

# NRA Conference 2013

## Threat of non-native invasive plants on National road schemes



**Pádraig Whelan,  
Environmental Research Institute and  
School of Biological, Earth and Environmental Sciences,  
University College Cork**

# What's it all about?



“Japanese knotweed...During the building of the Olympic Park in East London it cost an estimated £70million to remove the plant and dispose...”

Source: <http://www.dailymail.co.uk/sciencetech/article-2439754/1-7bn-spent-stop-foreign-invaders-killing-native-British-wildlife.html>

# Context

- Pressures to respond to invasive alien species – legislative, economic, conservation
- The field of invasive biology/management is reasonably recent and very active
- Some of the material that was introduced and planted was not known to be invasive
- We don't know all the answers

# Outline

- Origins and distribution
- NRA (2006) Guide to Landscape Treatments on Irish Roads
- Which ones are of concern?
- Biology/ecology of non-native invasive plants
- Effects of non-native invasive plants
- Road infrastructure as promoter of dispersion
- Control

# Origins

- Outside of their native ranges – human mediated (accidental or deliberate)
- Cause serious negative effects to species, habitats, economies, infrastructure, human health – e.g. Japanese knotweed (£1.5 billion to eradicate from the UK\*)
- Examples
  - *Rhododendron ponticum* (“Rhododendron”)
  - Japanese knotweed (and hybrids)
  - Himalayan balsam

\* <http://learninglegacy.independent.gov.uk/documents/pdfs/design-and-engineering-innovation/13-japanese-knotweed-dei.pdf>

# “Rhododendron” - gardening



# Japanese knotweed - gardening



# Himalayan balsam- gardening



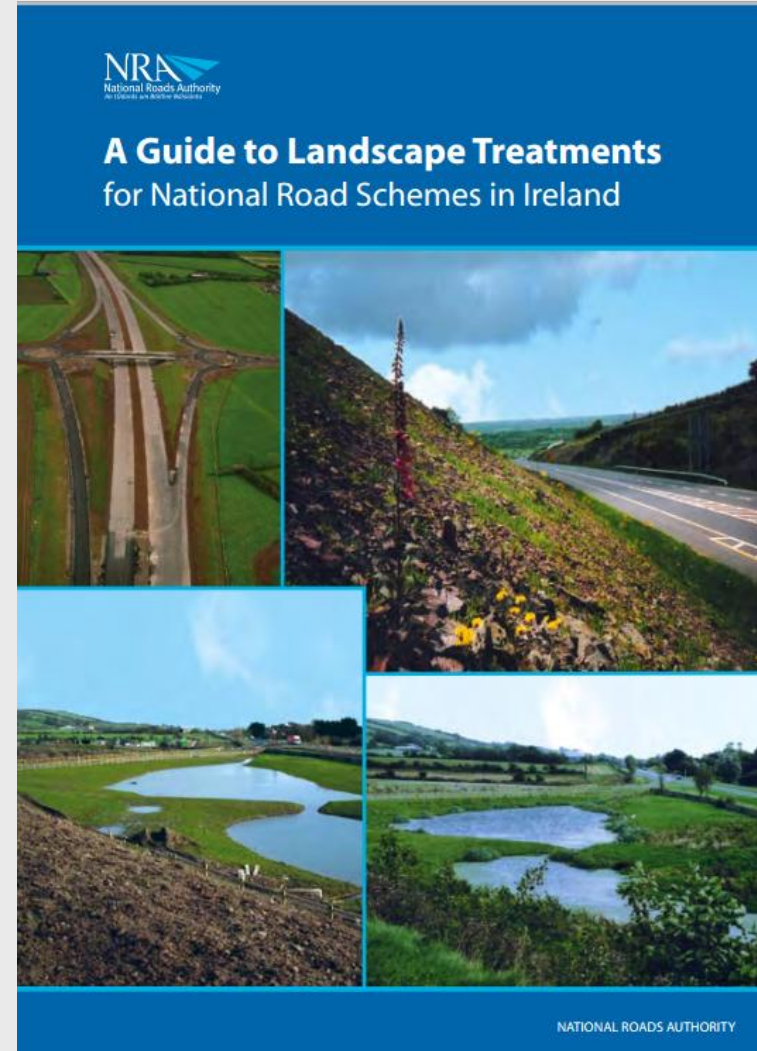


# Road landscaping = gardening???



# NRA (2006) Change in landscaping practices (less gardening)

- Horticultural to ecological landscape design approach
- Reducing inputs – mowing fertilisers, pesticides
- Native species of native provenance
- Use of subsoil – if possible
- Natural recolonisation
- Help to reduce alien establishment
- Legacy of existing road landscaping treatments



# Natural recolonisation

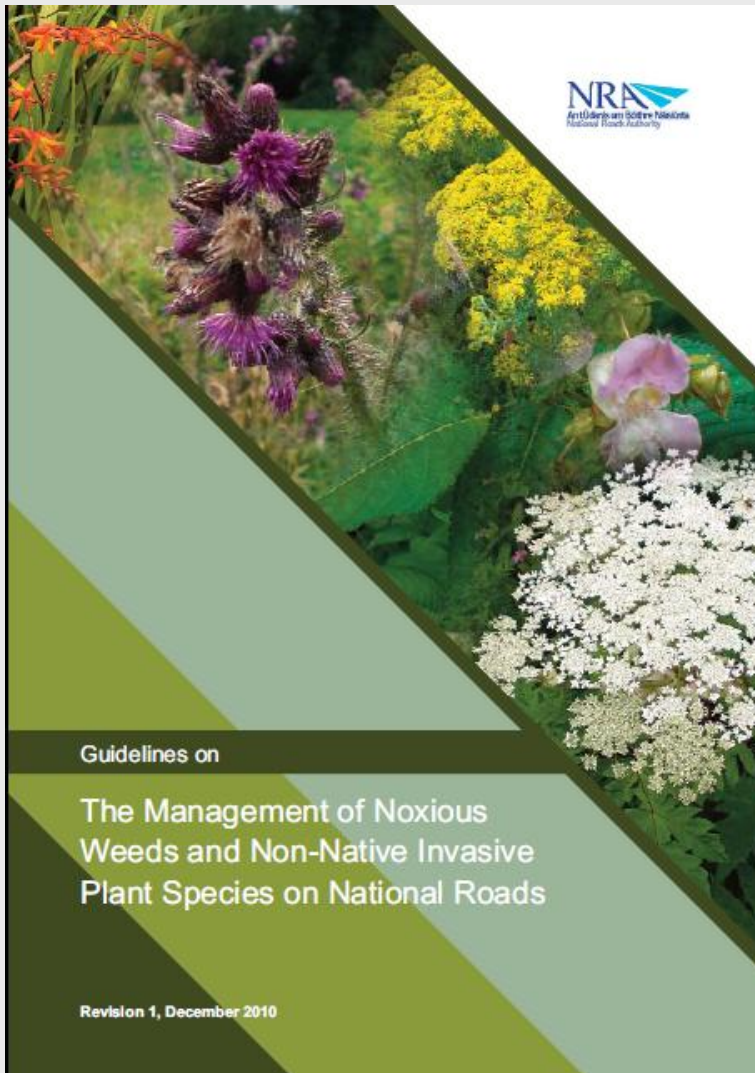


# Hay strewing (locally sourced)



# Further management of invasive alien plants on roads (more later)

- 2011 European Communities (Birds and Habitat Regulations) – S.I. 477



# Which ones are of most concern on roads?

- Field Guide to Invasive Species Ireland (2<sup>nd</sup> Ed): Himalayan Balsam, Japanese Knotweed, Giant Hogweed, Giant Rhubarb, Hottentot Fig (+7 FW aquatics and 1 marine)
- NRA (2010): Himalayan Balsam, Japanese Knotweed, Giant Hogweed, Giant Rhubarb, Rhododendron, Buddleja, Montbretia, Winter Heliotrope, Traveller's Joy
- S.I. 477 of 2011: Himalayan Balsam, Japanese Knotweed, Giant Hogweed, Giant Rhubarb, Hottentot Fig, Rhododendron, plus 9 others (not mentioned by the previous two works (+ 13FW aquatics and several marine species))

# Specified non-native invasive plants



Buddleja



Buddleja seed head

# Specified non-native invasive plants



Winter heliotrope



Traveller's joy



# Generalities Biology/Ecology

- Concept of propagules
- Prolific reproduction
- Vegetative (clonal) reproduction – resource use
- Fragmentation
- Rapid growth
- Often more vigorous than in native ranges – predator release
- Age at first seed set
- Time lag
- Seed longevity
- Seed bank formed
- Stem partitioning
- Perturbation regimes
- Vacant niches
- Nitrogen fixers (some cases)
- Dispersal mechanisms

# Effects

- McDonaldisation
- Burney “Biological invasion is really a bigger impact than a lot of horrible things that we hear about all the time, like global warming. Many of the impacts of global warming could be reversed in time, but once you homogenise the biodiversity of the world, there’s really no turning back from that”.
- Outcompete native vegetation (incl. shading effects)
- Attract pollinators away from native species
- Do not provide an alternative food source
- Do not provide habitat for other fungi, plants and animals
- Change in soil conditions and soil communities
- Erosion – siltation
- Damage to infrastructure
- Effects greatest on islands: Hawaii, New Zealand, Ireland(?)

# Himalayan Balsam attracts Bumble Bee



# Roads promote establishment and dispersion

- Road construction – perturbation on a landscape scale!!
- Road maintenance – local perturbation – Three-cornered leek, *Montbretia*, run-off carrying propagules (of flailed/strimmed alien plants)
- Road materials depots - sources of invasive aliens
- Attenuation ponds - establishment and dispersion of aquatic invasive aliens
- Slipstream effect – Traveller's joy, *Buddleja*
- Dumping of garden waste – establishment
- Roadside invasive plants as sources of further natural dispersion by animals, wind, water

# Dispersal through maintenance



Montbretia

Montebretia corms



# Road materials depots as sources of non-native invasive plants



# Road materials depots as sources of non-native invasive plants



Japanese knotweed adjacent to road material (BAD)



Segregation of material from potential sources of invasive alien plants (GOOD)

# Road materials depots as sources of non-native invasive plants



Giant Rhubarb –  
Dispersed in  
coastal areas of  
Achill/Connemara.  
Photo courtesy V.  
O'Malley (NRA)



# Road materials depots as sources of non-native invasive plants

Giant  
Rhubarb.  
Further  
spread along  
roads  
immediately  
adjacent to  
the coast?  
Picture taken  
in Bantry





**Ponds as centres of  
multiplication and dispersion for  
non-native invasive plants**

# Control

- No “magic bullet”
- Manage vegetation to promote resistance
- Early identification and early treatment reduce costs
- Accurate costing based on distribution, density, treatment
- Work with the biology/ecology of the species: let density effects do some of the work; knowing the age/timing of seed set can buy time; work down the catchment; treat outliers first
- Consolidate any gains by follow-up checks and control
- Use techniques that minimise herbicide use – saves money and protects non target species
- Physical removal creates soil disturbance – use with care to avoid perturbation which promotes alien plants and can cause erosion of soil
- Stem partitioning can be a problem in woody species
- Dispose of correctly – don’t turn disposal into dispersal

# It's not easy

- Roads construction and maintenance inherently involve perturbation
- Road construction and maintenance involves moving materials that can transport invasive alien plants
- Avoid the magic bullet concept
- Keep the biology and ecology of the native and alien plants in mind
- A single propagule can start an invasion
- Control is easier and cheaper at the early stages of establishment
- Consolidate your gains – don't skimp on follow up checks and treatment