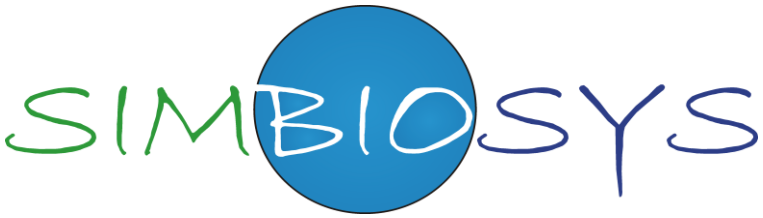

Invasive Species & Roads Workshop

May 23rd 2013

Trinity College Dublin

Introduction

The SIMBIOSYS project http://www.tcd.ie/research/simbiosys/ held a one day conference/workshop on 23rd May 2013 in TCD to communicate key messages from researchers, government, the NRA and industry regarding Invasive Alien Species (IAS) and roads in Ireland.

The speakers were Pádraig Whelan (University College Cork), Christian Nea (National Roads Authority), Gerry Lecky (National Parks & Wildlife Service), Paul Murphy (EirEco Environmental Consultants), Micheline Sheehy Skeffington (NUI Galway), Sean Hathaway (Swansea Council, Wales), John O'Donovan (O'Donovan Agri Environmental Services) and Rosalyn Thompson (University College Cork).

Key points from the meeting are presented below. Individual presentations are also available on the SIMBIOSYS website for further information:
http://www.tcd.ie/research/simbiosys/outputs/conferences/invasive-species-roads.php

Invasive aliens

There are legislative, economic and conservation pressures to respond to Invasive Alien Species (IAS). Many IAS weren't recognised as such when initially introduced, often as horticultural or garden plants, as well as during road landscaping. IAS often have traits such as clonal growth/vegetative spread, prolific reproduction and effective dispersal.

A number of priority plant species for Ireland have been identified at different times by different groups, but some are common (in bold): **Himalayan Balsam, Japanese Knotweed, Giant Hogweed, Giant Rhubarb, Hottentot Fig, Rhododendron ponticum,** Buddleja, Montbretia, Winter Heliotrope, Traveller's Joy, plus a handful of others. There are also a number of aquatic species that are well documented.

Invasibility differs by region, e.g. *Gunnera tinctoria* (Giant Rhubarb) is abundant in milder coastal regions of SW Ireland, Mayo, Cornwall, while Winter Heliotrope seems to have potential for invasibility in Cork.

Road materials depots (e.g. for road chips) were identified as potential sources that needed to be monitored for dispersal of IAS.

Road treatments

Road landscaping treatments traditionally involved a horticultural approach. NRA 2006 guidelines (http://www.nra.ie/Publications/DownloadableDocumentation/Environment/file,3481,en.pdf) promoted an ecological approach using native species, subsoil, natural recolonisation, hay-strewing (provides seed and mulch), soil management to reduce alien establishment, etc.

Roads can promote the establishment and dispersal of IAS. During the construction phase, landscape perturbation and the movement of machinery and materials to and from depots can create disturbance allowing colonisation by IAS propagules, as well as transporting propagules along the road corridor. Road maintenance can also promote dispersal.

IAS can inflict damage to road infrastructure, soil erosion and collapse of river banks, colonisation of adjacent habitats and facilitation of future spread, have an adverse effect on landscape quality and reduce the biodiversity value of roadside habitats.

Legislation

IAS in Ireland are calculated to cost over €200 million (http://invasivespeciesireland.com/wp-content/uploads/2010/07/Economic_Impact_Assessment_FINAL_280313.pdf). The EU Commission has concerns with how IAS are addressed – currently this is happening in a very fragmented and incomplete way, through a number of EU legislative instruments, which has led to a lack of consistency in approach across the EU and a lack of leverage for member states to take action against IAS. A new EU Regulation/Directive is due to be published soon.

Birds and Natural Habitats Regulations 2011: includes 35 IAS plants in its Third Schedule. The Minister has the power to add or delete species from this list. Relevant regulations include:

Regulation 27: defines the duties of public authorities relating to nature conservation. Public authorities (including ministers of government and An Bord Pleanála) must take steps to avoid damaging European sites. Local Authorities are responsible for maintenance of national roads; IAS can be introduced and spread to designated areas.

Regulation 49: anyone who plants, disperses, spreads or otherwise grows specified plants is guilty of an offence. The interpretation of this regulation is unclear, but can be taken to mean that local authorities, in the maintenance of national roads, shouldn't cause the spread or dispersal of plants. The plants (listed in the Third Schedule) can be seen on many national roads, e.g. Giant Hogweed, Giant Rhubarb, Japanese Knotweed.

Regulation 50 (not yet in force): this is an expansive provision, making it an offence to import, buy, sell, breed, reproduce or propagate, offer or expose for sale plant species or vector material listed in the Third Schedule. It will be an offence to advertise, publish a price list, transport or distribute these plant species (including online). Risk assessment on the species included in the Third Schedule, as well as engagement with stakeholders (e.g. horticultural industry, pet shop owners) will be carried out prior to commencement.

Irish response to IAS

The Invasive Species Ireland project ran from 2006 – 2012; a new all-Ireland project will commence later on this year.

NRA

The NRA is an independent statutory body established as a result of the 1993 Roads Act. Its mission is to deliver a network of national roads in a safe, cost-effective and sustainable manner. It specifies standards and guidelines in relation to construction and maintenance of roads.

NRA and Local Authority compliance

NRA has produced Environmental Assessment Guidelines (originally produced in 2008, updated in 2010), which outlines current best practice for management of invasive non-native plants (and noxious weeds). The guidelines provide:

- An introduction to non-native invasive plants and noxious weeds;
- An overview of legislation (to 2010, and doesn't include 2011 Birds and Natural Habitats regulations);
- An assessment of risks at EIA phase (assess presence and abundance, control measures, consider infestations outside the road footprint);
- Guidelines for control during site clearance and construction;
- Guidelines for control during maintenance; and

- Advice on identification, ecology and control of invasive non-native species and noxious weeds.

Management of IAS during road construction

The NRA Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads lists 9 invasive plants and 5 noxious weeds. (http://www.nra.ie/Publications/DownloadableDocumentation/Environment/file,16172,en.pdf)

Phases in construction of a road scheme:

1. Planning phase: constraints study – identifies the big issues in the landscape (SACs, physical structures etc.), route selection – several options, EIA – on the ground for a detailed look.
2. Pre-construction – while awaiting permission to go ahead with construction there is a requirement to update information during pre-construction surveys.
3. Construction – can take 2-3 years or longer.
4. Operation and maintenance.

Control measures during planning

During the EIA, detailed mapping along the route and beyond is carried out, and the location and extent of invasive species is plotted on a habitat map. Records are submitted to the National Biodiversity Data Centre (NBDC), and locations of IAS are flagged to the lead consultants of the project. EIAs include ecological, archaeological and geological surveys, and some surveying may risk dispersal of IAS, e.g. equipment or machinery moving throughout the landscape: this needs to be planned for.

The Environmental Impact Statement (EIS) describes the existing environment and describes what impact the road scheme will have and any mitigation measures proposed. For invasive plants, it will state the species, extent and impacts, and specify mitigation and control measures (including area of treatment, type of treatment, risk of re-infestation, requirement for the management plan – the EIS will transfer into contract documents for the road scheme by the engineering/construction company which will need all specifications to be documented. There may be multiple species requiring different management, codes of practice etc. If these issues are not dealt with during the EIS stage, they will not get into the contract or the Environmental Operating Plan.

Control measures during construction

A detailed assessment is required prior to commencement of construction (there may have been changes since the EIS was carried out), including a detailed survey determining the extent of plants, sensitivity of local environment (including seasonality – there may be seasonal restrictions concerning SACs or sensitive habitats which affect which control measures may be used), establishing how to minimise the risk of transfer of propagules, etc. The Management Plan will be established at this stage, those responsible for IAS will be identified. This can be contractually difficult, but if specified in the EIS that the contractor has responsibility then the developer is obliged to identify the responsible organisation to carry out control measures. The Management Plan will detail species, sensitivity, control plan, disposal measures and soil management. For disposal measures, see the NRA Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads http://www.nra.ie/RepositoryforPublicationsInfo/file,17730,en.pdf. Not all landfills will take IAS. The implementation schedule needs to be documented and incorporated into the Environmental Operating Plan.

Control measures need to be site-specific, and there will be need for on-going treatment and control. Where there is a risk of colonisation from a site just outside the road corridor, a temporary

Compulsory Purchase Order for the stand of invasive species can be sought to allow eradication. The use of herbicides should be minimised, especially when adjacent to water courses; consultation may be required with Inland Fisheries Ireland and/or the National Parks and Wildlife Service.

Control of Japanese Knotweed

Chemical control is currently the best option available for Japanese Knotweed. Glyphosate, a systemic herbicide, produces the best results, but timing is critical for application. From onset of flowering to dieback is the ideal time for foliar application. Stem injection is also effective but can be labour intensive and hence expensive. Acting in the early stages of an invasion is important.

Giant Rhubarb

Giant Rhubarb (*Gunnera tinctoria*) was introduced to Ireland in the 1800s as an ornamental garden plant. Genetic, climatic or environmental changes have resulted in it becoming established in the wild; it was first recorded as naturalised near Leenane and on the Corraun peninsula in Mayo by Praeger. By 2002 it was recorded in 12 vice counties.

Giant Rhubarb is prolific, producing large flower spikes (up to 7 per plant), with each spike capable of producing more than 100,000 seeds. Reproduction is mainly through seeds, although it can also spread vegetatively. It is generally found in disturbed habitats, and can be invasive in some areas, e.g. Achill. It has recently expanded its range in Ireland, which may be due to genetic adaptation to the climate.

Giant Rhubarb should be monitored, and eradicated/controlled where possible. Care should be taken with identification, as it can be confused with *Gunnera manicata*, which does not appear to be invasive.

Developing landscaping and management regimes that resist invasion by IAS

In a project carried out by Rosalyn Thompson as part of her PhD research on the SIMBIOSYS project, four IAS were selected to study invasion resistance of landscaping treatments both before and after the NRA Guidelines were produced. The species studied were Japanese Knotweed, *Rosa rugosa*, Buddleja and Winter Heliotrope. Four treatments were included in the study: bare topsoil; bare subsoil; SGSM (Standard grass seed mix, pre-guidelines, turf removed from an established community) and Natural Recolonisation (post-guidelines, turf removed from an established community). Propagules used were seeds, stems and rhizomes for Japanese Knotweed and *Rosa rugosa*, seeds and stems for Buddleja, and rhizomes for Winter Heliotrope.

For Japanese Knotweed, the only growth from seeds was on bare soil, stems did not produce much growth, but rhizomes generated shoots in all treatments. Post-guideline treatments actually produced more growth from rhizomes. *Rosa rugosa* showed seed growth only on bare soil, while stems and rhizomes generated shoots on all treatments. Most growth for Buddleja was recorded on bare topsoil and natural recolonisation treatments. Winter Heliotrope was found to produce leaves in all treatments.

Disturbance was found to be a major factor in allowing establishment of IAS; seeds and stems only grew on disturbed sites. No difference was found between the pre- and post-guideline treatments, indicating that the post-guideline communities, with higher numbers of native species, do not confer a greater invasion resistance. Ability to invade vegetated habitats (as opposed to disturbed) depends on plant species.

Note: Japanese Knotweed propagation via seeds is not considered problematic in Ireland, even though growth from seeds was found in this study. The following comments can be made in relation to this issue:

1. Seeds have been found to germinate in the plant's invasive range (in US study*), but they were out-shaded by the parent plant, and so did not develop.
2. The issue of seeds may have been overlooked as the clonal problem is so overwhelming.
3. That while concern has focussed on Japanese Knotweed var. japonica (and the fact it does not produce true seed), it is hybridization with related plants which could be problematic.

*Forman & Kesselli (2003) Sexual reproduction in the invasive species *Fallopia japonica*. American Journal of Botany 90(4).

IAS – city and council of Swansea perspective

Sean Hathaway of Swansea Council, Wales, gave an overview of the control measures employed in Swansea. Japanese Knotweed control began in 1991, with an urban survey in 1992 showing 48 hectares containing Japanese Knotweed. This area increased to ca. 63 hectares in 1998. Infected sites become less attractive to developers, as planning conditions for eradication/control of knotweed are added to planning approvals where it is found. Each month, approximately 6 planning applications are received with knotweed issues, and other IAS can also be problematic.

Treatment and control are limited by funding. Sites of conservation value, highways, areas where there have been complaints or safety/aesthetic concerns are more likely to get funding for control. Funding can come internally from the Highways Department, Housing Department etc., or externally from regional and national bodies.

Control is primarily through application of herbicides, with chemical stem injection proving particularly effective for Japanese Knotweed. A biological control initiative lead by CABI (Centre for Agricultural Bioscience International) in conjunction with stakeholders is underway in the UK. A sap-sucking psyllid (*Aphalara itadori*) has been released in 2011, 2012 and 2013, with the aim of control, not eradication.

There is a need to raise awareness of the threat of IAS, and to develop and maintain biosecurity protocols to prevent the spread of propagules. Climate change may increase the risk of spread, as some IAS may be able to grow throughout the year.

Notes from the Plenary Discussion:

While there were manuals for landscaping and weed control on National roads, it was felt that non-national (minor) roads needed attention and that auditing for IAS management of low cost safety measures would be necessary for legal reasons, since such works afforded opportunities for IAS dispersal and establishment. Currently there seems to be little pressure on local authorities to deal with IAS but this may be linked to a lack of knowledge of methods to manage invasions. Such potential problems could be addressed as a planning and development matter as well as legislation under SI 477 of 2011 of the 2011 Birds and Habitats Directive. Local authorities also have guidelines (e.g. for housing) and a similar framework could be used for management of IAS. As far as the management of soil was concerned it was suggested the British Standard be inserted into specifications for IAS management or roads. All protocols need to be audited, especially when IAS management takes place near SACs or the Water Framework Directive needs to be considered.

Increasing public participation was felt to be worthwhile as a way of increasing pressure and support for the removal of IAS. Working with the Tidy Towns initiative on the removal of IAS was valuable as a way of controlling such species and raising public awareness of the problems that they cause. It was considered useful if a government website featured images of the most serious IAS. Images and information can be found on the Invasive Species Ireland website (http://www.noticenature.ie/files/Invasive%20Species.pdf) and the National Biodiversity Data Centre website (http://invasives.biodiversityireland.ie/). Records of IAS can be submitted to both.

Forestry activities were highlighted as potential sources of invasion due to the perturbation regimes that are part of this industry. There was also some discussion on the problems of IAS on private land and the experience seemed to indicate that while some landowners react well to advice, others only react to demonstrated legal enforcement.

In conclusion the difficulty of implementing a genetic and phytosanitary barrier to importation of plant material was discussed. While the impossibility of installing this barrier is attributed to the need to permit free trade across the EU, there was some evidence presented that this isn't always the case and that such barriers are even permitted at regional levels within the one country.