Action Against Invasives: The Problems & Solutions for Invasive Alien Species

Carndonagh, Inishowen

Inishowen Rivers Trust

Eco Carn

The Community Foundation for Ireland

The Problem

What’s the Problem with Invasives

- Invasive Alien Species (IAS) are the second biggest threat to biodiversity worldwide (after habitat destruction)
- Particularly problem in aquatic systems
- Can have a high economic impact
- In Ireland the estimated cost is €200m per year to deal with invasives. This is estimated to increase dramatically in the next 10 years.

How they affect our environment

- Alter habitats and threaten ecosystems
- Increase competition, outcompeting native species
- Threaten animal and public health – parasites, pathogens
- Dilute native gene pool

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Global Legislation

Lots of different conventions and councils with a wide range of instruments created since 1970s which specifically address invasive species

E.g. Bern Convention, Bonn Convention, Convention on Biological Diversity (Rio de Janeiro, 1992), Habitats Directive, Birds Directive, Water Framework Directive, Convention on Wetlands of International Importance as Waterfowl Habitat (Ramsar Convention), Wildlife Trade Regulations, International Civil Aviation Organization (ICAO) Resolution on preventing the introduction of invasive alien species, CITIES *

Irish Legislation / EU Legislation

Some invasive species regulated under Part 49(2) and 50 of S.I. 477 European Communities (Birds and Natural Habitats) Regulations 2011.

* Stokes, K., O'Neill, K. & McDonald, R.A. (2004) Invasive species in Ireland. Unpublished report to Environment & Heritage Service and National Parks & Wildlife Service. Quercus, Queens University Belfast, Belfast.

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The Species


Japanese knotweed

Japanese knotweed – *Fallopia japonica*

- Introduced into Ireland in the late 1800s as an ornamental plant from Japan, China and Korea,
- High Impact Species
- Regulated - Offence to cause it to spread. Removal requires a license.

- JK is a perennial plant with an extensive rhizome system.
- Growth starts April/May. Dies off in Sept/Oct

- **In Ireland** it spreads mainly by rhizome or vegetative fragments as small as 2cm. Currently only the female plants with male sterile flowers are present in Ireland and therefore does not spread significantly via seed (0% to <2%)* although hybridisation with other *Fallopia* species may produce viable seed. This presents a future risk for Ireland as has been documented in other countries ^

* Tiébré, M. S., Vanderhoeven, S., Saad, L., & Mahy, G. (2007). Hybridization and sexual reproduction in the invasive alien Fallopia (Polygonaceae) complex in Belgium. Annals of Botany, 99(1), 193-203.
^ Bailey, https://www2.le.ac.uk/departments/genetics/people/bailey/res/bio

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Japanese knotweed – *Identification*

- One plant can have numerous stems coming from base forming dense stands.
- Up to 3m tall
- Stems red/purple speckled, bamboo like. Hollow.
- Mature plants have thicker stems.

Leaves

- Large, broadly oval and pointed
- Flat leaf base
- Serrated edges
- Zig zag placement on stem (alternate)

Flowers

- White/cream
- Arise from the tips of the stems

* Tiébré, M. S., Vanderhoeven, S., Saad, L., & Mahy, G. (2007). Hybridization and sexual reproduction in the invasive alien Fallopia (Polygonaceae) complex in Belgium. Annals of Botany, 99(1), 193-203.
^ Bailey, https://www2.le.ac.uk/departments/genetics/people/bailey/res/bio

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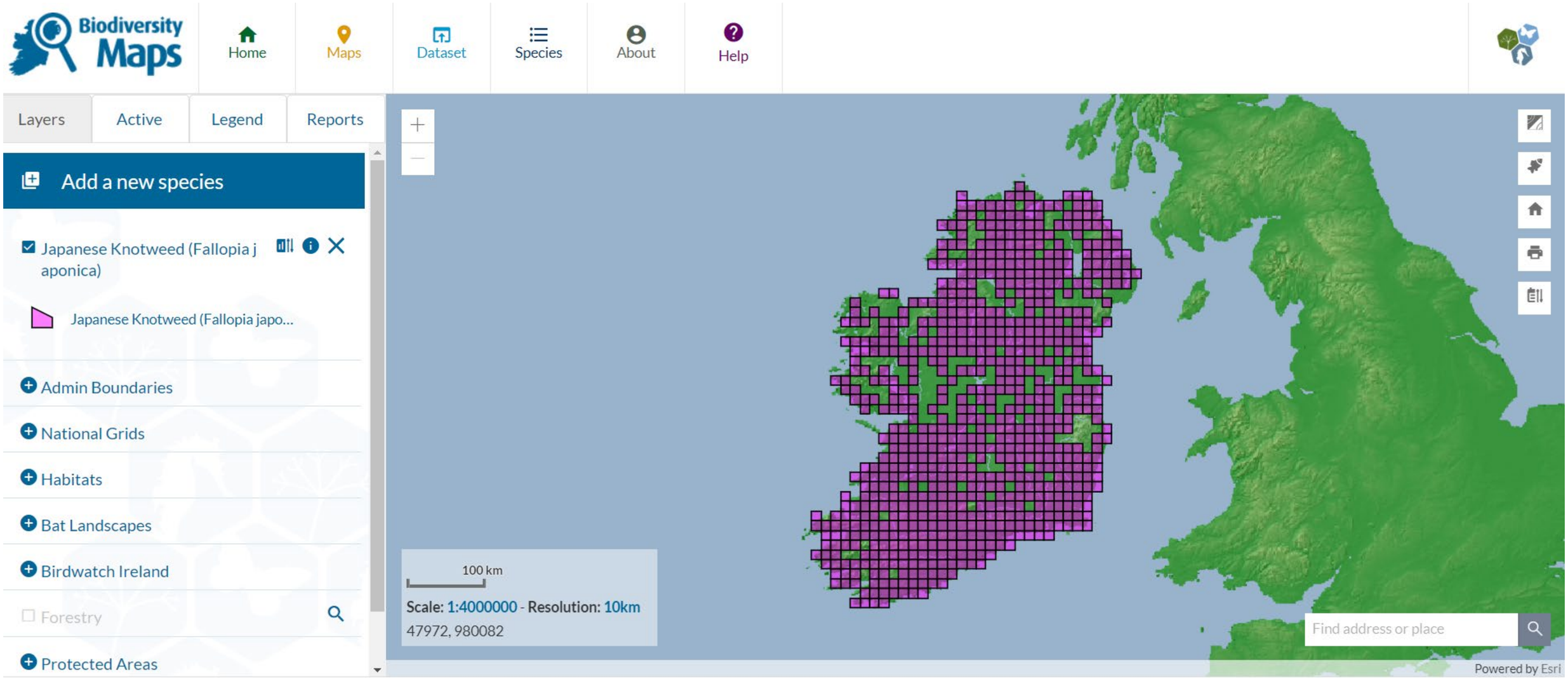
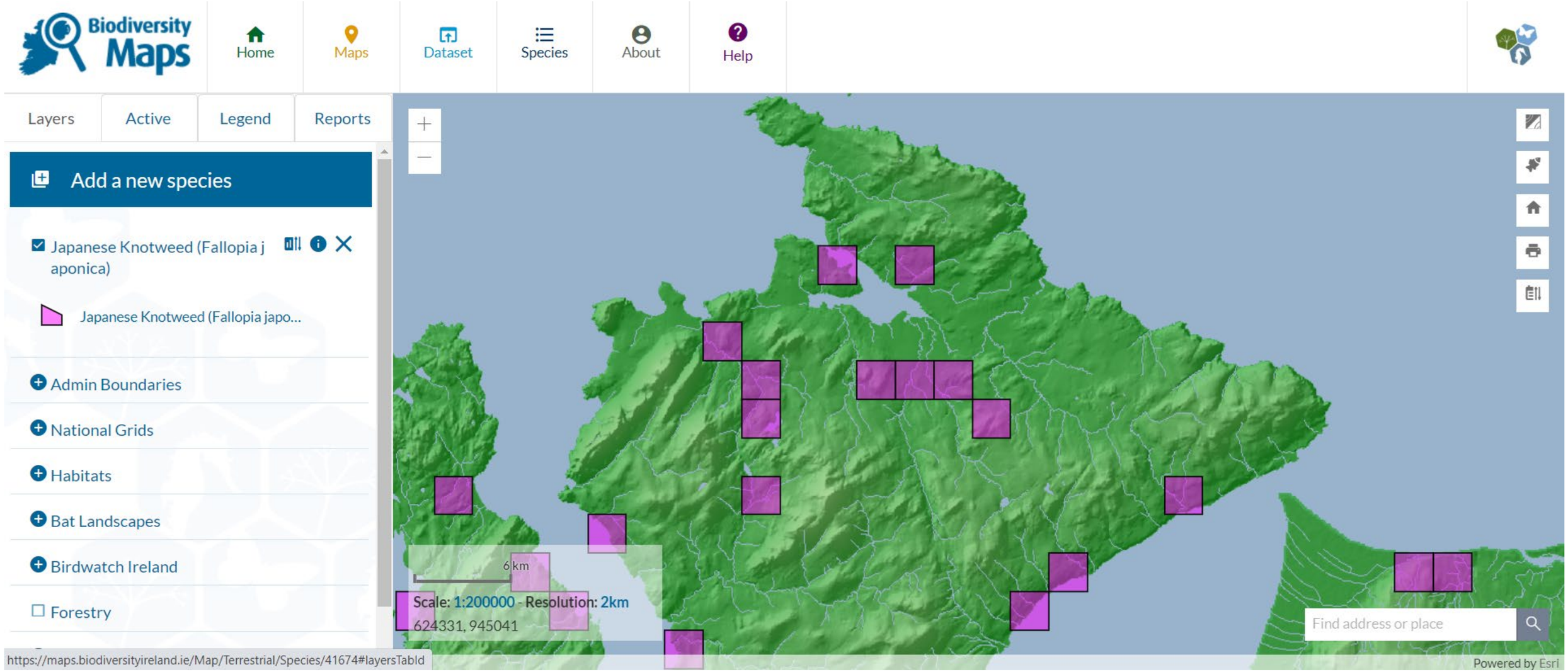
Japanese knotweed – *National Distribution*



Japanese knotweed – *North Inishowen Distribution*




Himalayan balsam

Himalayan balsam – *Impatens glandulifera*

- Introduced into Ireland in 1830s as an ornamental plant from western Himalayas
- High Impact Species, particularly in riparian and wetland areas where it can grow in dense stands
- Regulated in EU
- Favourite of bees due to high sugar content in nectar

- Spreads by seed
- Growth starts April. Dies off in Sept/Oct

- Long seed pods appear from June to September. Each plant can produce as many as 700 seeds which are dispersed by explosive action from the pod. Sensitive to touch. Once one pod explodes, this triggers other pods to rupture. Seed is cast up to 7m away.

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Himalayan balsam – Identification

- Up to 3-4m tall
- Stems brownish/green changing to red colour closer to the flower

Leaves

- Slender, green, pointed with serrated edges
- Leaves (opposite attachment to stem) in whorl pattern on stem
- Red midrib

Flowers

- Pink orchid like flower with wide petals

Seed Pods

- Long, pendular, tear drop shape
- Explosive

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Winter Heliotrope

Winter heliotrope – *Petasites pyrenaicus*

- Introduced into Ireland in early 1900s as ground cover and early food supply for bees
- Originated from southern Italy, Sicily, Sardinia and North Africa
- High Impact Species
- Not Regulated but of serious concern in Ireland

- Perennial but present all year round
- Flowers Nov - Jan

- Spreads vegetatively and control is very difficult. It forms dense colonies and inhibits the emergence of native species in spring, resulting in reduced biodiversity at invaded sites. Can be spread by small fragments.

Winter heliotrope – Identification

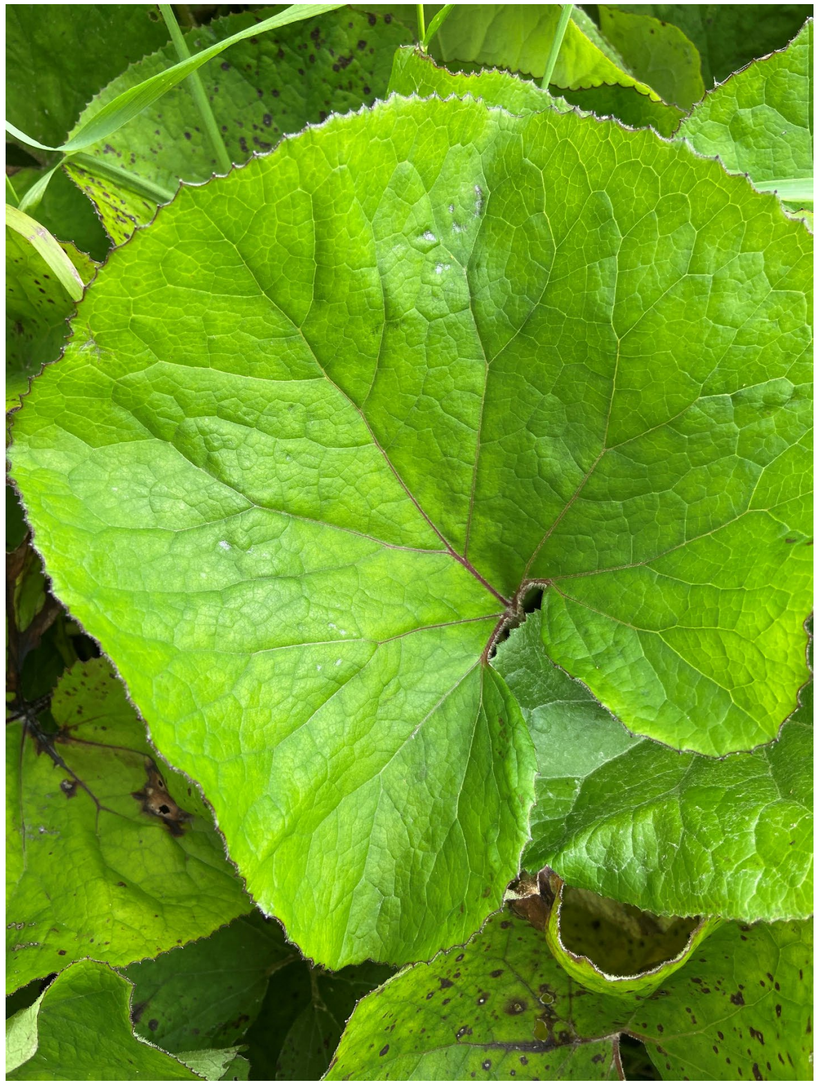
- Up to 30cm tall
- Stems green

Leaves

- Heart shaped 20com-50cm wide with shallow toothed edge

Flowers

- Pink/white held on stalks about 12inch above leaves



Frances E. Lucy, Joe Caffrey, Jaimie T.A. Dick, Eithne Davis and Neil E. Coughlan (2021). Prevention, Control and Eradication of Invasive Alien Species (2015-NC-MS-4) EPA Research Report 368

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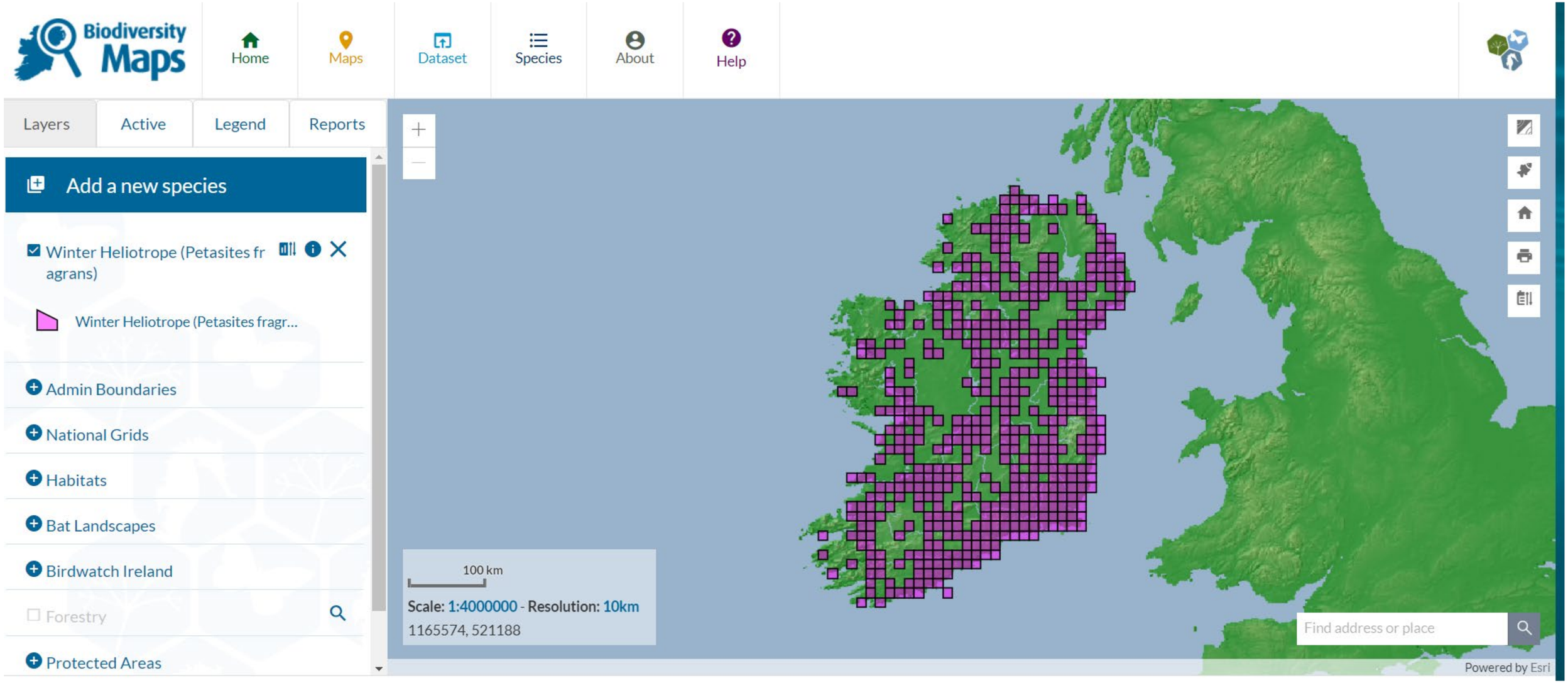
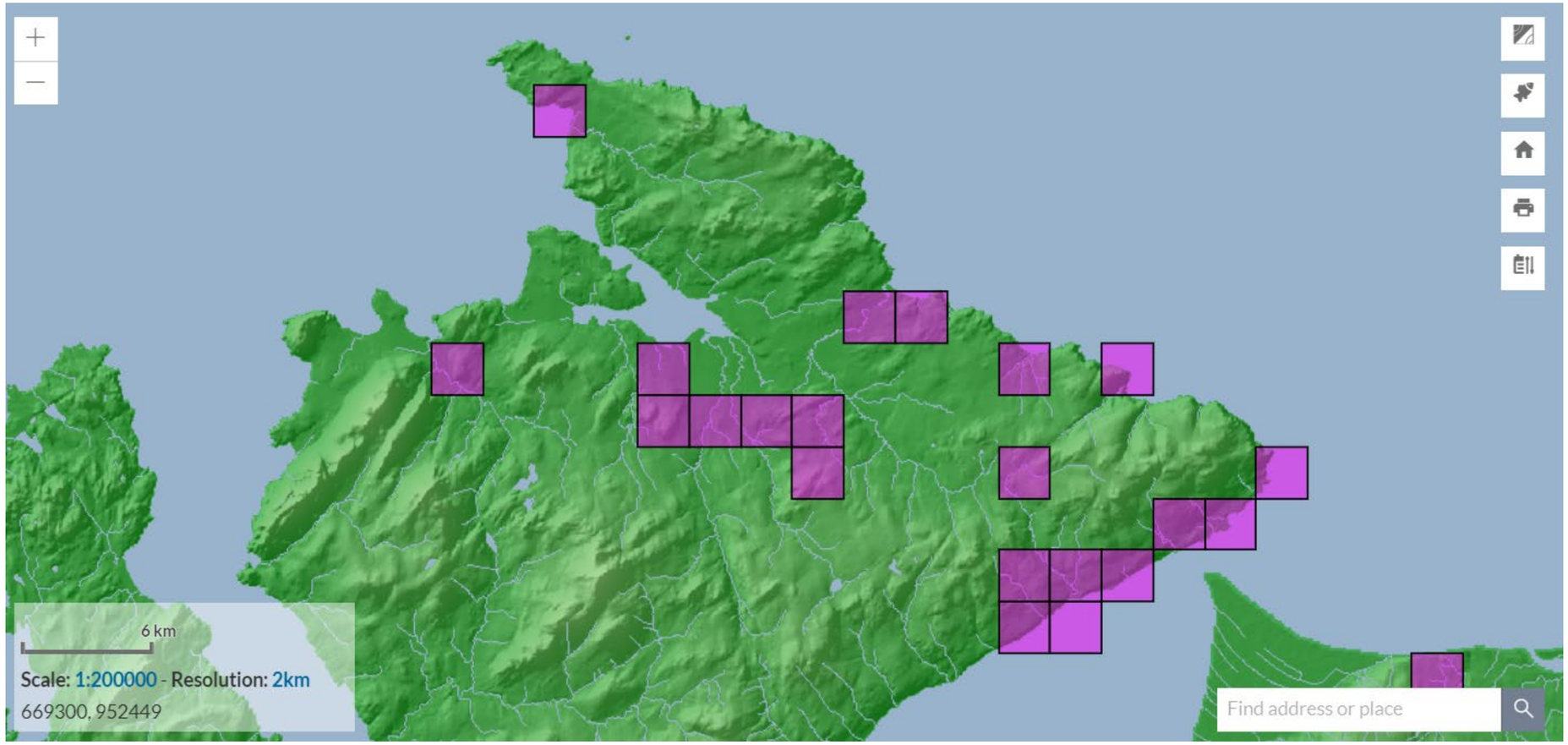
Winter heliotrope – National Distribution



Winter heliotrope – North Inishowen Distribution



Similar species

***Petasites pyrenaicus* (Winter Heliotrope) *vs* *Petasites hybridus* (Butterbur)**

	Petasites pyrenaicus (Winter Heliotrope)	*Petasites hybridus* (Butterbur)
Family	*Asteraceae* (Daisy Family)	*Asteraceae* (Daisy Family)
Status	**Introduced** perennial, can be invasive and cover large areas, displacing native vegetation.	**Native** perennial
Flowering Period	December- March	March-May
Inflorescence	Vanilla (ish) **scented.** Spikes up to 30cm long that contain flowers that are white/pink in colour.	**Unscented.** Cone-shaped spike containing flowers which are white/pink in colour.
Growth habit:	**Leaves before flowers** but are persistent after flowering as well.	**Flowers** appear **before leaves** (which can grow quite big, up to 1 to 1.2m wide). Winter Heliotrope leaves never get this large
Leaves	Heart/kidney-shaped with **shallow-toothed** edges.	Heart/kidney-shaped with **irregularly-toothed** edges.
Habitat	Roadsides, woodland edges, waste-ground. **Often associated with disturbance.**	Prefers **damper, fertile soils**, riversides, woodland
Notes:	1. Spreads by vegetative fragments 2. Formerly called P. *fragrans*	Mostly spreads vegetatively.

Other confusion species could be *Petasites japonicus* (Japanese butterbur) or *Petasites albus* (White Butterbur), but both are non-native and rarely encountered in Ireland.

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The Challenge

Challenge 1: Species competition

Invasives can outcompete native species:

- Faster growth
- More tolerant of a wide range of conditions (pioneer species)
- Reproductive strategies more effective
- Less natural predators

Challenge 2: Lack of Awareness

- Easy for plants to be spread when people are not aware of plant’s life cycle
- Tiny fragments of plants can be distributed on tyres, footwear, clothing etc
- Transportation of materials and dumping spreads plant fragments
- Biosecurity is not common practice amongst general public

Restricting spread

The key to reducing invasives is to restrict spread. There are a number of conditions necessary for this to happen:

1. Legislation needs to be in place to control transport, trade and sale of these species
2. Legislation needs to be enforced when appropriate
3. Awareness needs to increase

Research - Biocontrol

There are many organisations working on different ways to tackle invasives:

- Introducing predator – e.g., psyllid bug (*Aphalara itadori)* for Japanese knotweed. Limited success in UK
- Introducing pathogen – e.g. rust fungus for Himalayan balsam *Puccinia komarovii* var. *glanduliferae.* Shows good promise *
- Unfavourable conditions – make conditions unfavourable for growth e.g. change pH of soil, change microbial structure of soil
- A recent study found that the success of regeneration of JK is related to plant fragment size, with larger fragments more likely to successfully regenerate and, for rhizomes, if there is no node, there is no regeneration. Additionally, it was found that the removal of moisture on living material resulted in 0% regeneration after plant material was dried and replanted ^

* Pollard et al., (2022). A semi-natural evaluation of the potential of the rust fungus *Puccinia komarovii* var. *glanduliferae* as a biocontrol agent of *Impatiens glandulifera*. https://doi.org/10.1016/j.biocontrol.2021.104786

^ Lawson JW, Fennell M, Smith MW, Bacon KL. 2021. Regeneration and growth in crowns and rhizome fragments of Japanese knotweed (*Reynoutria japonica*) and desiccation as a potential control strategy. *PeerJ* 9:e11783 https://doi.org/10.7717/peerj.11783

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Standard methods of control

- Mechanical control – physical removal of plant. Good success with HB but need to get every plant.

- Spraying – Donegal County Council have sprayed 30,000m² to 50,000m² of JK since 2016 at a cost of €200,000

- Stem injection – More time consuming but better success rate than spraying

These techniques use pesticides which are a hazard for our biodiversity and public health

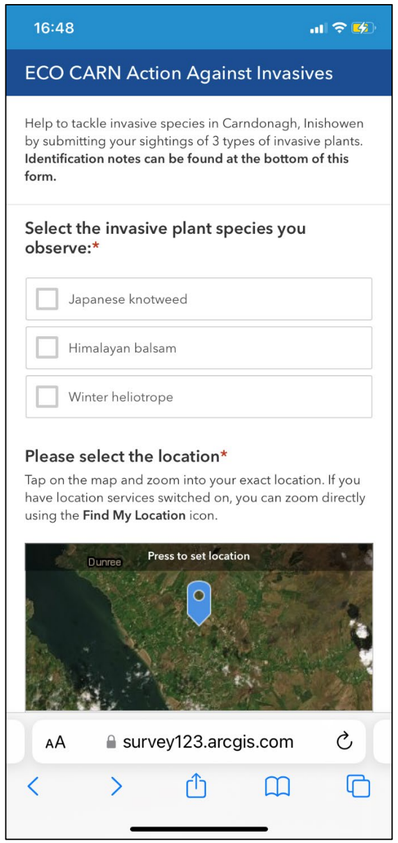
Action on Invasives

Mapping Invasives

First identify there is an issue. In ECO Carn Biodiversity Action Plan (published 2021), invasive alien species were identified in areas around Carndonagh and are causing significant impact.

Map species using online form. Use QR code to access using a smart phone.

https://arcg.is/1W1n5L



Invasives in Carndonagh

HB, JK identified at several sites.

WH observed on Moss Road and Ballyliffen Road

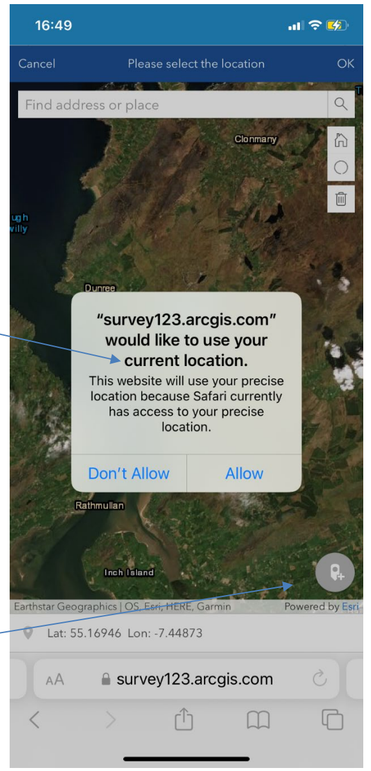
Both rivers have severe infestations and spreading rapidly

Council yard and surrounding area has HB, JK and WH

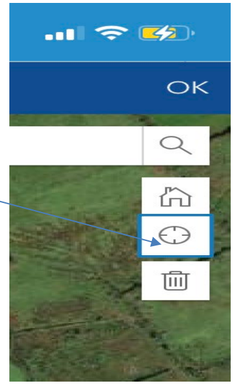
How to use the ECO Carn form

If you have Location Services switched on in the smart phone this makes it easier to use the form. Every phone is different and you will need to find out how to use the map on your phone.

- Click on map
- If Location Services switched on it will ask you to ALLOW form to find your location



- Click on the locator icon in the top right hand corner
  This brings you to your exact location



- Click on the pin at the bottom right hand corner of the map.
  This fixes the location.

- Press OK in the top right hand corner

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Knotweed Novel Organic Treatment

Small trial proposed for ECO Carn project

Using a specially formulated microbially activated compost to treat Japanese knotweed. Trial experiment with Donegal CoCo using funding from Public Service Innovation Fund.

Knotweed Novel Organic Technique

KPM Soils
Carndonagh
based consultant

Eco Carn Balsam Bash

When: Sunday 26th June 2022 @ 11.30am – 1.30pm

Where: Meeting in Colgan Hall car park

What to bring: Gloves

What to wear: Weather appropriate footwear and clothing

Thank You | Go raibh maith agaibh

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