

Non-native crayfish exclusion strategy and contingency plan.

1. Aim

The aim of this plan is to set in place the protocols needed to prevent the introduction of non-native crayfish to the island of Ireland. Should these efforts prove unsuccessful, a contingency plan has been designed to guide the relevant departments on the course of action required to eradicate this species and thereby protect the endangered white-clawed crayfish and Irish ecosystem functioning.

2. Key priorities

2.1. Exclusion

- Ensure no crayfish species and/or specimens are imported to Ireland either by enforcing existing legislation, enacting new legislation.
- Continue to raise awareness with water users and the angling sectors of the threat posed by Crayfish Plague being transferred from the Britain and Europe to Ireland via wet equipment.
- Education of aquaculture, food and pet industries on the nature of the threats posed by non-native crayfish species.

2.2. Contingency

- Ensure immediate removal/containment if non-native crayfish are imported illegally and released into the wild. To achieve this, appropriate licenses, trained staff and supplies of suitable equipment need to be in place prior to an introduction being discovered.

3. Introduction

Non-native crayfish represent a serious threat to the endangered white clawed crayfish. The island of Ireland is now one of the last strongholds for this globally threatened species. Based on its invasive history, ecology, trade and nearest neighbour donor populations, the North American signal crayfish (*Pacifastacus leniusculus*) is currently considered the most likely non-native crayfish species to be introduced to Ireland. Unfortunately, trends in crayfish trade in Britain indicate that there is an increase in the illegal trade of banned crayfish species such as *Orconectes limosus* (spiny-cheek crayfish) and *Procambarus* sp. (marbled crayfish).

4. Identification

It is recommended that custom officials and workers in the field focus their attention on accurate identification of the native crayfish (*Austropotamobius pallipes*) and all other species should be held for identification by an appropriate expert familiar with the non-native species in question. Recommended authorities include natural history museums, both on the island of Ireland and in Britain, and also workers from Britain at agencies such as Cefas who have experience identifying these species. All suspect cases should be reported to the crayfish point of contact and the Alien Watch section of the Invasive Species Ireland website immediately. To maximise the effectiveness of any control measures, early and accurate notification of any introduced populations is crucial.

5. Impacts

Due to the threatened nature of the native crayfish and the fact that all North American crayfish species carry a fungal parasite, commonly known as Crayfish Plague (*Aphanomyces astaci*), that is lethal to all non-American crayfish species; this is regarded as the main impact from their introduction. Crayfish Plague carried by North American crayfish is one of the main reasons for the collapse and extinction of native white-clawed crayfish across Europe, including Britain. In light of the rapid natural and human mediated expansion and colonisation of European water bodies by signal crayfish across many parts of Europe this document highlights the issues associated with this species in particular; however, the principals and methodologies described are applicable to all non-native species of crayfish.

6. Current distribution

The nearest neighbour populations to Ireland are present in England, Wales and parts of southern Scotland. Due to trade and travel links, Britain is considered the most likely source of non-native crayfish, but they are present across Europe, so there are a number of pathways that would bring non-native crayfish into Ireland.

7. Pathways

Given that the most likely pathway for non-native crayfish to Ireland is the deliberate introduction through illegal/legal import, the principal pathways into Ireland will be through the main ports of entry (by sea or by air). Importation of live crayfish can be for the live food trade, aquaria, garden ponds and also aquaculture. The smuggling of crayfish into Ireland through a port of entry cannot be ruled out.

8. Spread potential

As signal crayfish are acid intolerant, it is believed that if introduced to Ireland, they would quickly establish themselves in the lime-rich midlands, which is the core habitat type of white-clawed crayfish. Such a scenario would likely prove catastrophic for white-clawed crayfish in Ireland.

9. Exclusion strategy

8.1. Limit the entrance of these species into Ireland.

Action 1. Enforcement and raise awareness of legislative powers

Legislation is already in place to prevent the release of non-native crayfish species in both Northern Ireland and the Republic of Ireland:

Republic of Ireland - under the Wildlife (Amendment) Act 2000 it is an offence to

- a) turn loose, willfully allow or cause to escape any species of wild animal or the spawn (offspring) of such wild animal or wild bird or the eggs of such wild bird,
- b) transfers any species of wild animal or the spawn of such wild animal or wild bird or the eggs of such wild bird from any place in the State to any other place in the State for the purpose of establishing it in a wild state in such other place.

Northern Ireland - under The Wildlife (Northern Ireland) Order 1985 it is an offence to release or allow to escape into the wild any animal which

- a) is of a kind which is not ordinarily resident in and is not a regular visitor to Northern Ireland in a wild state; or
- b) is included in Part I of Schedule 9.

Action 2. Amend existing legislation

Legislation should be strengthened to ensure a total ban on import and possession of non-native crayfish. To this end:

- Non-native crayfish should be added to schedule 9 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. non-native crayfish should be brought to the attention of the Minister and the required prohibition enacted.

Action 3. Raise awareness with port of entry inspection staff

Regular awareness raising with customs officials, port of entry staff and seafood importers of the impact and nature of threat posed by these species may be effective in preventing non-native crayfish arriving in Ireland.

Action 3. Raise awareness with targeted sectors

Raising awareness of the endangered white-clawed crayfish and the implications of an introduction for the environment and the economies in Ireland may help prevent the import of non-native crayfish species in the first place. Raising the general public's awareness of non-native crayfish in particular might appear useful, but it has the potential consequence of being counter-productive. Widespread knowledge of the edible nature and value of signal crayfish might encourage some people to attempt to bring them into Ireland. It may be more effective to target particular sectors such as the live food trade, pet and aquaria industry and also port of entry inspection staff. Raising awareness with members of the public that spend time along water courses (e.g. anglers, aquatic ecologists, canoeists etc.) may be an effective strategy to ensure prompt reporting of sighting of non-native crayfish incursions in the wild.

10. Contingency plan

If non-native crayfish are discovered in Ireland, then management options will need to be considered with the aim of containment, control and eradication. Before this is done, it is necessary to define what these options mean in practical terms. Eradication is the complete removal of all non-native crayfish, at all growth stages. Control and containment is to limit the spread of a non-native crayfish population such that individuals are unable to gain access to uncolonised areas.

Non-native crayfish are difficult to remove from water bodies due to a number of ecological and logistical considerations. A particular factor in making the signal crayfish difficult to control or remove is their ability to create long burrows in the river bank or underneath large stones and in clay. As a consequence, variable success has been achieved with eradication and control methods.

10.1. Control and containment

- Trapping and pheromone trapping. A useful method for catching some crayfish present, but it does not remove or eradicate all crayfish present (regardless of bait). This methodology is perhaps best considered as a control tool for adults and does not work well for juvenile or sub-adults. Many factors are known to affect trapping efficiency.
- Electro-fishing. A useful method for catching some crayfish present, but it does not remove or eradicate all crayfish. This methodology is perhaps best considered as a control tool for catching all age classes.
- Repellent. Several recent studies have looked at using repellents to contain signal crayfish within certain reaches of colonised water bodies. Various repellents have been tried from pheromones to acidic rock gabion baskets ('acid stressing') put on a river bed to 'contain' crayfish within an area in the short term. The use of repellents is in its infancy, but is often used alongside control strategies, in an attempt to contain a population whilst control work is undertaken.

10.2. Eradication

- Poisoning. Directly poisoning a water body can be a highly effective control and eventual eradication method (refer to the Invasive Species Ireland Policy Statement on chemical control. A synopsis of this document can be found on the following page). There are many difficulties/problems associated with poisoning and these include
 - (i) polluting aquatic ecosystems
 - (ii) the killing of non-target species
 - (iii) the logistics of managing a poisoned site for several weeks
 - (iv) the difficult public relations issues with poisoning a water body
 - (v) legal constraints relating to the use of poisons in water courses.

To minimise time delays, appropriate licenses, trained staff and supplies should be in place for use of natural pyrethroids prior to an introduction being discovered.

9.3. 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 in Ireland Steering Group recognise that in these circumstances, chemical control has a role in the management of the aquatic invasive species.

11. Resourcing the plans

11.1. Exclusion

Effective resourcing of the exclusion options identified in this plan will minimise costs associated with introductions of non-native crayfish. The exclusion strategy as outlined can be divided into two broad categories: pre border action and border control actions. Pre border actions focus on the education and awareness with the general public, live food trade sector and customs officials. Border control actions involve materials and staff time necessary for the implementation of this strategy are estimated to be less than £10,000 (€12,000).

11.2. Contingency

Should efforts to prevent arrival not be successful, the contingency plan will need to be implemented. The costs associated with contingency will vary according to the scale of the incursion and site specific parameters such as right of access.

- For very small scale introductions that are detected early and a rapid response initiated costs associated can be quite low. In the first instance, where suitably trained volunteers and agency staff are engaged in the programme costs are estimated to fall within band 1 of the scale i.e. less than £10,000 (€12,000). This would only hold true for minor introductions on isolated river systems and in reality is unlikely to occur.
- For more widespread introductions, costs incurred will be greater. It is anticipated that if the introduction is beyond a certain critical point agencies will need to assess if private contractors will be required to carry out the eradication programme. This programme should run for a number of years with resources given over to monitoring for decrease in population size and eventual removal. Personnel costs will be greater. For such a scenario the estimated cost is >£100,000 (€120,000) in the first year with costs decreasing in subsequent until eradication. The control programme should be run for a number of years with systems in place to ensure that no further introductions are taking place. If there is a loss of the endangered white-clawed crayfish at a protected sites costs associated will increase beyond this band due to any possible infraction proceedings and necessary restoration works.

12. Recommended actions and timetables

Action	Responsibility	Timescale
Raise awareness of transfer of Crayfish Plague with water users	Education and awareness group	Ongoing
Agencies to agree different control/eradication methods and ensure draft procedures and protocols are adopted prior to an introduction being discovered	Agency staff	Within 3 months of plan being adopted
Ensure necessary resources are in place so that eradication can be undertaken	Agency staff	Within 1 month of procedures and protocols being agreed
Annual progress report and review to Invasive Species Forum	Nominated point of contact	Annually

13. Non-native crayfish 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:	
Nearest white-clawed crayfish population: Include site name and distance from invaded site.	

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

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Actions and resources

Management options	Responsibility	Date to undertake

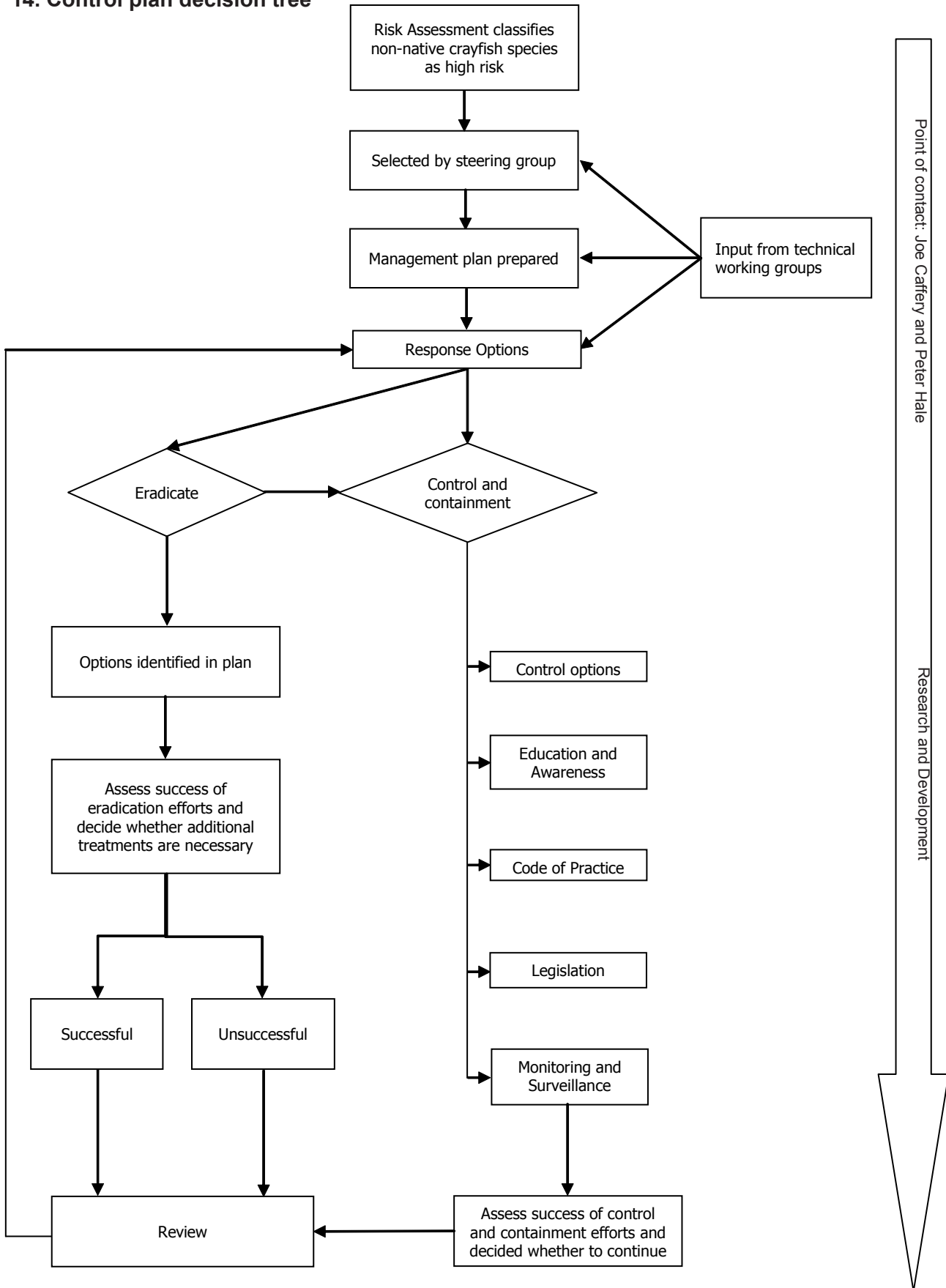
Resources needed	Responsibility	Date to undertake

Monitoring and evaluation

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

All equipment should be disinfected after every use to prevent crayfish plague been transferred to other sites.

14. Control plan decision tree



15. Summary of actions needed for effective management

1. Confirm identification of species. Refer to recognised experts to confirm identification.
2. Carry out a survey and produce a distribution map indicating the location across the site. Include all designated sites and connected and nearby river systems on maps produced. Use this information to help determine if you need to apply for a license to carry out control programme under the legislation governing protected sites. Remember that actions taken outside a designated site may have an impact on the designated site and therefore require notification to relevant governing body.
3. Consider surrounding properties and potential for spread. 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 outbreak and ensure alerts are placed in appropriate media e.g. the Invasive Species Ireland website.
4. 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.
5. Remember that any traps used should be disinfected to prevent spread of crayfish plague to and from the site.
6. Remember relevant health and safety legislation and procedures.
7. 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.
8. Identify disposal options for crayfish caught in traps.
8. Develop and produce a site specific control/management plan. Use the template provided in this document to guide you.
9. Monitor for missed animals/reintroduction during site visits. If applicable, ensure new members of staff are aware of the action plan and report sightings.

The Invasive Species Ireland Project is undertaken, in partnership, by
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www.envirocentre.co.uk



www.quercus.ac.uk

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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