



**Natural England
Strategies for Non-native
Freshwater Species
Management Forum - Cumbria
Pilot
Record of Cumbria Workshop:
20th November 2007**

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Note

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Executive Summary

- Natural England has designed this project, undertaken by Atkins, to progress a coordinated approach to non-native species management in two pilot areas; Cumbria and Norfolk.
- The first meeting on the Cumbria non-native species initiative was held at the Freshwater Biological Association, Ambleside, Cumbria and was attended by representatives from a variety of interested individuals and organisations.
- The group created a list of species of concern in Cumbria. This comprises species already present and causing negative impacts in Cumbria and species not yet present in Cumbria but known to cause adverse impacts and at risk of spread to Cumbria.
- The prioritisation of these species identified a range of types of actions required for the management of non-native species management. These include data gathering to fill information gaps, monitoring and direct active removal of species.
- Discussions of the group emphasised the need for partnership working and the need for some coordination of the process and partners.
- Funding of non-native species management is a key issue and the group felt that Natural England should, at the very minimum, fund a coordinator / fundraiser position to continue the management of the initiative after Atkins' input is complete.
- New approaches to non-native species management were discussed and included the potential of using grants and existing schemes, such as the Entry Level Stewardship (ELS), as incentives for landowners to tackle the problem on their own land.
- Considering the large funding requirement to address non-native species management across the country it was felt that spending some money on investigations into new practical methods of control, such as biological controls, would be beneficial.
- The need for the involvement of major landowners such as the National Trust and United Utilities, who were invited but unable to attend, was emphasised as was the need for involvement from the farming community in the form of the Farming and Wildlife Advisory Group (FWAG) and the National Farmers Union (NFU). These groups will be targeted for involvement at the next workshop.

1 Introduction

1.1 Non-native Species

Invasive non-native species are a significant threat to biodiversity. There are around 3000 non-native species in the UK; only a minority are freshwater species and this project focuses primarily on these.

Species such as Australian swamp stonecrop *Crassula helmsii* and North American signal crayfish *Pacifastacus leniusculus* are now widespread in many areas of England. In contrast, other species, such as floating pennywort *Hydrocotyle ranunculoides* have been introduced more recently and further spread of these species may be preventable. Non-native species may contribute to unfavourable status in SSSIs and cause significant impacts in many other areas.

A number of different terms are used when referring to non-native species. A few definitions are given below:

- Invasive non-natives – species introduced to the UK from another country and have a tendency to spread
- Naturalised non-natives – species introduced to the UK from another country but now behaving as if growing naturally in the wild
- Aliens – species not naturally occurring or in the UK
- Translocated species – species that occur naturally in the UK, but that are not necessarily naturally occurring in a specific area
- Transfaunation – the transfer of e.g. a fish parasite to a new host species
- Introductions – the release into the wild of species not naturally occurring in the UK
- Non-indigenous – species not originating from the UK
- Weeds – native plant species growing where they are not wanted
- Exotics – species introduced from or originating in a foreign country

1.2 Strategies for Freshwater Non-native Species Management – Pilot Project

Natural England recognises the fact that a strategic approach to non-native species management is required and has set up this project, which Atkins is managing. Experience in controlling invasions of problem species has indicated that eradication is difficult and that there is a risk of re-infestation from neighbouring sites or upstream sections if a strategic approach is not adopted.

Natural England recognises the importance of working with a range of partners and stakeholders to address invasive non-native species problems (see RPS, 2006) and have advocated such an approach as a means of delivering programmes of measures for the Water Framework Directive. Non-native species management 'initiatives' have the potential to ensure a coordinated approach to prevention and management activity and capture existing effort.

Via this project, Natural England proposes to establish two pilot initiatives to demonstrate the potential of such approaches and to serve as best practice examples. The initiatives are to be established in Cumbria and Norfolk and will initially deal with freshwater and riparian non-native species.

1.2.1 Objectives

This project is intended to demonstrate the potential of a coordinated and strategic approach to managing non-native species by initiating freshwater non-native species initiatives in Cumbria and Norfolk. The objectives of this project are as follows:

- to establish an initiative in each of the two areas including key individuals and organisations;
- to organise and facilitate at least one workshop/ meeting of each initiative;
- to assist each initiative in developing a suite of targets/objectives and a work plan to deliver these;
- to produce a report describing the work undertaken, critically evaluating the process and detailing lessons learned.

It is envisaged that at the end of the project there will be two operational non-native species initiatives, which will serve as exemplars for other regions of the UK.

1.3 Freshwater non-native species management – Cumbria Initiative Workshop 1

Atkins contract with Natural England was to establish two pilot "forums" to develop, and eventually deliver, strategies for the management of non-native freshwater species. On further reflection and discussion with Natural England, and based on feedback received from a number of the stakeholders invited to both the Cumbria and Norfolk meetings, we have decided to change the terminology. We propose to drop the word "forum" as it tends to suggest more discussion and less action, and replace it with the word "initiative" as this implies more action and less discussion. It also better reflects the nature of the process that needs to develop in that it will take initiative of many kinds, e.g. funding initiatives, partnership initiatives etc. and from all stakeholders involved in order for the management of freshwater non-native species to become effective.

The first workshop for the Cumbria Initiative was held on 20th November 2007 at the Freshwater Biological Association, Far Sawrey, Ambleside, Cumbria. This document provides a record of discussions, synthesis of the main findings, decisions and suggestions and outlines future actions.

1.3.1 Objectives

The main objectives of the first workshop were:

- To identify those non-native species in Cumbria that are causing concern either by already being present and causing detrimental impacts, or that are known to cause detrimental impacts, are not yet present in the county but that are nearby and have the potential to spread
- To consider and consolidate information about these species of concern and identify any gaps and needs
- To utilise available information to prioritise species for action and with the aim of producing a work plan
- To discuss resource availability and identify who is able to do what with the aim of assigning targets to the work plan

2 Non-native species of concern in Cumbria

2.1 Identification of species

The UK Technical Advisory Group (UKTAG) on the Water Framework Directive: Alien Species Group has produced a list of non-native species that are present across the UK and an assessment of their impact on the environment as follows:

- High impact – species about which a lot is known and that have a significant adverse ecological impact of some kind
- Low impact – species about which enough is known to conclude that although non-native, they are currently not having significant adverse ecological impact
- Unknown impact categories – species about which too little is known at present to decide which of the above categories they should be in

The full list contains species from coastal and transitional habitats as well as freshwater species. As this project is concerned with only freshwater species initially, species only occurring in coastal and transitional habitats were removed from the list prior to its consideration by the Cumbria group.

This amended list was used as a basis for the Cumbria Initiative to identify those species that are of concern on the basis of whether they are present in Cumbria and already causing negative impacts or not yet present in Cumbria but that are of concern because of their potential to cause negative impacts should they arrive. Species that were not thought to pose a threat and that are known to be absent from Cumbria were removed from the list.

In addition to those species listed by UKTAG, the list of species currently proposed for inclusion to Schedule 9 of the Wildlife and Countryside Act 1981 (WCA) and/or proposed for ban of sale in the Defra consultation paper (<http://www.defra.gov.uk/corporate/consult/wca-schedule9/index.htm>) were considered as were any other species not on any of these list but considered to be of concern by any member of the group.

The final list of species is given in Table 1.

The species on this list were divided up between three break-out groups for further consideration. Each group was assigned a number of species from the each of the high, low and unknown impact categories.

The break-out groups were tasked with determining the following information for each of their assigned species:

- the approximate location
- rate of spread
- additional local knowledge on impacts
- ability to, and method of, control
- any existing effort in control

High impact on native habitats and biota	
Australian swamp stonecrop <i>Crassula helmsii</i>	Floating pennywort <i>Hydrocotyle ranunculoides</i>
Water fern <i>Azolla filiculoides</i>	Monkey-flowers <i>Mimulus cupreus</i> , <i>M. guttatus</i> and hybrids
Canadian pondweed <i>Elodea canadensis</i>	Nuttall's pondweed <i>Elodea nuttallii</i>
Japanese knotweed <i>Fallopia japonica</i>	Himalayan balsam <i>Impatiens glandulifera</i>
Giant hogweed <i>Heracleum mantegazzianum</i>	Rhododendron <i>Rhododendron ponticum</i>
Signal crayfish <i>Pacifastacus leniusculus</i>	Freshwater copepod <i>Lernaea cyprinacea</i>
Freshwater amphipod <i>Crangonyx pseudogracilis</i>	Chinese mitten crab <i>Eriocheir sinensis</i>
Jenkin's spire shell <i>Potamopyrgus antipodarum</i>	Common carp <i>Cyprinus carpio</i>
Topmouth gudgeon <i>Pseudorasbora parva</i>	
Goldfish <i>Carassius auratus</i>	
Low impact on native habitats and biota	
Sweetflag <i>Acorus calamus</i>	Montbretia <i>Crococsmia x crocosmiiflora</i>
Orange balsam <i>Impatiens capensis</i>	Lupin <i>Lupinus nootkatensis</i>
Pink purslane <i>Montia sibirica</i>	Cape pondweed <i>Aponogeton distachyos</i>
Giant butterbur <i>Petasites japonicus</i>	Bitterling <i>Rhodeus sericeus</i>
Brook charr <i>Salvelinus fontinalis</i>	Rainbow trout <i>Oncorhynchus mykiss</i>
Grass carp <i>Ctenopharyngodon idella</i>	
Unknown impact on native habitats and biota	
Curly water-thyme <i>Lagarosiphon major</i>	Least duckweed <i>Lemna minuta</i>
Freshwater triclads <i>Dugesia tigrina</i>	Freshwater molluscs <i>Corbicula fluminea</i> <i>Ferissia wautieri</i> , <i>Marstoniopsis scholtzi</i>
<i>Phagocata woodworthi</i>	<i>Menetus dilatatus</i> , <i>Musculium transversum</i>
<i>Planaria torva</i>	<i>Physa acuta</i> , <i>P. gyrina</i> , <i>P. heterostropha</i>
Other freshwater malacostracans	Freshwater copepods <i>Achtheres percarum</i>
<i>Asellus communi</i> , <i>Corophium curvispinum</i>	<i>Ergasilus briani</i> , <i>Neoergasilus japonicus</i>
Freshwater oligochaetes <i>Branchiura sowerbyi</i>	<i>Tracheliastes polycolpus</i> , <i>Ergasilus sieboldi</i>
<i>Limnodrilus cervix</i>	European (wels) catfish <i>Silurus glanis</i>
Pikeperch (zander) <i>Sander lucioperca</i>	
Other species	
Skunk cabbage <i>Symplocarpus foetidus</i>	Mink <i>Mustela vison</i>
Canada geese <i>Branta canadensis</i>	Greylag geese <i>Anser anser</i>
Roach <i>Rutilus rutilus</i>	Red Eared Terrapins <i>Trachemys scripta elegans</i>
Ruddy duck <i>Oxyura jamaicensis</i>	Ruffe/Pope <i>Gymnocephalus cernuus</i>
Koi <i>Cyprinus carpio</i>	Giant knotweed <i>Fallopia sachalinensis</i>
Himalayan knotweed <i>Persicaria wallichii</i>	Giant rhubarb <i>Gunnera tinctoria</i>
South African clawed toad <i>Xenopus laevis</i>	

Table 1 Final list of non-native species in Cumbria for further consideration

Each group was to provide the information they have, recognising the fact that a species expert may be in a different group. Any additional information was added during the plenary feedback session.

2.2 Information gathering

2.2.1 Species with high impact on native habitats and biota

2.2.1.1 Australian swamp stonecrop *Crassula helmsii*

Australian swamp stonecrop is known to be present in Grasmere, Rydal, Windermere, Bassenthwaite, Derwent Water, Coniston and Silecroft Pond. It is a rapidly growing plant which out competes native species, in particular in Cumbria It competes with the rare *Luronium*, which is listed on Annexes II and IV of the Habitats Directive, Appendix I of the Bern Convention and is protected under Schedule 4 of the Conservation (Natural Habitats, etc.) Regulations 1994 and Schedule 8 of the Wildlife and Countryside Act (WCA) 1981. The presence of Australian swamp stonecrop on a SSSI contributes to unfavourable condition status.

Its mode of spread is considered to be by water users such as boat owners and fishermen who inadvertently transport the plant from one site to another. In Cumbria it dominates locally and is difficult to control. Control methods include chemical herbicides, such as Roundup, and shading. The effectiveness of the latter is in doubt. The use of large quantities of chemicals that would be required to control this species would have implications on United Utilities since many of the lakes are abstracted for water supply.

2.2.1.2 Floating pennywort *Hydrocotyle ranunculoides*

Floating pennywort is an aquatic species which spreads rapidly. It is not currently known to be in Cumbria so the target for this species would be to prevent its arrival. It is spread by water users and garden centres.

2.2.1.3 Japanese knotweed *Fallopia japonica*

Japanese knotweed is ubiquitous, occurring around most lakes in Cumbria. Its spread is generally associated with fly tipping, but ill informed cutting, which leads to the spread of fragments that easily regrow, is also a problem.

There is some effort in control known on Grasmere and the Rothay Valley, with a degree of co-ordination. At Bassenthwaite there is concerted effort to prevent upstream spread and similar approach with local people by the National Trust and National Parks Authority. The local community is already playing a big role in the management of this species, although funding the cost of spraying is a problem.

Chemical herbicide (glyphosate) is used as a method of control but this is again limited by the fact that waterbodies are used as potable water supply. Other methods of control include persistent cutting, cutting and spraying combined or digging (rotovator, excavator etc) and spraying combined. The potential for using hens as a control method was also suggested since hens constantly scratch at the soil and would possibly prevent growth.

2.2.1.4 Canadian pondweed *Elodea canadensis*

Canadian pondweed is very widely spread across Cumbria. It is questionable whether it is a problem or whether it is in balance with natives and now naturalised. Little is known about its adverse impacts although it is assumed to compete with natives for space, light and resources. It is difficult to control, methods include dragging and herbicides, but there is

currently no effort to remove. As with other species' control, the use of chemicals is limited due to the use of waterbodies for potable supply.

2.2.1.5 Himalayan balsam *Impatiens glandulifera*

Himalayan balsam is widespread across Cumbria and, where there are no control mechanisms in place, it is spreading rapidly by flooding, flood defence earthworks, human movement and animal feed (in silage and hay). This species out competes native plants, including the touch-me-not balsam (*Impatiens noli-tangere*), which hosts the BAP priority moth species, netted carpet moth (*Eustroma reticulatum*), posing a threat to its distribution also. Himalayan balsam can be controlled with herbicides (glyphosate), pulling throughout the year and strimming (it needs to be cut very low and repeated). There are issues with disposal; on-site composting has usually been effective but this year, due to wet weather, the pulled plants re-rooted where they were left to dry out, therefore removal to waste disposal sites may be required.

There are existing control efforts on the River Kent from Kentmere Tarn downstream, Burnside, Kendal, Pettoril (Eden Rivers Trust), Ulswater, Grasmere and Bassenthwaite. There needs to be a whole catchment approach to control of this species. A potential for grazing as a control method was suggested as this would keep shoots short preventing growth. The aspirational target for Himalayan balsam would be to eradicate by starting at the top of the catchment.

2.2.1.6 Rhododendron *Rhododendron ponticum*

There was some discussion as to whether this species should be included or not in a "freshwater initiative" but it was agreed that Rhododendron is widespread along riparian habitats in Cumbria.

Where it occurs in the vicinity of waterbodies it will extend to the water's edge expanding on a gravitational route. The large amount of shading it produces negatively impacts native species by preventing growth nearby. Rhododendron thrives in acid conditions and renders the surrounding soil sterile preventing growth of other species.

The method of control involves chopping, burning and respraying, resulting in it being expensive to remove. There is currently widespread removal effort in the county.

After further discussion it was decided to remove this species from the list as its links to freshwater are tenuous and there is already an extensive eradication programme in progress.

2.2.1.7 Water fern *Azolla filiculoides*

Water fern is present in south Lakes and Derwent Water. This plant is not frost resistant so it dies off each year and is not thought to be a big problem. However, climate change has the potential to improve its habitat conditions resulting in more severe problems. Continual monitoring is needed to detect if there is any spread. The proposed opening up of the Lancaster canal may present a route to spread.

2.2.1.8 Nuttall's pondweed *Elodea nuttallii*

Distribution information for Nuttall's pondweed should be available from the FBA/Centre for Ecology and Hydrology (CEH) though it is known to be present in the Windermere basin. This species may impact on rare species by out competing and being better adapted to changing conditions or ranges of environmental conditions. Research is needed on which of the *Elodea* species is where.

2.2.1.9 Giant hogweed *Heracleum mantegazzianum*

Giant hogweed is present in Cumbria in small amounts, patchily distributed. There have been known stands at Ambleside, South Cumbria Sewage Treatment Works and possibly on the River Kent. It regrows in the same location each year so is either growing from seed or rhizomes. Its spread may be associated with tipping.

This species is closely monitored and is controlled on an ad hoc basis. If it is found it is dealt with rapidly due to its public health issues. Existing control methods are very effective. In Cumbria it is not thought to be very invasive and is not rapidly spreading.

2.2.1.10 Monkey-flowers *Mimulus cupreus*, *M. guttatus* and hybrids

Although known to be present in Cumbria, distribution is not known. Other information on impacts and control are also unknown.

2.2.1.11 Freshwater amphipod *Crangonyx pseudogracilis*

This amphipod species is thought to be widespread, but not currently routinely identified in Environment Agency macroinvertebrate surveys. Identification of this and other freshwater amphipods is needed to verify distribution. Control methods for freshwater amphipods are unknown.

2.2.1.12 Freshwater copepod *Lernaea cyprinacea*

An FBA research student has undertaken a study on this species and further information is available from the FBA. It was suggested that it could be an EA issue to monitor and that health checks on fish stocks may detect its presence. Other details were not known.

2.2.1.13 Jenkin's spire shell *Potamopyrgus antipodarum*

This species is widespread across the UK but further information was unknown.

2.2.1.14 Chinese mitten crab *Eriocheir sinensis*

Chinese mitten crab has been present on the Dudden estuary for 12 months. The species is spreading rapidly nationally and there is potential for spread within the county. Spread would be by movement upstream although conditions may not be suitable. Adverse impacts relate to their burrows undermining banks and possibly similar to crayfish competing with native species and affecting macrophyte and macroinvertebrate communities. There is no current control effort but monitoring for presence of holes is required. The target for action would be to eradicate the species at the current location and prevent its spread.

2.2.1.15 North American signal crayfish *Pacifastacus leniusculus*

The North American signal crayfish is present at St. John's Beck and Derwent Water and probably arrived through trout stocking. The population expands rapidly at a site but expansion around the county is thought to be slow. This crayfish causes problems for flood defence by undermining banks with their deep burrowing. They also compete with native crayfish for food and habitat, carry plague to which native species are not resistant and have significant impacts on macroinvertebrate and macrophyte populations. They may also eat fish eggs.

They can be controlled by permethrin poisoning but this also kills everything else in the waterbody. There is some existing effort involving the removal of adults to reduce the breeding population but more awareness raising and education is needed regarding its spread, which can be through the movement of water or wet gear between sites.

The aspirational target for this species would be for eradication at St. John's Beck and prevention of the spread of population and of the crayfish plague.

2.2.1.16 Common carp *Cyprinus carpio*

The common carp is locally present in still waters in Cumbria. Its route of impact on native species is to cause adverse changes to its environment. It is difficult to control but is not thought to be a major problem in Cumbria. The same is considered to apply to tench and bream.

2.2.1.17 Topmouth gudgeon *Pseudorasbora parva*

Topmouth gudgeon has been present but was eradicated from the Ratherheath Tarn at the cost of up to £70k. Control requires removal of native fish before applying a poison (Rotenone). Thought to have been introduced through trout stocking, the top mouth gudgeon competes with native species and may carry a damaging parasite, threatening fish diversity. The target for this species would be to prevent its reoccurrence.

2.2.1.18 Goldfish *Carassius auratus*

The goldfish is thought to die off once released and not to be self sustaining, although climate change may make conditions more suitable. Its negative impacts involve it hybridising with crucian carp and interbreeding with native brown fish. The highest risk then would be to waterbodies with crucian carp; information is available on the distribution of crucian carp from the FBA.

2.2.2 Species with low impact on native habitats and biota

2.2.2.1 Orange balsam *Impatiens capensis*

Orange balsam is not considered to be as bad as Himalayan balsam and there are only small amounts patchily distributed in the UK. It is not thought to be present in or to be an issue for the lakes.

2.2.2.2 Cape pondweed *Aponogeton distachyos*

The presence and distribution of Cape pondweed in Cumbria was not known, but may possibly be in Kendal. No other information was known.

2.2.2.3 Lupin *Lupinus nootkatensis*

Lupin is naturalised in Cumbria and not thought to be a problem.

2.2.2.4 Sweetflag *Acorus calamus*

The distribution of sweetflag is not known and is not thought to be a problem in Cumbria.

2.2.2.5 Giant butterbur *Petasites japonicus*

No information or details known.

2.2.2.6 Brook charr *Salvelinus fontinalis*

Brook charr may have been present in the past but is not currently known to be a significant issue in Cumbria. It is thought that they are not able to maintain a population and that any populations are isolated.

2.2.2.7 Rainbow trout *Oncorhynchus mykiss*

Rainbow trout are not known to be a problem as they are controlled by stocking with triploids, which prevents breeding.

2.2.2.8 Other species

The following species were not covered in the time available and no information was gathered:

- Montbretia *Crococsmia x crocosmiiflora*
- Pink purslane *Montia sibirica*
- Bitterling *Rhodeus sericeus*
- Grass carp *Ctenopharyngodon idella*

2.2.3 Species with unknown impact on native habitats and biota

2.2.3.1 Curly water-thyme *Lagarosiphon major*

Curly water thyme (or curly water weed) is widespread in Cumbria and is found in flowing waters as well as still waters, extending the habitat suggested by the UKTAG species list. It is possibly as invasive as the *Elodea* spp with a similar impact. There is currently no control effort.

2.2.3.2 European (wels) catfish *Silurus glanis*

The spread of the European catfish is thought by some to be due in part to its release by fishermen; some education may be needed regarding possible impacts and implications of the spread of this species. This is a large predatory fish, which will take wildfowl and small mammals as well as fish, although the long-term impacts are unknown. Incidences of European catfish are controlled by the Environment Agency.

2.2.3.3 Least duckweed *Lemna minuta (minuscula)*

Least duckweed is not known to be a problem in Cumbria.

2.2.3.4 Freshwater oligochaetes *Branchiura sowerbyi, Limnodrilus cervix*

No information or details known.

2.2.3.5 Freshwater molluscs *Corbicula fluminea, Ferissia wautieri, Marstoniopsis scholtzi, Menetus dilatatus, Musculium transversum, Physa acuta, Physa gyrina, Physa heterostropha*

The EA may have information on the distribution of freshwater molluscs from their routine monitoring. Other information was unknown.

2.2.3.6 Freshwater malacostracans *Asellus communis, Corophium curvispinum*

Information on these species was unknown.

2.2.3.7 Other species

The following species were not covered in the time available and no information was gathered:

- Freshwater triclads *Dugesia tigrina, Phagocata woodworthi, Planaria torva*
- Freshwater copepods *Achtheres percarum, Ergasilus briani, Ergasilus sieboldi, Neoergasilus japonicus, Tracheliastes polycolpus*

2.2.4 Additional species listed

2.2.4.1 Himalayan knotweed *Persicaria wallichii*

Himalayan knotweed is locally distributed within Cumbria and is known to be at Whitemoss Common. This species is known to dominate the flora where it occurs but the risk significant adverse impact is uncertain. Removal from alongside watercourse leaves bare banks leading to increased run-off of sediment, which is an issue for fisheries. For this reason there is some money and volunteers available from fisheries organisations. The National Trust and Lake District National Park Authority undertake some removal by glyphosate spraying, but there needs to be a more coordinated approach.

2.2.4.2 Skunk cabbage *Symplocarpus foetidus*

Skunk cabbage is known to be present at Grasmere, Rydal, the west coast, Craike, Conniston as well as other locations. It is not rapidly spreading and is dealt with on an ad hoc basis by Cumbria Wildlife Trust. It does have potential for exponential growth within a site causing displacement of other species.

2.2.4.3 Giant knotweed *Fallopia sachalinensis*

Giant knotweed has been recorded once in Ambleside and was dealt with. It is not thought to spread as rapidly as other knotweeds.

2.2.4.4 Mink *Mustela vison*

The distribution of mink in Cumbria is widespread. The impact of mink on native species is via predation of water voles and birds. There has been some effort by the Cumbria Wildlife Trust and the Eden Rivers Trust to control this species through a volunteer programme but this is control on a local level, the problem is widespread. The control of mink needs a coordinated approach; the work of the two Trusts has had a huge impact.

2.2.4.5 Greylag goose *Anser anser*

Greylag geese have been translocated to Cumbria and are present at Windermere and Derwent Water. They have a long life span and cause damage to reedbeds and farmland. They are spreading rapidly but can be controlled by fencing to keep them off farmers' fields or by managing the eggs to prevent hatching (egg pricking). There has been a local Windermere meeting to discuss Greylag and Canada geese problems and how to tackle them. There is some current effort in control in the form of egg pricking around Grasmere.

2.2.4.6 Ruddy duck *Oxyura jamaicensis*

Ruddy duck are not considered to be a lakes issue. There is a European conservation problem due to them hybridising with the white-headed duck; there is a national attempt to eradicate the species in support of this.

2.2.4.7 South African clawed toad *Xenopus laevis*

The South African clawed toad is not currently in Cumbria but monitoring for it is needed. Further information is needed on its impacts and distribution; Richard Tinsley at Bristol University is known to be a toad expert.

2.2.4.8 Roach *Rutilus rutilus*

Roach is a native species to the UK but is not naturally present in Cumbria; it has been translocated to the county and climate change now allows its distribution in Windermere. It causes changes to the plankton community of the waterbody. Control, as with other fish species is difficult.

2.2.4.9 Ruffe/Pope *Gymnocephalus cernuus*

Ruffe, or Pope, is another species of translocated fish, not naturally occurring in Cumbria despite being native to the UK. It is known to be present in Bassenthwaite Lake where it is thought to eat the eggs of vendace (*Coregonus albula*), a UK BAP priority species. As with other fish species, control is difficult and there is currently no active programme of control. The spread of this species is thought to be likely.

2.2.4.10 Other species

The following species were not covered in the time available and no information was gathered:

- Pikeperch (zander) *Sander lucioperca*
- Canada geese *Branta canadensis*
- Red Eared Terrapins *Trachemys scripta elegans*
- Koi *Cyprinus carpio*
- Giant rhubarb *Gunnera tinctoria*

3 Prioritising Species and Actions

Due to the large number of non-native species present in Cumbria, a large number and range of actions will be needed to address the issues. For this reason, as well as the key issue of the need for coordinated action in order for there to be effective control as highlighted by the information gathering process above, the next step in the process was to determine a method of prioritising actions.

Atkins' suggested format for this session was to return to breakout groups to continue discussions on the assigned species. Feedback from the group, however, was that continuing in plenary would make full use of all the knowledge available in the room and working in this way would ensure that the whole group was involved in discussions on how the species should be prioritised.

Clearly there are numerous potential ways of approaching prioritisation, ranging from relatively simple categorisation to more complex scoring matrices based on level of impact, sensitivity of sites, resources needed, etc. Based on the time and knowledge immediately available, a categorisation process was agreed upon, starting by identifying those species for which there was insufficient data for the group to make any kind of decision/prioritisation and those species which were not considered to be of particular concern in Cumbria.

Of the remaining species, the following categories were created:

- Species not currently present in Cumbria but that are of concern due to their potential for spread into the county
- Species widespread in Cumbria and of immediate concern
- Species present at specific sites and of immediate concern
- Species which are widespread but whose eradication would cause damage to native species and would require extensive resources but whose spread to other sites should be prevented

The results of the classification are shown below in Table 2.

<p>Species widespread in Cumbria and requiring control:</p> <ul style="list-style-type: none"> • Australian swamp stonecrop <i>Crassula helmsii</i> • Japanese knotweed <i>Fallopia japonica</i> • Himalayan balsam <i>Impatiens glandulifera</i> • Giant hogweed <i>Heracleum mantegazzianum</i> • Mink <i>Mustela vison</i> 	
<p>Species present at specific sites and that require attention (remediation, prevention, eradication etc):</p> <ul style="list-style-type: none"> • North American Signal crayfish <i>Pacifastacus leniusculus</i> • Roach <i>Rutilus rutilus</i> • Canada Geese <i>Branta canadensis</i> • Greylag Geese <i>Anser anser</i> • Rainbow trout <i>Oncorhynchus mykiss</i> • Chinese mitten crab <i>Eriocheir sinensis</i> • Common carp <i>Cyprinus carpio</i> • Goldfish <i>Carassius auratus</i> • Water fern <i>Azolla filiculoides</i> • Curly water-thyme/weed <i>Lagarosiphon major</i> • Koi <i>Cyprinus carpio</i> • Himalayan knotweed <i>Persicaria wallichii</i> • Giant rhubarb <i>Gunnera tinctoria</i> • Skunk cabbage <i>Symplocarpus foetidus</i> • Giant knotweed <i>Fallopia sachalinensis</i> 	
<p>Species not currently present in Cumbria, but present in neighbouring counties and that have potential for impact in Cumbria and that require watching brief:</p> <ul style="list-style-type: none"> • European (wels) catfish <i>Silurus glanis</i> • Pikeperch (zander) <i>Sander lucioperca</i> • Topmouth gudgeon <i>Pseudorasbora parva</i> • Zebra mussel <i>Dreissena polymorpha</i> • Floating pennywort <i>Hydrocotyle ranunculoides</i> • South African clawed toad <i>Xenopus laevis</i> 	
<p>Species which are widespread but whose eradication would cause damage to native species and would require extensive resources but whose spread to other sites should be prevented:</p> <ul style="list-style-type: none"> • Canadian pondweed <i>Elodea Canadensis</i> • Nuttall's pondweed <i>Elodea nuttallii</i> 	
<p>Species for which insufficient information was available from those present to be able to prioritise:</p> <ul style="list-style-type: none"> • Freshwater copepod <i>Lernaea cyprinacea</i> • Freshwater amphipod <i>Crangonyx pseudogracilis</i> • Freshwater molluscs: <i>Corbicula fluminea</i>, <i>Ferissia wautieri</i>, <i>Marstoniopsis scholtzi</i>, <i>Menetus dilatatus</i>, <i>Musculium transversum</i>, <i>Physa acuta</i>, <i>Physa gyrina</i>, <i>Physa heterostropha</i> • Monkey-flowers <i>Mimulus cupreus</i>, <i>M. guttatus</i> and hybrids • Giant butterbur <i>Petasites japonicus</i> • Cape pondweed <i>Aponogeton distachyos</i> • Least duckweed <i>Lemna minuta (minuscula)</i> • Freshwater triclads: <i>Dugesia tigrina</i>, <i>Phagocata woodworthi</i>, <i>Planaria torva</i> 	
<p>Species that were not considered to pose a threat or have the potential to cause problems in the county:</p> <ul style="list-style-type: none"> • Pink purslane <i>Montia sibirica</i> • Bitterling <i>Rhodeus sericeus</i> • Brook charr <i>Salvelinus fontinalis</i> • Montbretia <i>Crococsmia x crocosmiiflora</i> • Orange balsam <i>Impatiens capensis</i> • Grass carp <i>Ctenopharyngodon idella</i> • Sweetflag <i>Acorus calamus</i> • Lupin <i>Lupinus nootkatensis</i> • Freshwater oligochaetes <i>Branchiura sowerbyi</i>, <i>Limnodrilus cervix</i> • Ruddy duck <i>Oxyura jamaicensis</i> • Freshwater copepods <i>Achtheres percarum</i>, <i>Ergasilus briani</i>, <i>Ergasilus sieboldi</i>, <i>Neoergasilus japonicus</i>, <i>Tracheliastes polycolpus</i> • Jenkin's spire shell <i>Potamopyrgus antipodarum</i> • Freshwater malacostracans <i>Asellus communis</i>, <i>Corophium curvispinum</i>, <i>Musculium transversum</i>, <i>Physa acuta</i>, <i>Physa gyrina</i>, <i>Physa heterostropha</i> • Red Eared Terrapins <i>Trachemys scripta elegans</i> 	

Table 2 Prioritisation of Species of Concern in Cumbria

4 Discussion

As noted before, the large number of non-native species present in Cumbria requires a large number of actions to exert control and these actions require resources and funding, this is fully recognised by the group. This section is a synthesis of the final discussion session, which covered this issue of resources and how to approach the required actions, and also of the various comments and suggestions raised throughout the workshop.

4.1 Strategic approaches to non-native species management

NE cannot tackle the problem of non-native species alone. One of the issues that was clearly articulated and agreed by the discussions of the Cumbria group was that effective control, especially of very widespread species, needs coordinated action from a number of different parties and the involvement of the wider community. Promoting and achieving such an approach has not historically been a skill of NE.

Partnership working and the involvement of communities and volunteers is vital to the success of non-native species management control, prevention and eradication initiatives. Partnerships of volunteers and other people and organisations will, however, need funding and support in order for them to effectively deal with the issues discussed. Volunteers, such as some of those present at the 1st Cumbria meeting, are not paid to be involved in this process; this includes the simple act of attending meetings. There are many potentially interested volunteers and organisations with professional staff but the process of bringing them together to develop a coordinated approach needs management, organisation and the provision of resources. Resources can refer to either financial or practical, e.g. tools, health and safety coordination, etc. Involved organisations and parties etc. need to be asked what they can give to the project e.g. chemicals, tools, money, volunteers, time, etc as it is likely that different ones will be able to provide a variety of different resources all of which are important in the process.

The practical issue of insurance for volunteers working on control, management or eradication was also discussed. Under whose auspices should work be done and whose insurance will cover work parties? This emphasised the need for non-native species management to be a long term project with some overarching management and coordination by an agreed person or organisation.

It was emphasised that Cumbria is a large county and that a lot of work will be needed to get a countywide pilot going. No single, existing, “ready-made” organisation or partnership that NE can call upon to do this work was identified at the meeting and it was suggested that perhaps lots of small pilots, such as the River Trust initiatives already in existence, might be needed for Cumbria? Although there are a number of successful rivers trusts in Cumbria, there are none in the west of the county and so little is currently being done there to tackle non-natives. It was also explained that there has traditionally been a lack of trust between different parts of Cumbria and thus that contact with civic trusts may also be needed as part of the initiative.

The control of non-native species is needed at a number of sites to meet NE’s and the EA’s Public Sector Agreement (PSA) targets e.g. for Sites of Special Scientific Interest (SSSI) to be in good ecological condition. NE emphasised that where non-native species are present on a SSSI and causing unfavourable condition, their approach would be to tackle these on a

unit by unit basis. Water quality and abstraction issues are, it seems, currently considered as higher priority and thus taking all / the majority of the available resources; there is currently no prioritisation for the non-native species issues. Also, NE's current survey process for assessing condition status only takes place every six years. This means that there could well have been a major spread of non-natives on protected sites between surveys and thus that the current system is not adequate to address non-native species issues.

Although non-native species are nationally perceived to be one of the top three threats to biodiversity (along with habitat loss and climate change with which they are also inextricably linked) and therefore of high priority, NE and the EA are not able to fund all of the required actions across the country. It is unlikely that either would be able to put in a large bid to provide national funding or that area teams would be able to provide sufficient funding at the local level. Finding funding from elsewhere, for example seeking out options and applying for grants, is, however, a time consuming exercise, particularly when each initiative may be seeking out the same national funding streams (for example, both Cumbria and Norfolk pilot initiatives applying to the same funding bodies). It was therefore suggested that as a very minimum, and as an alternative to funding the physical actions required to effect control/management/eradication, NE would need to provide funding for a fundraiser position within an organisation. This fundraiser position could also take on responsibility for management and coordination of the initiative and provide support in terms of organising health and safety and insurance requirements etc.

Atkins is being funded to run this process until the end of February, but the process will need to continue after this and there will need to be organisation and funding for future meetings as well as practical actions. The strategic management of non-native species needs motivation of groups and individuals with continual impetus and drive in order for the initiative to succeed. Given the size of the task involved, a coordinator, and possibly several coordinators for each catchment, will be required.

Monitoring, data collection and management were not fully discussed during the workshop although it is clear that monitoring of species already established, as well as those currently thought to be absent, is needed to prevent spread within the county. This will be discussed at the next workshop.

4.2 Other issues

4.2.1 Physical control methods

There are a large number and range of "traditional" or existing methods for management and control of non-native species. As recognised during discussion on specific species, however, all of these require great effort and funding. The total cost to NE of tackling the problem of non-native species itself would be vast and it would be worth spending some money investigating alternatives.

There have been a large number of successful examples of biological control (despite a few exceptional and well publicised failures). Mass control methods such as this need thorough and careful research, e.g. to eradicate all possible secondary impacts, as well as central government approval in order for them to be approved and utilised.

Physical and chemical control of crayfish has already been investigated, including the use of pheromones.

4.2.2 Incentive schemes

As Japanese knotweed and giant hogweed are notifiable plants, grants could be made available for land owners to tackle the problem themselves. Or this could be done through grants and payments such as the Entry Level Stewardship (ELS), e.g. where payments would be made to landowners to eradicate e.g. Himalayan balsam from their land. NE and others would, however, need to provide advice to enable them to do this. Such approaches should be applied on an area or parish basis, for example, one year start at the top of the catchment followed in subsequent years by the next patch down. Currently, the ELS allows x% of non-native species to remain in a defined area in order not to penalise other landowners. Where the landowner responsibility is not known, volunteers could be used to fill in these gaps. Volunteers would still be needed but it would make their job much easier. This would also need monitoring and enforcing and may in fact be too much for farmers to do in isolation. Uncoordinated and inappropriate approaches have the potential for causing collateral damage further emphasising the need for a coordinator.

4.2.3 The role of landowners

The importance of landowners' roles in the control of non-native species highlighted the need for input from significant landowners, such as United Utilities, the National Trust and farmers. The input of farmers' representative groups, such as the Farming Wildlife Advisory Group (FWAG) and the National Farmers Union (NFU), was also emphasised. Input from councils (district and county) is also needed.

4.2.4 The role of public awareness

Raising public awareness, particularly among water users, of the problems of non-native species could also be of benefit to the volunteer effort. There is a general lack of information about the impact of some of these species and on their biology/description. For noxious weeds, more information and education is needed on proper disposal. General information is needed on issues such as what to do if you find, e.g. Japanese knotweed, on your land or elsewhere, who to notify and on the prevention of spreading species between sites. There is a need for an awareness raising campaign with water users (fisheries, sailing etc).

4.2.5 Specific human resources

The University of Cumbria is keen to be involved in this initiative and has highlighted the potential resource available in terms of student research projects and practical environmental projects. This should be kept in mind during any further discussions on resources and information gathering

5 Conclusions & Recommendations

5.1 Conclusions

- To be successful, the management of non-natives species will require a coordinated approach involving a number of partners; NE can not tackle the problem alone.
- Volunteers need management, coordination and support financially and practically.
- The initiative needs input from councils (district and county) and major landowners (e.g. National Trust, United Utilities and the farming community). Cumbria County Council, NT and UU were invited but were unable to attend this first workshop and farmers groups were omitted but will be invited to the 2nd meeting
- There are large gaps in information, which need addressing to be able to fully assess the risk of some species.
- The task of non-native species management will require a large amount of money; some of this would be well spent on researching novel approaches to control methods, including research into the potential of new grants or use of existing stewardships etc as well as on the ground practical control.
- Funding for the work involved is a key issue and there is a strong need for further information from NE regarding the future of the initiative and funding of the process at least including the potential for a coordinator post.

5.2 Recommendations

- Need to fill information gaps in terms of distribution, biology and impacts. This could be a national project which needs integration of information from e.g. FBA library, universities, etc nationally.
- NE's expectation of a detailed work plan for each species from Atkins' as an output from this project is considered an unrealistic target. The initiative therefore needs to know how the project is going to proceed and whether the development of work plans is a project in its own right.
- There is a fundamental issue for NE to consider: they may need to revise their definition of unfavourable status with respect to e.g. *Elodea* species. There are some waterbodies for which there is no practical solution for eradication and they may need to consider instead favourable management and decide what the reasonable actions are.
- Preparation is needed for the next meeting; information is required from NE on what is possible for the future of the group and on the on-going funding of the initiative and funding of projects. Atkins need to go back to NE with the areas of work identified in the species categorisation list, which can be covered by different people.
- Also in preparation for the next workshop Atkins need to specify clearly what information they need and what outputs are required from the meeting; any questions needing answers at the next meeting need to be issued beforehand. For example, if specific costs of actions are needed, then need to give individuals time to collate this information.
- Representatives from the two largest landowners in the county United Utilities and the National Trust are needed as key stakeholders; these were invited, were unable to attend but wish to be kept informed of the outputs. Atkins will endeavour to arrange the next workshop with NT and UU attendance a priority.

6 References

RPS (2006) Strategic control of non-native invasive aquatic plants. English Nature Research Report No. 686

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