Prioritising species – not just about risk

Olaf Booy

GB Non-native Species Secretariat

Department for Environment Food & Rural Affairs

The Scottish Government

Llywodraeth Cymru
Welsh Government

Animal & Plant Health Agency

The conundrum

The conundrum

The conundrum

Department for Environment Food & Rural Affairs

The Scottish Government

Llywodraeth Cymru Welsh Government

NNSS

GB non-native species secretariat

The conundrum

EDRR

Prevention

£

Control

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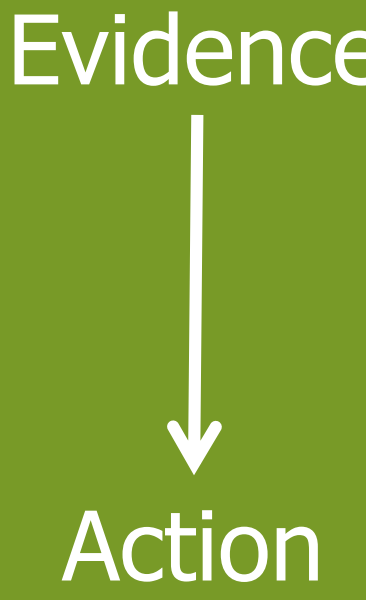
What do decision makers need

- Documented evidence
- Transparency
- Methods for managing uncertainty

What do decision makers need

- Documented evidence
- Transparency
- Methods for managing uncertainty



GB example

- 90+ risk assessments signed off
- Top 30 new threats identified by horizon scanning

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But … just having a list of threats is of limited use to decision makers

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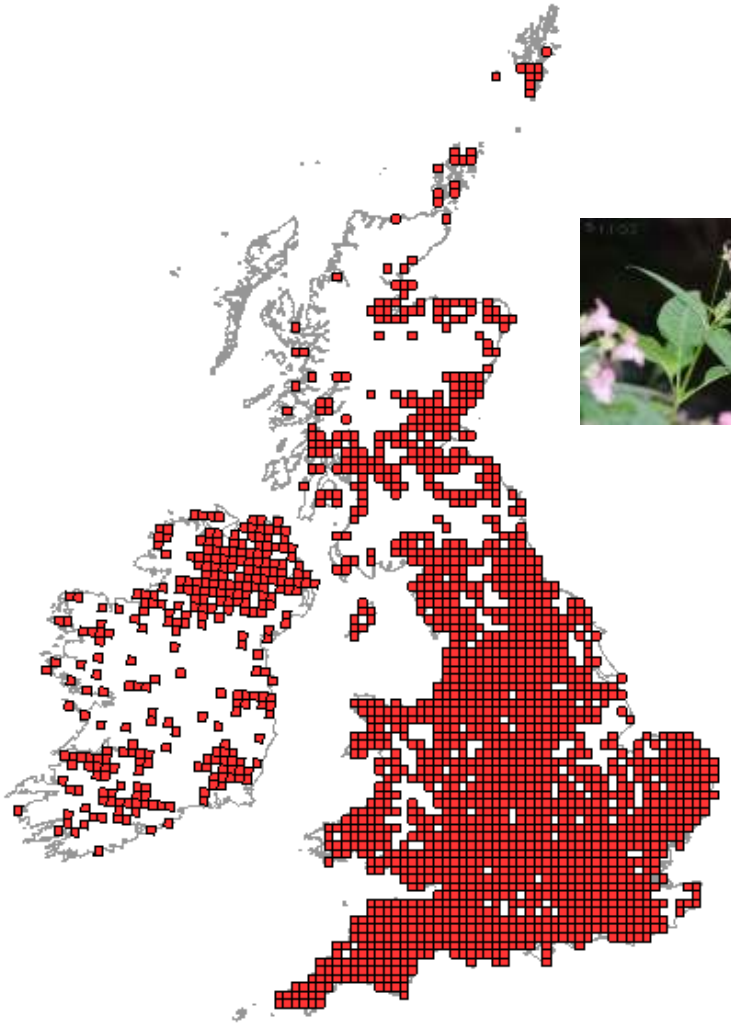
Established species

HIGH RISK



HIGH RISK

Horizon species

HIGH RISK

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Horizon species

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Horizon species

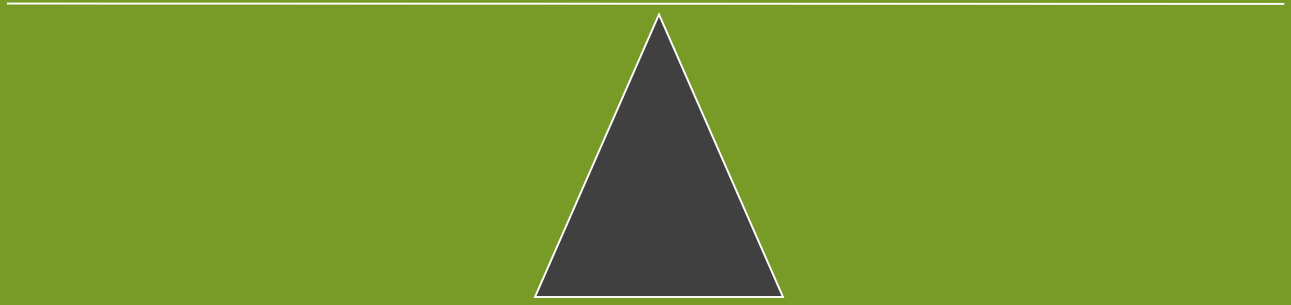
HIGH RISK

HIGH RISK

Risk management

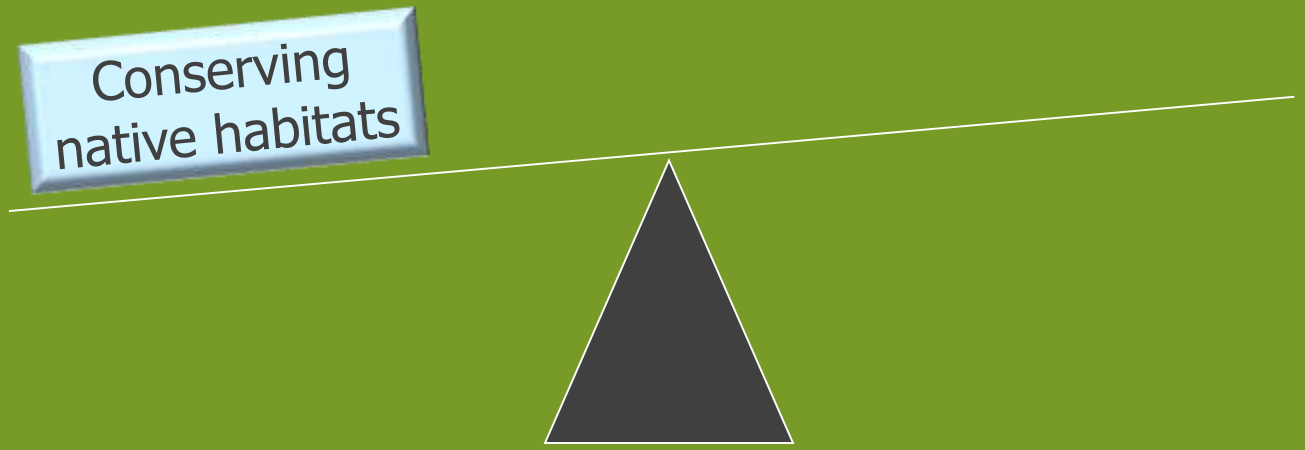
Risk management = benefits / costs

Risk management



Benefits **Costs**

Risk management



Risk management

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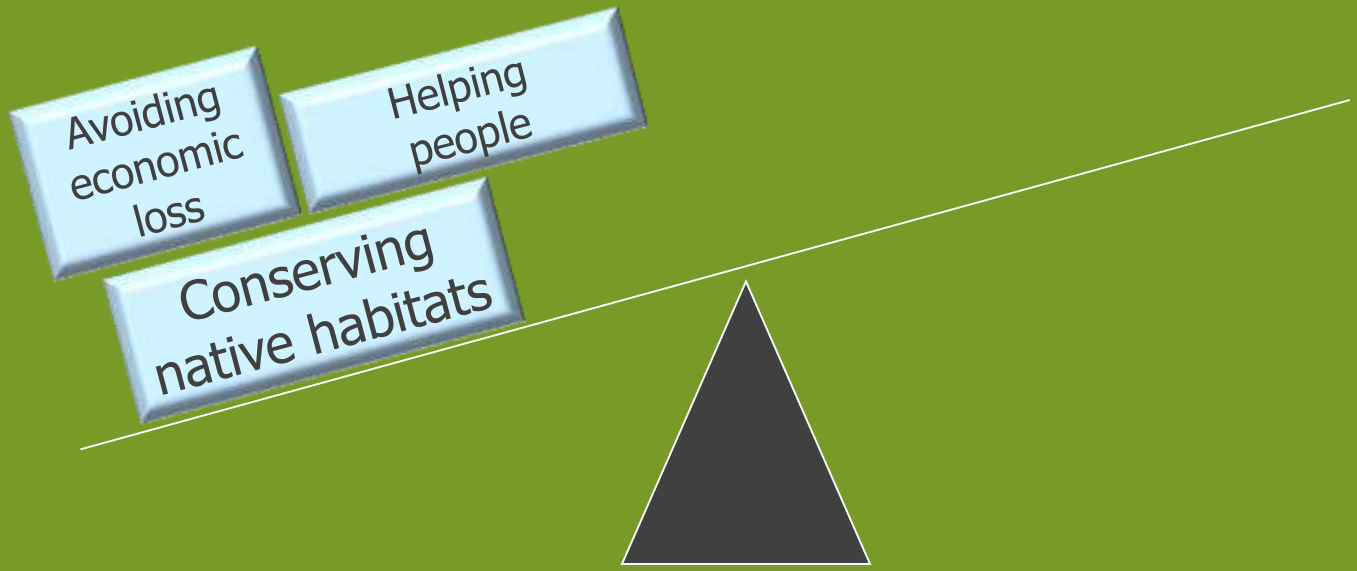

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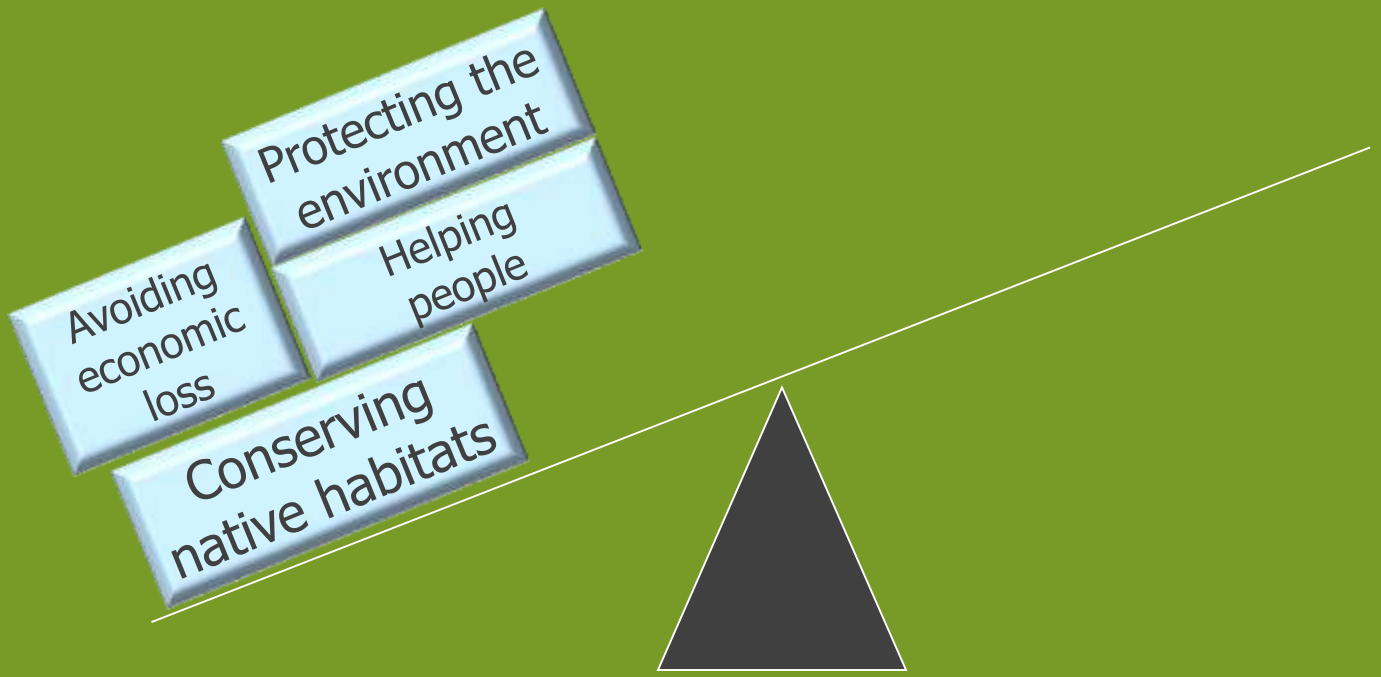
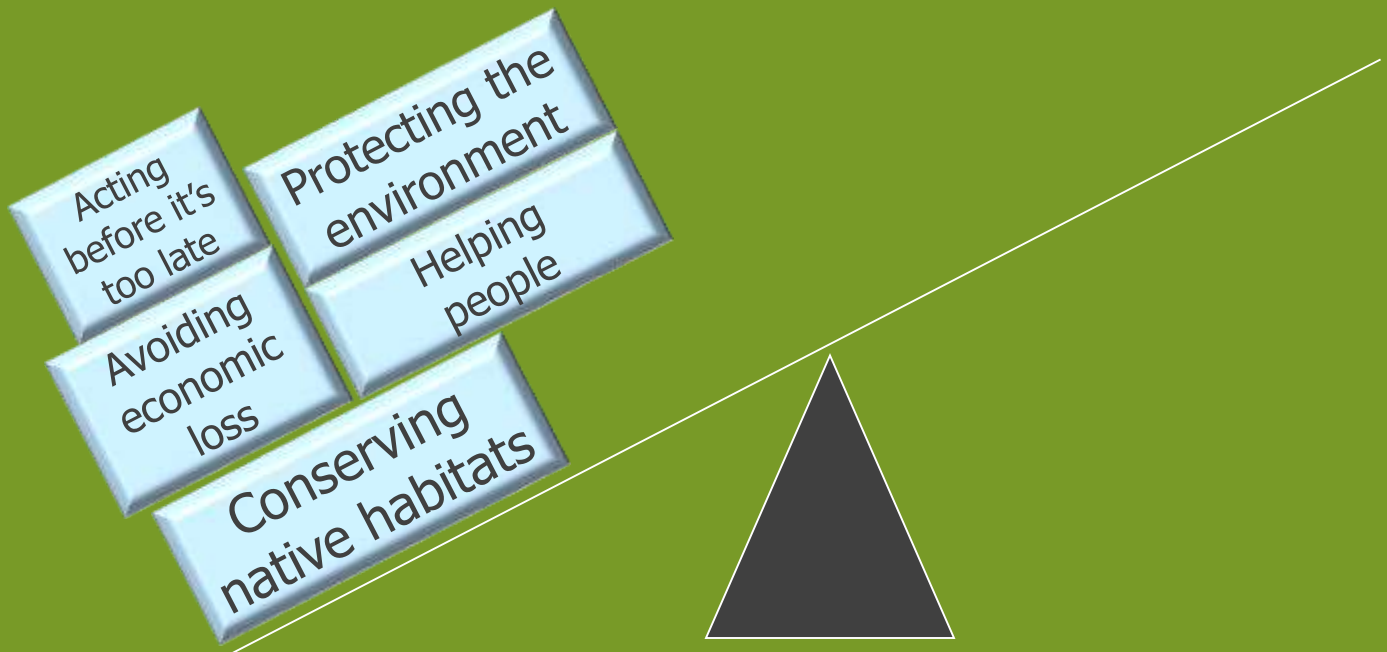


Risk management



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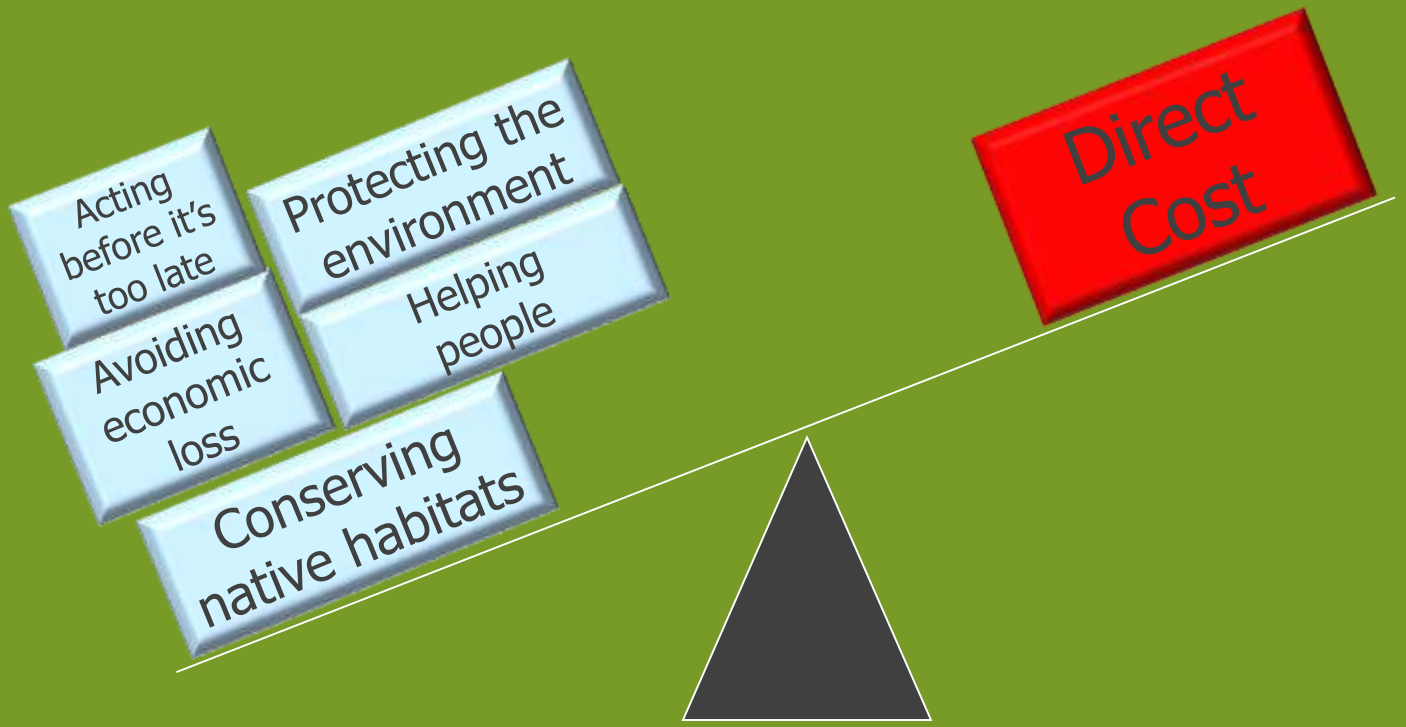

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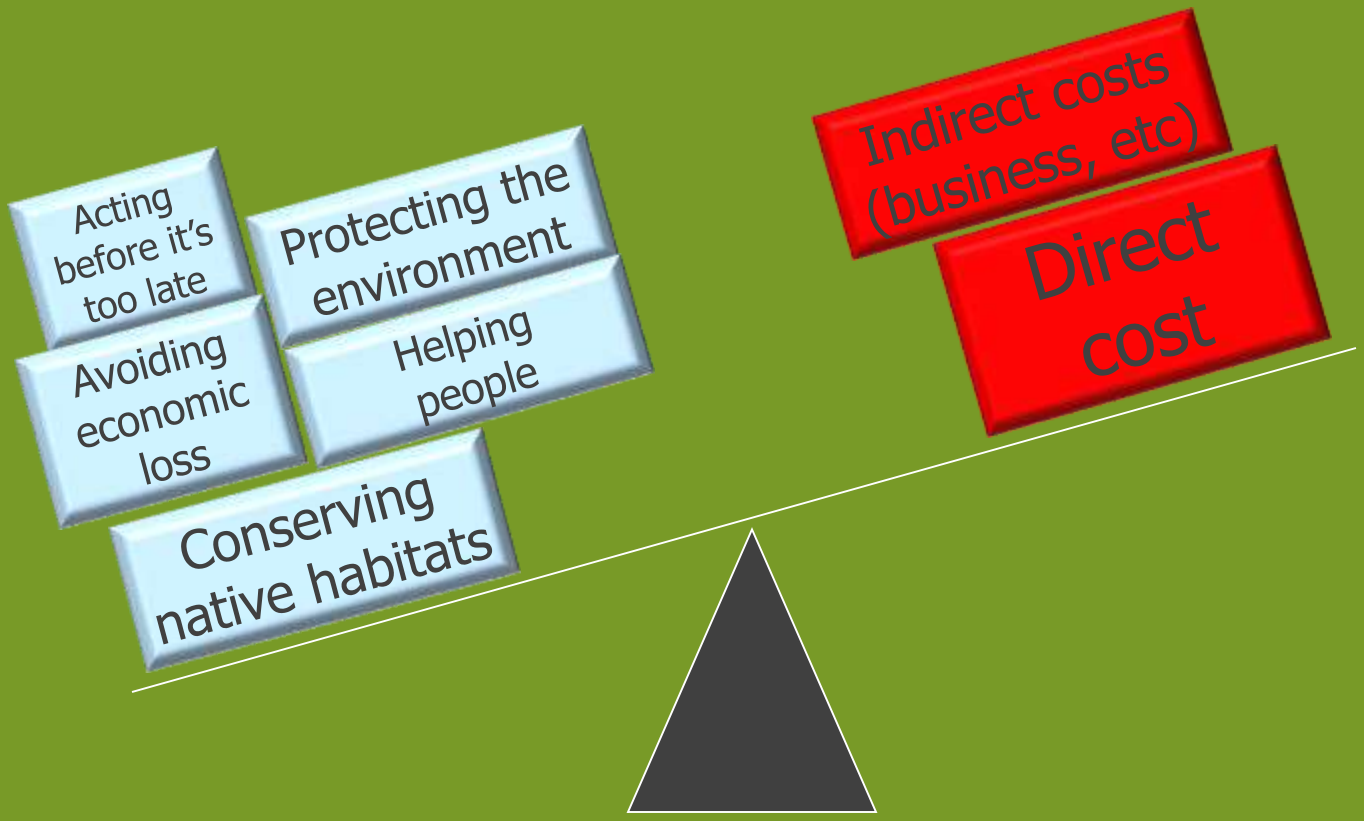

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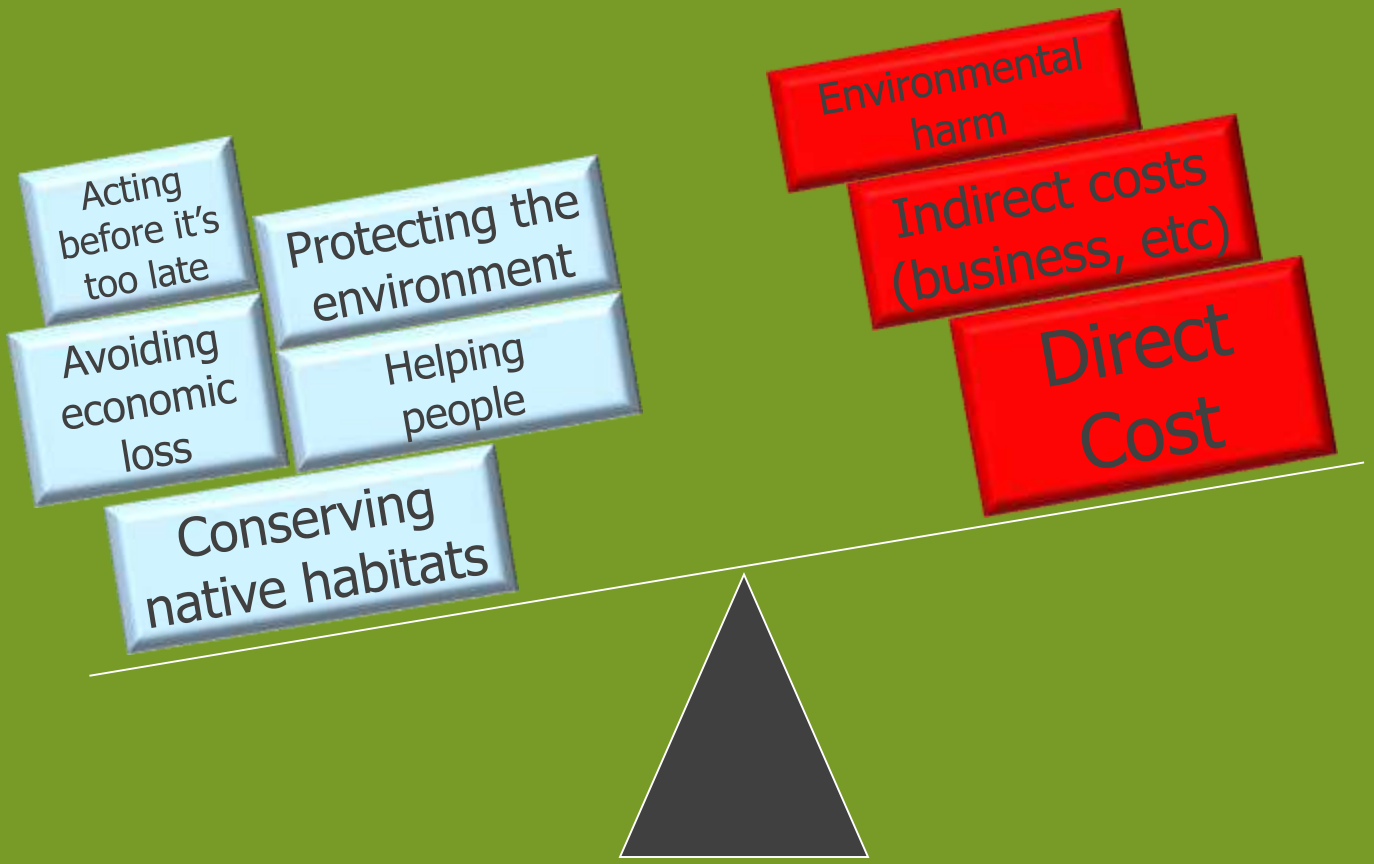

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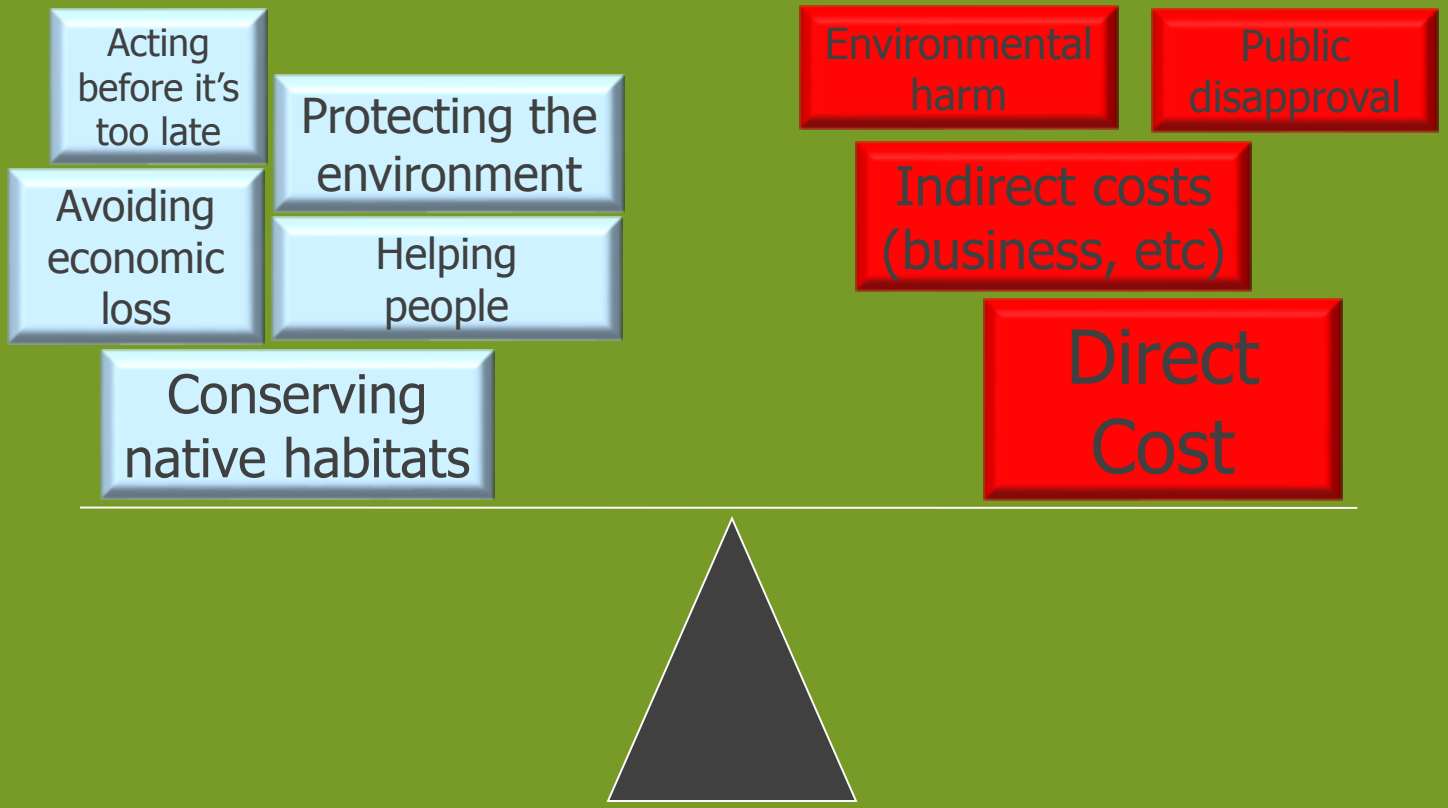


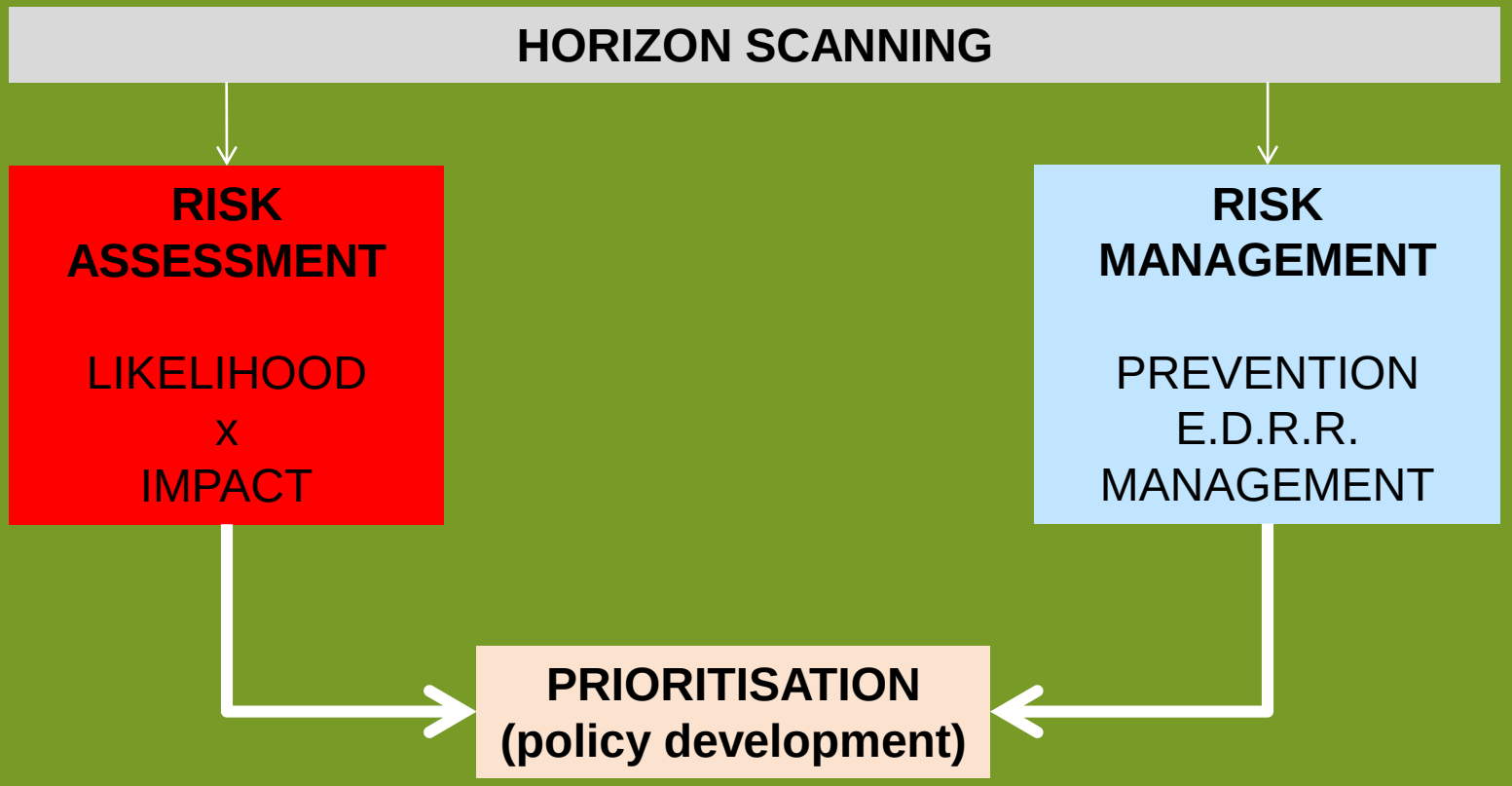
Framework for prioritising action

HORIZON SCANNING

Framework for prioritising action

Framework for prioritising action

Framework for prioritising action



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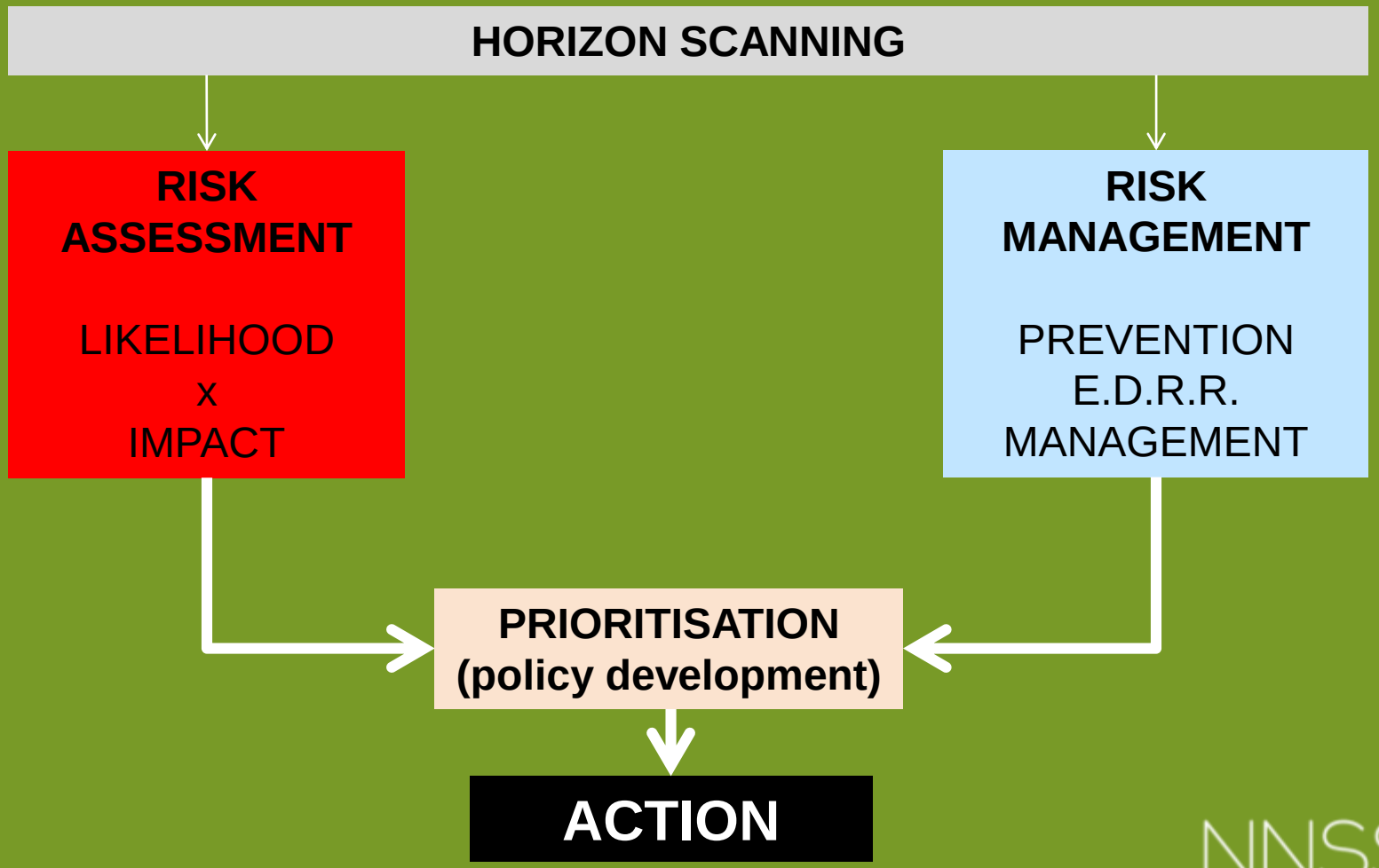

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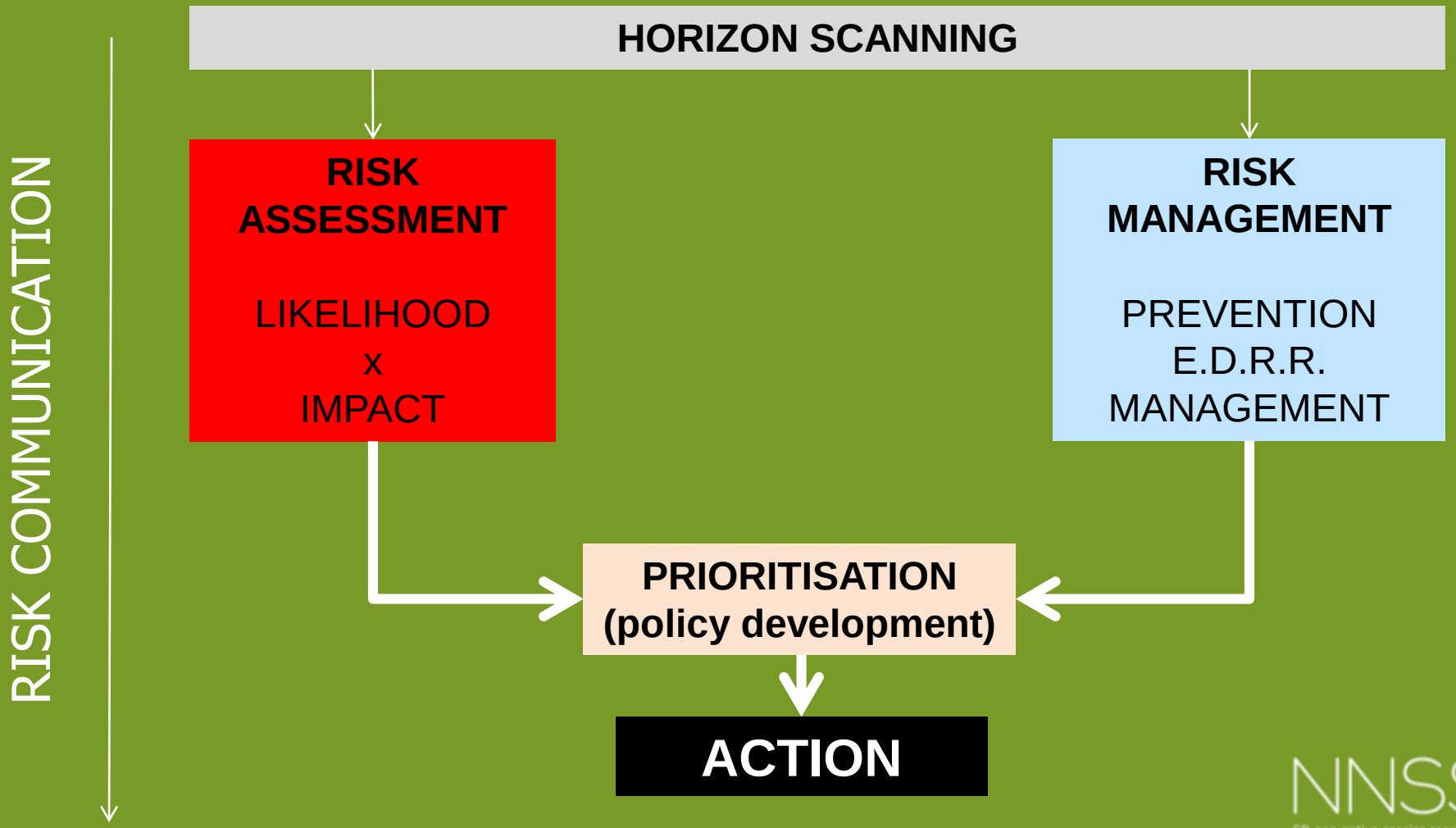

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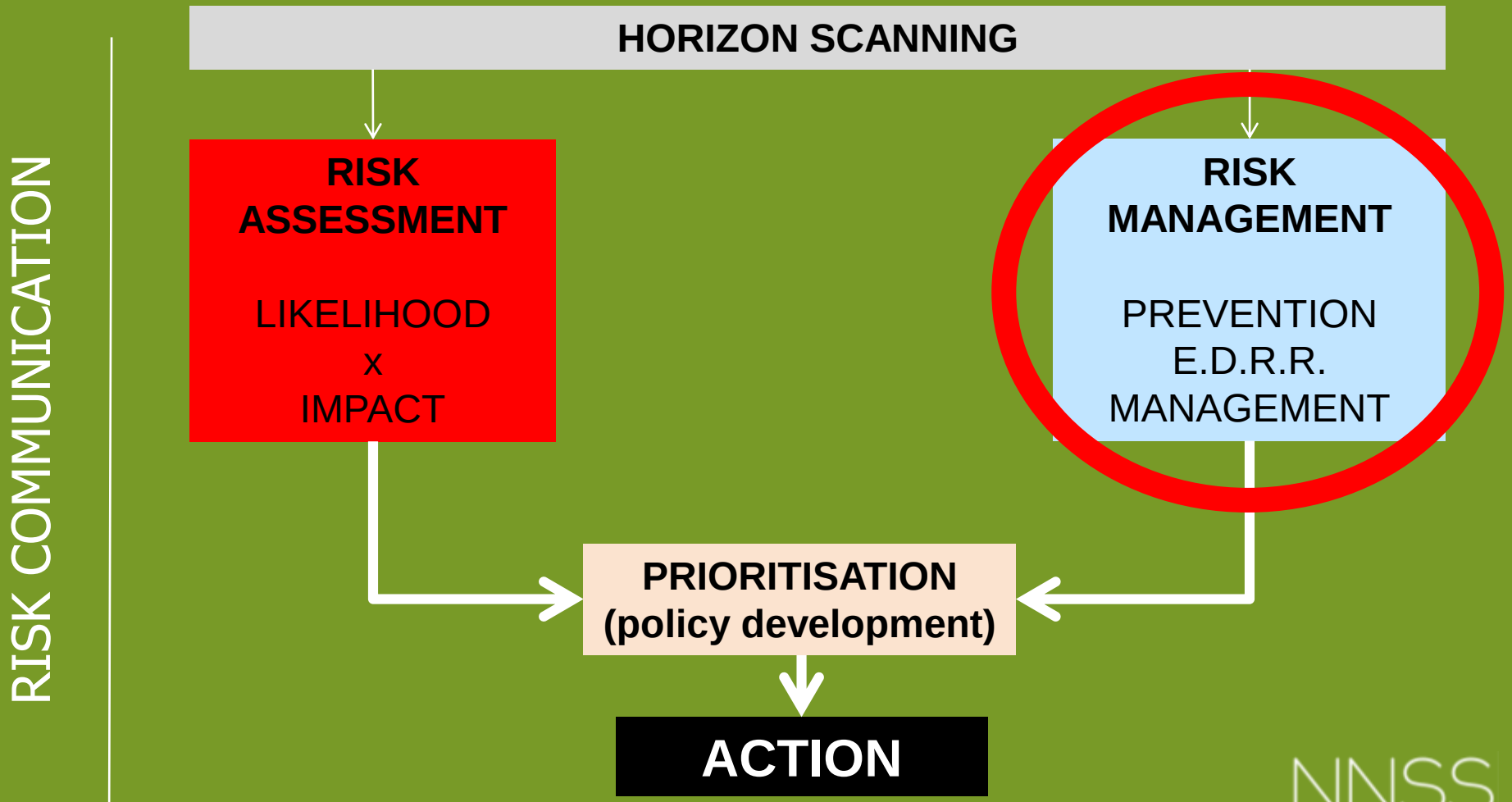

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Developing a risk management scheme

NNSS
GB non-native species secretariat

Developing a risk management scheme

- Determining a management objective

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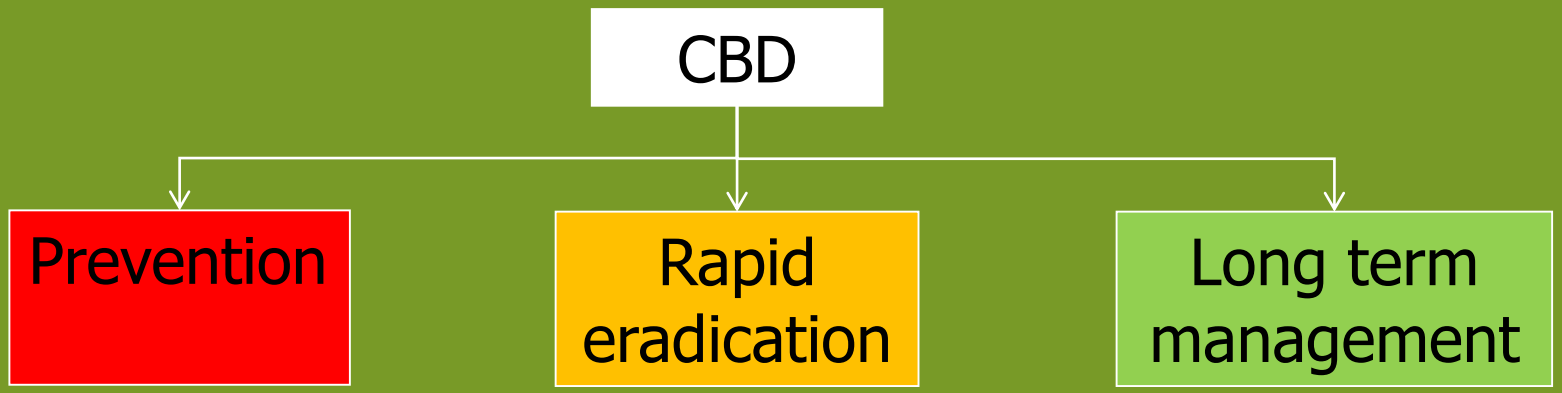

Developing a risk management scheme

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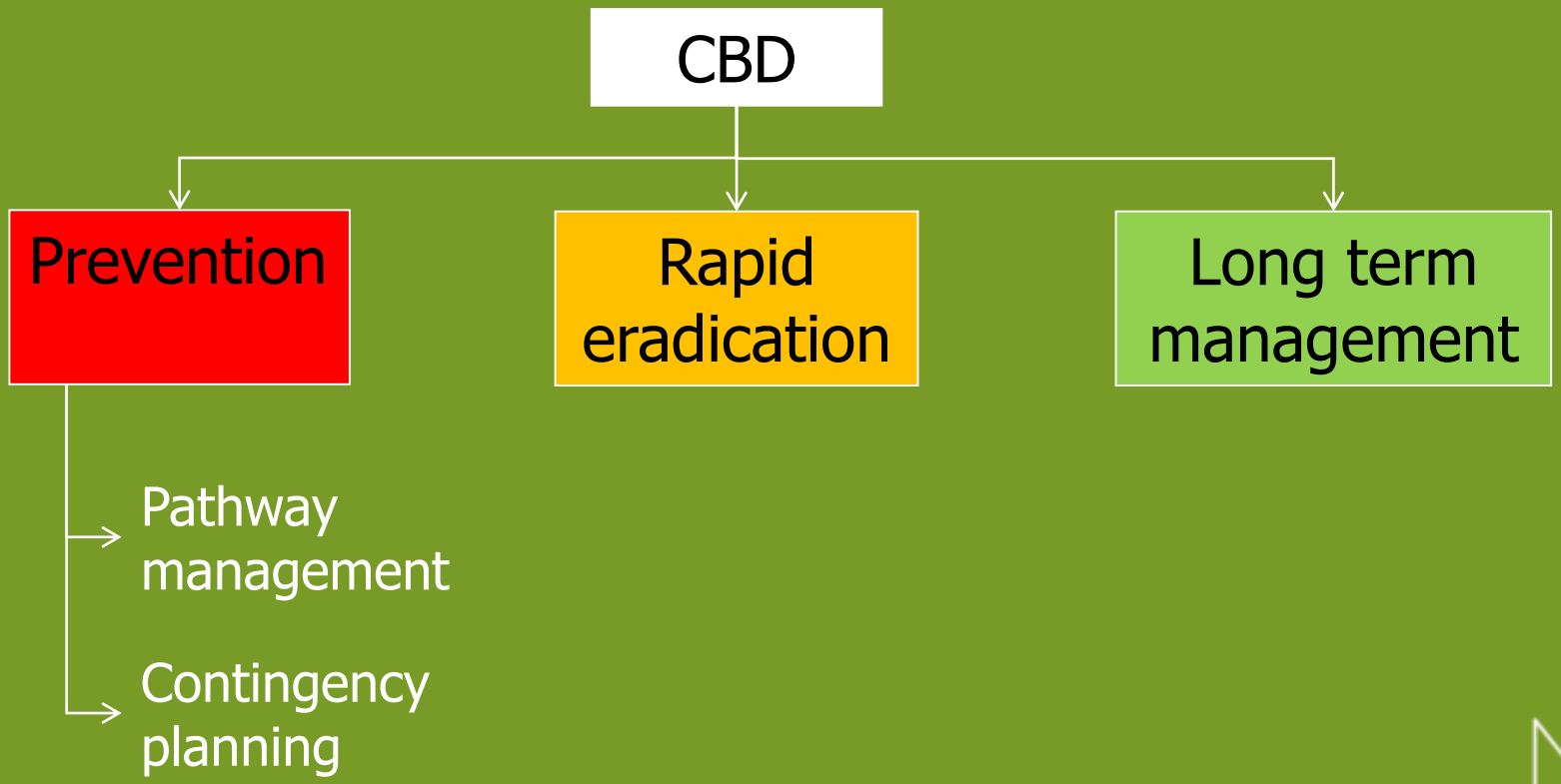

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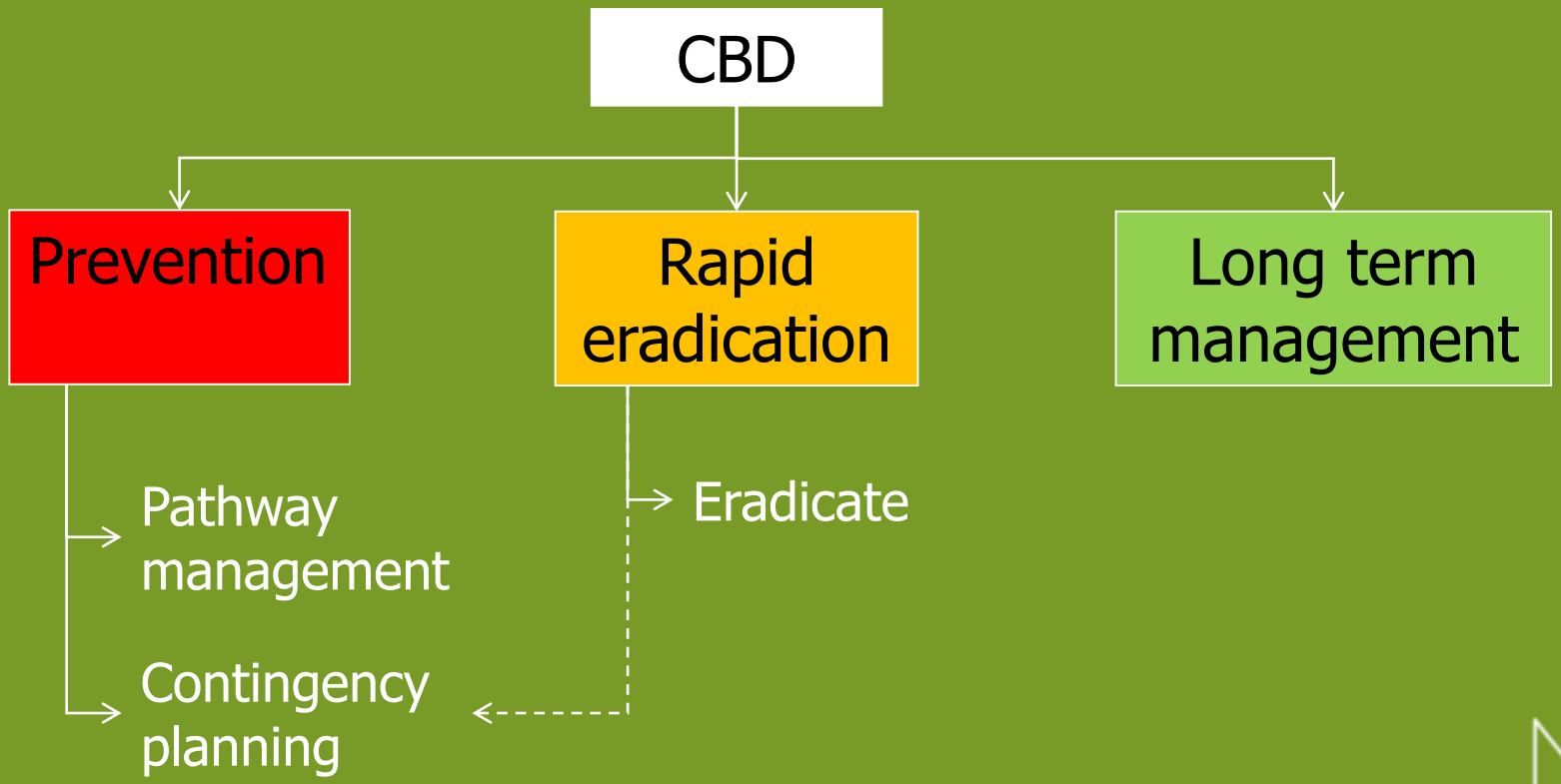

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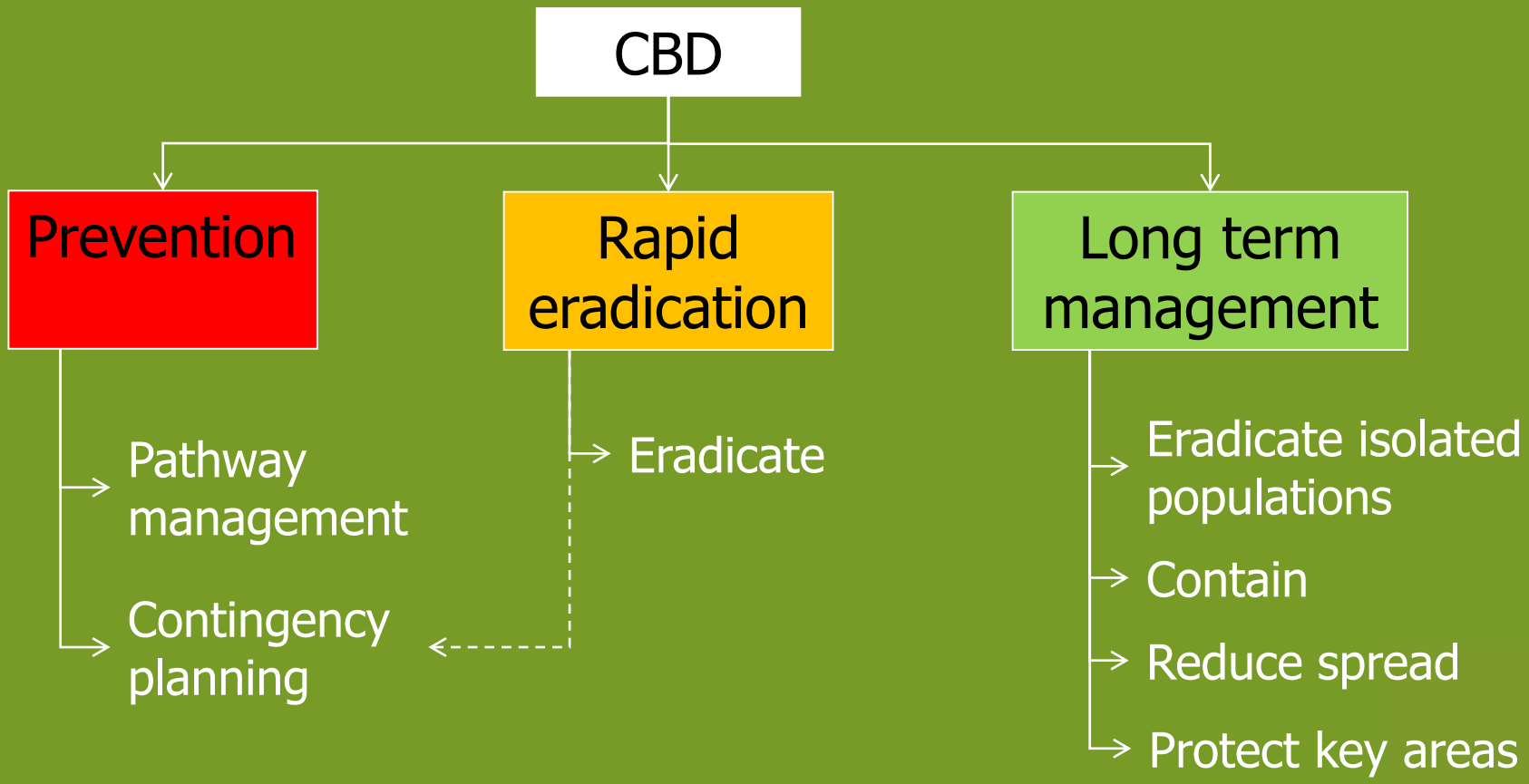

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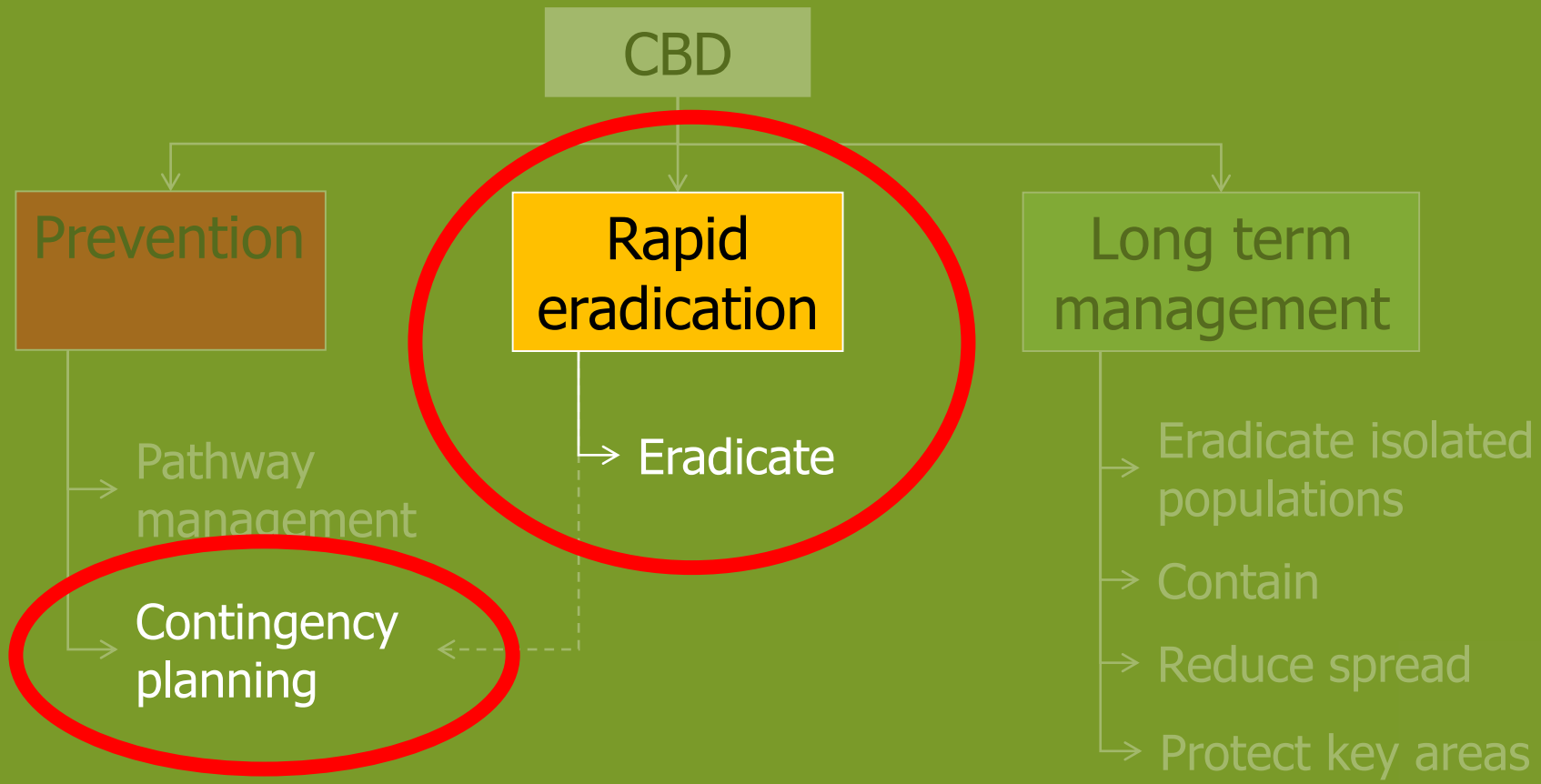

The RM scheme

Annex 1. Template for assessing risk management (eradication) scores

Assessor name(s):

Species name:

Title	Response	Confidence	Comment
1. Define the scenario	*Input scenario here*		
2. Define the eradication strategy	*Input eradication strategy here*		
3a. How effective is the strategy?	5 - V EFFECTIVE 4 – EFFECTIVE 3 – MODERATE 2 – INEFFECTIVE 1 - V INEFFECTIVE	3 – HIGH 2 – MED 1 – LOW	
3b. How practical is the strategy?	5 - V PRACTICAL 4 – PRACTICAL 3 – MODERATE 2 – IMPRACTICAL 1 – V IMPRACTICAL	3 – HIGH 2 – MED 1 – LOW	

Stages within the scheme

1. **Scenario**
   - most likely situation at point of detection in the wild

2. **Eradication strategy**
   - the best strategy for total eradication (entire strategy)

Annex 1. Template for assessing r

Assessor name(s):

Species name:

Title
1. Define the scenario
2. Define the eradication strategy
3a. How effective is the strategy?
3b. How practical is the strategy?
3c. How expensive is the strategy?
3d. How much negative impact would the strategy have?
3e. How acceptable is the strategy?
4. What is the window of opportunity for implementing the strategy?
5. What is the likelihood of reintroduction?
6. Conclusion

Stages within the scheme

3a. Effectiveness
- would it work if you could do it?

3b. Practicality
- can you do it?

3c. Cost
- how much would it cost

3d. Impact
- negative consequences

3e. Acceptability
- would the public / key sectors oppose

Annex 1. Template for assessing r

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Stages within the scheme

4. **Window of opportunity**
   - how quickly do you need to act

5. **Likelihood of reintroduction**
   - following eradication

Annex 1. Template for assessing r

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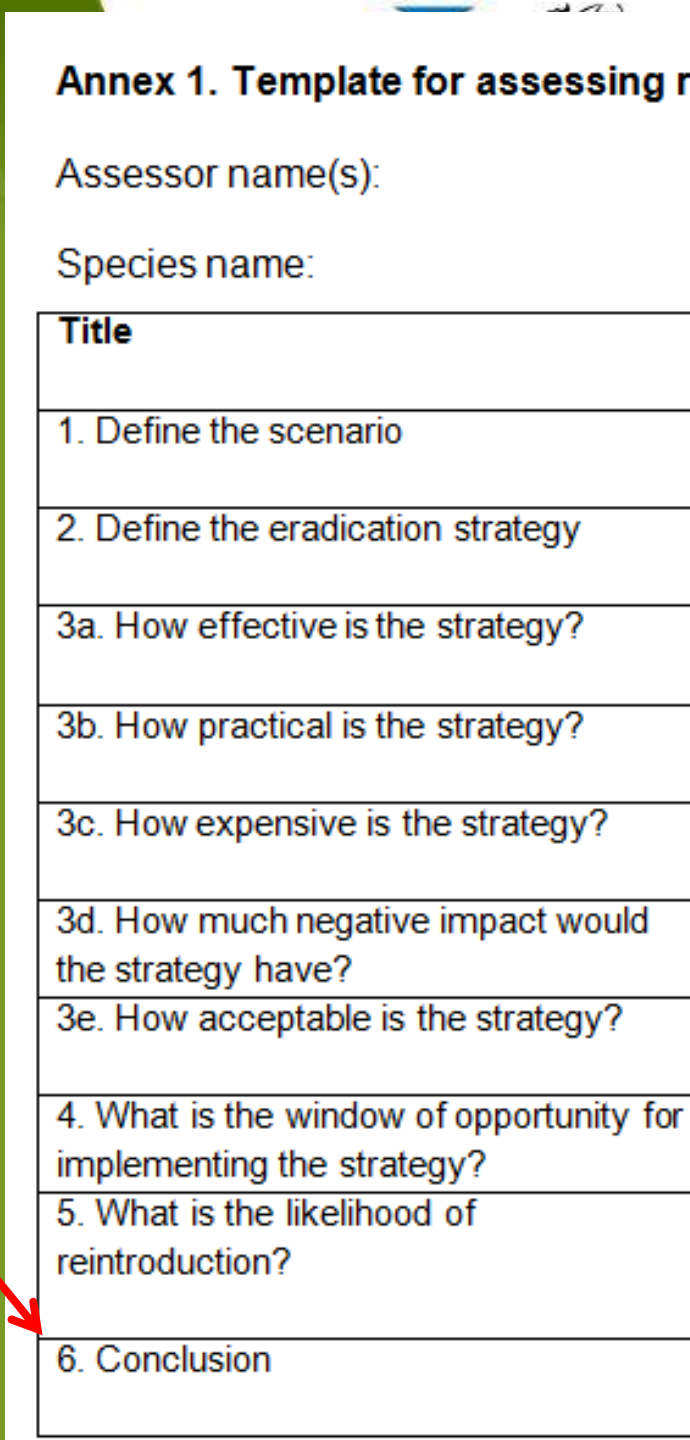
Stages within the scheme

6. Overall conclusion (feasibility of eradication)

- taking all issues into account, how feasible is complete eradication?



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6. Conclusion

Applying the scheme in GB

Horizon Species (n=25) (Roy *et al* 2014)

Species with restricted distributions (n=16)


Consensus workshop

Results

Species	Effectiveness	Practicality	Cost	Impact	Acceptability	Opportunity	Reintroduction	Overall
Mnemiopsis leidyi	1	1	1	1	1	1	1	1
Dreissena bugensis	2	1	1	1	1	2	1	1
Echinogammarus ischnus	2	1	3	1	1	2	2	1
Echinogammarus trichiatus	2	1	3	1	1	2	2	1
Gracilaria vermiculophylla	1	1	3	4	3	3	1	1
Myriophyllum heterophyllum	1	2	3	3	3	3	2	1
Hemigrapsus sanguineus	1	2	2	4	4	3	2	1
Hemigrapsus takanoi	1	2	2	4	4	3	2	1
Celtodoryx ciocalyptoides	2	1	3	5	4	4	3	1
Procambarus clarkii	2	2	2	2	1	3	2	2
Orconectes virilis	2	2	2	2	1	4	3	2
Proterorhinus marmoratus	2	2	2	2	3	2	2	2
Neogobius melanostomus	2	2	2	2	3	2	2	2
Lysichiton americanus	4	2	1	3	2	1	1	2
Sagittaria latifolia	3	3	2	2	2	3	3	2
Corbicula fluminalis	2	2	2	3	3	2	1	2
Homarus americanus	2	3	2	5	4	4	3	2
Rapana venosa	2	3	3	5	4	3	2	2
Linepithema humile	3	3	5	4	3	3	2	2
Egeria densa	3	2	1	2	3	5	3	3

Example (established species):

Quagga Mussel

Effectiveness	low
Practicality	v. low
Cost	v. high
Impact	v. high
Acceptability	v. low
Window of opp.	high
Likelihood of reintro.	v. high
Overall feasibility of eradication	v. low

Example (established species):

Aesculapian Snake

Effectiveness	v high
Practicality	v high
Cost	low
Impact	v low
Acceptability	mod
Window of opp.	long
Likelihood of Reintro.	low
Overall feasibility of eradication	v high

Example (horizon species):

Raccoon

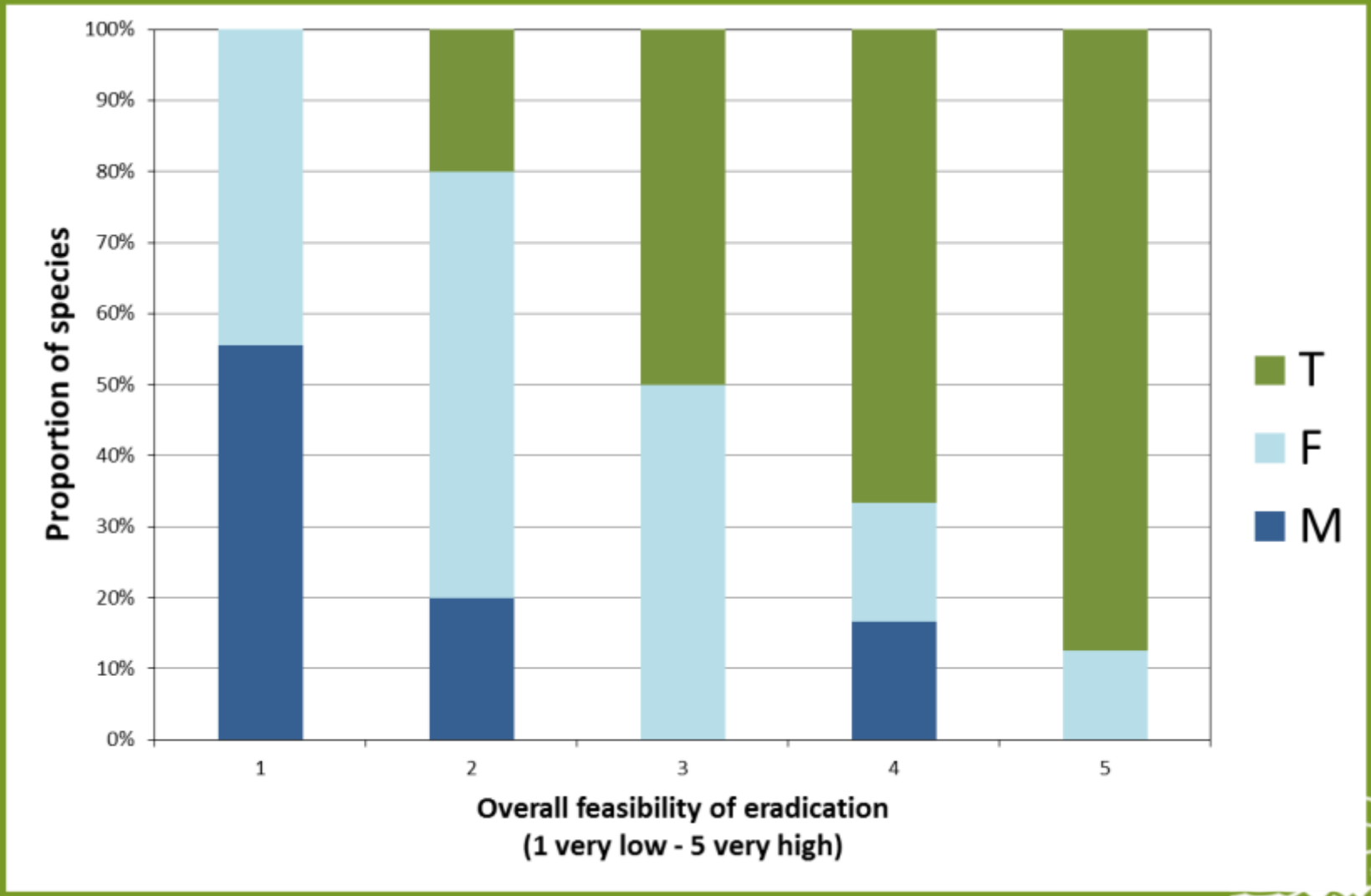
Effectiveness	v high
Practicality	v high
Cost	v low
Impact	v low
Acceptability	high
Window of opp.	mod
Likelihood of Reintro.	high
Overall feasibility of eradication	v high

Example (horizon species):

Echinogammarus trichiatus

Effectiveness	low
Practicality	v low
Cost	mod
Impact	high
Acceptability	v low
Window of opportunity	short
Likelihood of Reintroduction	high
Overall feasibility of eradication	v low

Effect of environment on feasibility

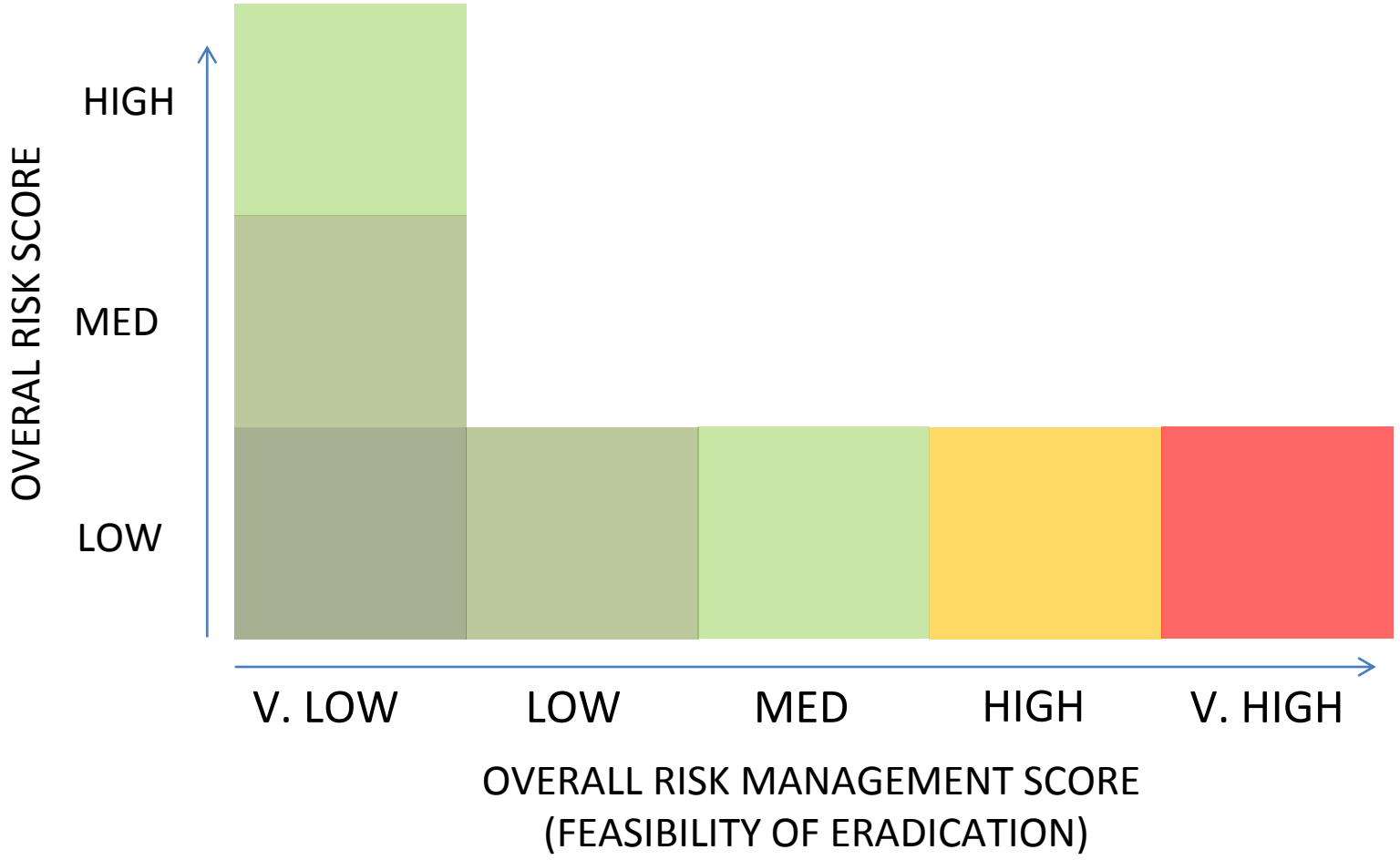


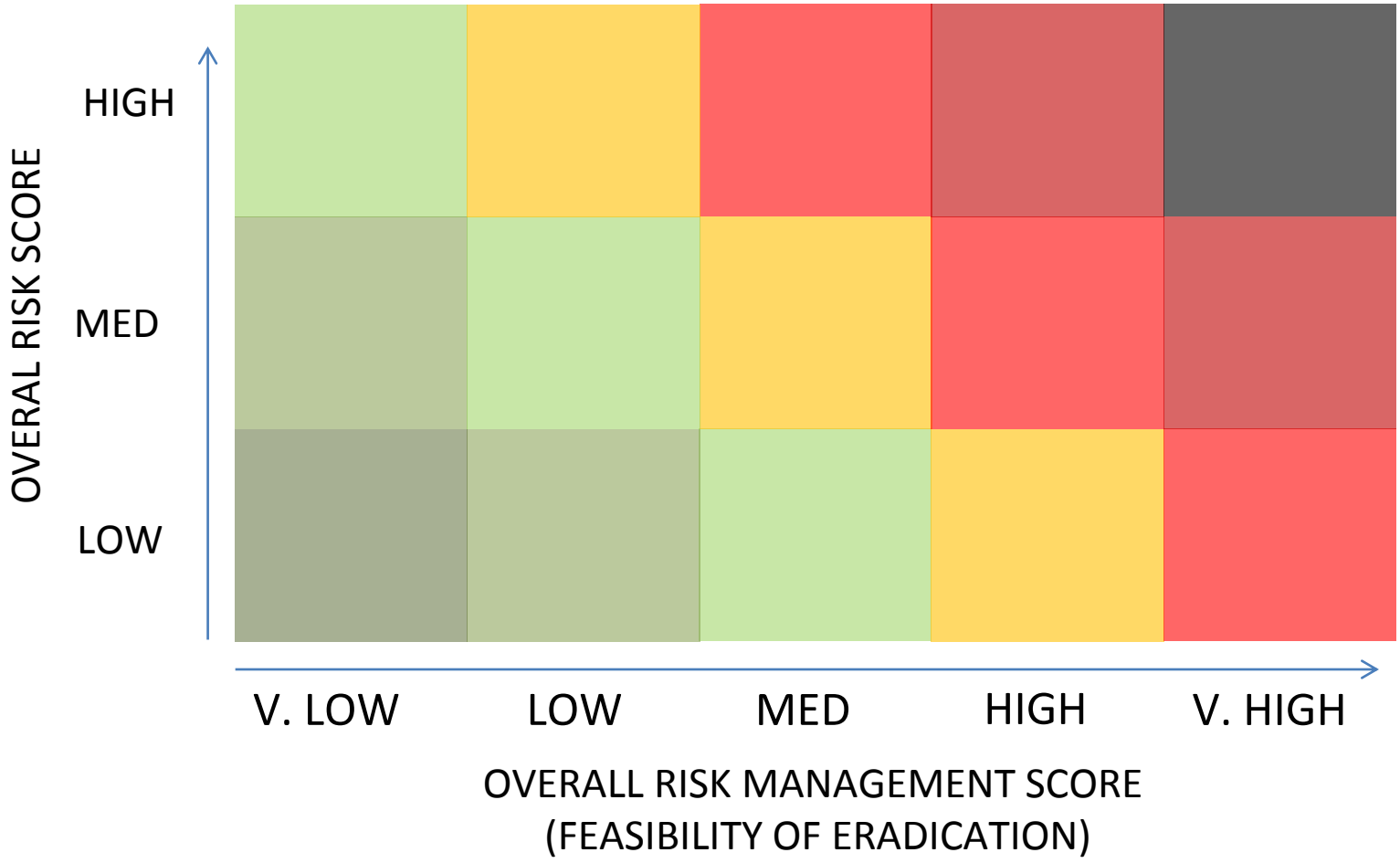
Prioritisation

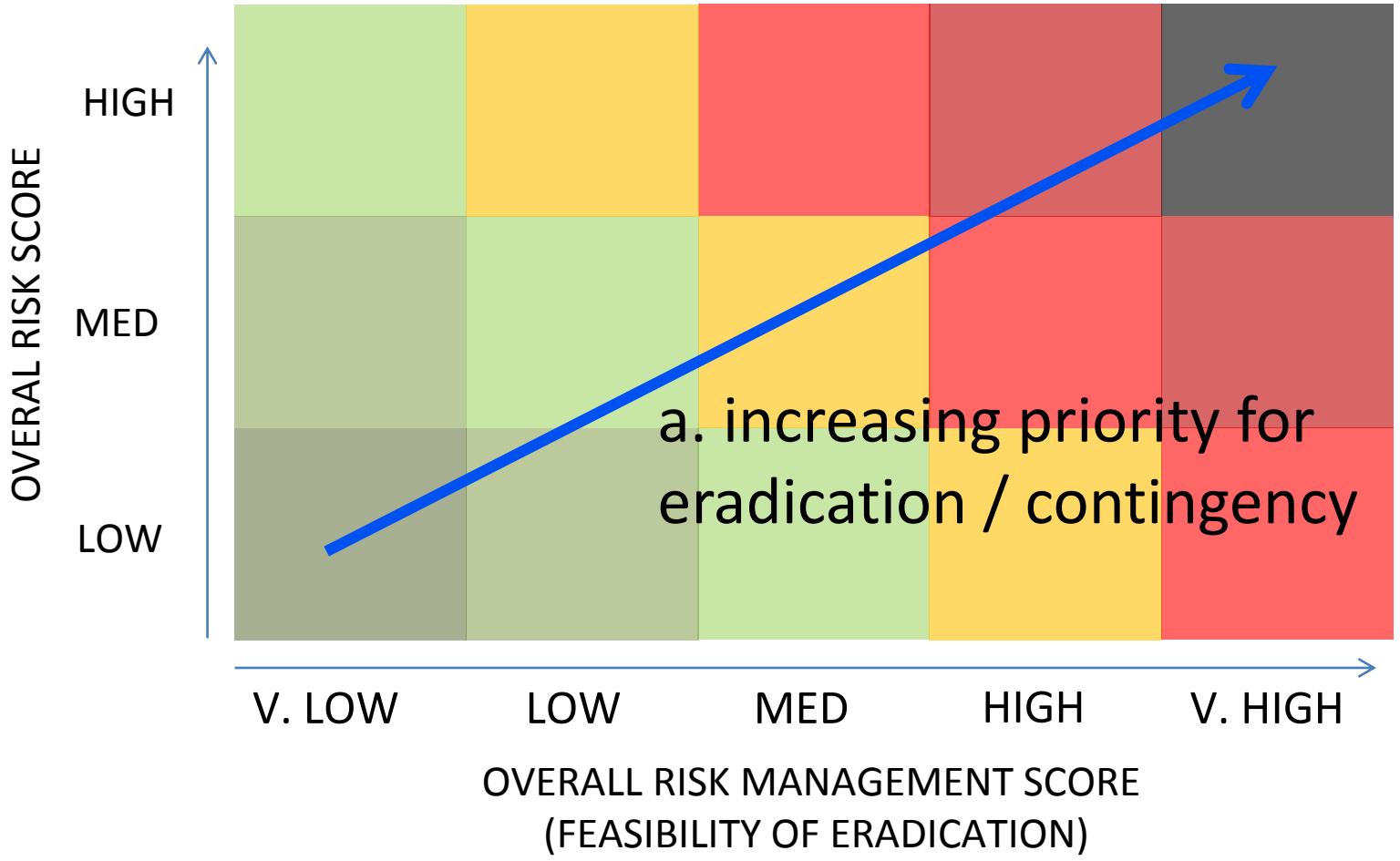
- Comparing risk assessment and risk management scores

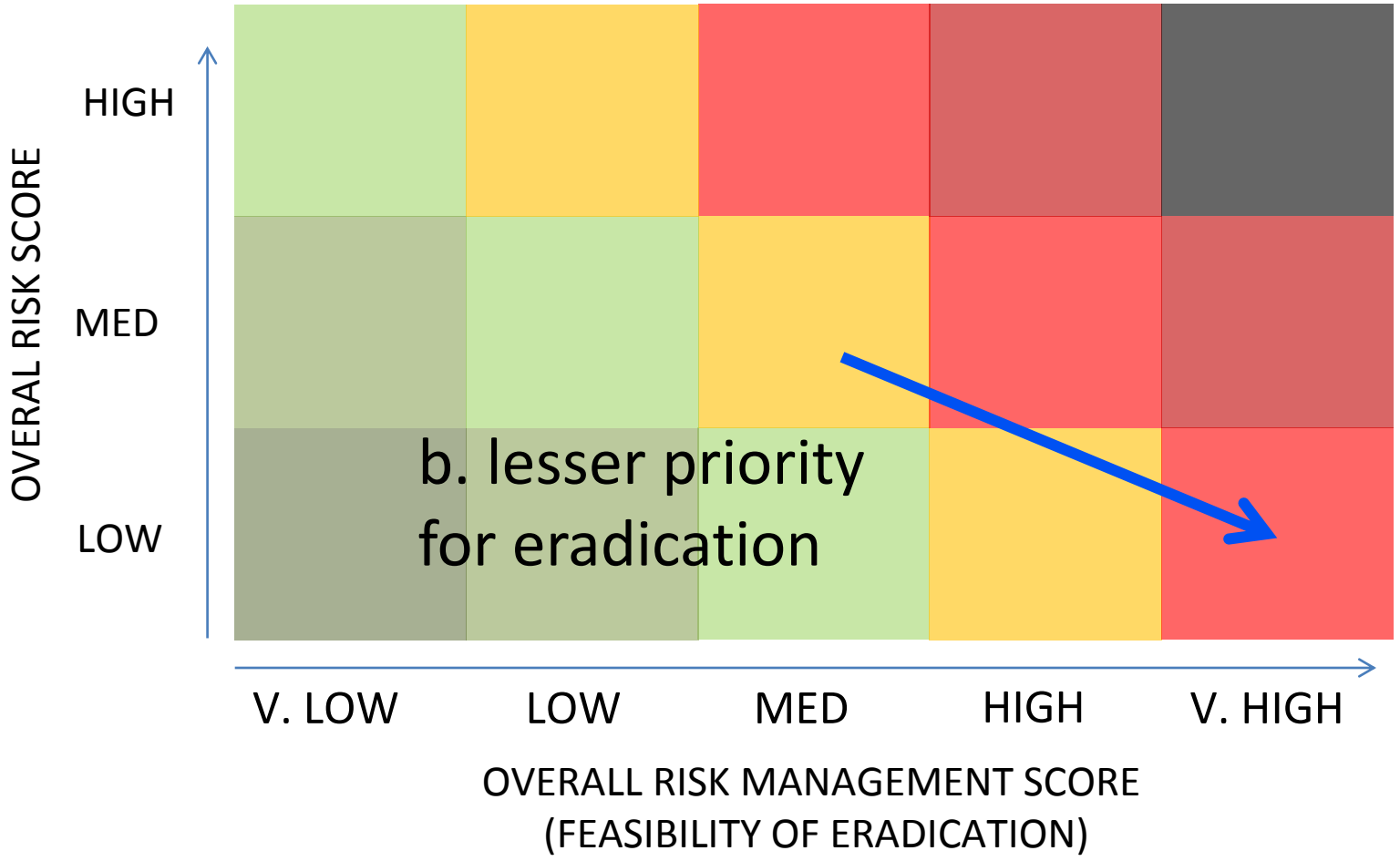
V. LOW LOW MED HIGH V. HIGH

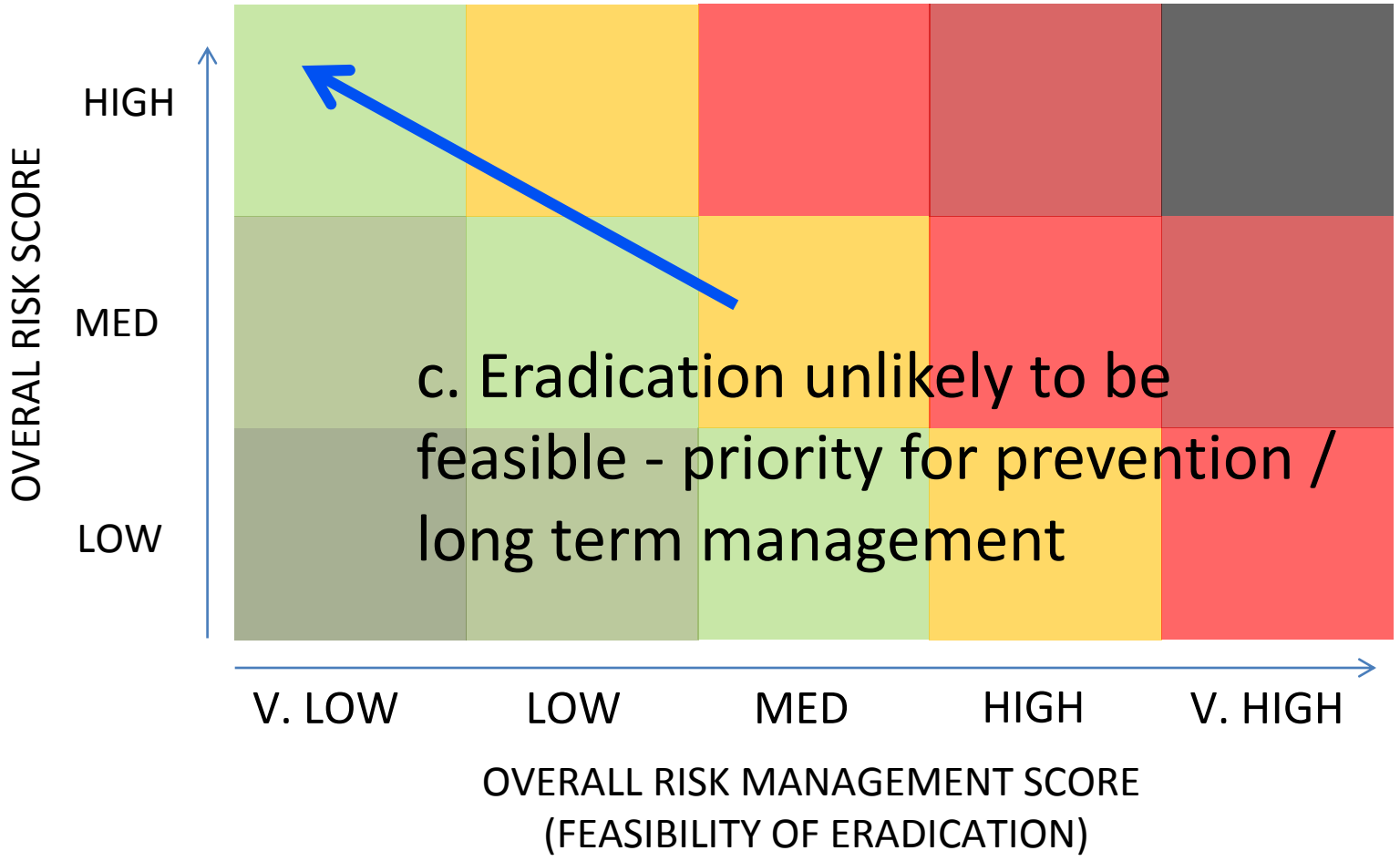
OVERALL RISK MANAGEMENT SCORE
(FEASIBILITY OF ERADICATION)


HIGH
MED
LOW
OVERAL RISK SCORE
V. LOW
LOW
MED
HIGH
V. HIGH
OVERALL RISK MANAGEMENT SCORE
(FEASIBILITY OF ERADICATION)

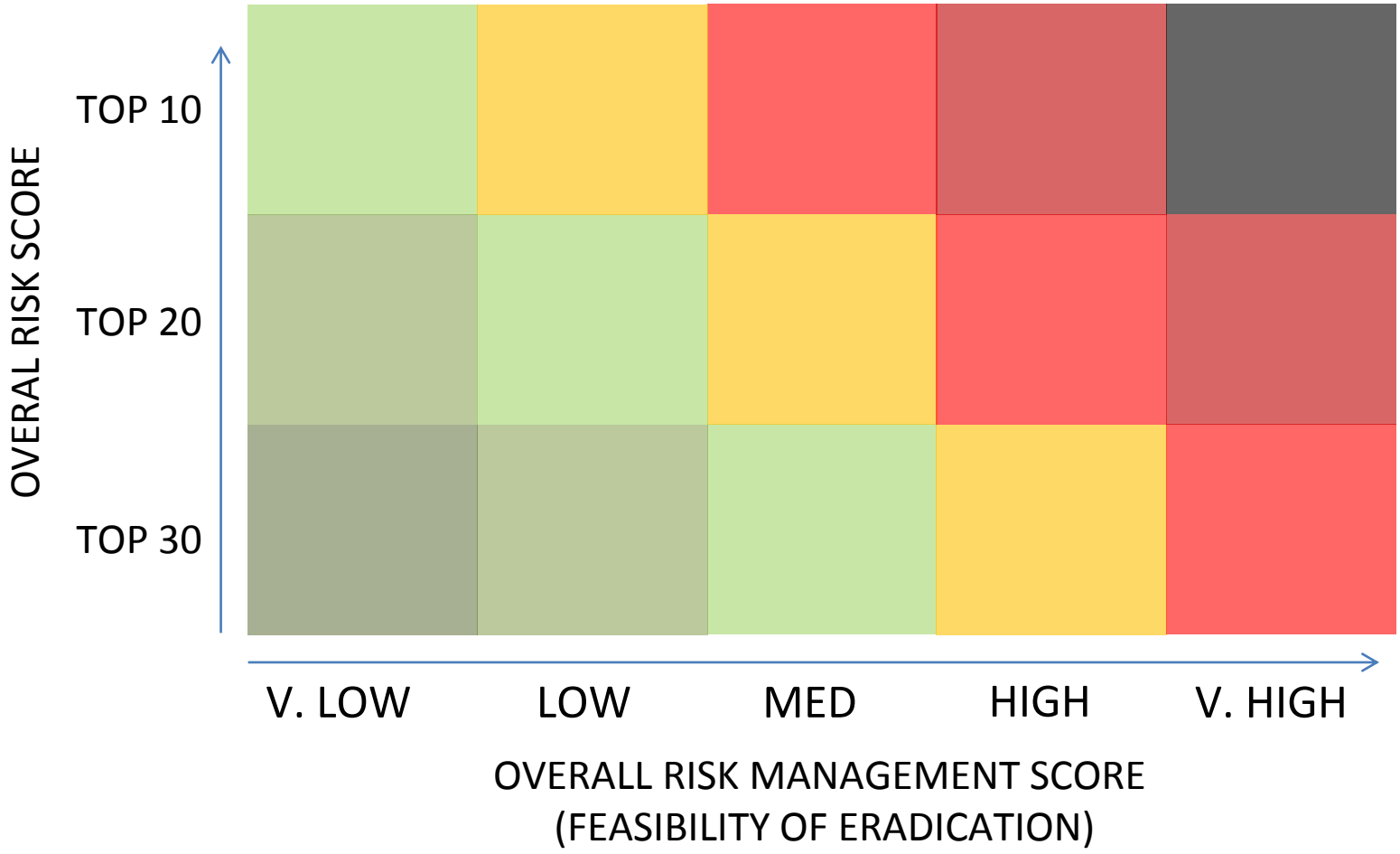

OVERAL RISK SCORE
HIGH
MED
LOW
V. LOW
LOW
MED
HIGH
V. HIGH
OVERALL RISK MANAGEMENT SCORE
(FEASIBILITY OF ERADICATION)


HIGH
MED
LOW
OVERAL RISK SCORE
a. increasing priority for eradication / contingency
V. LOW
LOW
MED
HIGH
V. HIGH
OVERALL RISK MANAGEMENT SCORE
(FEASIBILITY OF ERADICATION)


HIGH
MED
LOW
OVERAL RISK SCORE
b. lesser priority
for eradication
V. LOW
LOW
MED
HIGH
V. HIGH
OVERALL RISK MANAGEMENT SCORE
(FEASIBILITY OF ERADICATION)


HIGH
MED
LOW
OVERAL RISK SCORE
c. Eradication unlikely to be feasible - priority for prevention / long term management
V. LOW
LOW
MED
HIGH
V. HIGH
OVERALL RISK MANAGEMENT SCORE
(FEASIBILITY OF ERADICATION)

Contingency priorities (horizon species)



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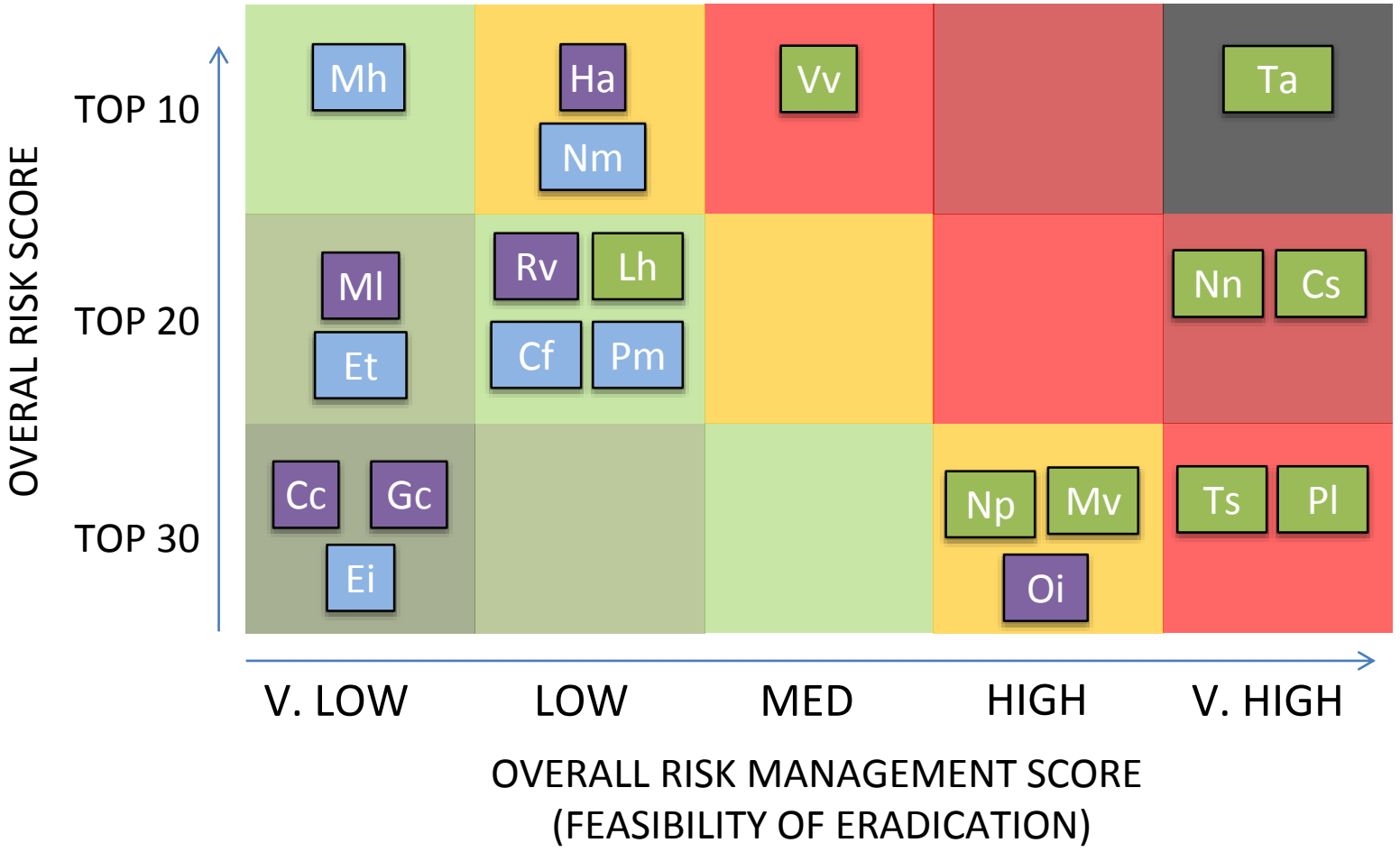

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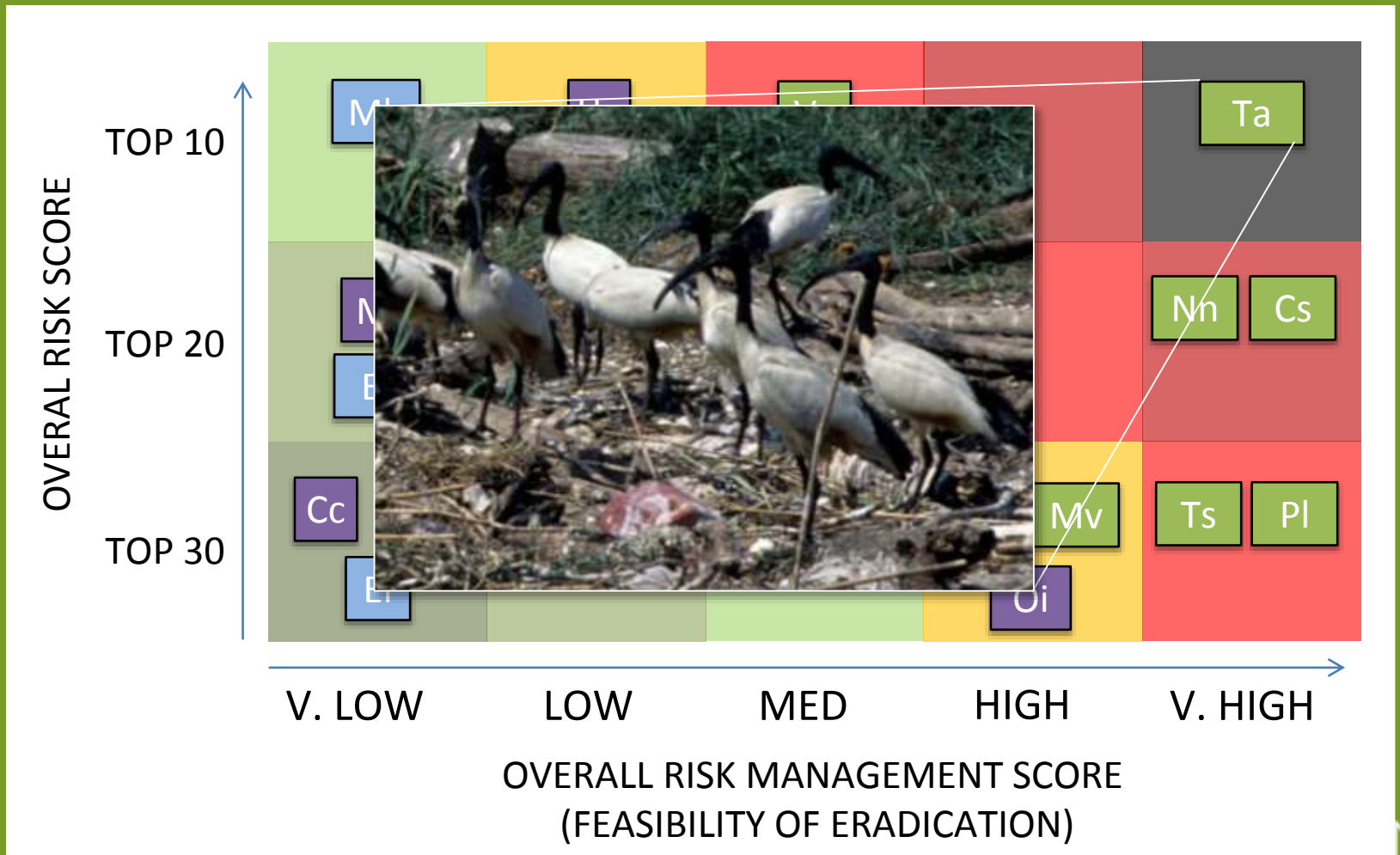

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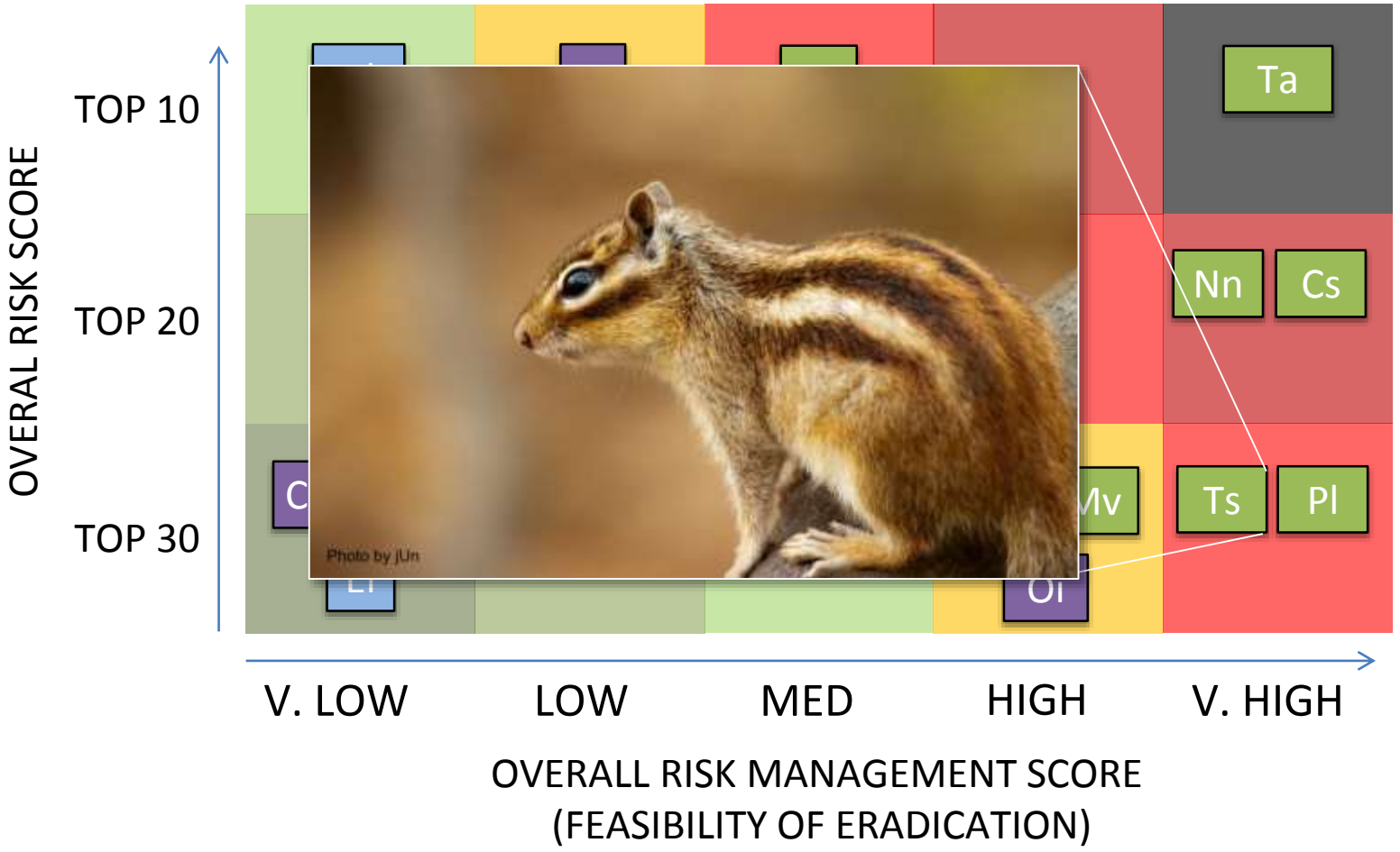

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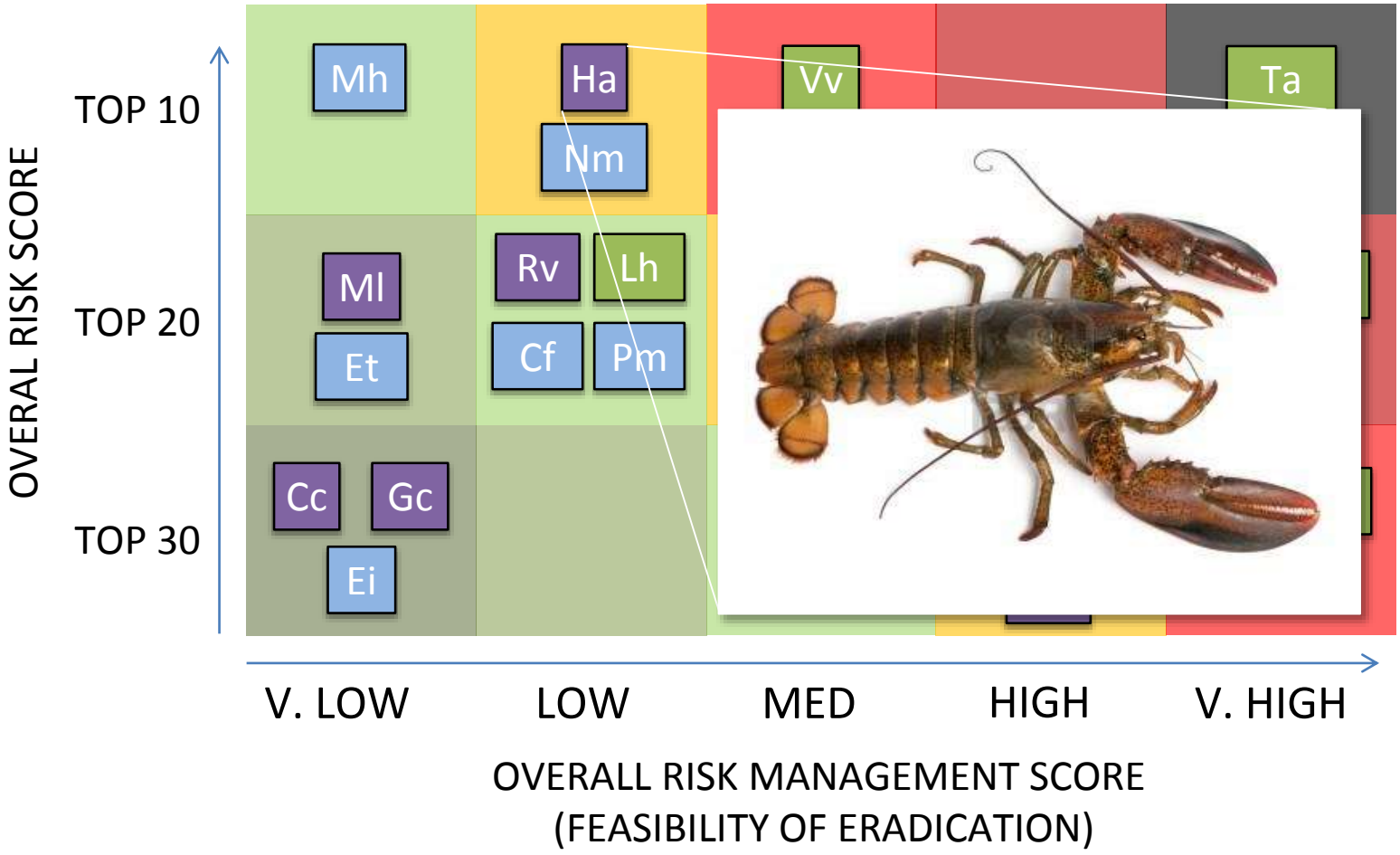
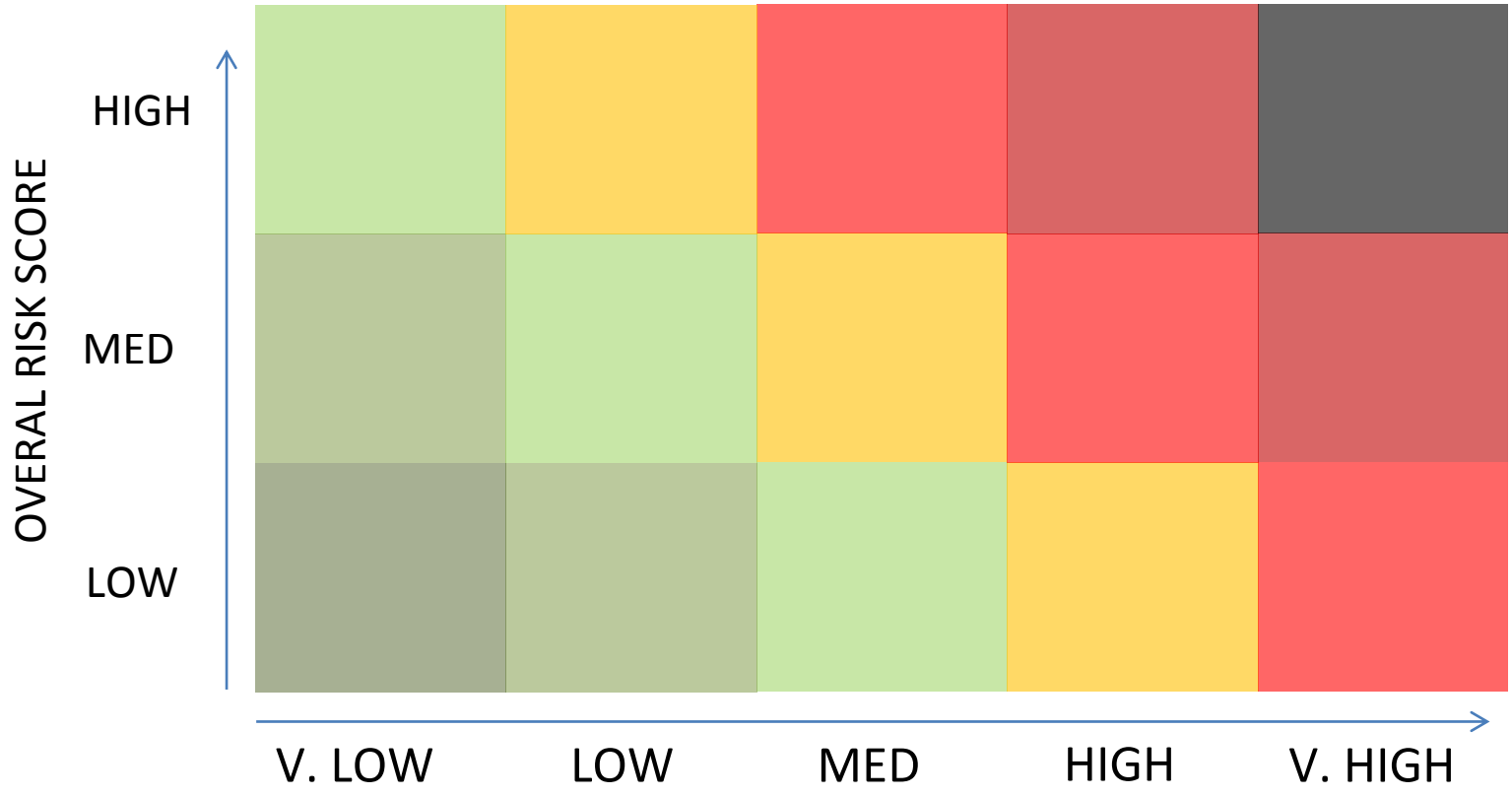


Eradication priorities (established species)



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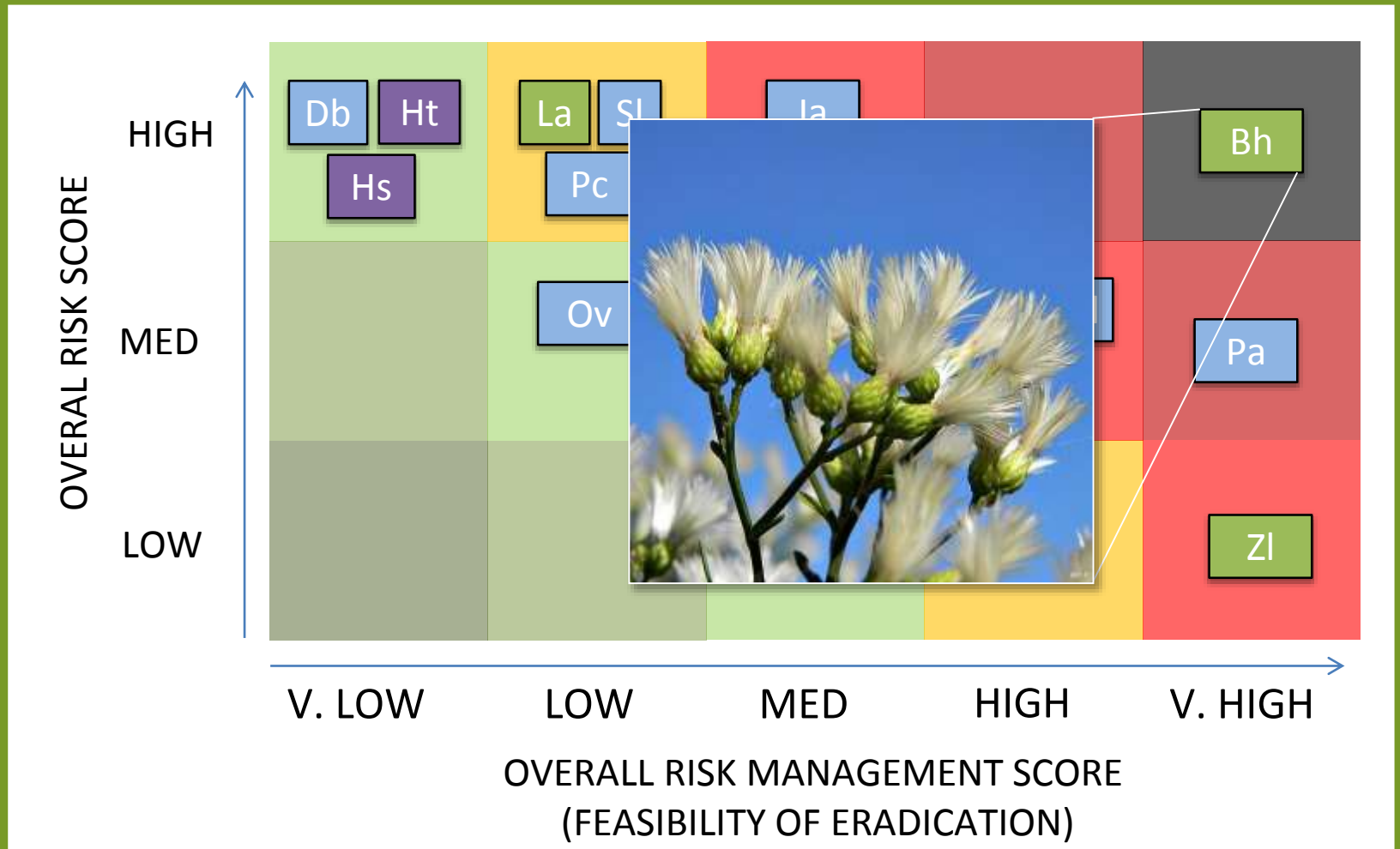

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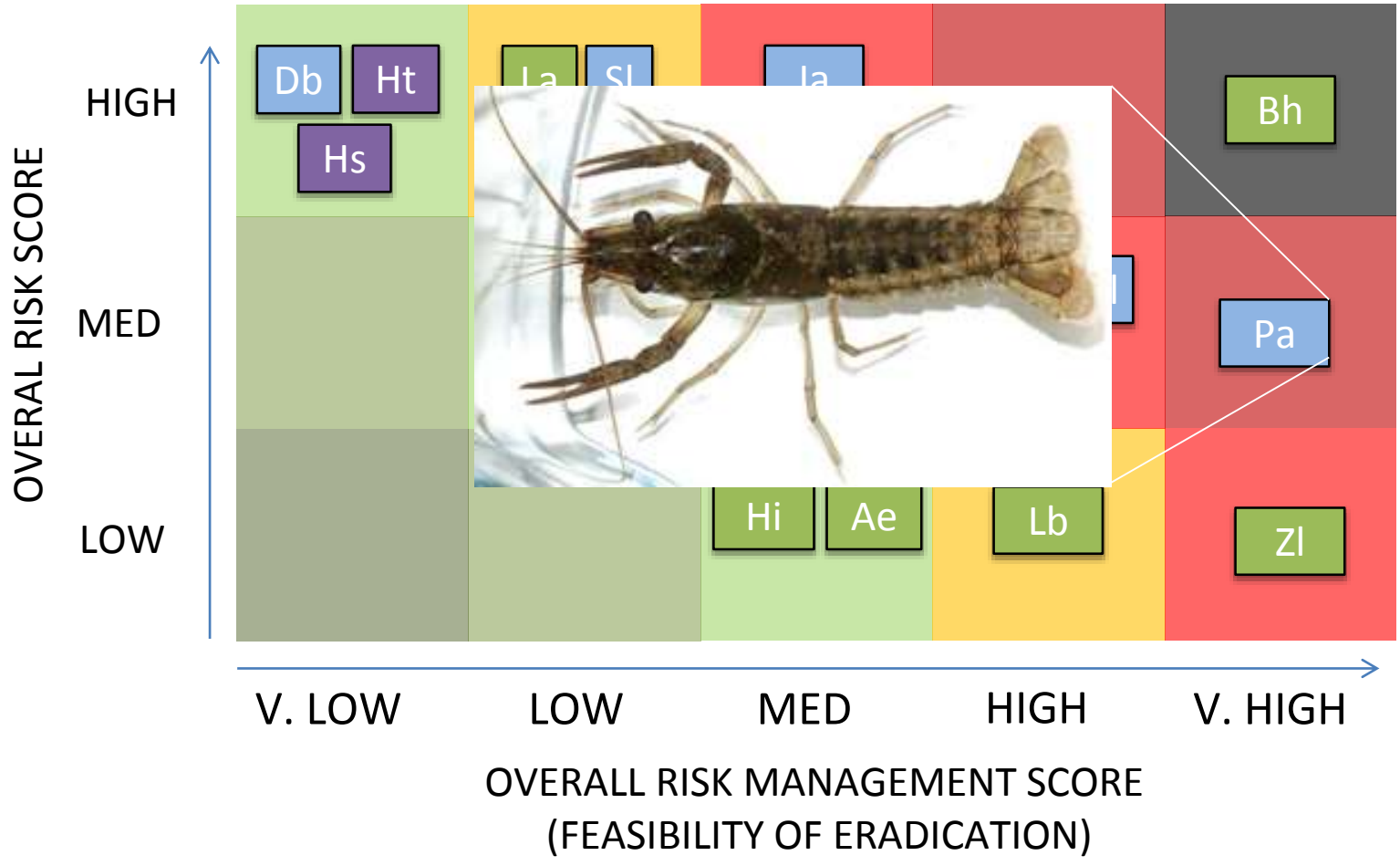

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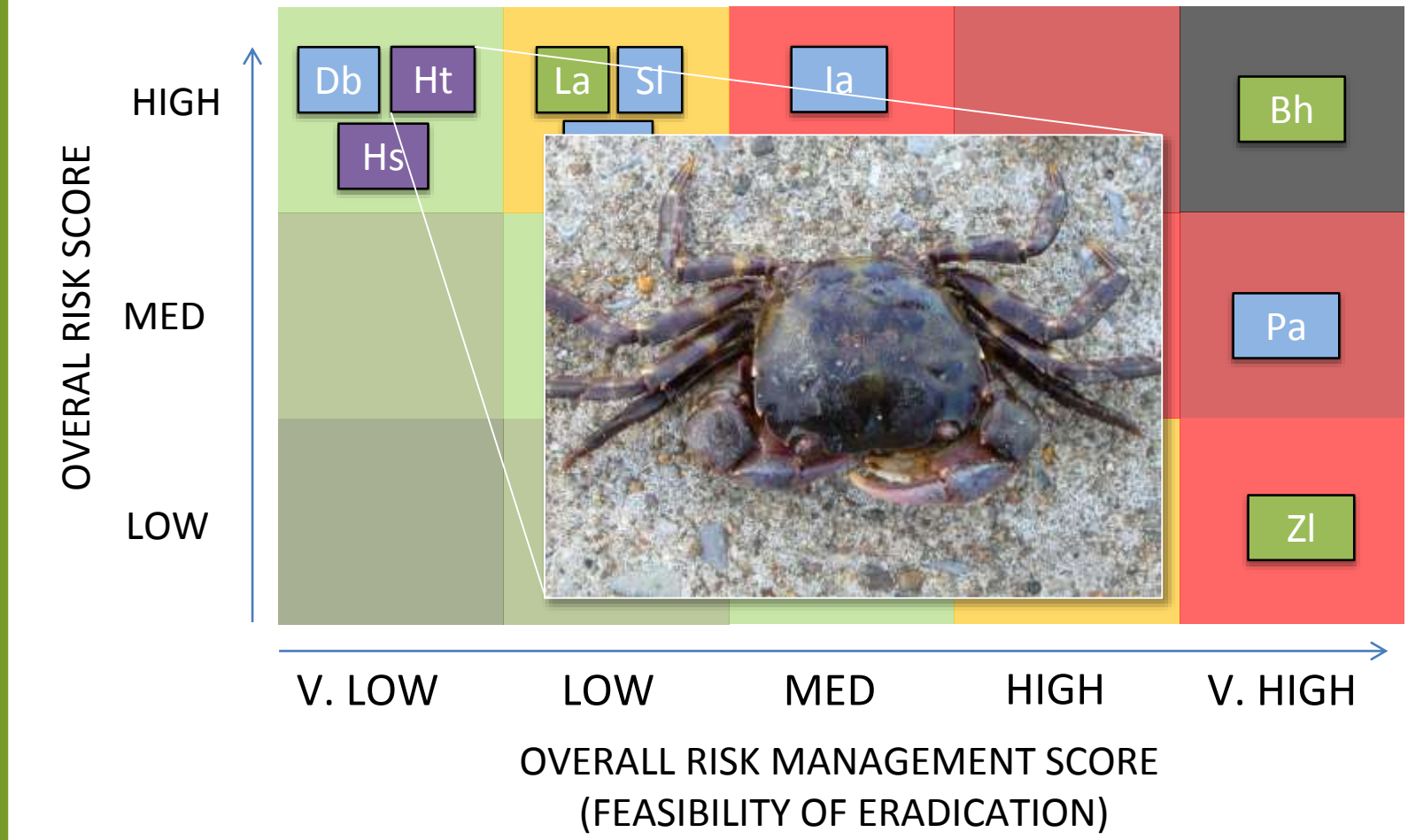

So what?

- Costed, evidence based assessment of how GB can respond to priorities

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  - Relatively cheap

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  - Need for a ‘standing army’

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So what?

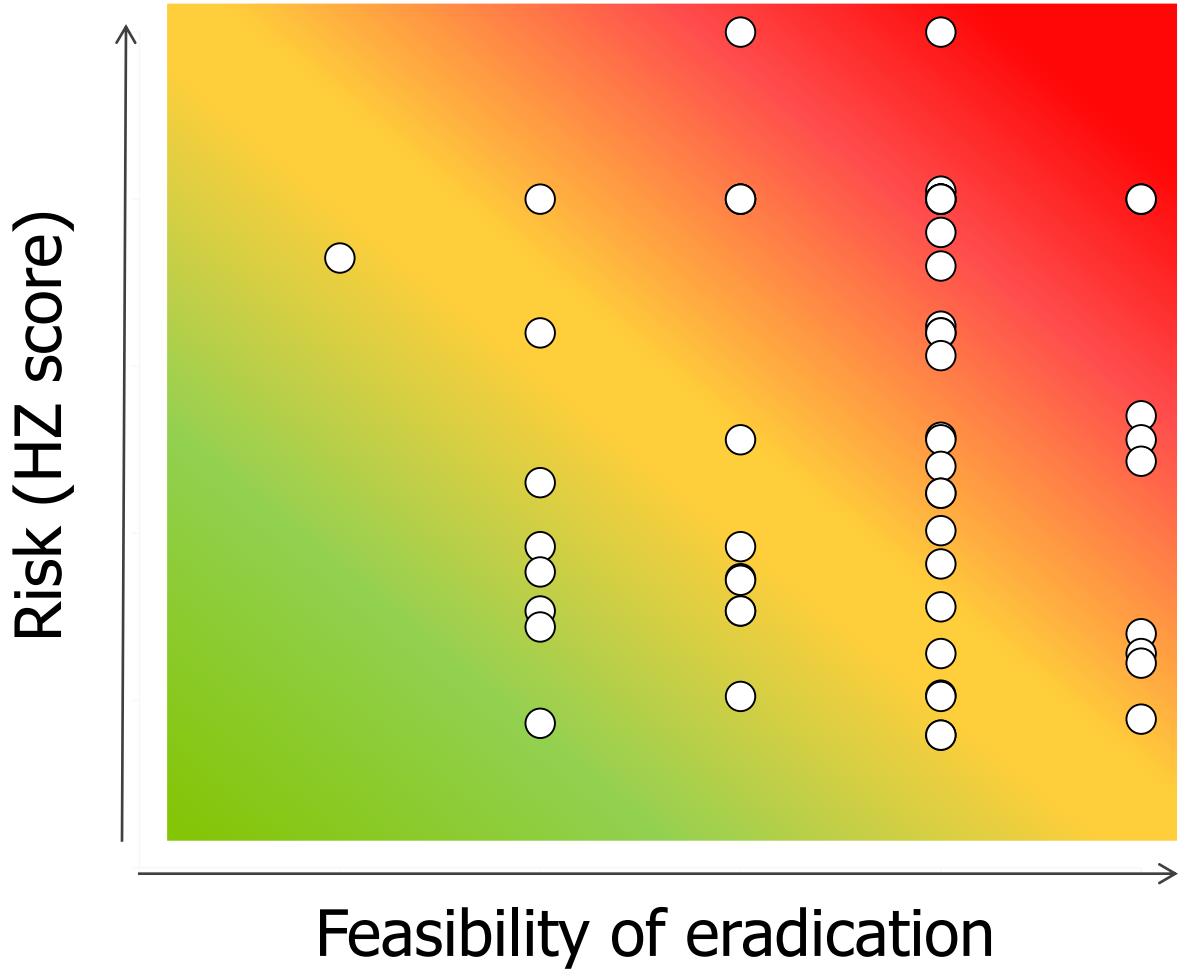
- Costed, evidence based assessment of how GB can respond to priorities
  - Relatively cheap
  - Issues identified
  - Need for a ‘standing army’
- Contingency plans in place
- Eradications moving forward

EU Risk Management

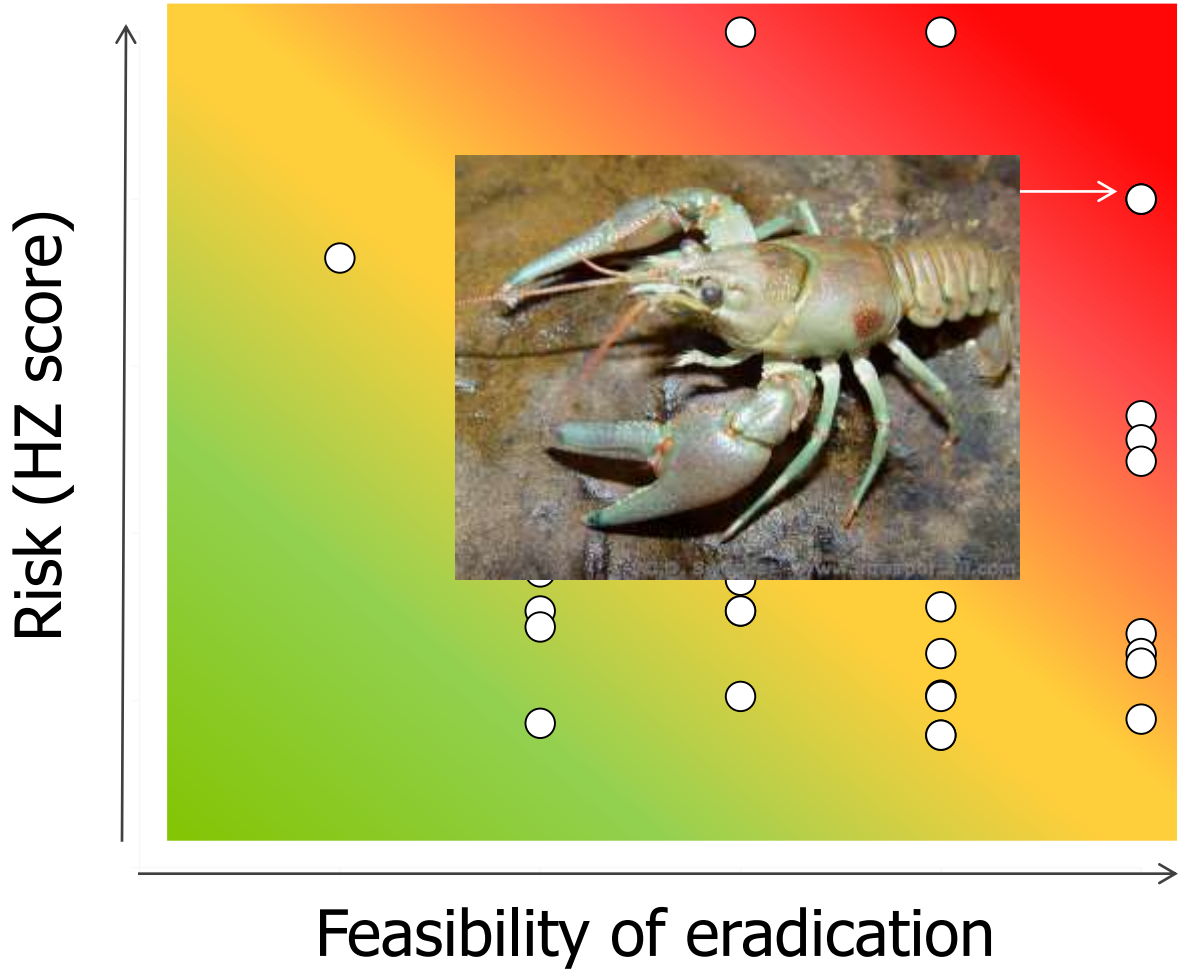
- Roy et al 2015

- Of 95 species:
  - 19 high priorities eradication
  - 32 high priorities for contingency planning

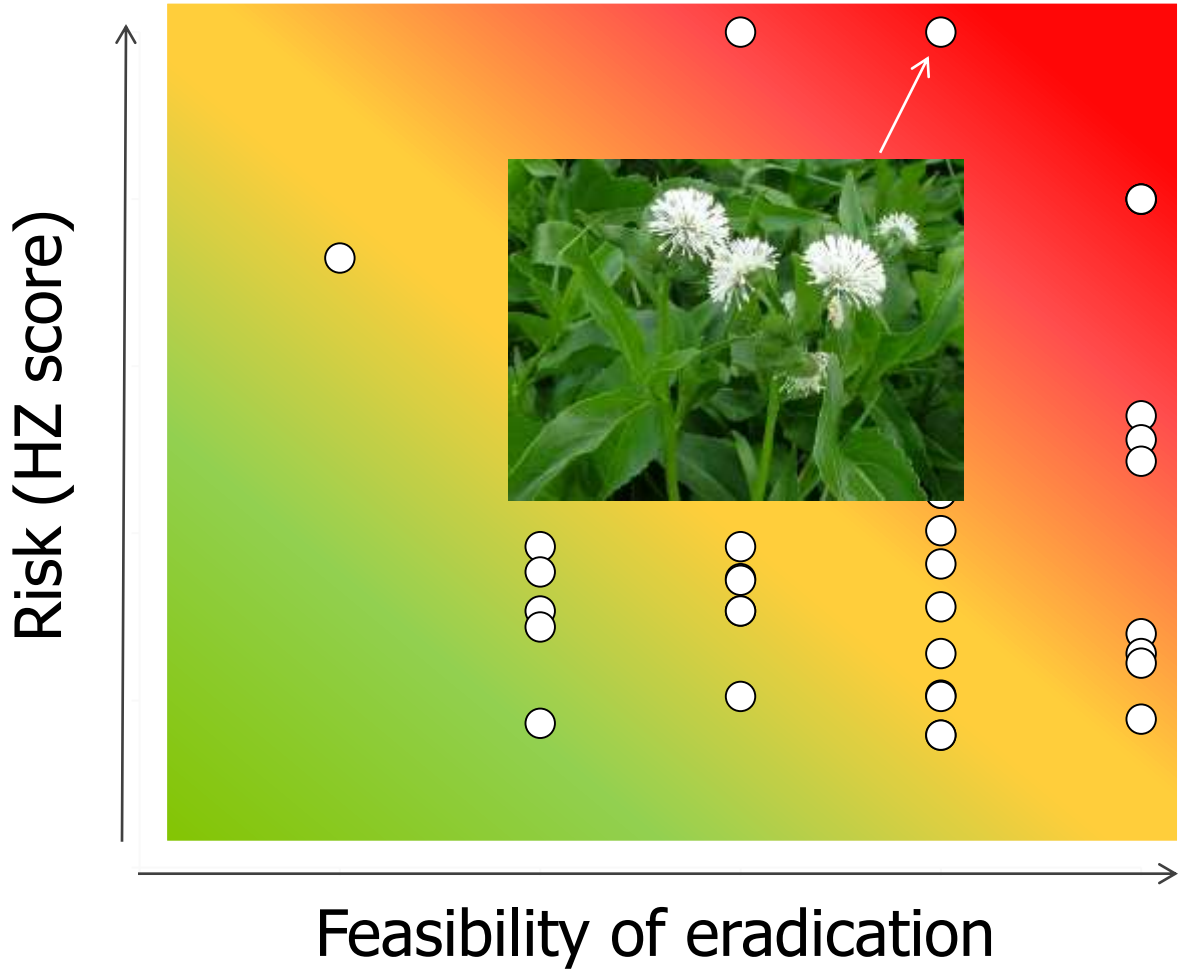
EU Risk Management



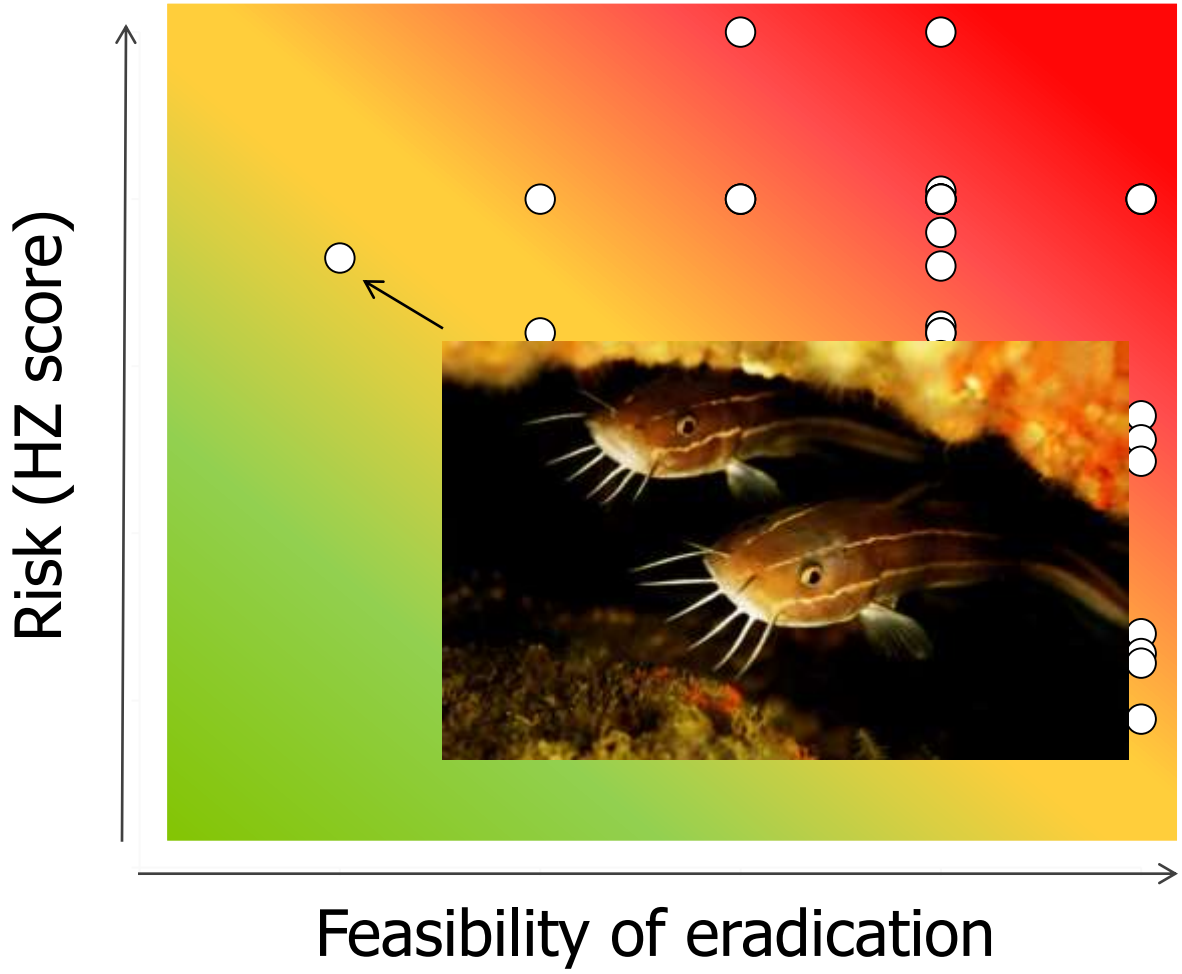
EU Risk Management



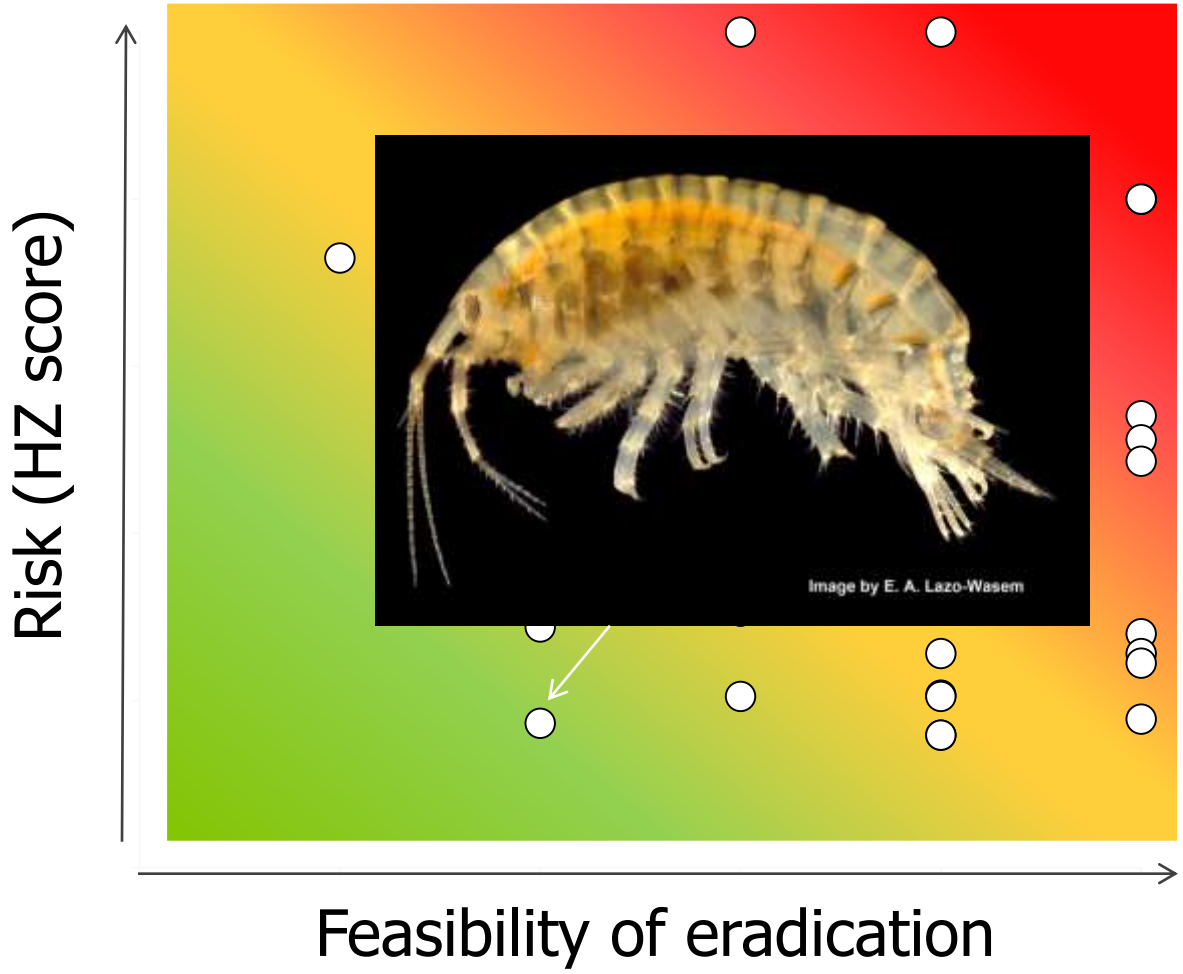
EU Risk Management



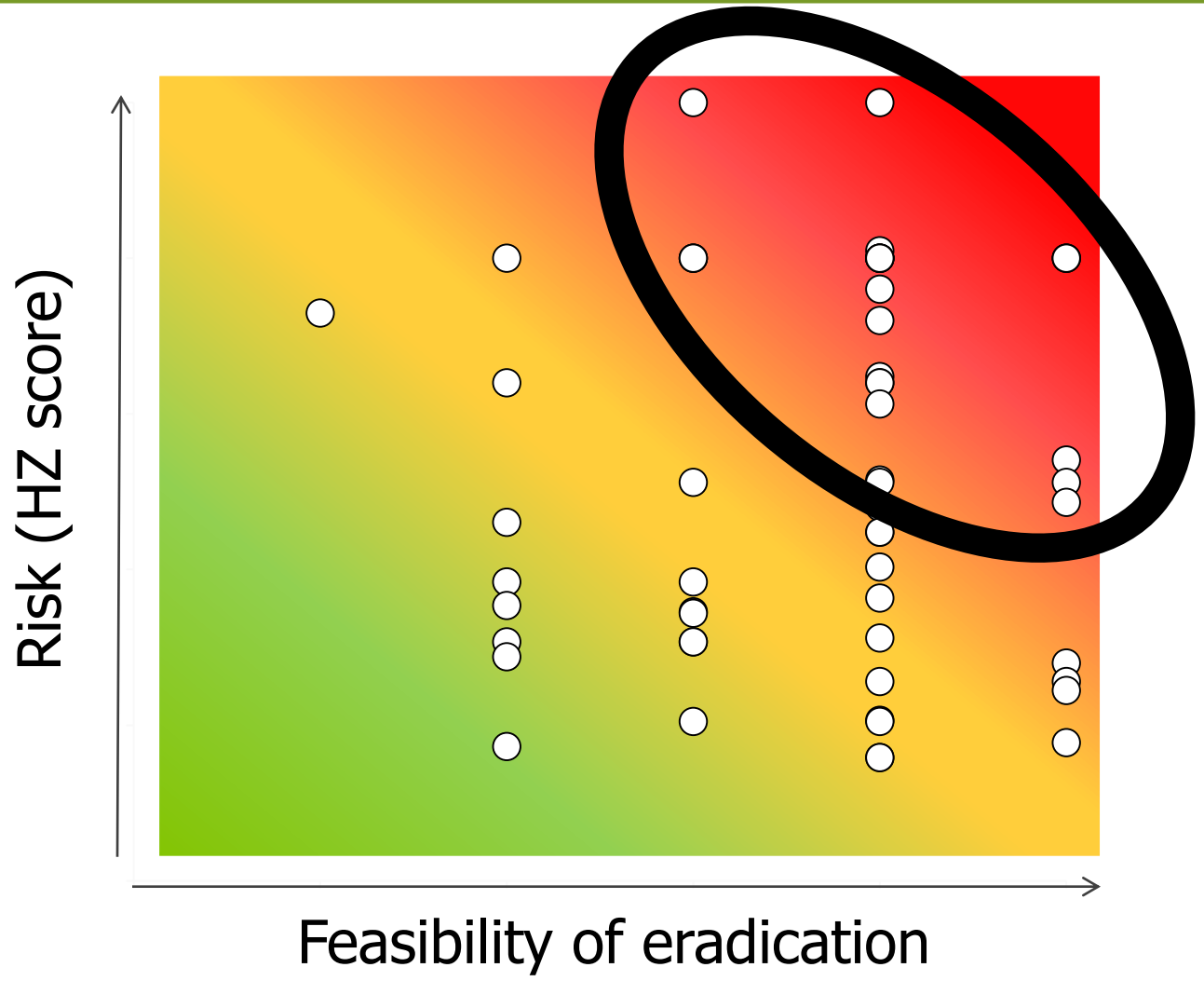
EU Risk Management



EU Risk Management



EU Risk Management



What about other types of management?

- Focus on eradication because it is a critical part of the CBD approach
  - But we do need tools to support long term management and prevention

What about other types of management?

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  - But we do need tools to support long term management and prevention

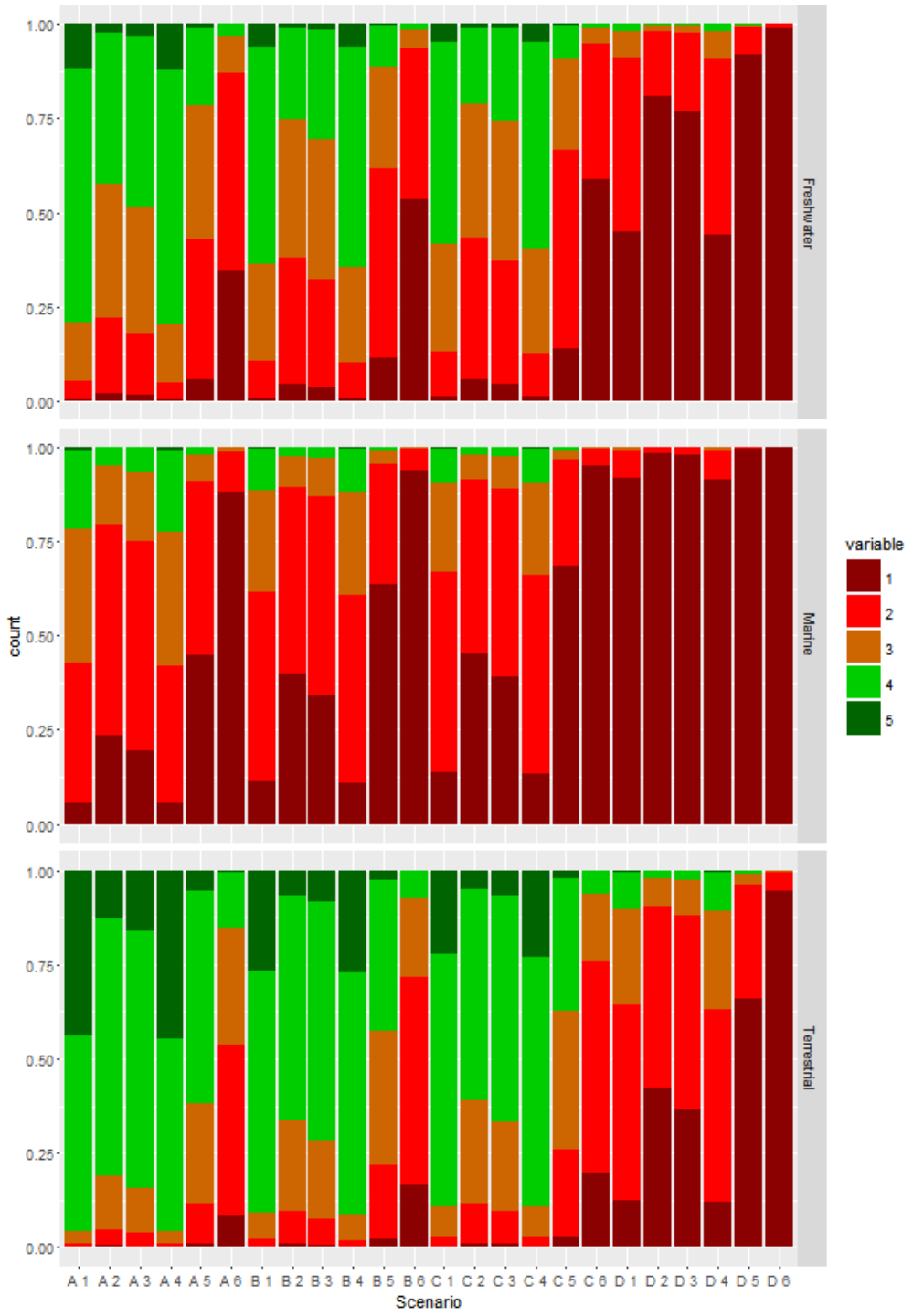
- However, this approach fits well with horizon scanning
  - Contingency planning
  - Highlighting the importance of prevention species we cannot eradicate

Thanks!

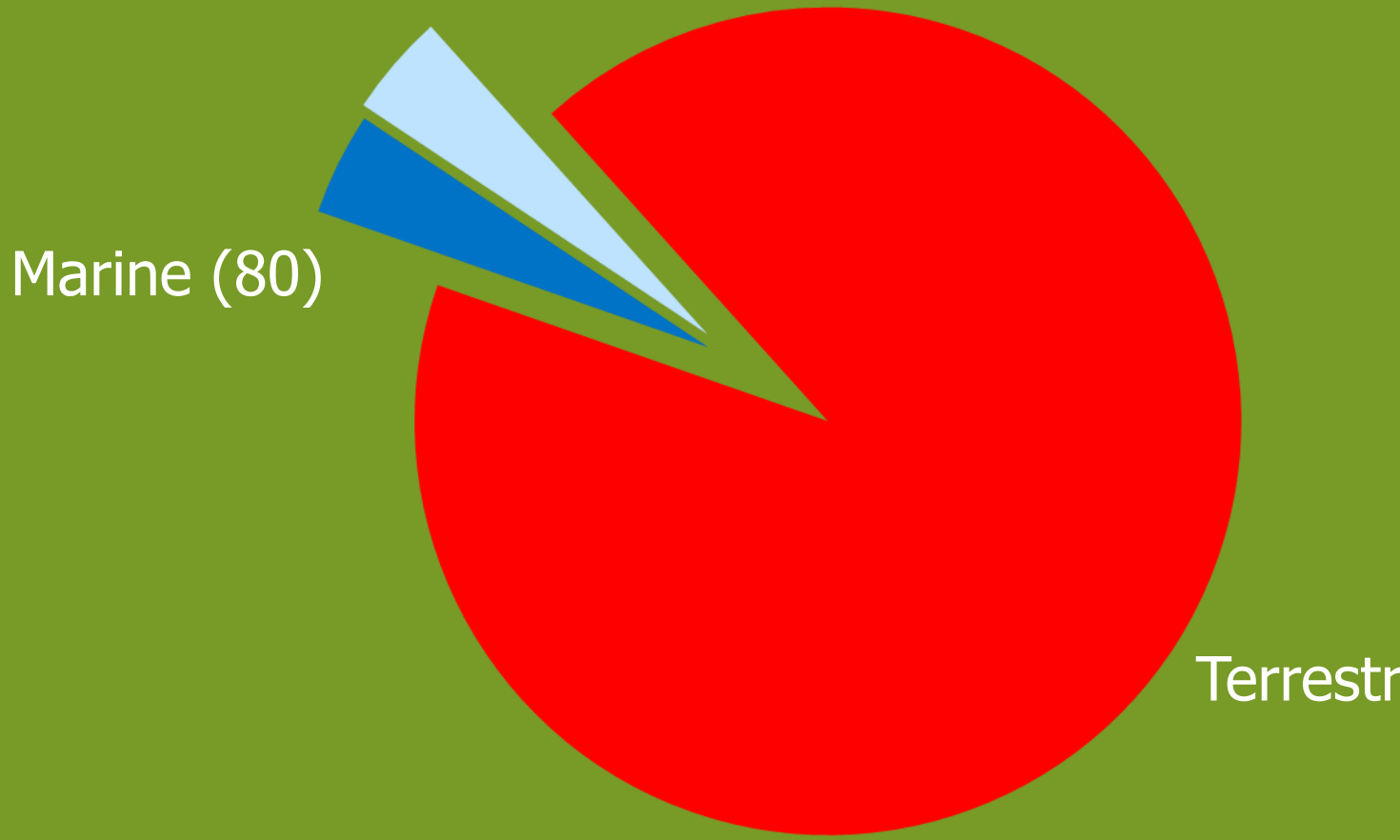
olaf.booy@apha.gsi.gov.uk

www.nonnativespecies.org

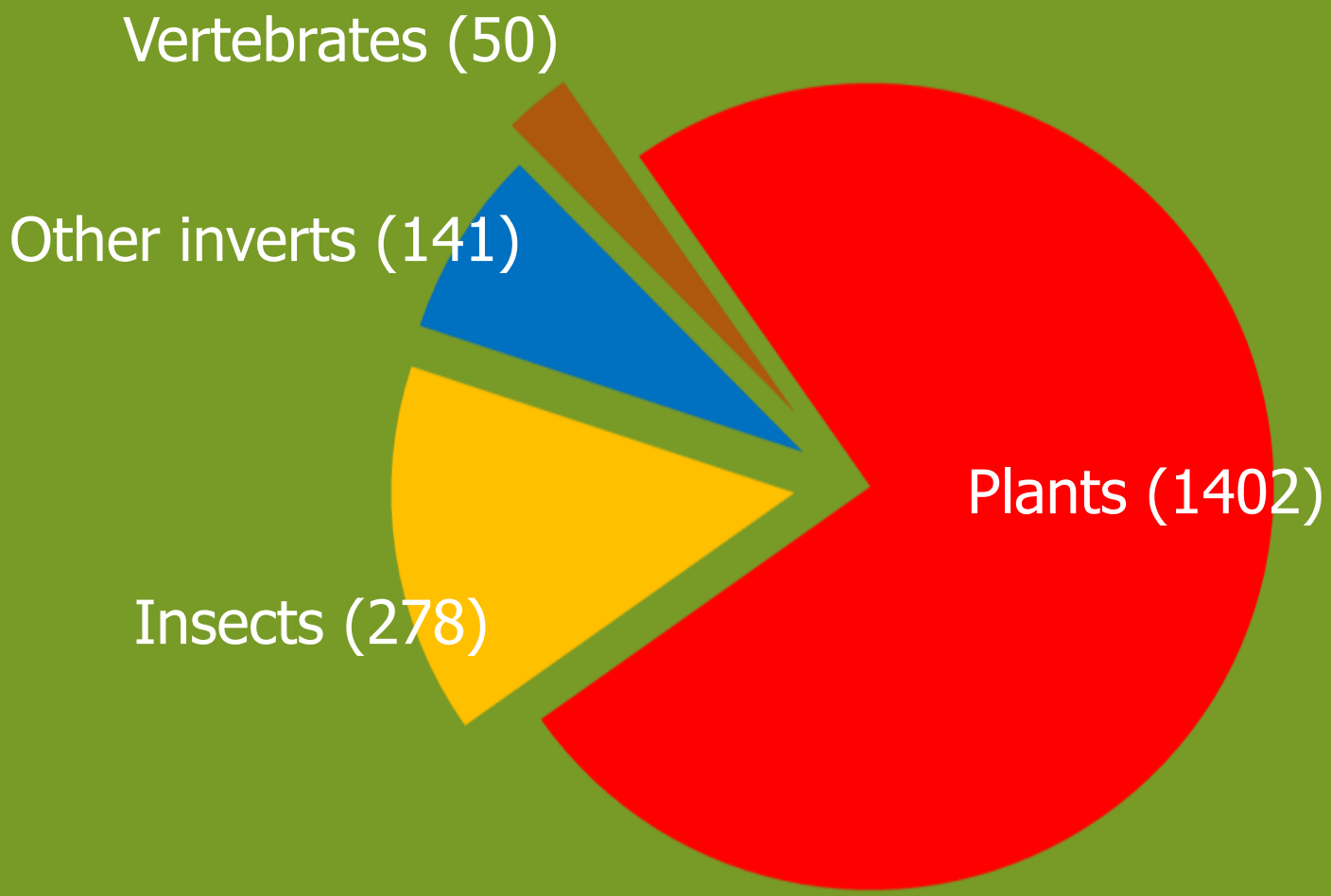
End



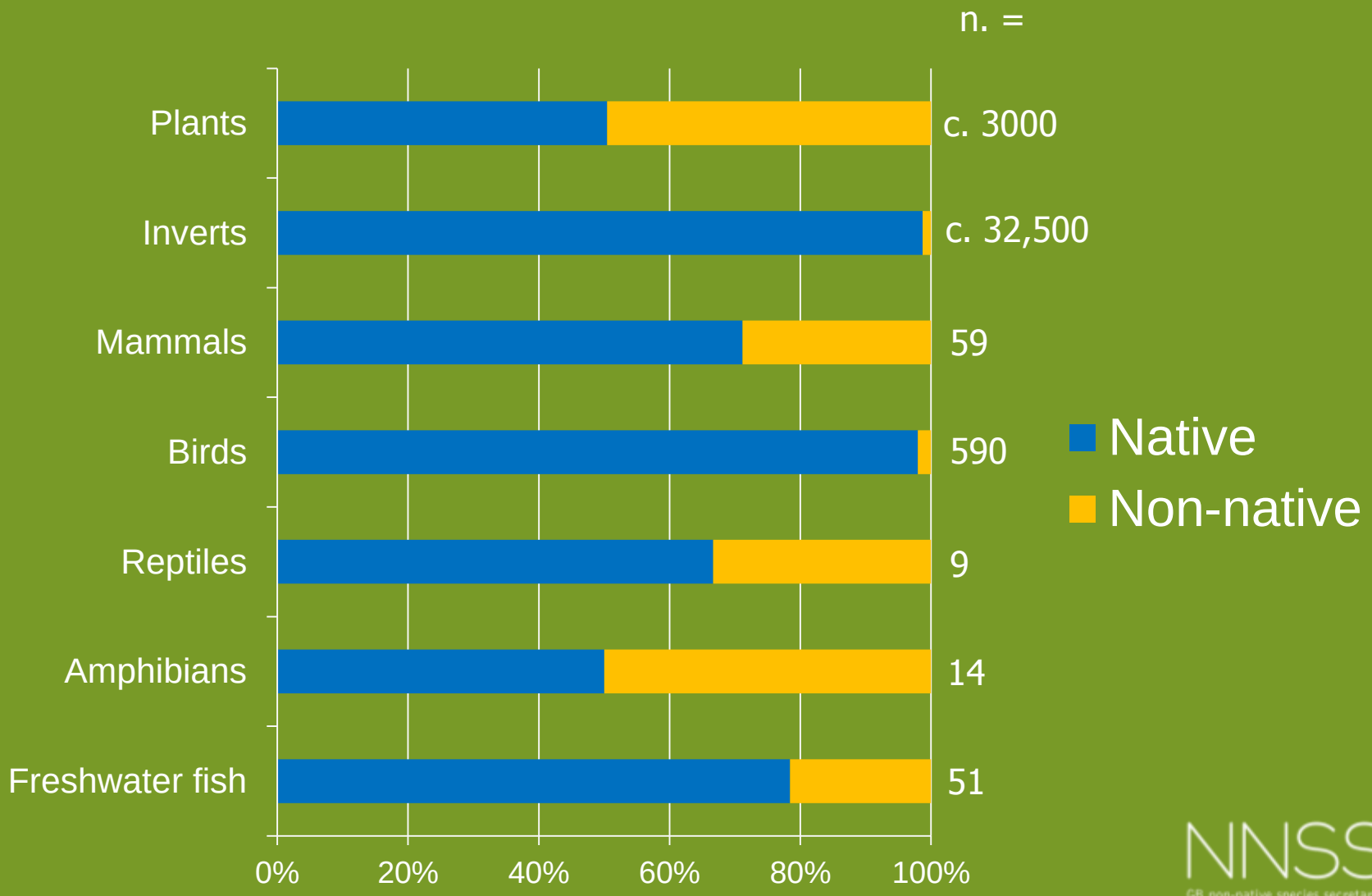
Environment

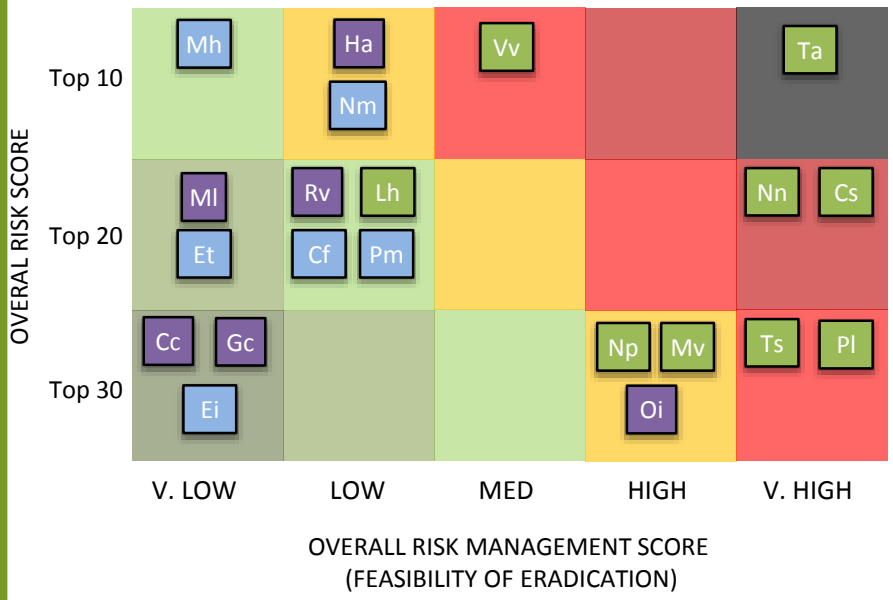


Taxa



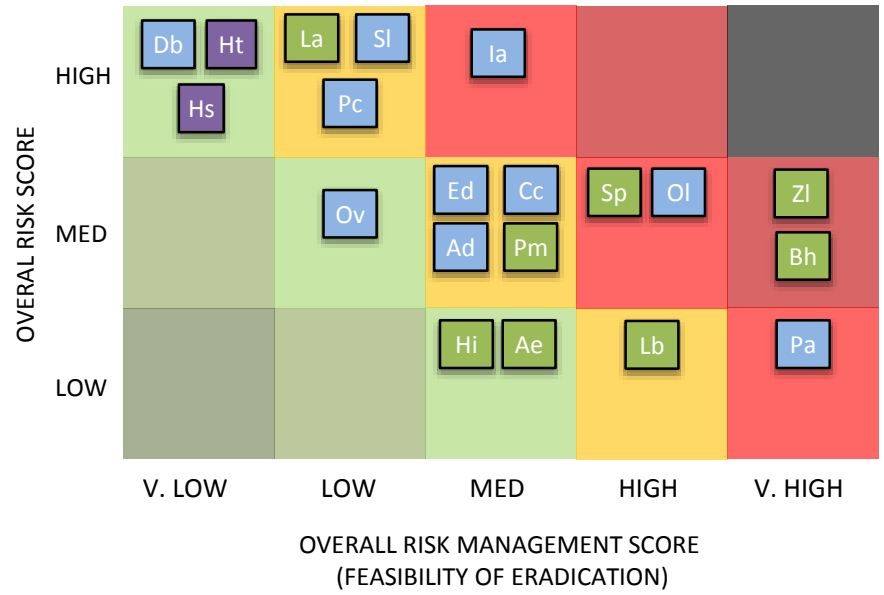
Alien vs. Native





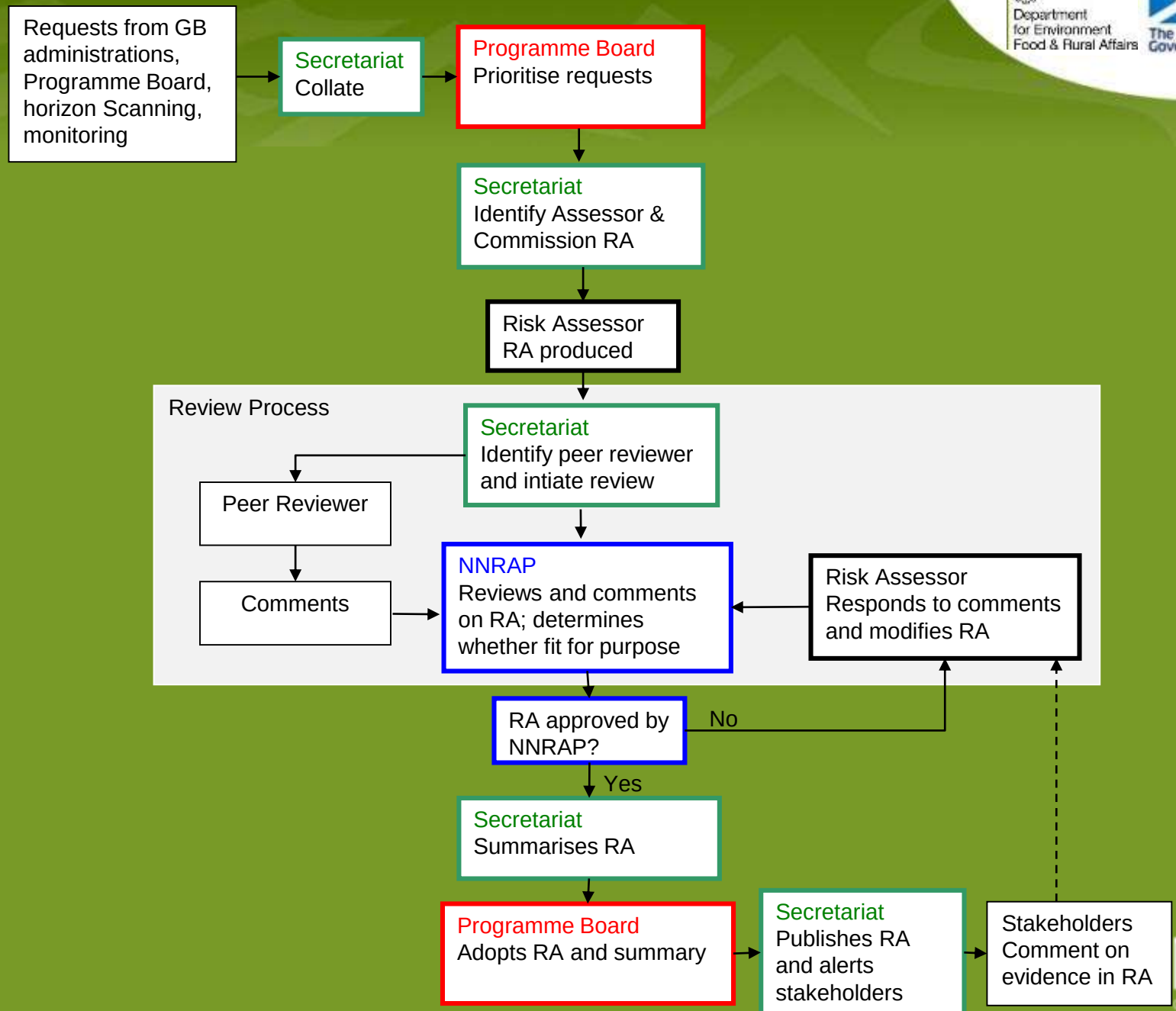
Priority	Species	Code
Highest	Threskiornis aethiopicus	A1
Very high		
	Corvus splendens	B1
High	Procyon lotor	C1
	Tamias sibiricus	C1
	Vespa velutina	C3
Medium	Nyctereutes procyonoides	D1
	Microstegium vimineum	D1
	Ocenebra inornata	D1
	Homarus americanus[1]	D3
	Neogobius melanostomus[1]	D3
Low	Rapana venosa[1]	E2
	Linepithema humile[1]	E2
	Corbicula fluminalis[1]	E2
	Proterorhinus marmoratus[1]	E2
	Myriophyllum heterophyllum[1]	E3
Very low	Mnemiopsis leidyi[1]	F2
	Echinogammarus trichiatus[1]	F2
Lowest	Celtodoryx ciocalyptoides	G1
	Gracilaria vermiculophylla	G1
	Echinogammarus ischnus	G1

[1] Priority for prevention

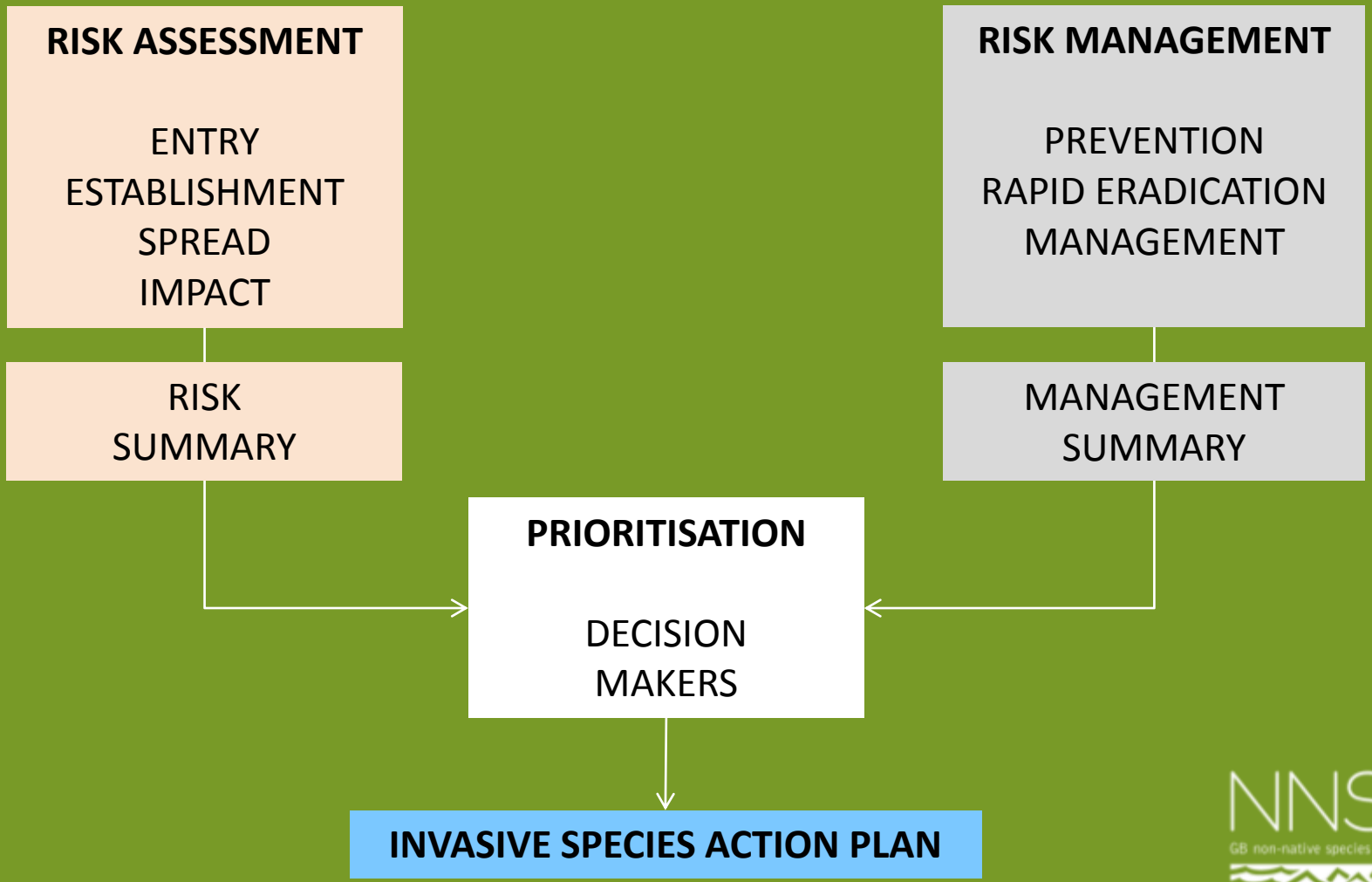


Priority	Species	Code
Highest	None	A1
Very high	Zamenis longissimus	
	Baccharis halimifolia	B1
High	Procambarus acutus	C1
	Sarracenia purpurea	C2
	Orconectes limosus	C2
	Ichthyosaura alpestris	C3
Moderate	Lacerta bilineata	D1
	Egeria densa	D2
	Cabomba caroliniana	D2
	Aponogeton distachyos	D2
	Podarcis muralis	D2
	Lysichiton americanus	D3
	Procambarus clarkii	D3
	Sagittaria latifolia	D3
Low	Hydropotes inermis	E1
	Alopochen aegyptiacus	E1
	Orconectes virilis[1]	E2
	Dreissena bugensis[1]	E3
	Hemigrapsus sanguineus[1]	E3
	Hemigrapsus takanoi[1]	E3

[1] Priorities for long term management


Requests from GB administrations, Programme Board, horizon Scanning, monitoring
Secretariat
Collate
Programme Board
Prioritise requests
Secretariat
Identify Assessor & Commission RA
Risk Assessor
RA produced
Review Process
Secretariat
Identify peer reviewer and intiate review
Peer Reviewer
Comments
NNRAP
Reviews and comments on RA; determines whether fit for purpose
Risk Assessor
Responds to comments and modifies RA
RA approved by NNRAP?
No
Yes
Secretariat
Summarises RA
Programme Board
Adopts RA and summary
Secretariat
Publishes RA and alerts stakeholders
Stakeholders
Comment on evidence in RA

Using risk analysis to inform decision making



Testing the scheme

- Selecting species

Global Change Biology

Global Change Biology (2014) 20, 3859–3871, doi: 10.1111/gcb.12603

Horizon scanning for invasive alien species with the potential to threaten biodiversity in Great Britain

HELEN E. ROY[1], JODEY PEYTON[1], DAVID C. ALDRIDGE[2], TRISTAN BANTOCK[3], TIM M. BLACKBURN[4,5], ROBERT BRITTON[6], PAUL CLARK[7], ELIZABETH COOK[8], KATHARINA DEHNEN-SCHMUTZ[9], TREVOR DINES[10], MICHAEL DOBSON[11], FRANÇOIS EDWARDS[1], COLIN HARROWER[1], MARTIN C. HARVEY[12], DAN MINCHIN[13], DAVID G. NOBLE[14], DAVE PARROTT[15], MICHAEL J. O. POCOCK[1], CHRIS D. PRESTON[1], SUGOTO ROY[15], ANDREW SALISBURY[16], KARSTEN SCHÖNROGGE[1], JACK SEWELL[17], RICHARD H. SHAW[18], PAUL STEBBING[19], ALAN J. A. STEWART[20] and KEVIN J. WALKER[21]

[1]*Centre for Ecology & Hydrology, Wallingford OX10 8BB, UK,* [2]*Aquatic Ecology Group, Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, UK,* [3]*British Bugs, 101 Crouch Hill, London N8 9RD, UK,* [4]*Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY, UK,* [5]*Centre for Invasion Biology, Department of Botany and Zoology, Stellenbosch University, Stellenbosch, South Africa,* [6]*University of Bournemouth, Poole BH12 5BB, UK,* [7]*Aquatic Invertebrates Division, Department of Life Sciences, The Natural History Museum, Cromwell Road, London SW7 5BD, UK,* [8]*Scottish Marine Institute, Oban, Argyll, PA37 1QA, UK,* [9]*Centre for Agroecology and Food Security, Coventry University, Priory St, Coventry CV1 5FB, UK,* [10]*PlantLife, Uned 14, Llys Castan, Parc Menai, Bangor LL57 4FD, UK,* [11]*APEM Ltd., The Technopole Centre, Midlothian EH26 0PJ, UK,* [12]*Department of Environment, Earth and Ecosystems, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK,* [13]*Marine Organism Investigations Killaloe, Co Clare, Ireland,* [14]*British Trust for Ornithology, Thetford IP24 2PU, UK,* [15]*Animal Health and Veterinary Laboratories Agency, Sand Hutton, York YO41 1LZ, UK,* [16]*RHS Garden Wisley, Nr Woking, Surrey GU23 6QB, UK,* [17]*The Marine Biological Association of the United Kingdom, The Laboratory, Citadel Hill, Plymouth, Devon PL1 2PB, UK,* [18]*CABI E-UK Bakeham Lane, Egham, Surrey TW20 9TY, UK,* [19]*Centre for Environment, Fisheries and Aquaculture Science, Barrack Road, The Nothe, Weymouth, Dorset DT4 8UB, UK,* [20]*School of Life Sciences, University of Sussex, Falmer, Brighton BN1 9QG, UK,* [21]*Botanical Society of Britain and Ireland, Natural History Museum, Cromwell Road, London SW7 5BD, UK*

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Abstract

Testing the scheme

- XX experts with relevant invasive non-native species experience
  - e.g. fish eradication, bird and mammal management, aquatic plant management, herptile management, marine management, terrestrial plants management, freshwater invert and terrestrial invert management

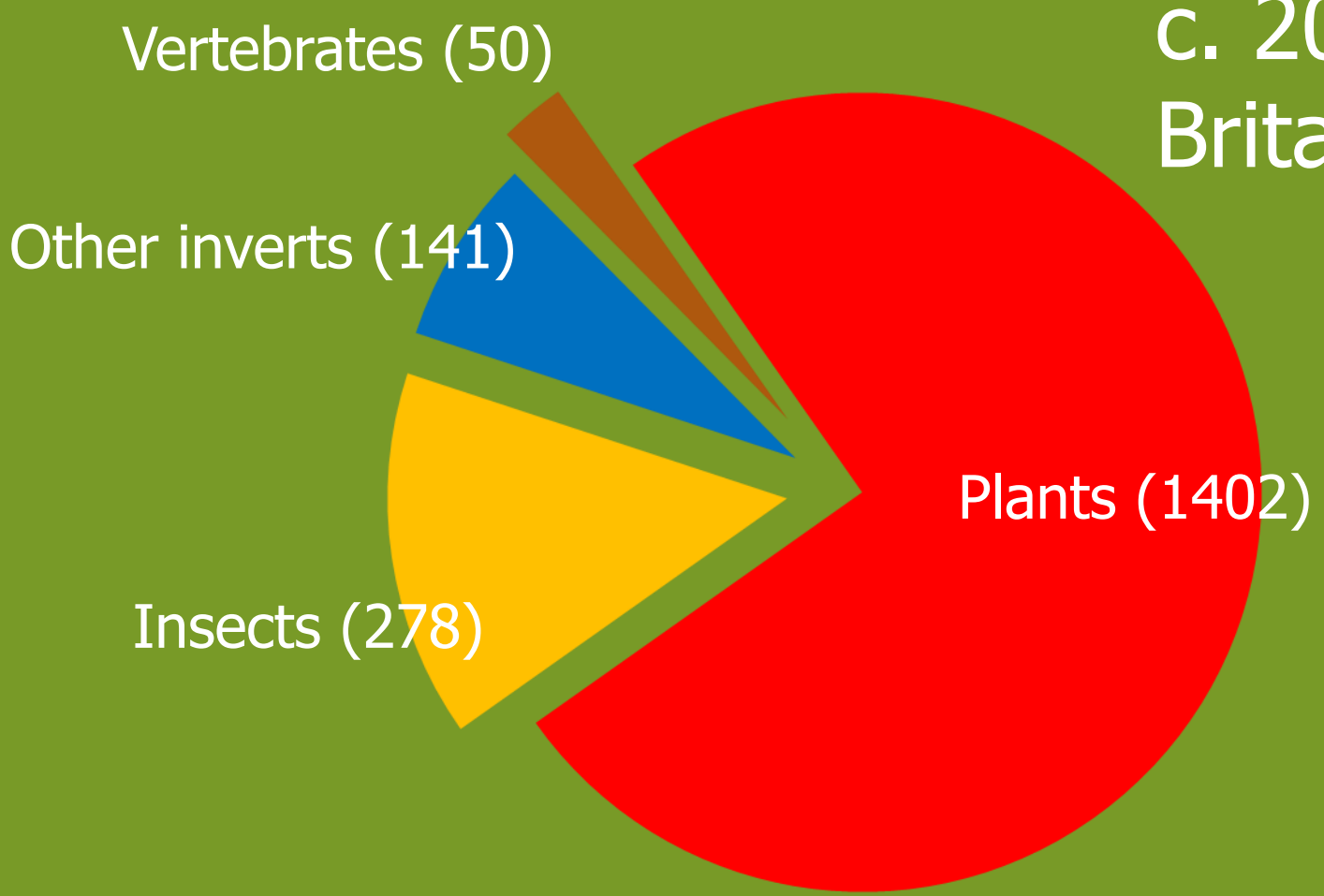
- Grouped according to expertise:
  - Plants
  - Marine
  - Terrestrial animals
  - Freshwater animals

Using the RM scheme

- Robust scores that show the feasibility of eradication for 41 species (here and on the horizon) and the associated issues
  - Clearly documented to help communicate the rational

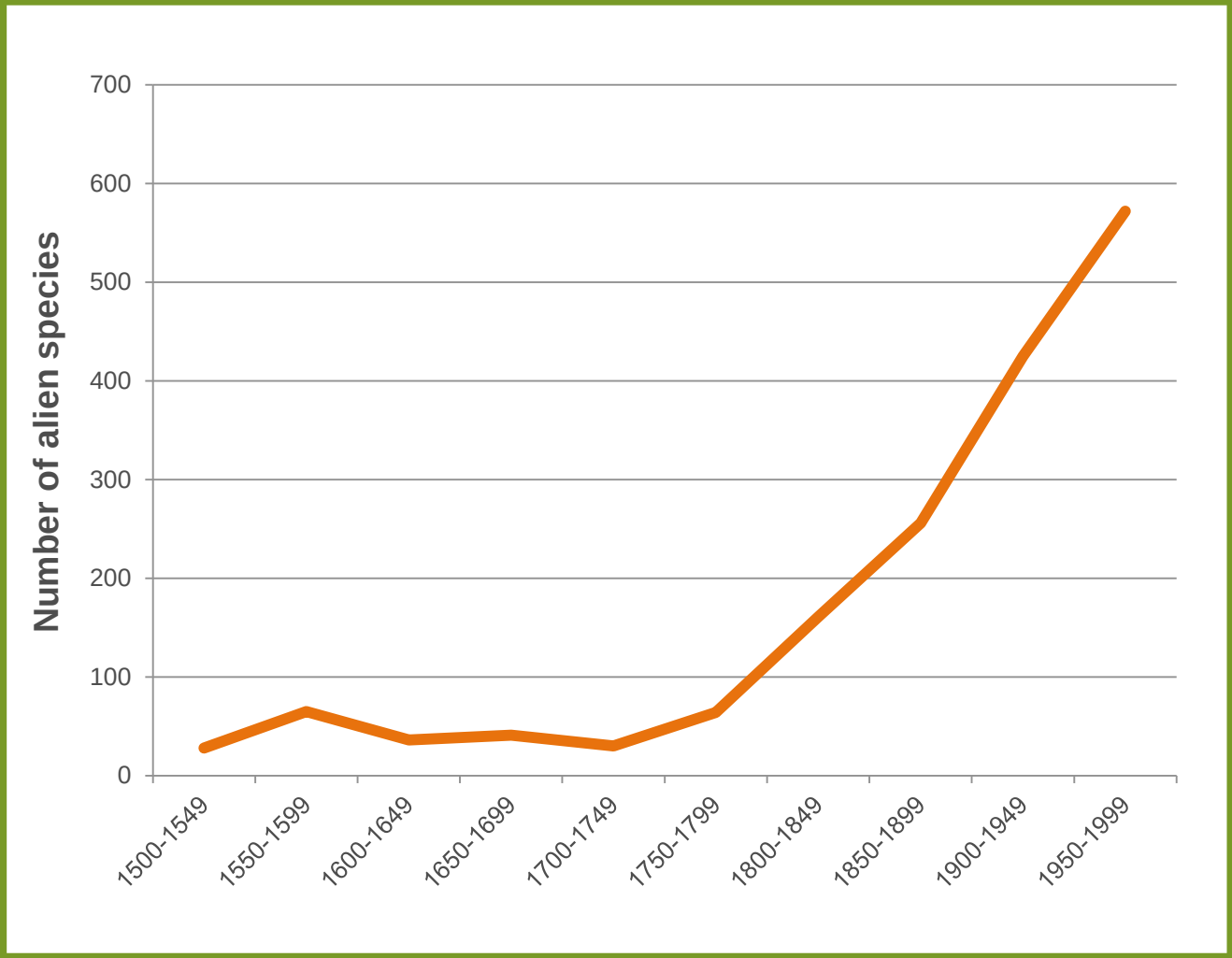
- Ideally need to link these scores with risk in order to give an indication of where priority may lie

Lots of species



c. 2000 in Britain

… more on the way



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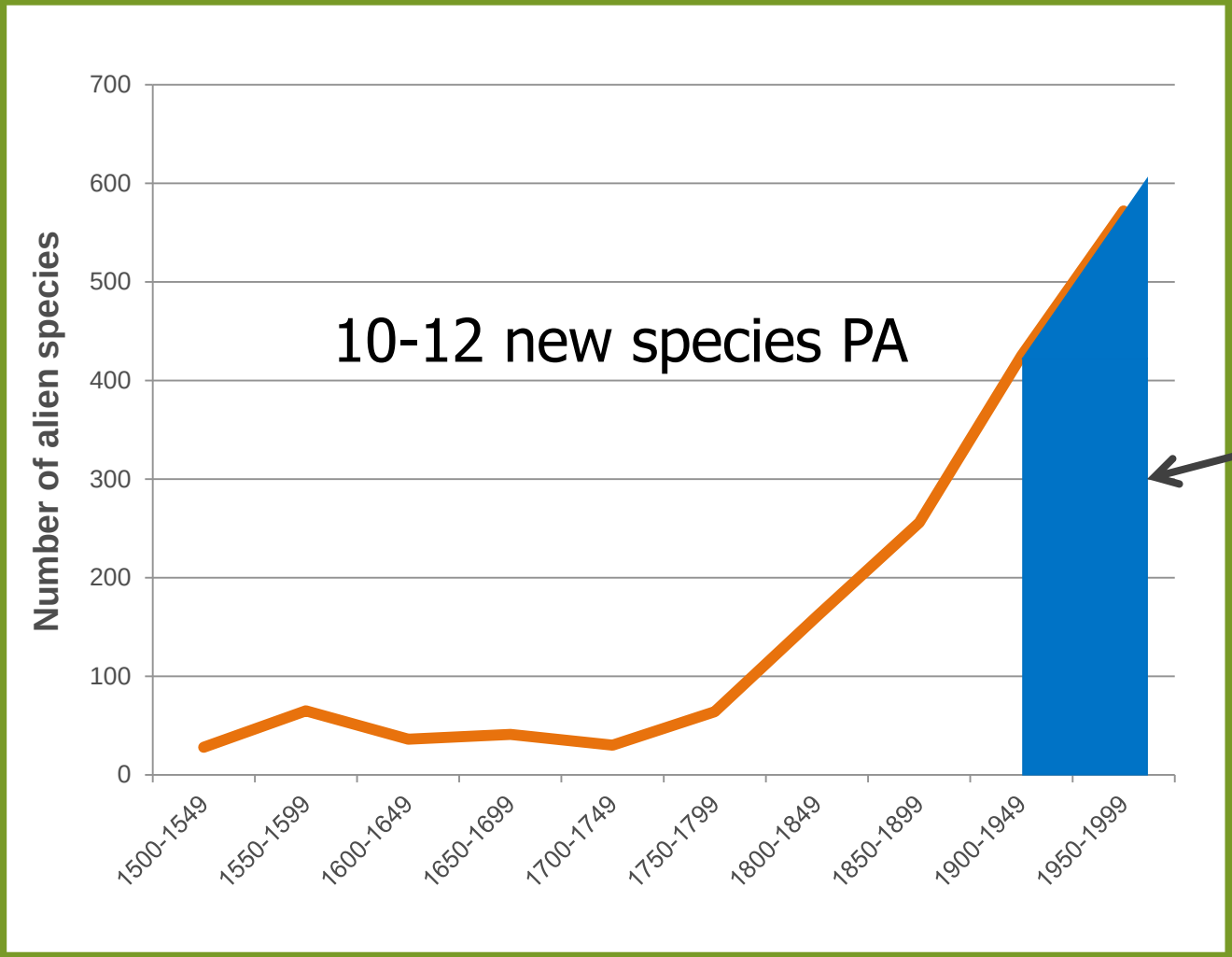

Limited resources