

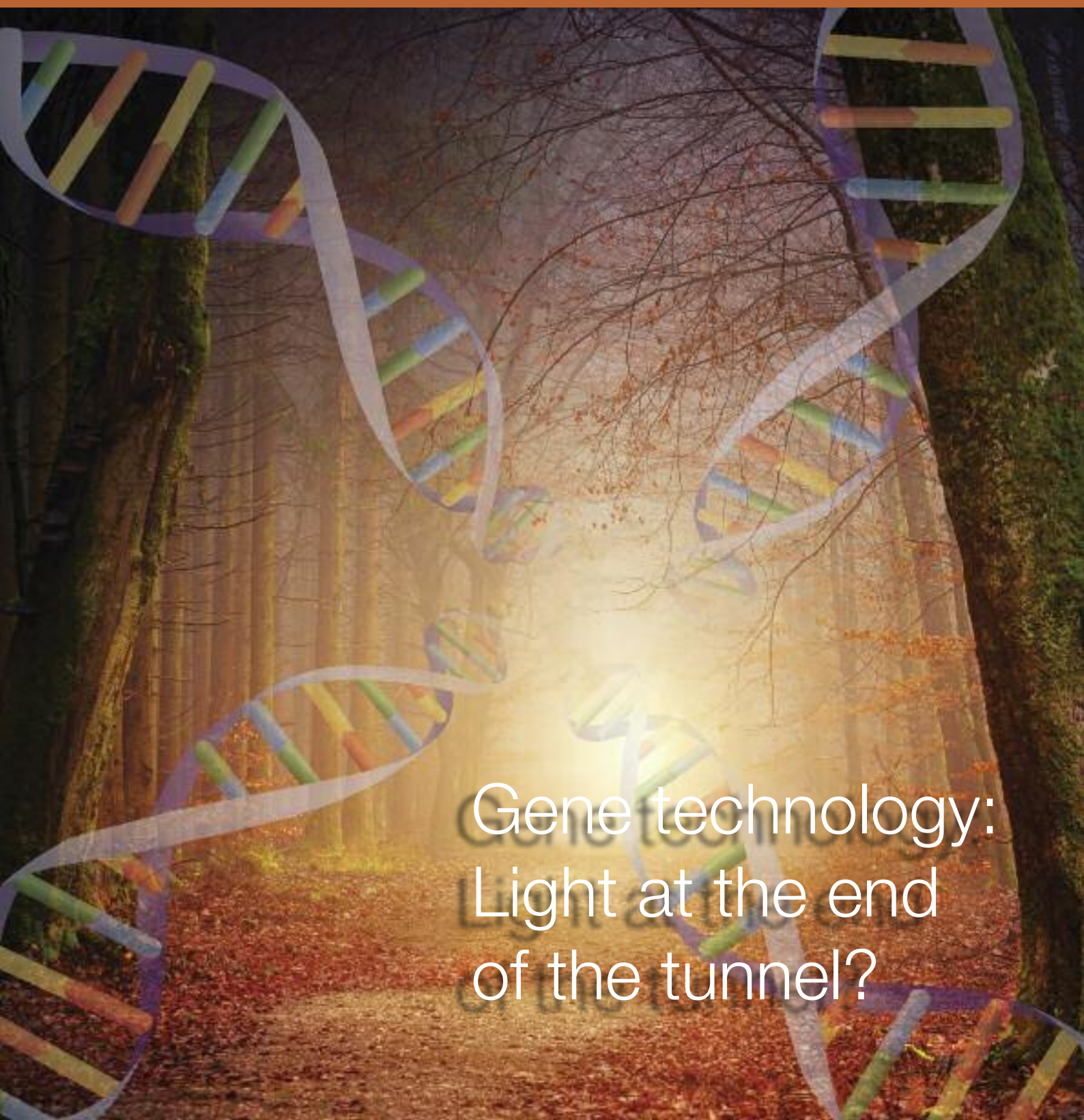
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# SQUIRREL

[www.europeansquirrelinitiative.org](http://www.europeansquirrelinitiative.org)

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Gene technology:  
Light at the end  
of the tunnel?



## Dear Supporters

**Autumn 2021, and our lives are still being affected by Covid and its impacts. News of the Omnicom variant is causing worried brows across the political and medical worlds. Covid has shown us all too dramatically the effects of an out-of-control organism on human society. As tree growers and foresters, we can associate with that sentiment.**

Recent news of yet another tree disease arriving at our shores – *Phytophthora pluvialis*, which causes needle loss in Douglas Fir and Western Hemlock, increases the assault on our nations beloved treescapes to add to the woes already associated with Ash die back, Oak processionary moth, *Phytophthora ramorum*, Red band needle blight to mention but a few. These are all irritating, but the greater damage caused by Grey squirrel damage to our beloved broadleaved trees is perhaps even more so. Maybe this is because many of our broadleaved trees take longer to establish and are often cared for with much fondness, that the bark stripping damage that occurs soon after those expensive years is so demoralising.

Whilst the work of the UK Squirrel accord continues apace on the practical use of Immunocontraception in Squirrels ESI are now firmly committed to seeing the development and wider use of gene

drive technology to help with the dramatic over-turning of the Grey Squirrel problem in the country. This work may take another decade to come to fruition, but it looks like this could be the 'silver bullet' which overcomes the negative impacts that Greys perpetually have on our woodlands.

There are several oft repeated steps along the way which need to be worked through:

1. The creation of a gene drive in Grey Squirrels which drives single sexed-ness through a population.
2. The testing of the gene drive in a Captive bred population to ensure that it works and behaves as expected.
3. The testing of the gene drive in an outdoor field trial on a limited basis
4. The adoption / commercialisation and wider use across of Grey Squirrel gene drive the UK.

Each of these steps is not without



Graham Taylor

their complications and have a price tag attached to them. Our colleagues at the Roslin Institute consider that £10 million over 10 years may do the job. Our next challenge as an organisation is to identify key supporters and fundraise for the next phase of the work. We are already in dialogue with APHA and Roslin about working closely on this project. We need the support of Government in regulatory terms, but also being willing to help fund the next stage of development of this next exciting science. It is likely that co-funding from supporters and donors will be required. We are thus keen to get members and supporters excited about the prospect and galvanise action to help progress Gene drive technology for use in Grey Squirrels.

Whilst the dismal ongoing battle continues – there is a bright horizon looming.

Happy Christmas.

**Graham Taylor MBE FICFor**

## Jigger Writes...

### The New Legal Traps

**On the Estate where I work as a squirrel catcher I have a new partner, Paul Edwards, who is a natural. My old partner Steve had to retire for personal reasons.**

Paul and I have tested every trap on the market, and some that were not. In theory, some were perfect but not one comes up to The Fen. It may be that I am just used to them. Set in 3

seconds, cheap to buy as 'anti's' sometimes break our traps or throw them in ponds. As an old boy I find the new traps dangerous. They are so strong I have many a sore finger or black nail from The Fen. These new ones I fear could break a finger, perhaps we will get quicker with use but if I was a squirrel, I would not want to get in any of them.



# ESI Update - by Andrew Kendall, ESI

One of the advantages of being involved with production of this newsletter is that I get to choose the front cover. Over the years I have tried to both entertain the reader and highlight the impact of ESI's work. In this woke age, pictures of dead squirrels may not be approved of by some but, hopefully, as far as our readers are concerned, they strike a chord and provide some encouragement. Creating an impact, is important as it draws the reader in to the magazine. This edition, the 39th, sees ESI moving further along the road to finding a solution to the problem of the grey squirrel.

As you will see from the front cover there is now light at the end of the tunnel. It has been a long and challenging road, but we now believe that at least science can provide a real and definitive solution to dealing with not only grey squirrel but other invasive alien species.

In this edition you will see a number of articles dealing with gene drive, ESI's work in collaboration with the Roslin Institute under the guidance with Professor Bruce Whitelaw is making good progress.

At last, it is being recognised by those in government that the solution is available. What it now requires is determination by government to adopt this technology and make it happen.

Over the past twelve months we have had endless government announcements relating to tree planting with millions of pounds of taxpayer's money being allocated yet, as we all know, much of this is futile, unless it is accompanied by great squirrel control. COP 26 identified tree planting as one way in which we can mitigate climate change. Billions of pounds will be spent in fulfilling these ambitions.

The amount of money required to deliver effective grey squirrel control is miniscule when compared to the amount of money being pledged by government to supporting tree planting. With the solution now available, government must accept that it must take responsibility and once and for all



Andrew Kendall has been involved with ESI since its founding in 2002, and is responsible for the day to day operation of the charity.

deal with the problem of grey squirrels in order to fulfil its own ambitions and not irresponsibly waste taxpayers' money. Gene editing could remove grey squirrels from this country within 20 years, a blink of an eye for a forester but possibly a horizon too far for a politician. However, they must act responsibly and courageously and fully support gene editing, in order to save those countries trees for future generations.

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## Optimising the Modern Air Rifle for the Control of Grey Squirrels

**The Airgunner's Companion JDJ Braithwaite Shares Some tips on the Humane and Lethal Removal of Grey Squirrels in the Lake District.**



The stunning and ancient woodlands of the Lake District mask an on-going battle from a formidable foe. The non-native grey squirrel arrived in Lakeland around the early 1990s and now has a stronghold throughout the region. This is worrying for a host of reasons, perhaps most notably because this part of the country is also one of the last English strongholds of our native and endangered red squirrel. Sadly these two species cannot really co-exist. Humanely removing the grey squirrel from our woodlands is now of such importance it is far beyond pest control, and now one of serious red squirrel conservation.

There are many effective methods for the humane and lethal removal of grey squirrels from our woodlands and they all have their place in a more holistic approach to woodland management. I am a champion of using modern precision air rifles which have many merits in this regard. The modern air rifle is ecological (only firing a single pellet), is near silent and highly discrete. Some of my woodland shooting occurs around pheasant pens, free range poultry, near horse paddocks and livestock – animals which remain undisturbed when such a quiet tool is discharged. For serious projects the modern PCP (pre-charged pneumatic), multi-shot and silenced air rifle is a 21st Century solution for a contemporary problem. Due to their design they are also completely recoilless – increasing their effective distance and hence effectiveness. They are ideally suited to the problems the grey squirrel poses for our woodlands. The air rifle can be an effective companion on a woodland stalk, but it really comes into its own when coupled to the planned ambush.

### **The Planned Ambush**

To really optimise this method I would suggest the following: Try to locate the “highways” used by the greys through the woodlands. These can be routes from drey to drey or from drey to food and foraging areas – but grey squirrels will typically use the same routes when navigating through the woods. Once these routes have been identified, find a suitable tree along them on which to place a ‘feeder’ or bait station. A nice broad hardwood is ideal. In addition, locate an ambush area – somewhere for you, the shooter, to sit in and wait in ambush. This really needs to offer a good backdrop behind you and provide cover to help mask your presence and motion cues. In winter woodland evergreens and things like holly bushes work very well for cover. What the woods offer can be complemented by either building a natural hide, the addition of leaf netting, or a pop-up hide. They all work well. Ideally, the distance should be around 25-30yds from shooter to feeder.

I prefer to use a ‘flip-top’ style feeder as they seem to last longer and get chewed less than other designs. Fill the feeder with nutty goodies for around 8-10 days before shooting. Let the message spread through the woodlands that there are goodies to be had on the tree and they will come in for them in good numbers. You can also add a scent attractant (like aniseed oil) to the feed mix itself or grind up some Star Anise pods into a powder and just sprinkle this into the feed. I also like to add a smear of Nutella to the tree trunk hosting the feeder (and facing my shooting position). This is good to do when trying to initially establish the feeder in the area or at the start of a shooting session – to bring them in. My own

additional twist is to occasionally add shelled nuts as the squirrel will often pause to nibble open the outer casing to get at the inner nut. They tend to stay reasonably still when doing this, providing an ideal opportunity for an unhurried brain shot, humanely dispatching the grey squirrel with no drama. Here the skill is to get them to come to the feeder area, to position themselves either on the feeder of the tree hosting it and to stay still, so the optimal shot can be taken.

For large-scale estate shooting the strategy here would be to have feeders in different sections of the woodland and monitor the activity on them. Ideally, and to optimise the method further, the feeders will be coupled to PIR wildlife trail cameras to capture all visits to them. Trail cams will reveal which squirrel species are present and when they like to feed. Once the data from the trail cams has been consulted and grey squirrel activity noted, then its ambush time! The trick now is to get out into the woods, set up and get ready before the squirrels come to feed. One final top tip is the use of thermal imaging – which will increase the shooters awareness of the wildlife around them and reveal grey squirrels sat in the trees watching you that otherwise you might not spot. From the feed mix and design of the feeders, to the use of passive infra-red (PIR)-enabled trail cameras, thermal imaging, and precision air rifles, nothing goes unconsidered. I tend to refer to these methods as an optimised feeder-based methodology. The sheer scale of some of the projects I cover requires a 21st century approach combining research, observation, and data gathering technology. A lot has to take place before the final trigger is pulled.



# DIGB – Funding for the Next Decade

by Graham Taylor, ESI Chairman

I was once taught the phrase – ‘How do you eat and elephant?’ the answer of course is – ‘One piece at a time!’. The prospect of developing and seeing DIGB finally in operation across the UK with an aim of turning the Grey squirrel tide is one which ESI is now singularly focussed on. The biggest challenge however is the journey from A to B. Getting from where we are – a concept and good science to a working and deliverable gene drive tool which could significantly dent UK grey squirrel populations and see the resurgence of our native Red Squirrel to parts of the country it was lost from over 70 years ago.

The route for developing projects and ideas into a working product is a well-worn route that business is used to, involving a logical sequence of steps (the piece at a time of elephant eating!) It starts with the Research and Development (R&D) phase, through a succession of developmental working phases through testing / trialling and on to commercialisation. These are the steps through which ESI & Roslin must go over the coming decade are outlined below:

**Phase 1: Early R&D** - this phase involves designing and manipulating the gene drive in the lab using Grey Squirrel egg cells “oocytes” and sperm cells. It is possible to then identify and see whether through fertilisation via in vitro methods (IVF) the gene drive is working in a fertilised egg – i.e., in a laboratory setting. This phase will also involve the creation of a Daisy chain gene tool which sets the number of breeding cycles the gene drive can work. It will be a required safeguard to ensure that in the event of any unforeseen environmental problems of application, the use of DIGB in the wider environment could be curtailed.

**Phase 2: Introducing and testing Gene drive in Captive Bred GS populations:** this work would be done in conjunction with a Captive bred GS facility in the UK. With the use of small, localised anaesthetic the gene drive can be inserted into live Grey Squirrels and then monitored to see how it starts to impact on gamete production and whether the drive starts to impact the

Gender bias in gamete production. Follow up work would test to see if the gene drive can be spread through sexual intercourse naturally and whether the progeny is of the desirable gender.

### **Phase 3: Small Scale Field Trials**

– subject to regulatory approval and careful monitoring the aim would be then release a small number of creatures containing the gene drive ideally into an island but wild population and see how the drive behaves and monitoring to see if achieves the desired outcome – the driving of single sexed-ness through that population leading to a localised crash in populations

Phase 4: Wide scale application – this would be the commercialisation phase. With appropriate safeguards and with evidence to show that there will be no unexpected negative impacts, the application would be delivered over a period of years with a view to starting to see localised population crashes of grey squirrels some 3-5 years following release.

Each of the above will require considerable investment in staffing, facilities, welfare and scientific techniques. None of this is cheap, and the best estimate at this stage is a total of £10 million over the next decade.

The first two phases are estimated at this stage to cost in the region of £3-4 million. For most scientific endeavours there is often support from UK research pots, which is more readily accessed if there is some business /



charitable backing of the endeavour. As a result, it may be possible for ESI & Roslin to secure £5million R&D grant to fund Phase 1&2 DIGB if the partners can raise 10% of the total pot. This means that ESI may need to raise somewhere between £300k & £800k over the coming few years from donors and supporters.

ESI believe this is a realistic and possible task and are preparing to invest in more intensive fund-raising efforts while we await approval of DEFRA to proceed with work being ready to make bids into the larger scientific pots, from a position of strength.

Damage to UK trees and woodlands has been assessed at around £40 million / year with losses to Climate change, impacts on biodiversity and failure of generations of broadleaved trees to develop normally. Bearing in mind that the damage is cumulative and has been ongoing for more than 50 years, this puts the cost to landowners at around £2 billion and growing. Set against that context, the coming ask for £3-800k of fund raising is not insurmountable. Successive phases should lead to commercialisation and a separate way of raising funds. In the meantime, ESI would like its supporters to consider how they may help with this task.



## Gene Drive – a game-changing technology for grey squirrel control

**Stef Kaiser from Confor speaks to Bruce Whitelaw, Professor of Animal Biotechnology at Roslin Institute.**

Grey squirrels (*Sciurus carolinensis*) are an invasive, non-native animal in the UK and are a threat to the health of woodland ecosystems. Tree damage caused by squirrels costs the forestry industry £40m per year.

In addition, grey squirrels are rapidly pushing the UK's native red squirrel (*Sciurus vulgaris*) to extinction. It is predicted that without effective conservation measures, the red squirrel could be lost from the UK by 2030.

The UK Squirrel Accord is backing the development of an immuno-contraceptive approach to control grey squirrel numbers. In parallel, the Roslin Institute in Edinburgh, in collaboration with the European Squirrel Initiative, Edinburgh Innovations and the Biotechnology and

Biological Sciences Council, proposes an innovative genetic control strategy to complement existing methods. The suggested technology, Directed Inheritance Gender Bias (DIGB), relies on genetic engineering technology; specifically, DIGB relies on gene drive, a proven innovative application of genome editing and GMO technology. DIGB offers a genetic alternative 'contraception' by skewing the sex ratio within the target population, leading to a population crash.

For less than the annual cost burden of grey squirrels, DIGB could be

developed for £10m. It could be used to humanely eradicate the grey squirrel from regions within 20 years and could be applied for the control of other invasive, non-native species.

### **The technology - Using Gene Drive for directed inheritance gender bias**

Gene drive is the use of a genetic engineering tools to 'drive' a desired genetic trait through a population by increasing the probability that the trait will be transmitted to future generations (figure 1). It is currently being developed for use in insects, and the Roslin Institute proposes that the technology could be tailored to cause female infertility and be used to control grey squirrel numbers in our woods and forests.

Normally, what happens with inheritance is that both females and males carry two copies of the same gene (the copies are called 'alleles') but each parent only passes on one copy of the gene to offspring. Unless there is a selection pressure for a given allele, half of the first generation of offspring will carry the gene of interest, half will not and so on through generations (figure 1, left side).

Gene drive changes this inheritance pattern for the gene of interest with the aim that, theoretically, at some point 100% of the population will carry the gene.

The gene drive technique involves adding, deleting, disrupting, or modifying genes by using 'transgenes'. For gene drive to work, a transgene is inserted in one allele of the gene (figure 2, left).

"As soon as we've done that, the introduced gene drive activates and copies itself into the other copy of the gene. Now, this animal has two copies of the desired transgene and, rather than 50%, all gametes (sperm or egg cells) will carry the gene drive. When a gene drive animal mates with a non-gene drive partner and fertilisation happens, the same copying happens again, and the offspring, once more, will have two copies of the desired gene. This way, the desired trait 'drives itself' through the population", explains Prof Whitelaw.

Gene drive can be used to 'drive' any trait, such as disease resistance or, in this case, infertility through a target population. In the case of the proposed project, the gene drive will be used to drive female infertility, and over time, this will lead to a preponderance of males. Eventually, the population will crash due to an absence of female animals.

### **Creation and deployment of genetically modified squirrels**

This project is at an early stage as no animals have been produced. Looking forward, gene drive grey squirrels could be engineered. Such animals, who will



### Gene drive to control grey squirrel populations

- Drive infertility through the target population
- Genetic equivalent to immunocontraception
- Can be used in parallel to other control strategies
- Technology applicable to other pest species
- Humane (no animals killed)
- Specific for grey squirrel (no collateral)
- Possibility to limit gene drive to a number of generations.
- 5 + 3 yrs R&D (£10m)
- Then impact in 15-20 years
- Now seeking £10m funding for R&D phase

be males, would be released into the target woodland. After natural mating, those males will pass their gene drive on to their offspring – and produce fertile males and infertile female.

Thanks to funding from the ESI, researchers have performed an initial simulation study (Nicky Faber et al,

2021. Scientific Reports 11, 3719) of a conservative gene drive strategy indicating that the release of 100 squirrels in a region harbouring 3000 squirrels could achieve eradication over a 20-year period (figure 3). This assumes a one-year breeding cycle. Further modelling will enable the deployment parameters to be refined to identify optimal release number and, reduce time to eradication predictions.

The team at Roslin will closely work with ecologists to model the impact of reducing grey squirrels in a particular ecosystem, and red squirrels filling the ecological niche.

Although there is considerable current activity developing gene drive strategies to control mosquito populations and mitigate disease transmission by these insects, using gene drive in squirrels would be pioneering, it hasn't been done before. There is no gene drive work in the world beyond experimental in mice, which was conducted in the US – with very valuable lessons learned about limitations of the technology.

### Assessing and mitigating risks

When it comes to genetic engineering, a main concern for both the public and funding bodies will be the potential existence of unintended or unpredictable consequences on other species or the ecosystems as a whole, when genetically modified organisms are

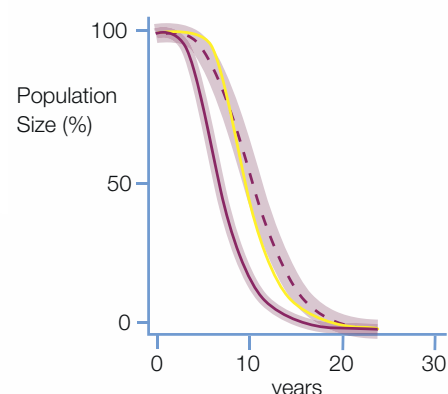


Figure 3

introduced into the wild. Currently, regulations for approval of GM projects are very strict, with a strong bias towards the principle of precaution. Equally, there is a consequence of not trying new control approaches to a pest animal which continues to expand its footprint in the UK.

Using the DIGB technology for grey squirrel control would come under Defra's GMO regulations – with the outcome of their recent consultation on genetic technologies imminent.

### Is there a risk of red squirrels or other species becoming infertile?

The first barrier to contamination of other species is the so-called 'species barrier'. The gene drive can only be transmitted to animals that a grey squirrel could mate with. There are situations where certain similar species can inter-mate but usually the offspring will be sterile.

Beyond that, the gene drive will be tailored designed to work only on DNA sequences that are exclusive to grey squirrels, or even a specific grey squirrel population. These 'personal sequences' are a common genetic denominator of a certain group of individuals (species, breeds or even families) that is different to everyone else. To illustrate this, let's say we wanted to target an isolated population of grey squirrels in Aberdeen. It is possible that these squirrels have slightly diverged from other populations and therefore have 'personal sequences'. It would be possible to design a gene drive that just works in this local population in Aberdeen.

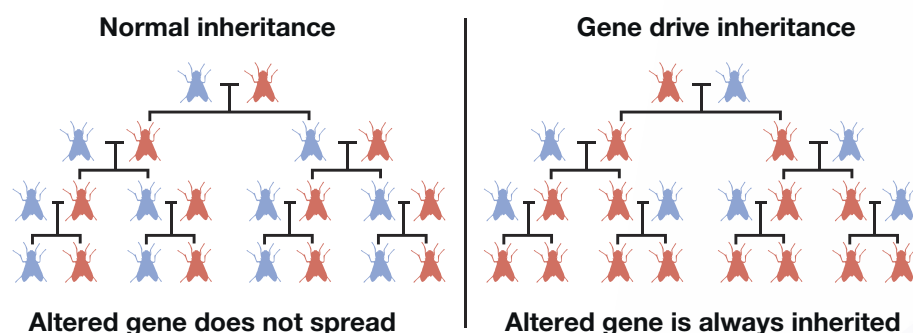


Figure 1

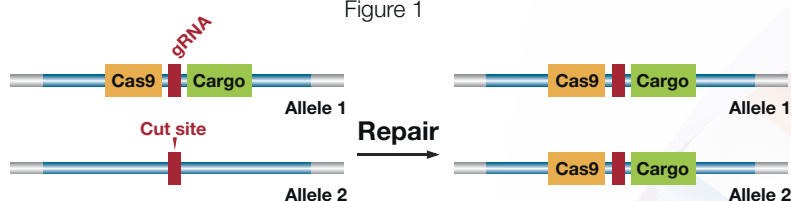


Figure 2



# Research

The likelihood of this gene to be introduced into other populations or even species would be in effect zero.

***Is there a risk of eradicating the species as a whole, even in its native habitat, for example, by accidental return of individuals to their original habitat?***

This risk does exist. However, there are tools to design strategies that limit the number of generations for the gene drive; this means that we can ‘dial-in’ an end point where the infertility trait doesn’t get inherited anymore. This can be imagined a bit like ‘planned obsolescence’ in electronic devices, or commercial seeds only working for a specific number of years chosen by the manufacturer.

An example for such a strategy is the ‘Daisy Chain’: within the transgene, there are in this case four gene drive sequences, with one targeting the next until the last sequence has no target and the gene drive stops. This strategy has been proven in mosquitoes under laboratory conditions.

Several parameters allow researchers to create a safe and bespoke grey squirrel control strategy that reconciles efficiency and speed of eradication with maximum risk mitigation. The choice of the genetic target sequence (to ensure specificity), the number, location and timing of animals released, and the number of generations the gene drive should work.



**Research timeline and cost**

A outline timeline to develop the DIBG project would be:

- **Years 1-3:** refinement and validation of gene drive technology and reagents
- **Years 3-5:** production of gene drive grey squirrels (in containment)
- **Years 5-8:** contained use field trials
- **Years 8-25:** deployment in our woods and forest.

The project cost is estimated at £10 million, and the research consortium is currently looking for funding to start the research phase.

## Questions from the community

***What is the desired outcome – totally remove species or remove numbers?***

Conceptually, we can either reduce the population or aim for a complete eradication at a local or regional level. Grey squirrels are an alien species that has negative impact on the environment; ESI’s long-term aim is to see eradication of the species and for red squirrels to take their space.

***Do you anticipate public opinion as a major challenge for funding and implementing this technology?***

The public will have reservations against any kind of animal control. However, explaining the bigger picture and the reasoning behind control of invasive species usually has a very positive effect on public opinion, says Graham Taylor of the ESI.

The main aspects people are concerned with, in particular in the case of GM animals, is animal welfare and sustainability. In this sense, Prof Whitelaw believes that using this gene drive strategy to control grey squirrels is exactly what the public want – “it’s humane and it’s safe for the environment”. In Australia, scientists

are looking into utilising the technique as a way of controlling rodents. Interestingly, it is PETA, an NGOs who you might not suspect of being supportive of biotech, who are coming out in support of this technology.

***What is the likelihood of mutations occurring that would render the gene drive mechanism ineffective in 10 or 20 years?***

Yes, mutations are a natural process and would limit the gene drive. There would be a natural selection favouring those mutations, once they appeared. As the model will be based on the gene drive working for a limited number of generations anyways, the effect of spontaneously occurring mutations on the efficiency of our control method should be negligible. In addition, sequential gene drives could be deployed to mitigate this.

***How will trial areas be selected?***

The initial trials would be conducted in containment facilities and after that, it could be trialled in specific forests. We do get a lot of interest from landowners who offer their forest for trials. The ideal site for an open trial would be an island with only grey

squirrels – but that is wishful thinking, of course. But we could use ‘island populations’ of grey squirrels on the mainland. No GM squirrels have been produced yet, and we are still far away from the open trial phase.

***What are the constraints of the technology?***

The biological constraints are that no-one has ever genetically engineered a squirrel and we’d have to set up the practical capability to do that. In Roslin, we use similar strategies for mice, rats, chickens, pigs, sheep and cattle so we are confident that we can adapt the methods to squirrels.

Although gene drive has worked in insects and experimentally in mice, we haven’t got any practical experience with the proposed technology working in squirrels. We might have to try a few target sequences and gene drives to figure out which one is the most effective.

We are still in the development phase, but we don’t think any of the challenges are insurmountable. The insect research community will provide useful information that we can use for our R&D.



# Squirrels Across The Pond

In the United Kingdom the control of the most numerous species of squirrel, the grey squirrel is very different from how its US cousins are treated. In the UK the grey squirrel is controlled all year round as a harmful invasive pest species whereas in the USA it is classified as a game animal.

Being classified as a game animal means that squirrel hunting can only take place within a prescribed calendar period with a limit imposed on the number of squirrels that can be shot on any day within that season. This daily quota is often referred to as a bag limit. The bag limit and dates of the squirrel season are set by each of the fifty US states or even individual counties within the state. There may even be different seasons and bag

limits for different species of squirrel within each state or county. For example, Arkansas squirrel season runs from May 15, 2021 to February 28, 2022. The daily bag limit is set at 12 squirrels. Arkansas also prescribes what types of firearms and ammunition can be used to hunt squirrels during squirrel season. Some US states have days within the squirrel hunting seasons specifically set aside for the exclusive use of military veterans or for instructional hunts as part of the states youth hunting program.

Squirrel hunters in the USA also appear to make greater use of what are referred to as squirrel dogs than do their counterparts in the UK. A squirrel dog is a dog trained to chase a squirrel and then keep the squirrel in a particular area until the hunter arrives. A well trained squirrel dog



will bark at a squirrel from the opposite side of the tree to where the hunter is standing. The barking dog captures the squirrels attention and therefore makes it easier to shoot.

Squirrels are regarded as part of the US tradition of small game hunting. Small game being such animals as rabbits, squirrels, grouse, quail and wild pheasants. This tradition has declined in recent years as there has been greater interest in hunting other species such as white tailed deer and turkeys.



## Italian update

**The grey squirrel situation in Italy has deteriorated strongly since our latest update for ESI.**

For example, grey squirrels have now invaded most important green areas (parks), both public and private gardens, of the city of Milan in Lombardy. Also the Piedmont capital Turin has grey squirrels in many parks with the main population in the Valentino Park along the Po river. Here, researchers from the Turin and Varese universities are currently studying the behavioural and physiological adaptations of grey squirrels to urban

areas. Only good news is that the two minor populations of Genua (Nervi Park) and the city of Perugia, the latter in Central Italy, seem to have been successfully eradicated. In the Genua case, because of strong opposition of local people and local and national animal welfare groups, the techniques used were live-capture followed by surgical sterilisation and subsequent released in other, isolated parks (without red squirrels) until natural death of the sterilised animals (slightly more than 300).

With regard to the legal aspects, the action plan for the management of the grey squirrel in Italy was prepared in its final version in 2020 by Sandro Bertolino, Valentina La Morgia, Piero Genovesi, as a joint work between the University of Turin and ISPRA (Institute for Environmental Protection and Research). Below is the link, but unfortunately the plan is only in Italian. [https://www.mite.gov.it/sites/default/files/archivio/allegati/biodiversita/def\\_pg\\_scoiattolo\\_grigio\\_2020.pdf](https://www.mite.gov.it/sites/default/files/archivio/allegati/biodiversita/def_pg_scoiattolo_grigio_2020.pdf)

Several action plans on species of

Union concern have been produced in these years and are ready to be officially adopted by the Government as provided by EU Regulation 1143/2014. However, it seems that adoption is a prolonged process since the first action plan on coypu was produced in 2018. Unfortunately, the fragmented situation of political and administrative responsibilities and lack of a hierarchical command-execution structure, typical for Italy, is a great obstacle for efficient and/or fast control or eradication of invasive alien species actions.

From the research perspective, the Insubria University of Varese has started a wide-scale new project on the adaptations of native red squirrels to suburban and urban parks and woodlands, monitoring the personality (boldness, exploration tendency, being aggressive or tolerant) behavioural profiles), the genetics, the microbiota (composition of the gut bacteria) and the space use in red squirrel populations along a gradient that goes from the conifer forests in the Alps, over lowland mixed deciduous woods to urban parks.



## Government's new action on trees welcomed, but must be matched by grey squirrel control

**The Government's new goal to treble tree planting rates to 7,000 hectares of new woodland in England a year by 2024, must go hand in hand with a commitment to grey squirrel control, warns a leading squirrel charity.**

With funding to be put in place to provide incentives for landowners and farmers to plant and manage trees, and plans announced for the creation of at least three community forests, the European Squirrel Initiative (ESI) warns that this commitment will be undermined, unless action is taken to manage damage threats to broadleaf trees caused by populations of invasive non-native grey squirrels.

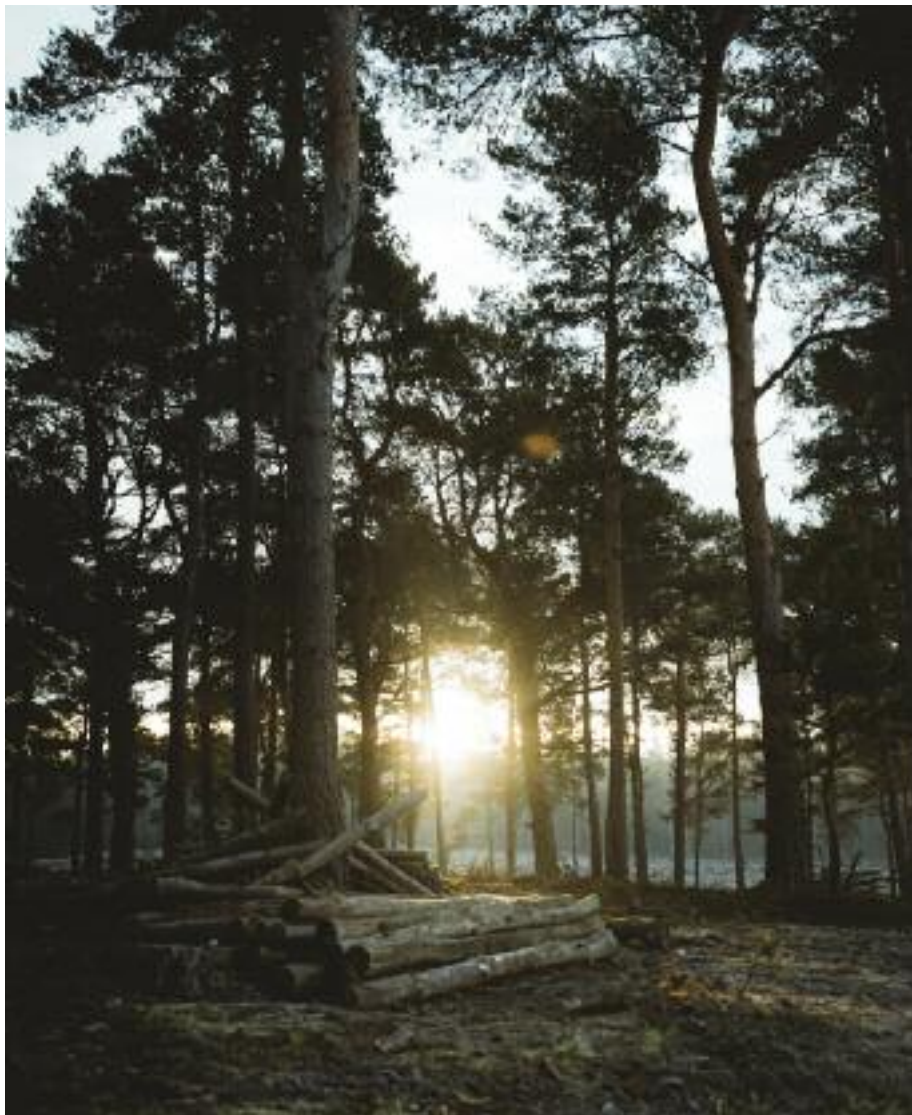
While it welcomes the new strategy, the ESI fears that the initiative will be ineffective unless action is taken to reduce the dangers of irreparable damage to broadleaf trees caused by grey squirrels stripping barks, either killing trees outright or damaging them enough to allow infections in.

"A Royal Forestry Society survey in March supports our own research, rating grey squirrels as the number one threat to lowland silviculture and our broadleaf woodlands," explains Charles Dutton, chartered forester and trustee of the ESI.

"If the Government is serious about the large-scale expansion of growing trees to combat climate change, it has got to get serious about grey squirrel control and help fund the research that is needed," he adds.

The Government need only look to the results of the grant aided tree-planting of 1988-90, to replace the mighty oaks following the 1987 storms. Poor grey squirrel control has resulted in irreparable damage, leaving the trees planted mostly destroyed and those areas replaced with scrub woodland.

The ESI believes that by embracing



gene editing tools, grey squirrel populations could be suppressed by spreading female infertility genes through targeted populations, leading in time to population decline owing to the lack of fertile female squirrels available as breeding partners.

"ESI has funded research, through the Roslin Institute, into species-specific, humane and cost-effective solutions to managing invasive grey squirrel populations in the UK," explains Graham Taylor, ESI chairman.

"We feel this offers the opportunity to

control the damage grey squirrels cause both economically and ecologically to the UK, while providing a realistic proposition for red squirrel conservation" he adds.

ESI research in 2019 revealed that grey squirrels cost the UK economy in excess of £40 million every year. As well as damaging trees, parks and gardens and preying on woodland birds, grey squirrels have driven our native red squirrels to the verge of extinction, both through competition and as carriers of the squirrel-pox virus to which greys are immune.



## An update on the Good Nature Trap

By John Wilding MBE, head of Forestry and Energy at The Clifton Devon Estate

"I have been experimenting with Good Nature traps for over two years, within the Bickton Parkland Estate in Devon. While the kill mechanism works well getting grey squirrels to enter the trap to trigger it has been an issue. I believe this to be bait related, specifically the supplied bait.

Last summer I experimented with peanut butter with immediate positive results, to the point that we had to fit metal shrouds to all traps to prevent grey squirrels gnawing their way in.

I have settled on a self-mix formulation of smooth peanut butter mixed with bird feed peanuts blitzed in a food processor. This gives a grade from peanut flour to pieces of nut. The former is important to gain the correct viscosity in the bait, so it sticks, the latter is key to getting grey squirrels switched on.

Over the summer I was needing to replace gas canisters as hits mounted up. This success has been tempered by a complete lack of success since the early autumn and onset of prolific natural food. At this time of year grey squirrels

herd into the parkland from the Bickton Gardens and wider estate and it is not uncommon to shoot half a dozen under the same tree every couple of days. Beech, chestnut and oak mast is the draw. Meanwhile the freshly re baited Good Nature traps on the very same trees remain unused, for weeks.

My current thinking on this is that these traps will be seasonally effective. It will be interesting to see how they are used in late February / March and into the spring when grey squirrels are

hungry. My expectation, based on last summer's step, is that they will be effective.

The acid test is that we are still using only six traps given to us to trial and have not yet the confidence to invest in more. This is partly the bait issue and partly the time needed to frequently re bait around the trap- slugs are an issue. Currently they are far from "fit and forget", the USP game changer we had hoped for. The .221r remains the autumnal control method of choice."

### By Charles Dutton FICFor

My own feedback is that results are patchy. I echo John's observations about seasonal use and uptake of natural food. It was always the case when using Warfarin that some woodland managers had great success and some did not. I do still feel that we have yet to learn and adapt how and when we use the Good Nature trap.

We need also to understand that there will be NO one single silver bullet to controlling grey squirrels. The IUCN 'Turning the Tide' book tells us that. Therefore we need to use a menu of control methods, GeneDrive & or IMC will give us the 'knockdown' of the population that we desire, 'Mopping up' can be achieved by shooting and trapping.

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