
Other rare or threatened species:			

Current identified impacts

Impacts	Minimal	Moderate	Severe

Human sensitivities/vested interests at site

Issue	Human receptor

Identify requirements and best practice for collaboration with stakeholders

Actions and resources

Management options	Responsibility	Date to undertake

Resources needed	Responsibility	Date to undertake

Monitoring and evaluation

Name of person/s	Date to undertake	Report to	Additional treatments date (if required)

16. Summary of actions needed for effective management

1. Confirm identification of species. Refer to recognised experts to confirm identification, if required.

2. Develop and produce a site specific management plan. Use the template provided in this document to guide you. A key part of this will involve surveying and producing a distribution map indicating the species distribution on the site.

3. Consider all designated sites on or nearby the management area. You may need to apply for a license under nature conservation legislation to proceed and/or undertake an Appropriate Assessment under the terms of Article 6 of the Habitats Directive. Remember that actions taken outside a designated site may have an impact on a nearby designated site and are thus subject to the same considerations.

4. Consider surrounding properties and households. Talk to adjacent land owners and make them aware of the issues and what you plan to do. It may not be possible but always attempt to get their support. Control programmes will have a higher chance of success with support from the local community. Raise awareness of the issues and ensure alerts are placed in appropriate media e.g. the Invasive Species Ireland website.

5. Consider if you can successfully and safely carry out the work or if professional practitioners, with relevant training and certificates should undertake the work. Also consider if the programme can be co-ordinated with voluntary clubs and local societies and ensure their support and understanding of the issues.

6. Ensure safe disposal of plant material, including the cleaning of any machinery or equipment that may be contaminated.

7. Remember relevant health and safety legislation and procedures.

8. Identify if sufficient resources are/will be available to complete the work within the planned timescale. If work will take more than 1 year to complete, ensure you have sufficient funds to complete the work.

9. Monitor for missed plants/reintroduction during site visits. If applicable, ensure new members of staff are aware of the action plan and report sightings.

17. References

CEH (Centre for Ecology and Hydrology), 2004. Information Sheet 11: Australian Swamp Stonecrop. [online] Available from http://www.nerc-wallingford.ac.uk/research/capm/pdf%20files/12%20Crassula.pdf. [accessed 12 June 2009].

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Habitas, 2009. *Crassula helmsii*, New Zealand Pigmyweed. [online] Available from http://www.habitas.org.uk/invasive/species.asp?item=4639 [accessed 18 June 2009].

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The Invasive Species Ireland Project is undertaken, in partnership, by EnviroCentre and Quercus.

www.envirocentre.co.uk

www.quercus.ac.uk

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Northern Ireland Environment Agency
www.ni-environment.gov.uk
An Agency within the Department of the Environment
www.doeni.gov.uk

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

www.ni-environment.gov.uk

www.npws.ie

For more information on the Invasive Species Ireland Project please see the website at www.invasivespeciesireland.com

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