Red Squirrels United

Understanding dynamics to improve vertebrate INNS management using Citizen Science

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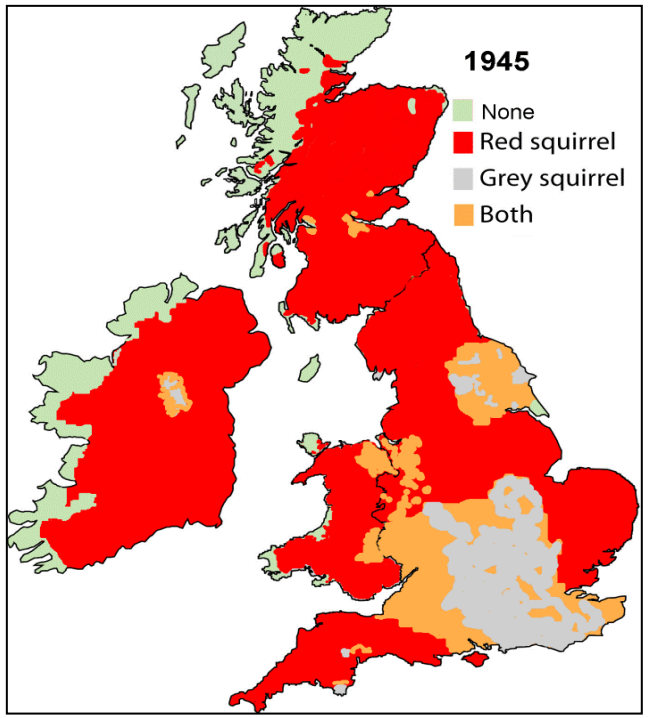
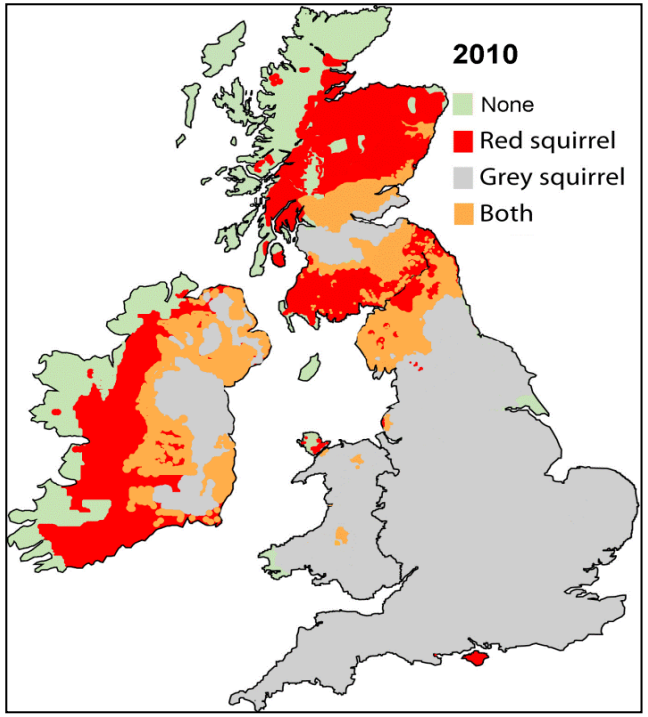




Red and grey squirrel distribution in the British Isles in 1945 and 2010.
Copyright Craig Shuttleworth/RSST

- Red squirrel populations declined rapidly across the UK, since the introduction of grey squirrels in 1876.
- An estimated 140,000 red squirrels remain

Red Squirrels United

Grey squirrel management prior to RSU

- Long history of community engagement.
- 94 organisations that are members of the UK Squirrel group, UK Squirrel Accord and Saving Scotland's Red Squirrels.
- Varying levels of science

Challenges:

- Goals
- Killing
- Scale
- Retaining engagement
- Cost
- Success

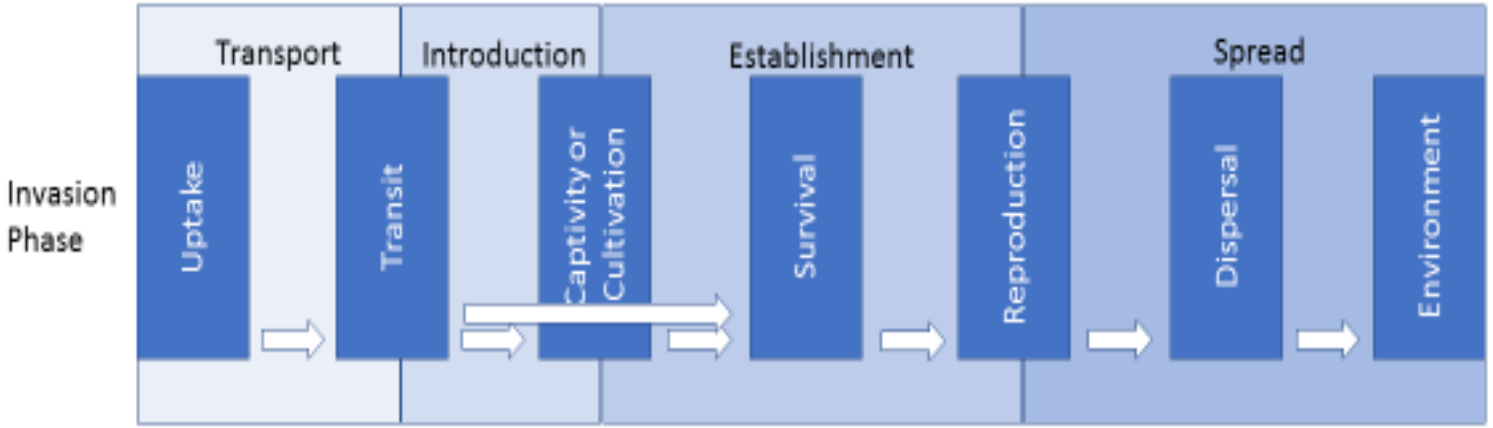
Should you consider a citizen science approach?

Increasing suitability for a citizen science approach	Clarity of aim/question	Importance of engagement	Resources available	Scale of sampling	Complexity of protocol	Motivation of participants
	Clear aim/ question	Engagement is important	Plenty of resources	Large-scale sampling	Simple protocol	Good reasons to participate
	Vague aim/ question	No engagement or only one-way communication	No resources	Small-scale sampling	Complex protocol	Reasons to participate are not clear

Pocock, M.J. et al (2014). **Choosing and Using Citizen Science: Centre for Ecology and Hydrology**

Invasion phases and Management

A proposed unified framework for biological Invasions. Blackburn et al. (2011) Trends Ecol Evol 26:333-339.



Invasion phases and Management

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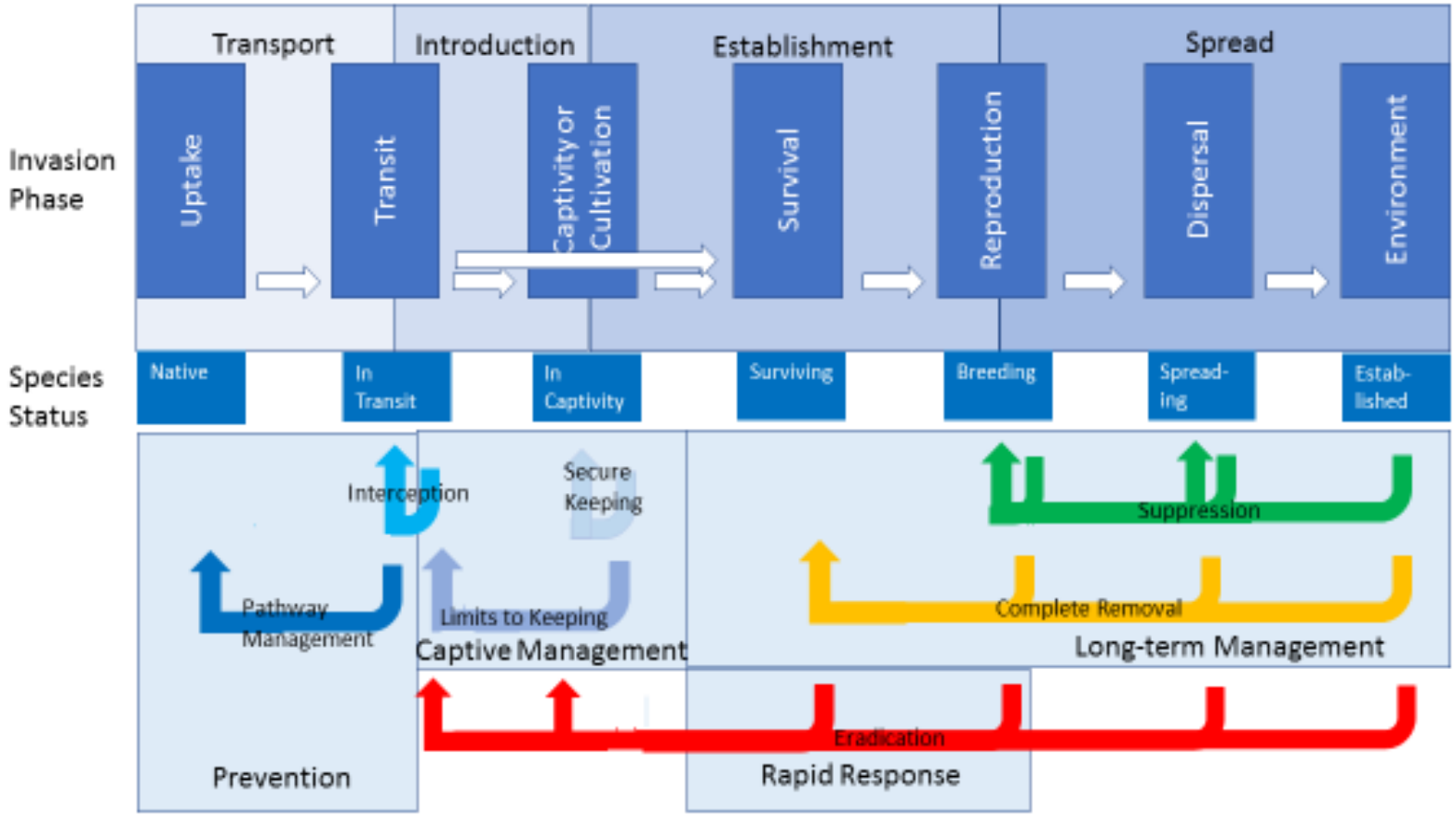
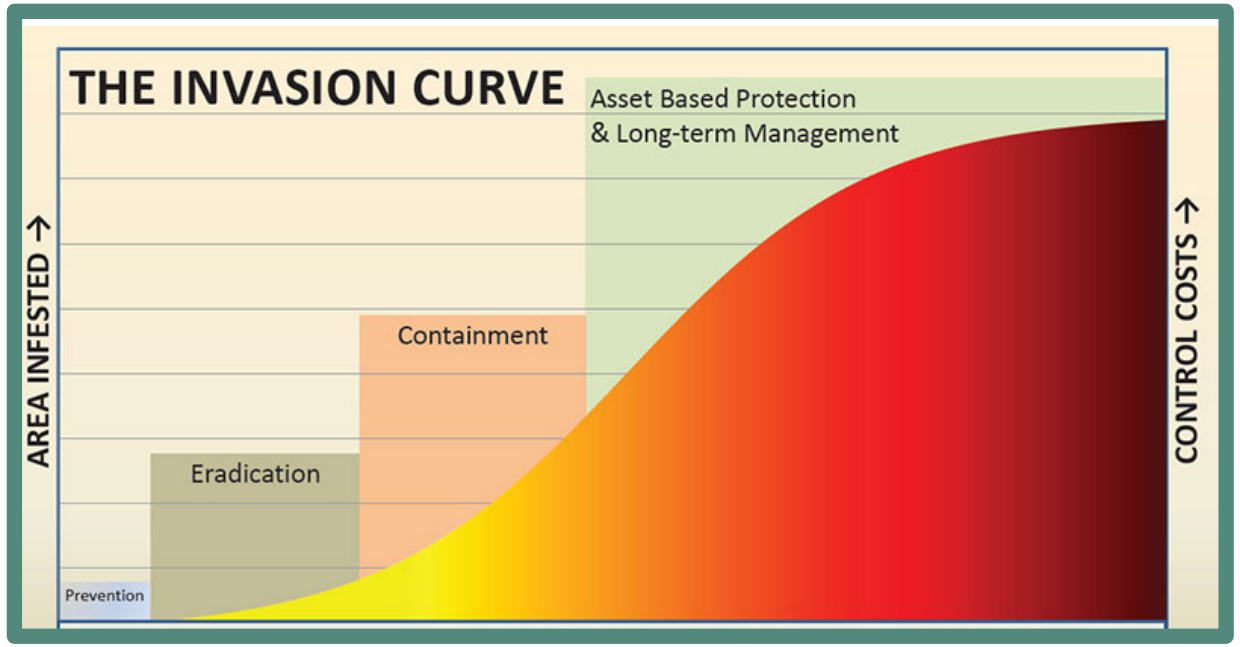
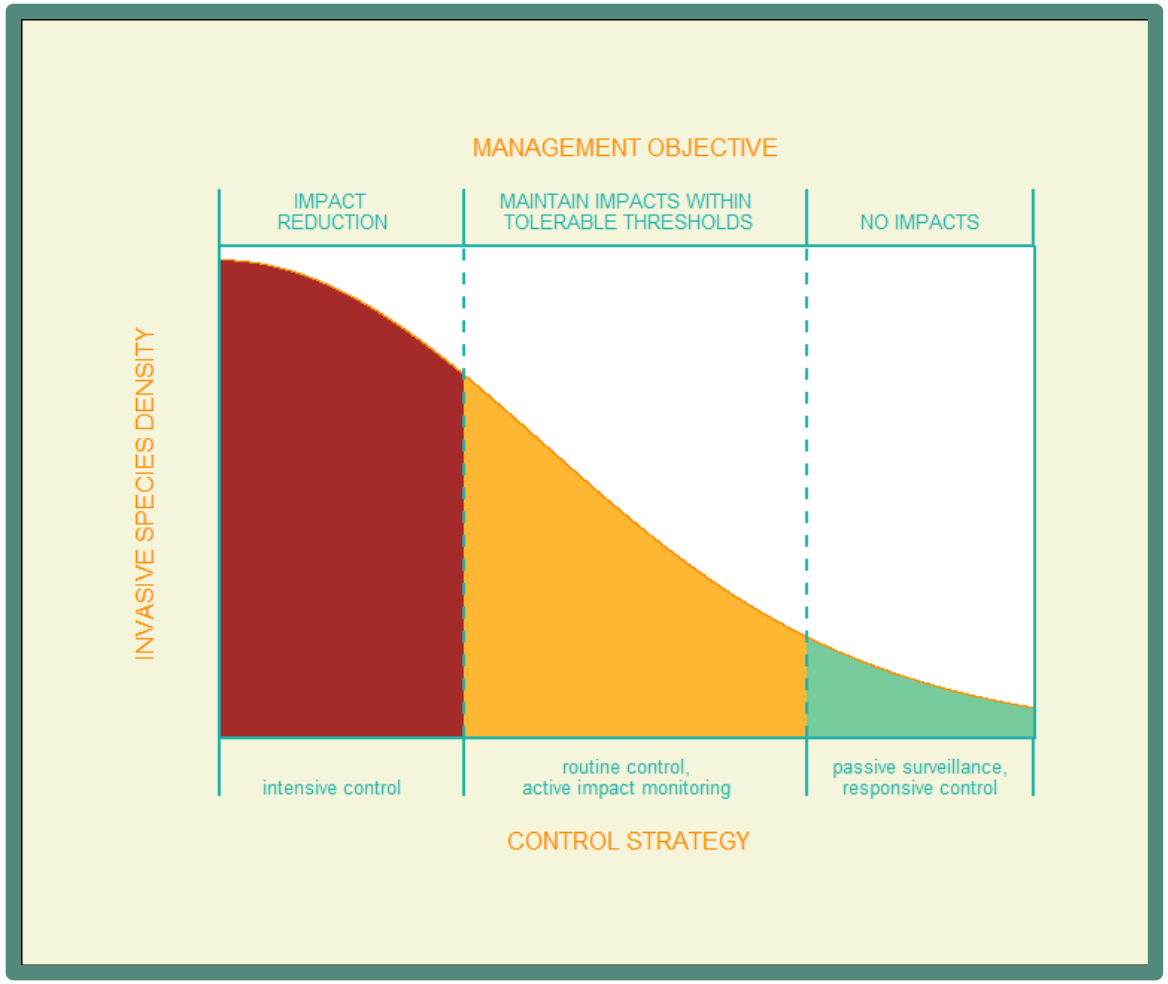
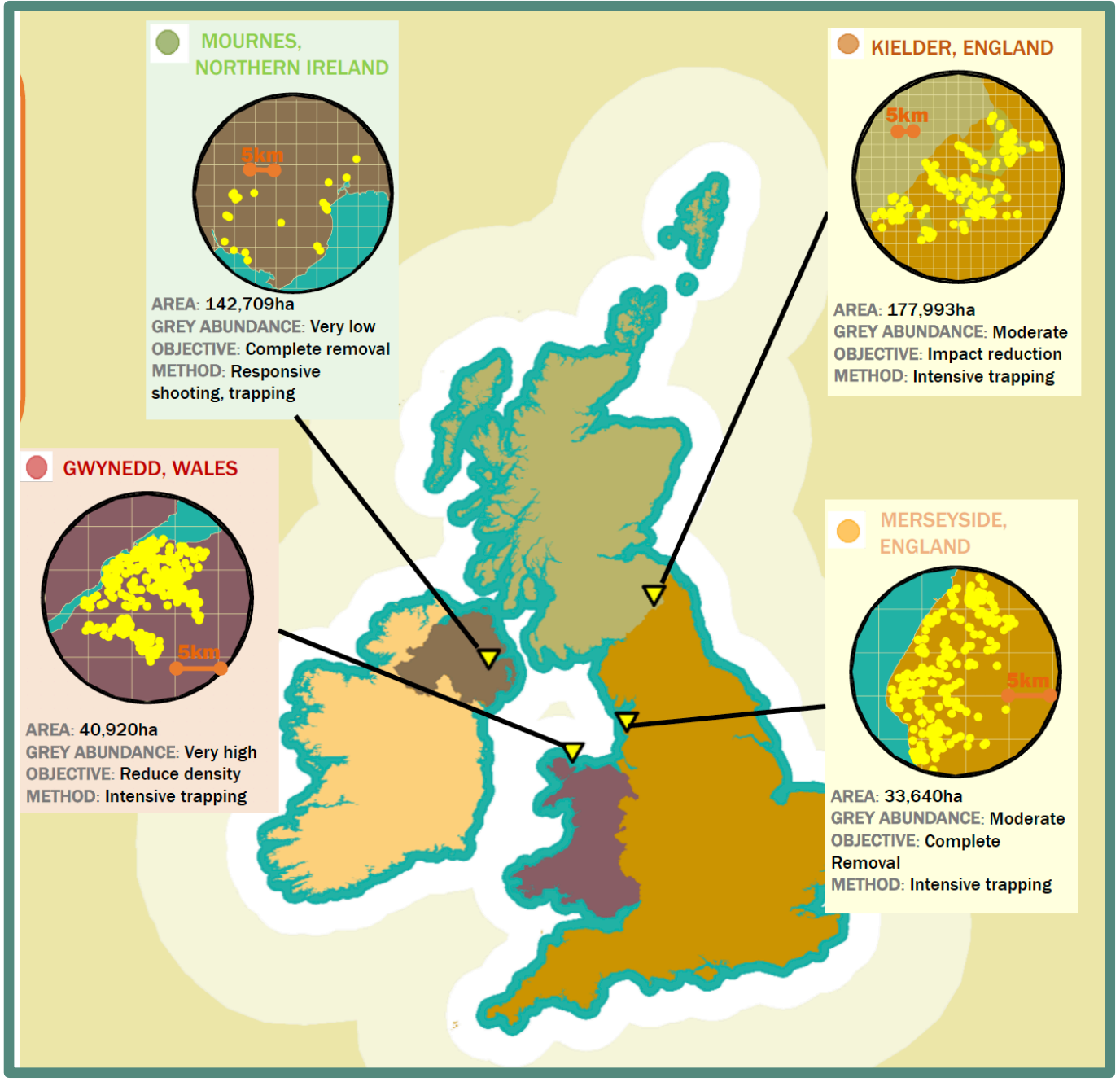
A proposed unified framework to describe the management of biological invasions. In review. Biological Invasions (Robertson et 'al lot of lovely folk')



Invasion phases and Management







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Life

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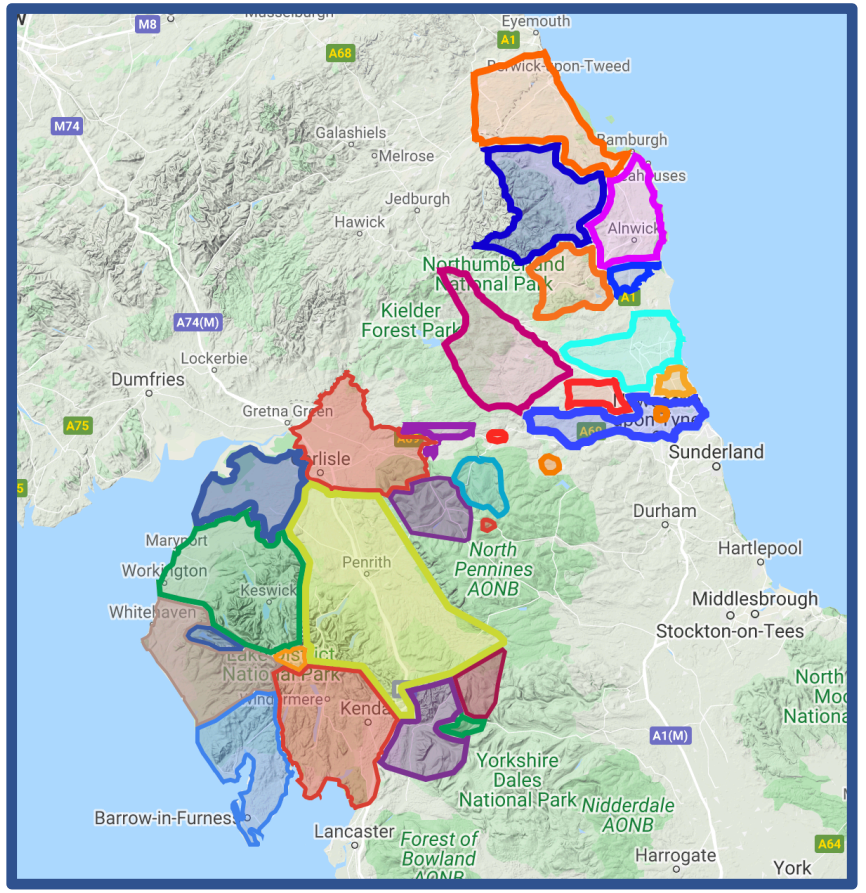

Mammal Review

Mammal Review ISSN 0305-1838

REVIEW
SPECIAL ISSUE ON INVASIVE MAMMAL SPECIES

A systematic review of adaptive wildlife management for the control of invasive, non-native mammals, and other human–wildlife conflicts

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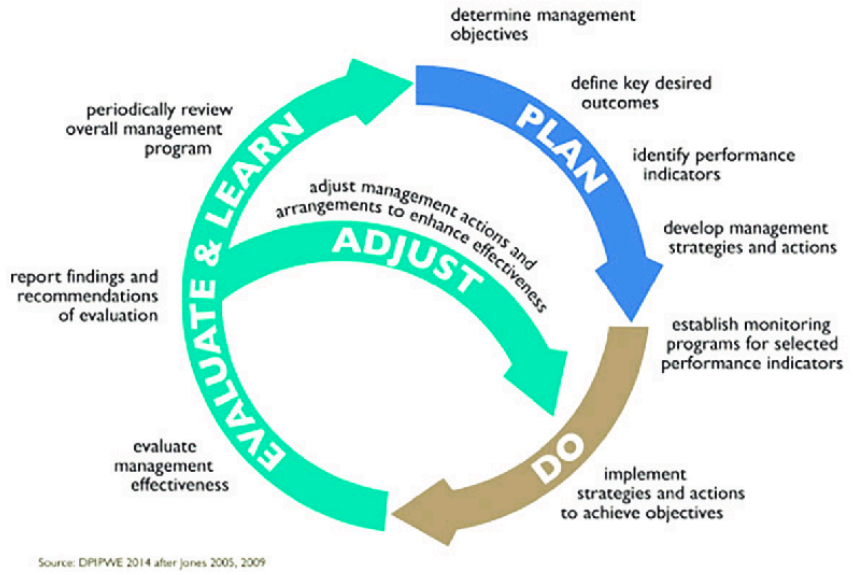
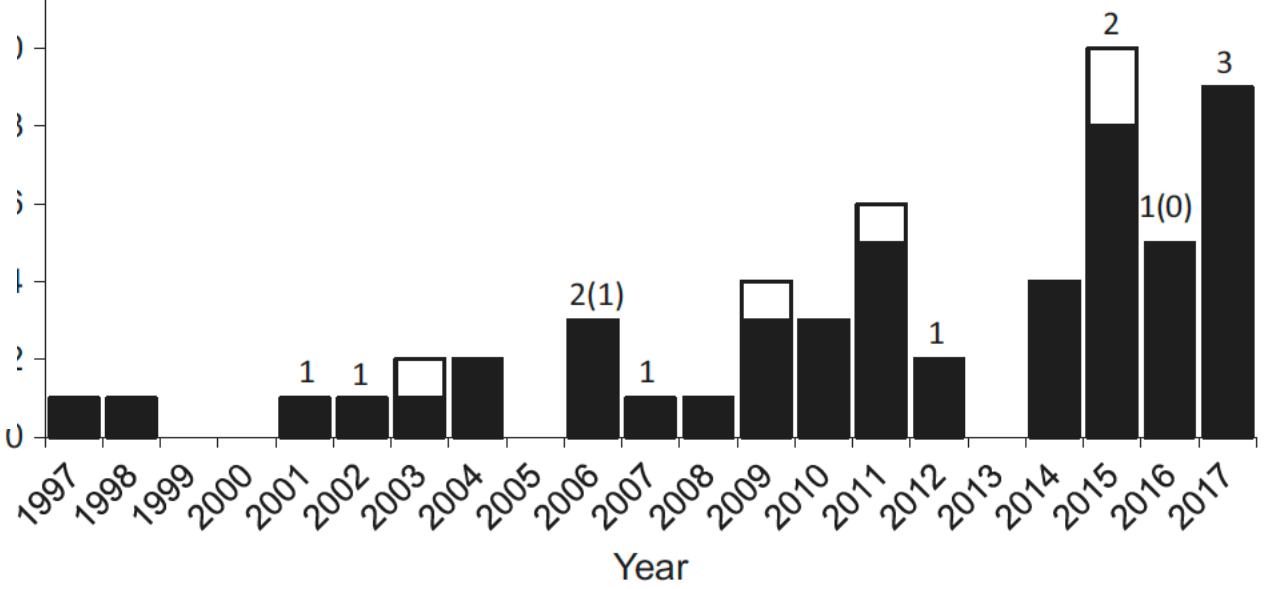
The adaptive management cycle





Adaptive Management for Grey squirrel control

Removal operations

Individuals are removed from the population with a probability *p*. Estimating *p* with accuracy requires repeated sampling (1a, 1b) during a closed period within a random sampling framework.

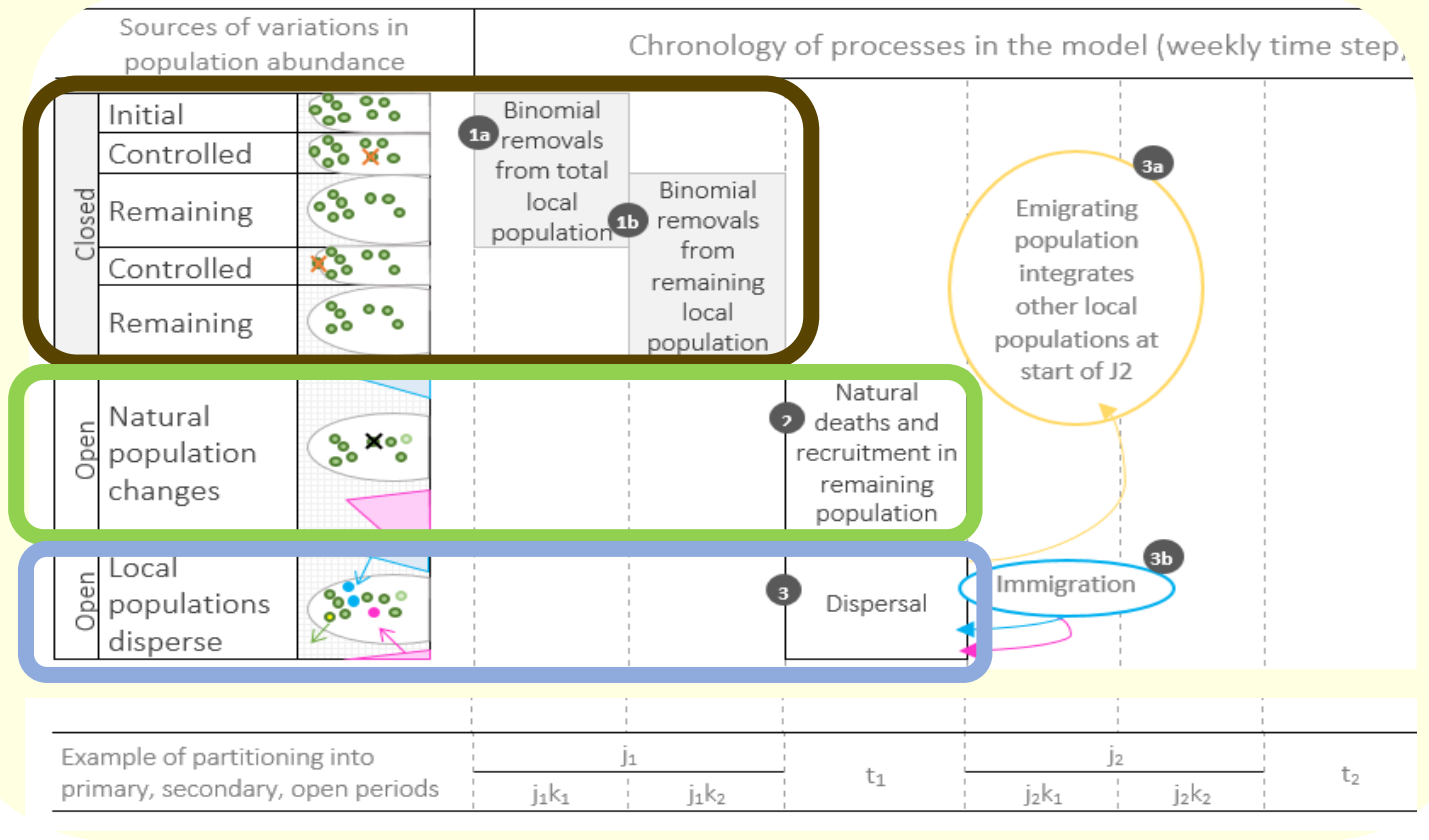
Population change

Population growth and losses occurring independently from the control operations; natural births and deaths (2), during an open period of duration *t*.

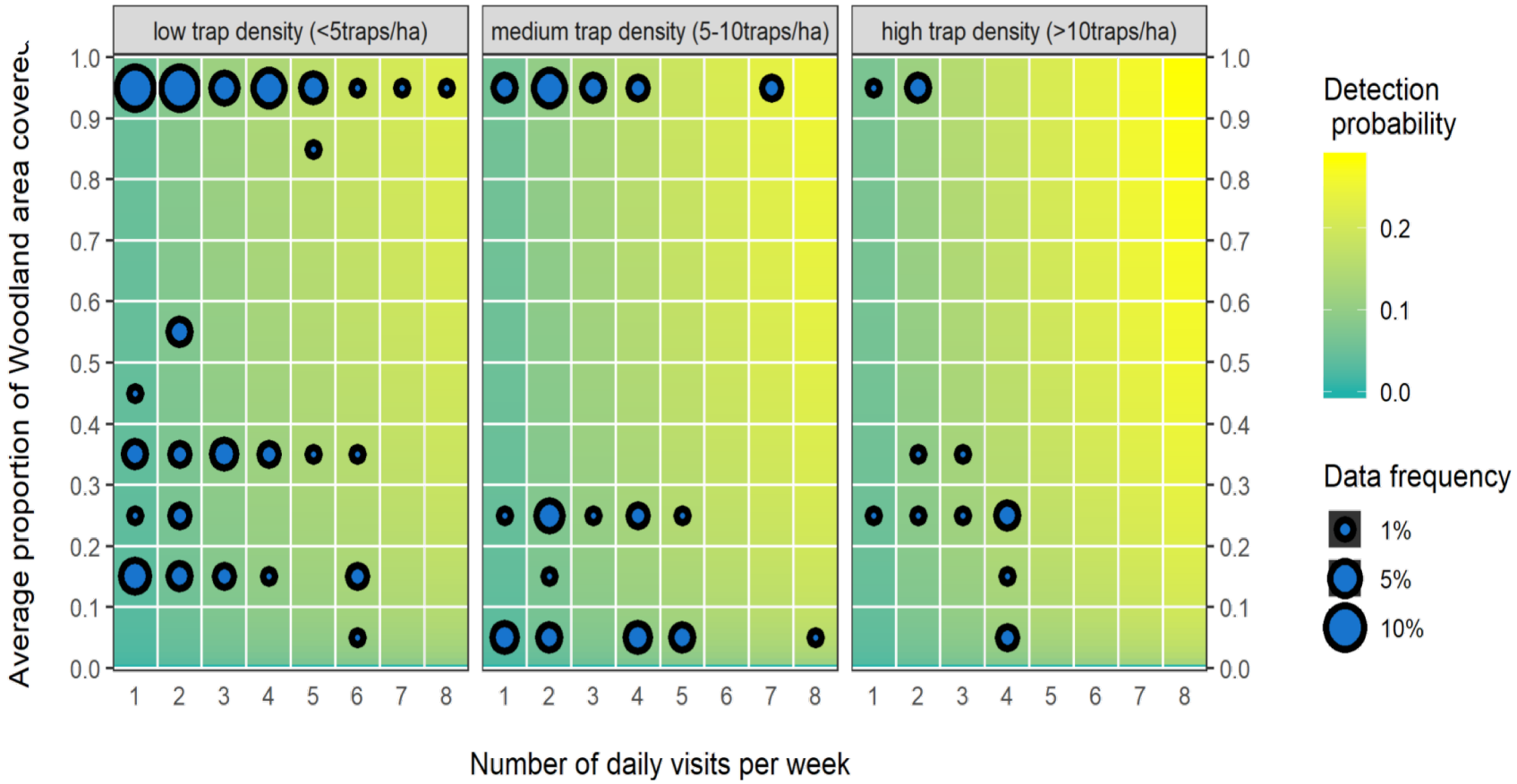
Dispersal

Individuals from local populations move between sites (3a, 3b), during an open period of duration *t*.

A robust design removal data modelling framework

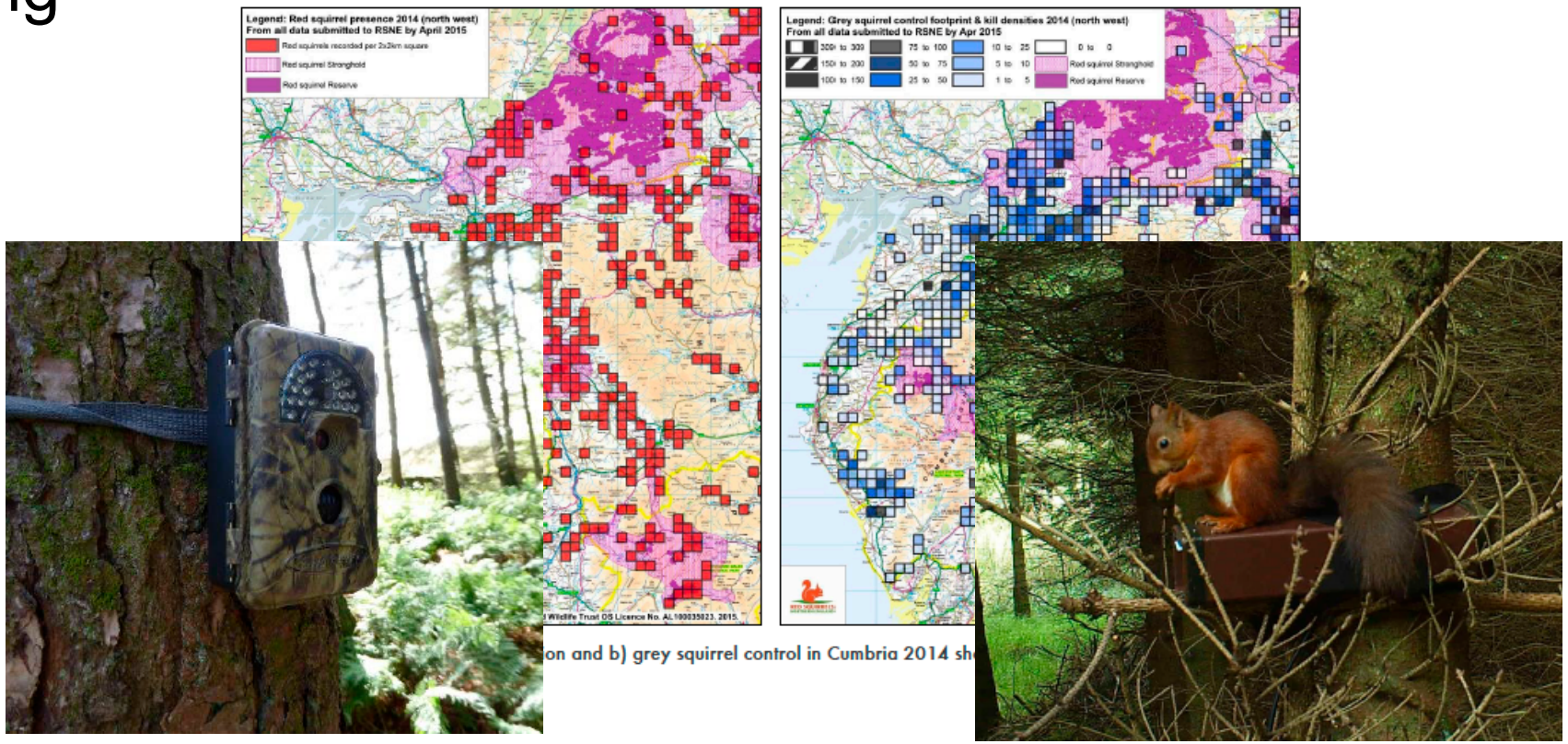


Adaptive Management to assess control success



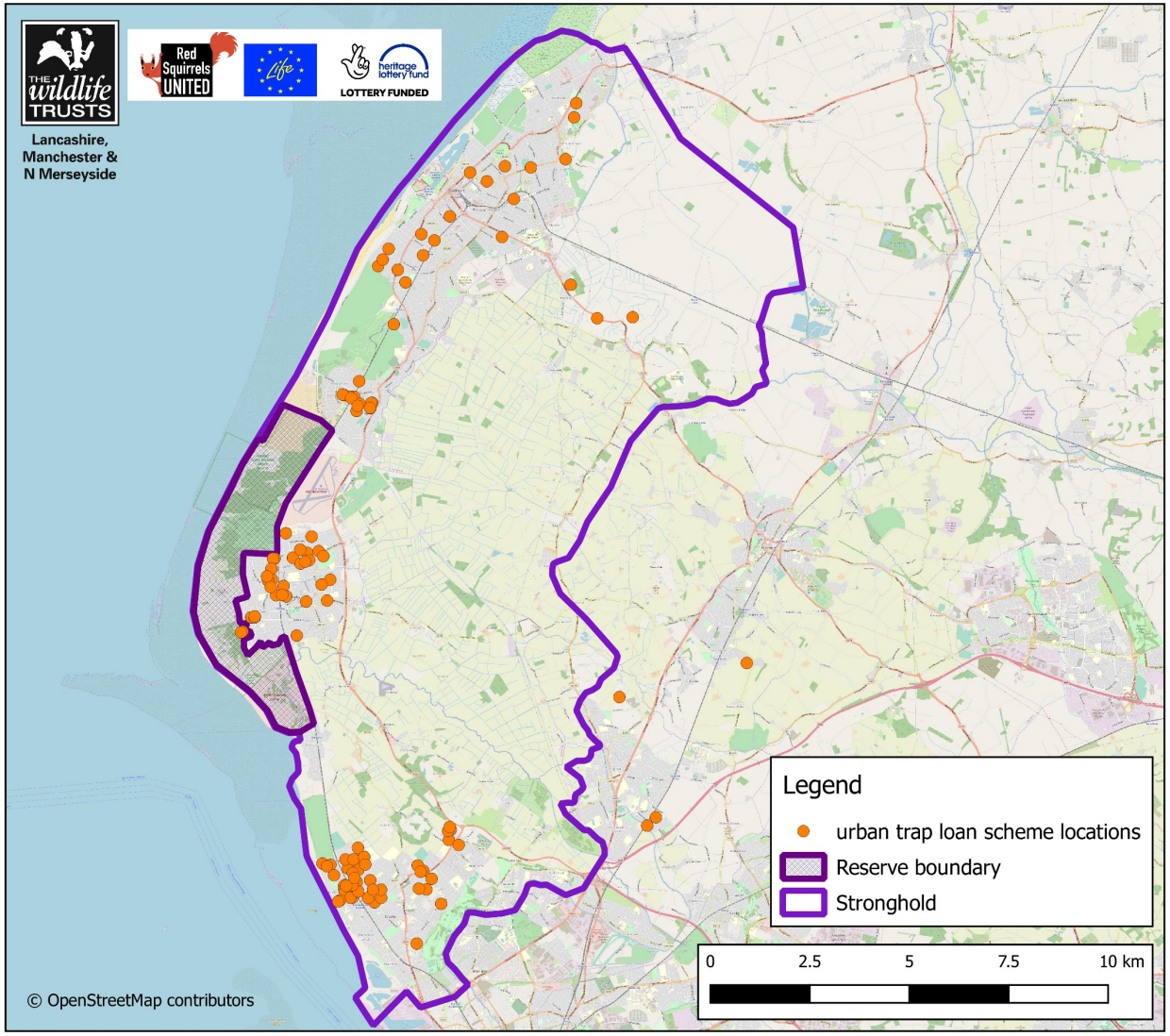
Citizen Science for Adaptive Management

Monitoring



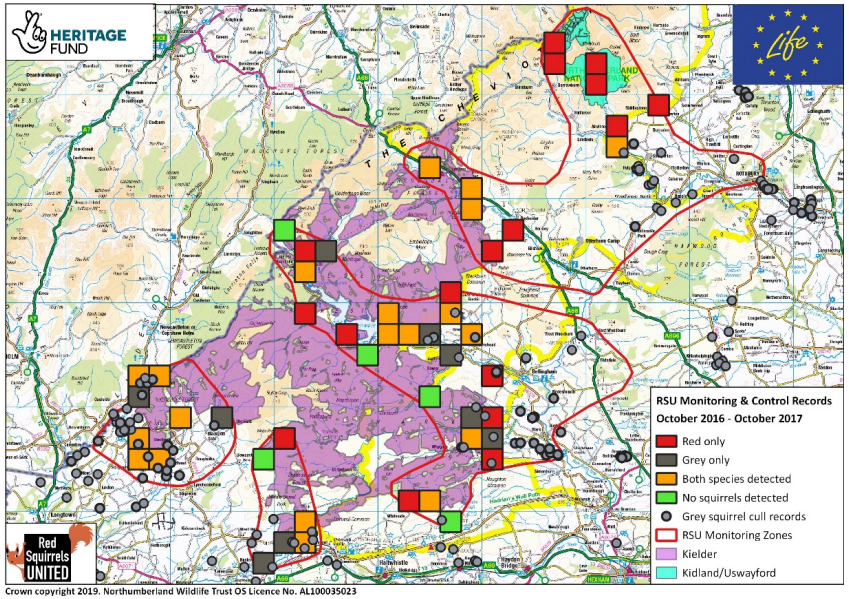
Trap Loan Scheme

- 145% increase in the number of households involved in the trap loan scheme in Crosby
- Barriers include negative publicity from animal rights protestors
- Secured a network of grey squirrel control volunteers in each area – good foundations for Red Alert group to continue to grow the scheme through community engagement events and Red Alert membership

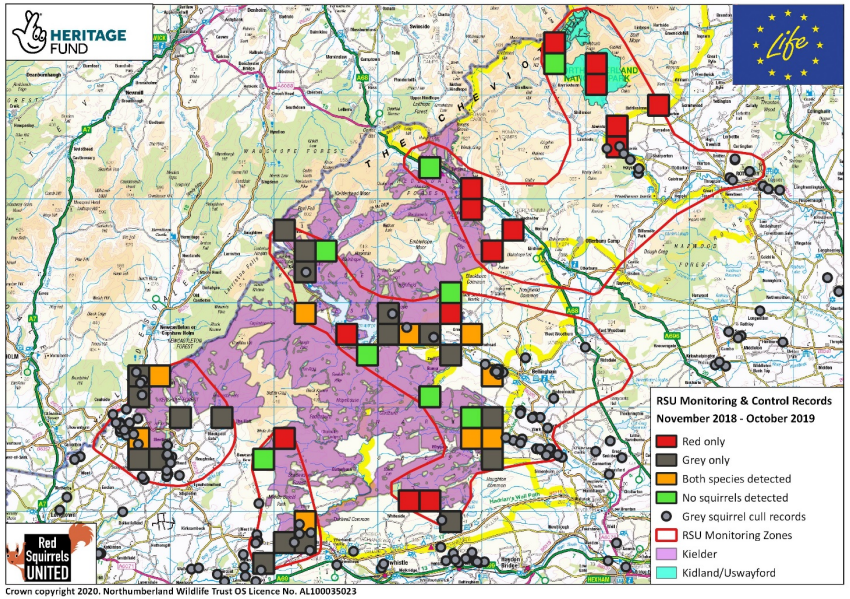


Early warning system, rapid response & proactive grey squirrel management

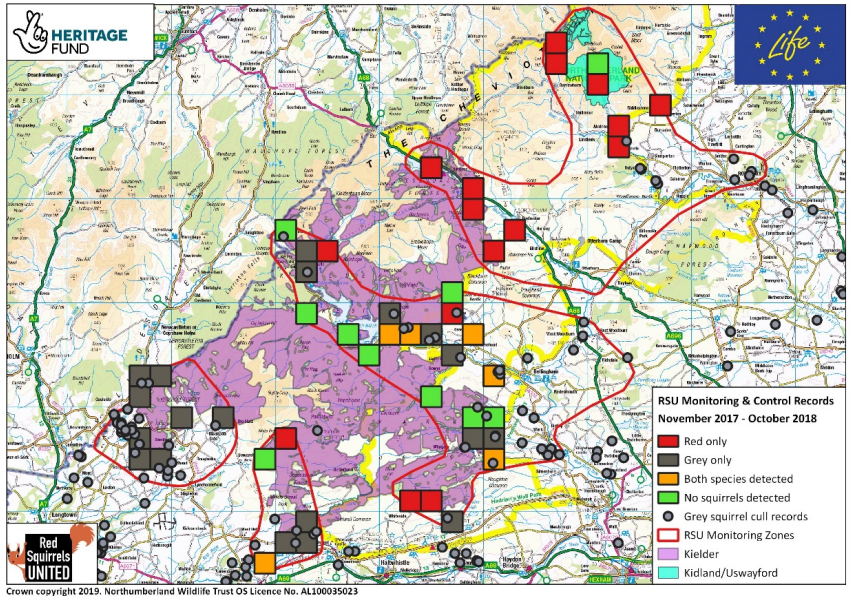
- NWT Ranger-delivered grey management; 1,358 animals culled by staff of a recorded total of 2,115 (64%)
- Majority of grey squirrels caught within the buffer zone outside of main forests
- Local community groups active in some zones but poor overall volunteer coverage: groups focus outside of the public forests & not in the most remote areas



2017

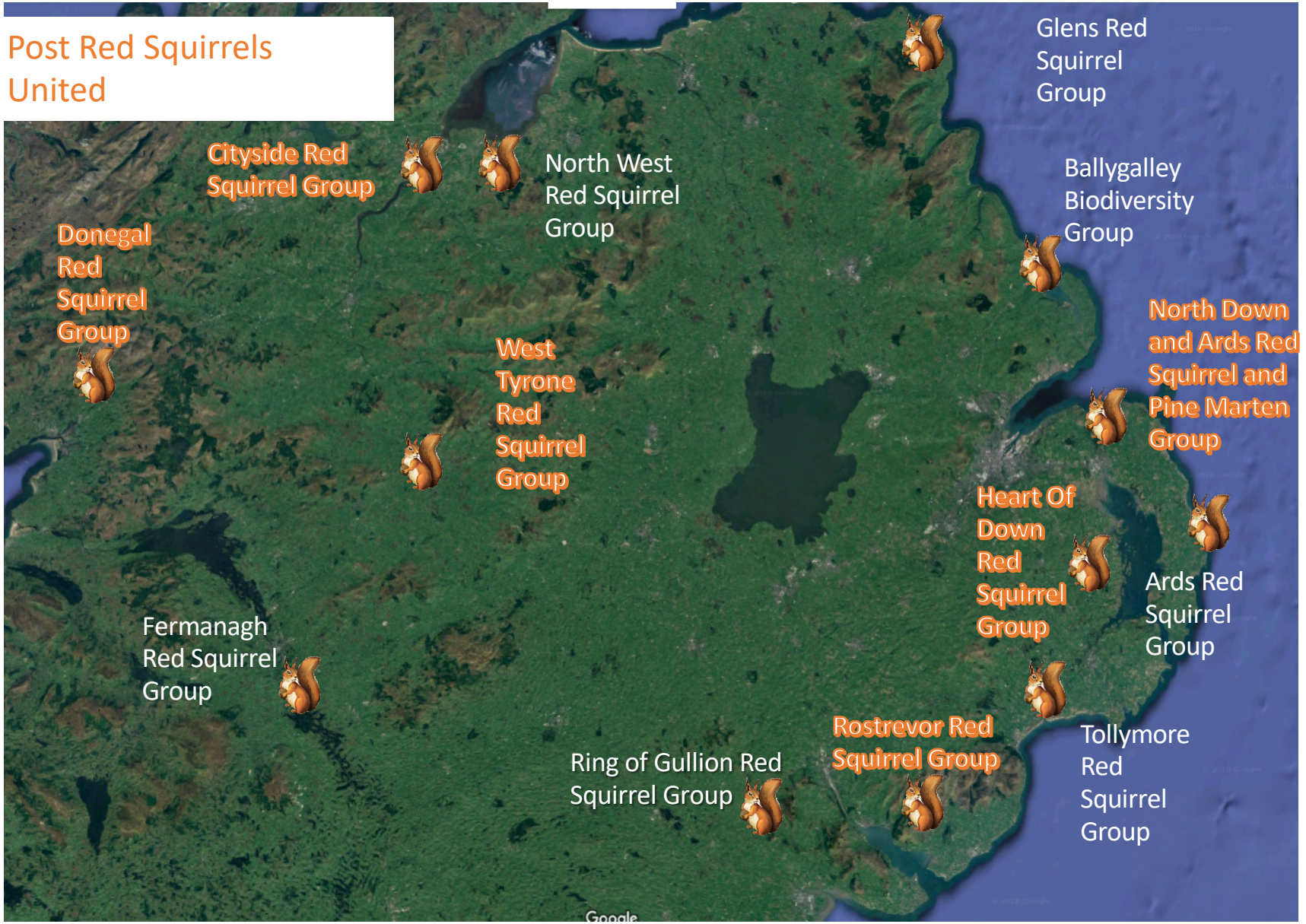


2018



2019

Post Red Squirrels United



Citizen Science to achieve management

Training

UK Forestry Standard **Technical Note** December 2019

Controlling grey squirrels in forests and woodlands in the UK

Grey squirrels (*Sciurus carolinensis*) have spread rapidly since their introduction into Great Britain in the late 19th century, and Ireland in the early 20th century. They have a significant impact on woodland biodiversity, and in particular the native red squirrel (*Sciurus vulgaris*). Grey squirrels have displaced red squirrels throughout most of England and Wales, central and southeast Scotland, and parts of Northern Ireland, through competition and disease. Grey squirrels also pose a threat to the sustainable management of woodlands through the damage they cause to trees by bark stripping. Such damage may lead to a loss of particularly vulnerable tree species (e.g. beech) within the canopy of woodlands and this may be accompanied by a decline in associated fungal and invertebrate fauna. It some areas it can act as a disincentive to the creation of new woodlands for timber because it reduces the value of the trees. In many areas of the UK, grey squirrels are unaffected by predation and therefore targeted control is often necessary to reduce their impact on woodlands and biodiversity. This Technical Note provides updated information on methods of grey squirrel control. It has been produced in response to changes in legislation as well as recent developments in control methods and trap designs.

Forestry Commission · Scottish Forestry Coilltearachd na h-Alba · Cyfoeth Naturiol Cymru Natural Resources Wales · FORESTSERVICE

Volunteers

Motivations:

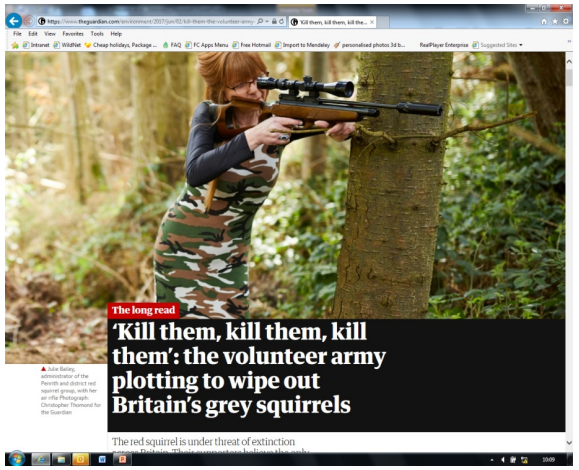
- Desire to see and/or protect red squirrels
- Sense of purpose
- Opportunity to acquire new knowledge and learn new skills
- Social, physical and mental benefits

Challenges and barriers:

- Finding time…majority of volunteers are retirees
- Competing with other conservation objectives (birds, bats etc.)
- Group sustainability reliant on a committed core and charismatic leader. Risky but difficult to change
- Lack of funding and training opportunities
- Difficulties of landscape-scale collaboration…impedes access; frustrates eradication efforts
- Fear of public backlash from public/lack of support from conservation landowners?
- Uncertain about the ‘killing’ aspect

Moving forward:

- Building relationships based on local goals
- Helping to raise awareness
- Public attitudes – challenge or opportunity?



Landowners

- Narrower range of **perceived benefits** for landowners than volunteers but key motivations for supporting Red conservation:

  Nativeness; spin-off benefits (public enjoyment, economy, pride); Grey damage; grey impact on wider ecology (e.g. birds)

- **Barriers** to landowner support:

  Fear of trespassing & damage; safety concerns (incl. insurance); fear of public opposition; apathy, lack of awareness; perceived hopelessness; conflicts with other management objectives

- **Incentivising engagement**

  Conforming to social norms; grants and financial incentives; greater awareness of conservation (and commercial/financial sense); building trust with rangers/volunteers; exploring new approaches (e.g. contraception, pine marten)

Citizen Science for Adaptive Management

Learning and knowledge sharing

Mammal Review

0305-1838

REVIEW
SPECIAL ISSUE ON INVASIVE MAMMAL SPECIES

The challenges of long-term invasive mammal management: lessons from the UK

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1. DEFINING LANDSCAPE-SCALE MANAGEMENT STRATEGIES
2. CO-ORDINATION OF MANAGEMENT
3. STAKEHOLDER CONTRIBUTIONS AND COMMUNITY ENGAGEMENT
4. SUSTAINABLE FUNDING
5. EVIDENCING PROGRESS AND BENEFITS

Citizen Science for Adaptive Management

Supportive infrastructure needed for effective landscape-scale management of invasive mammals to fulfil long-term conservation aims:

1. There is a need for evidence-based Invasive Species Action Plans to provide strategy for the long-term ongoing management of prioritised species at appropriate scales.

2. Where possible, multispecies approaches to invasive species management should be adopted.

3. Trusted leadership should be identified to take ownership of Action Plans and provide an overarching co-ordination to bring individuals, organisations and funders together.

4. Support for a centralised hub for training, data and knowledge flows will greatly improve scientific outcomes through a searchable evidence base and best practise and knowledge sharing.