Horizon Scan of invasive alien species for the island of Ireland

Professor Frances Lucy
Eithne Davis

Prevention, Control and Eradication of Invasive Alien Species

What is horizon scanning?

Horizon scanning is the **systematic** process of conducting a **contextualised** search for potential threats and opportunities that need identification, to **inform** future decision-making and policy development (Sutherland et al. 2011; Peyton et.al. 2019)

Aim of the horizon scan

To anticipate which IAS are most likely to arrive and which will cause the greatest impacts, such that preventative action can be taken

The island of Ireland

Northern Ireland

Republic of Ireland

One landmass –
Two separate legal and administrative jurisdictions

Methods

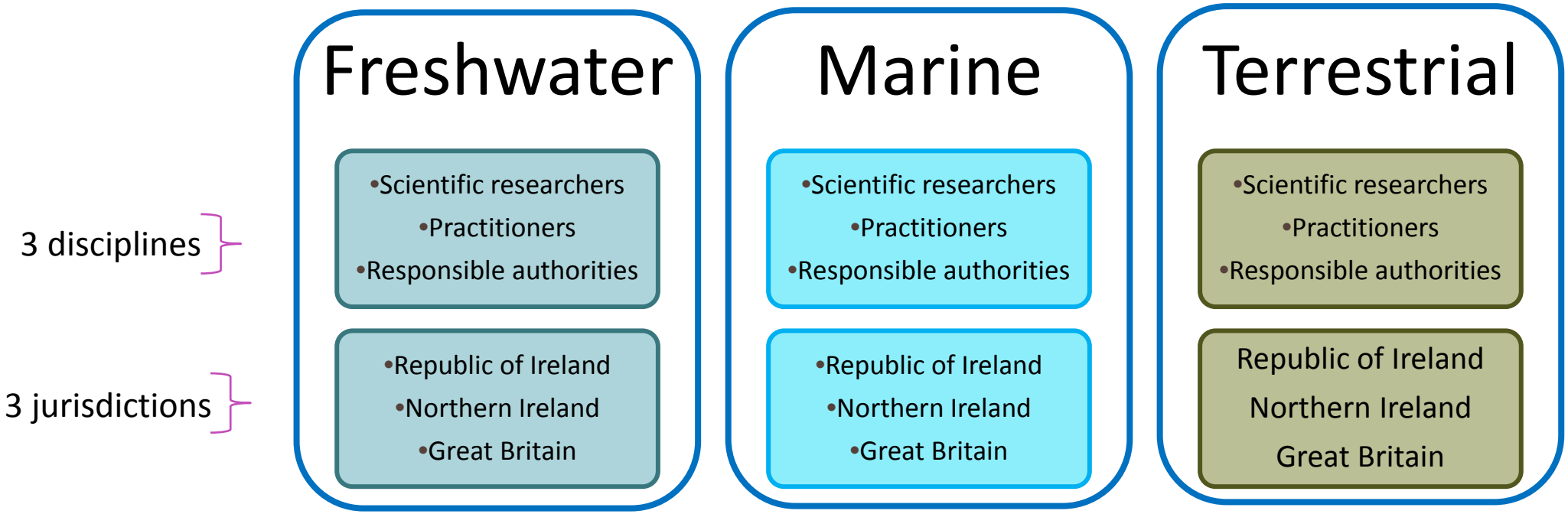
For this horizon scan of IAS, we used an adapted version of the consensus method used by Roy et al. (2014). The process involved **two distinct phases**.

1. **Preliminary consultation** between groups of experts in Freshwater, Terrestrial, and Marine species.
2. **Consensus building** among and between expert groups to provide a ranked list of species mostly likely to invade the island of Ireland, based on the probability of the arrival, establishment and impact of individual species.

23 experts were divided between the three working groups

Each group comprised of between 7-8 experts, including

- group leader
- co-leader/rapporteur
- the core group



In preparation for the workshop:

Lists were collated by the Invasive Species Officer, National Biodiversity Data Centre

348 potentially invasive species for consideration

Lists collated from:

1. Species identified previously as High Risk in the GB horizon scanning for IAS (Roy et al. 2014)
2. Previous Invasive Species Ireland horizon scan
3. Marine list (Minchin 2014)
4. Non-native species Application based Risk Analysis for Ireland (NAPRA 2014) major risk species
5. Species not currently established in Ireland pursuant with the 37 species named in the EU Invasive Alien Species Regulation 1143/2014 and the EU Implementing Regulation (EU) 2016/1141 of 13 July 2016 adopting a list of IAS of Union concern.

In preparation for the workshop:

Scoring methods

Each species was given a score from 1 (very unlikely) to 5 (very likely) under the following topics:

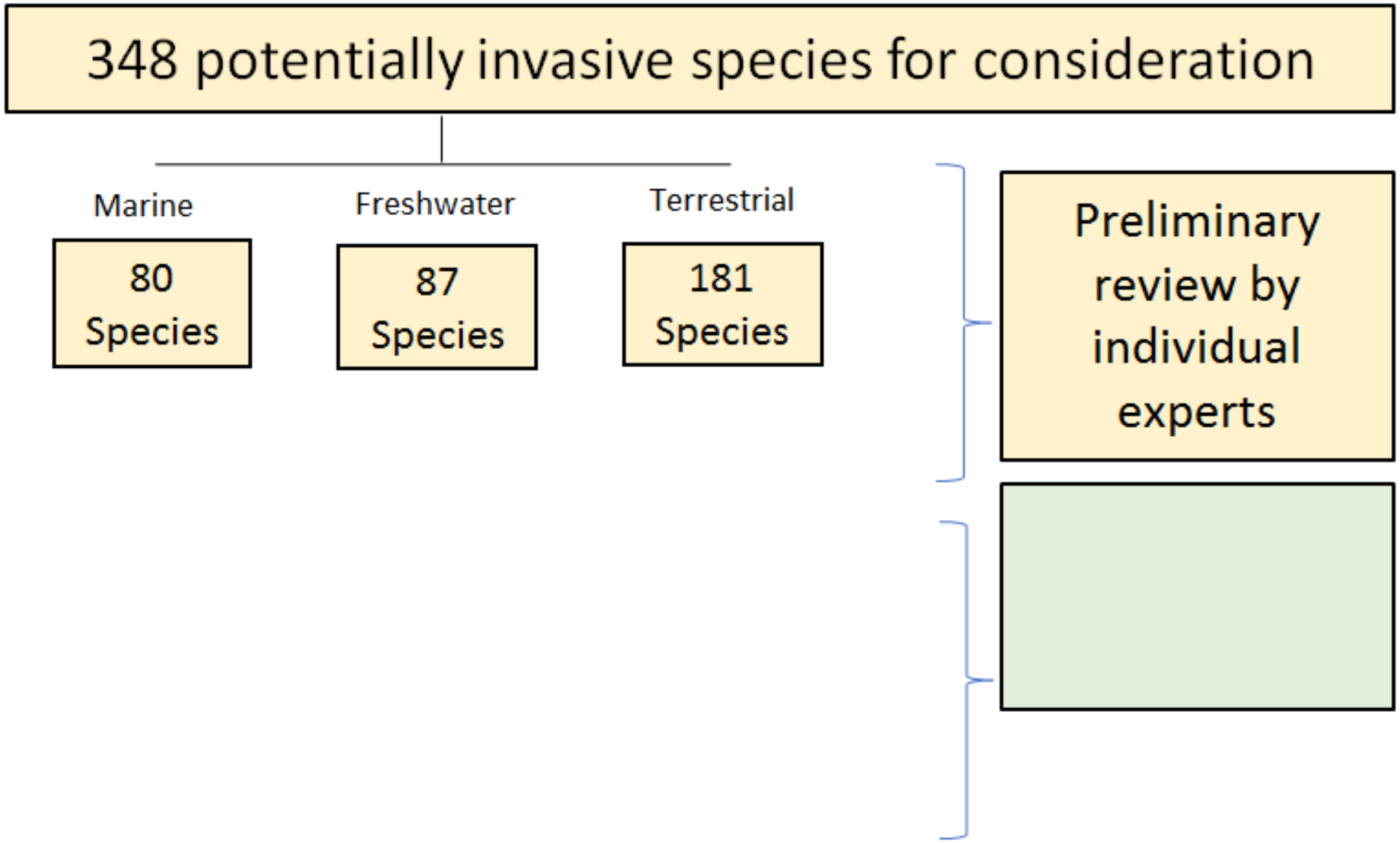
A. Likelihood of **arrival**

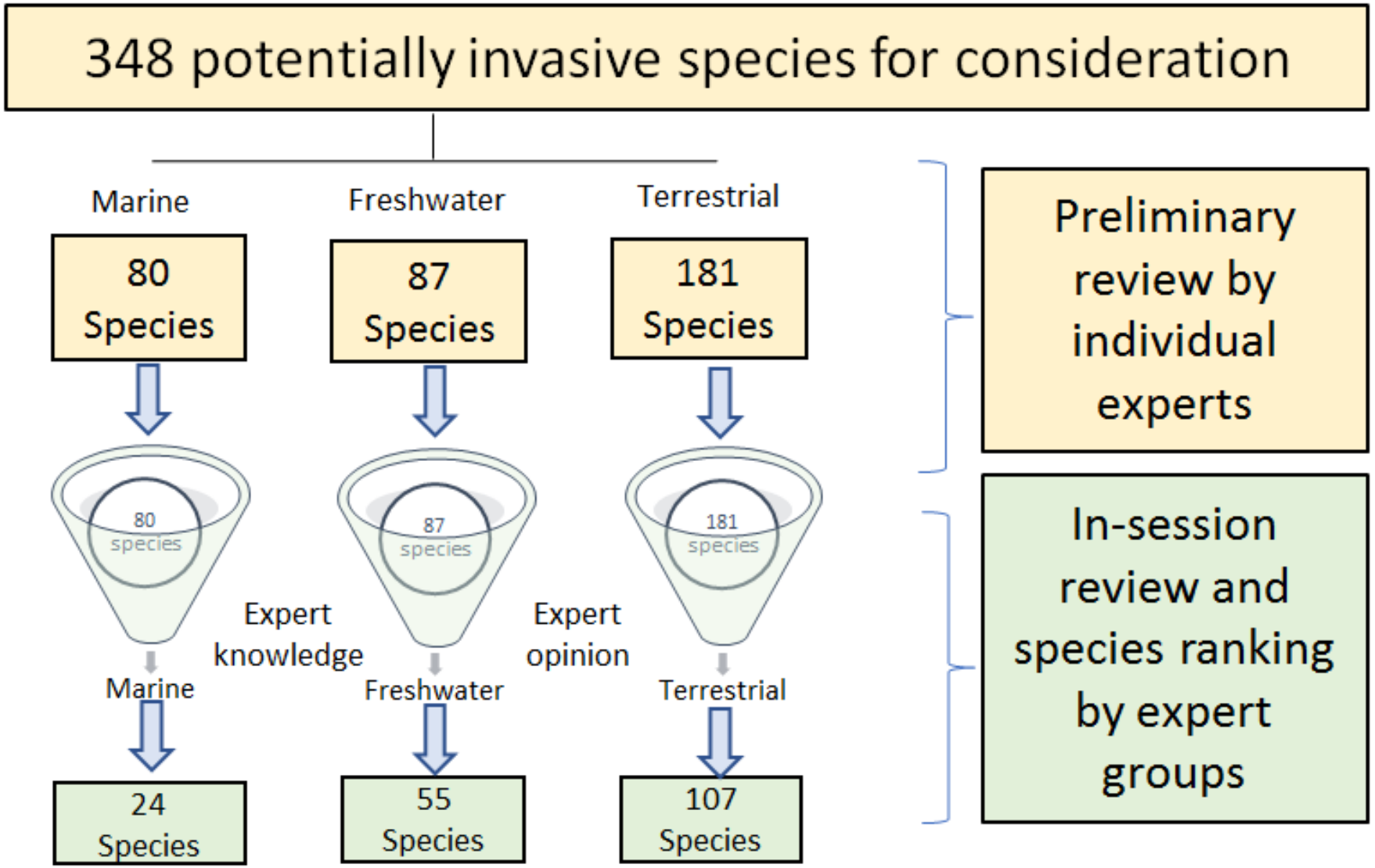
B. Likelihood of **establishment**

C. Likelihood of **impact on biodiversity**

A x B x C = Overall score

Uncertainty was defined as the level of uncertainty on the overall assessment in terms of the quantum and quality of the information available on the particular species and also in terms of the overall uncertainty in the species' assessment (Kelly et al. 2013). This was ranked as low, medium, high and very high, with the most certain invasions as low and the most uncertain as very high.


348 potentially invasive species for consideration
Marine
80 Species
Freshwater
87 Species
Terrestrial
181 Species
Preliminary review by individual experts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Marine
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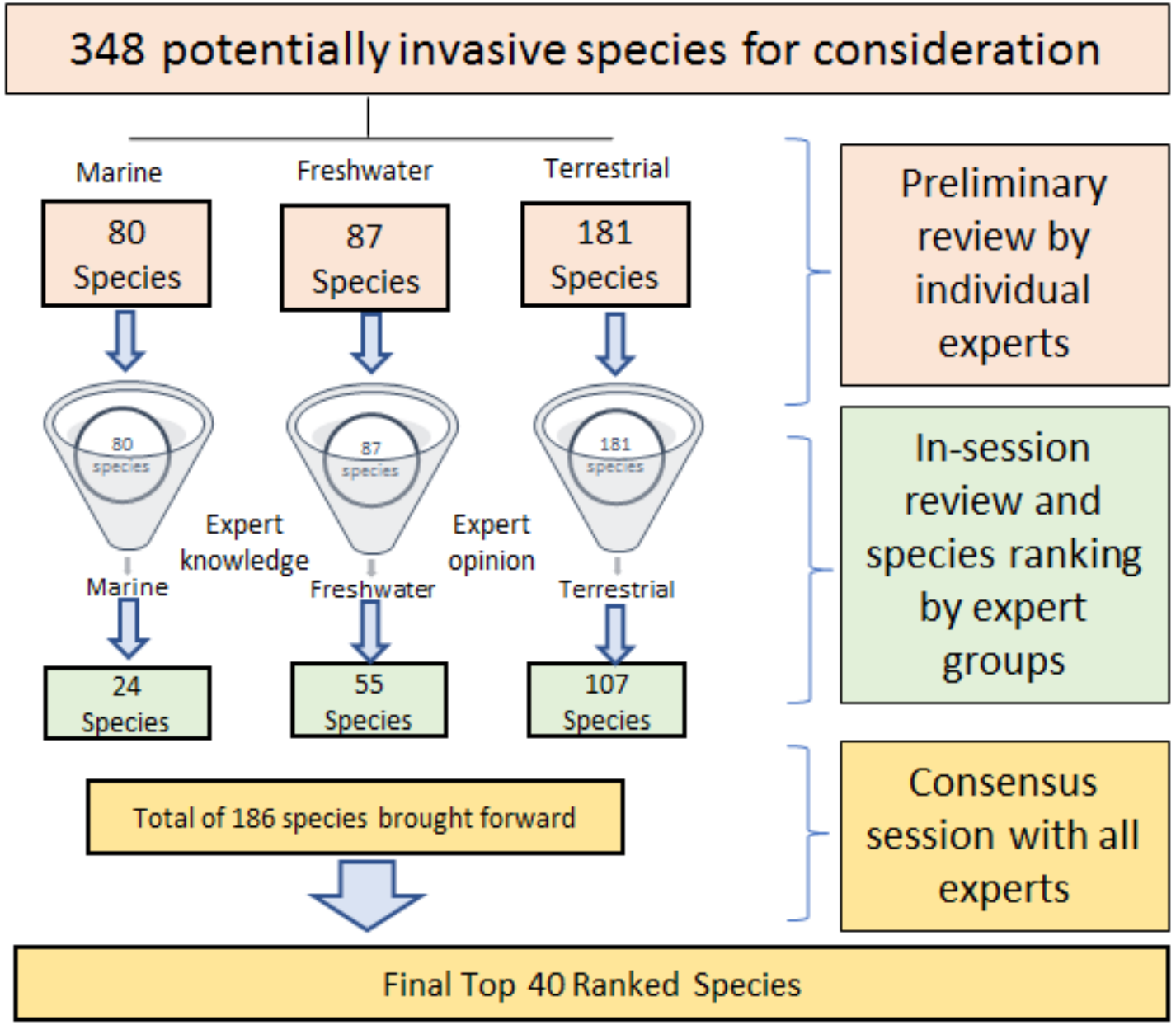
24 Species
55 Species
107 Species
Preliminary review by individual experts
In-session review and species ranking by expert groups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Expert knowledge
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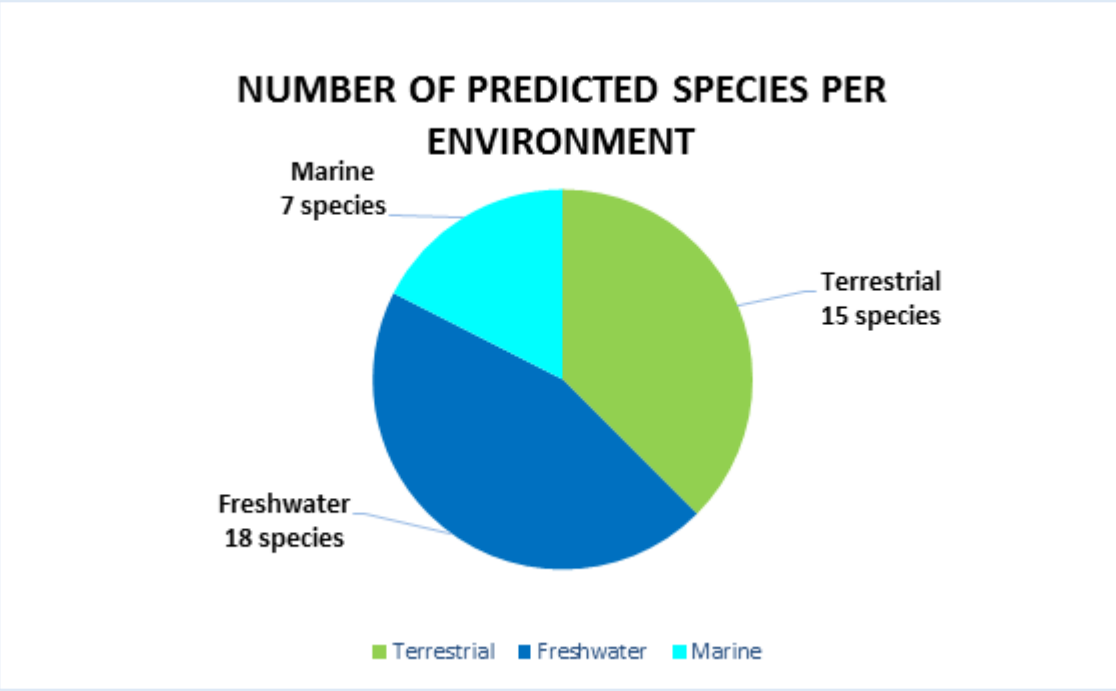
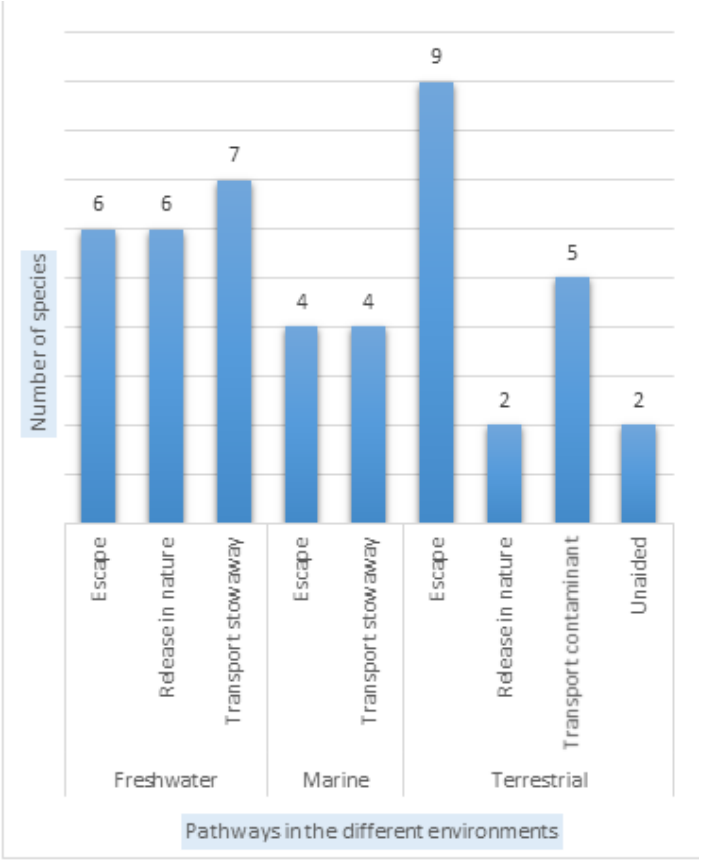
24 Species
55 Species
107 Species
Total of 186 species brought forward
Final Top 40 Ranked Species
Preliminary review by individual experts
In-session review and species ranking by expert groups
Consensus session with all experts



NUMBER OF SPECIES PER FRESHWATER, MARINE AND TERRESTRIAL ENVIRONMENTS



BREAKDOWN OF PATHWAYS IN FRESHWATER, MARINE AND TERRESTRIAL ENVIRONMENTS

(PATHWAYS DEFINED BY IUCN PATHWAYS CODES)

Rank	Species	Common name	Taxonomic Group	Functional Group	Environment	Native Range	Pathway of arrival	A	B	C	PROD	UNCERTAINTY
1	*Pacifastacus leniusculus*	Signal crayfish	Crustacean	Omnivore	Freshwater	North American	M/E/FB; M/E/A; V/TS/FE	5	5	5	125	Low
2	*Capreolus capreolus*	Roe deer	Mammal	Herbivore	Terrestrial	Europe, Middle East	M/R/HW	5	4	5	100	Low
3	*Dikerogammarus villosus*	Killer shrimp	Crustacean	Predator	Freshwater	Ponto-caspian	V/TS/FE	5	4	5	100	Low
4	*Gyrodactylus salaris*	Salmon fluke	Monogenean	Parasite	Freshwater	Baltic Sea	V/TS/FE	4	5	5	100	Low
5	*Hesperibalanus fallax*	Warm-water barnacle	Crustacean	Filter feeder	Marine	Atlantic coast of tropical Africa	V/TS/BW; V/TS/HF	5	5	4	100	Medium
6	*Hydrocotyle ranunculoides*	Floating pennywort	Plant	Primary producer	Freshwater	North and South America, Africa	V/TS/S	5	5	4	100	High
7	*Dreissena rostriformis bugensis*	Quagga mussel	Mollusc	Filter feeder	Freshwater	Ponto Caspian	V/TS/S	4	4	5	80	Low
8	*Caulacanthus okamurae*	Pom-pom weed	Alga	Primary producer	Marine	Japan, NW Pacific	M/E/A	5	5	3	75	low
9	*Eriocheir sinensis*	Chinese mitten crab	Crustacean	Predator	Freshwater	Eastern Asia	V/TS/S	5	3	5	75	low
10	*Pseudorasbora parva*	Topmouth gudgeon; Stone moroko	Crustacean	Predator	Freshwater	NW Pacific	V/TS/FE	3	5	5	75	Medium

1. *Pacifastacus leniusculus*

2. Capreolus capreolus

3. Dikerogammarus villosus

4. Gyrodactylus salaris

5. Hesperibalanus fallax

6. Pacifastacus leniusculus

7. Dreissena rostriformis bugensis

8. Caulacanthus okamurae

9. Eriocheir sinensis

10 Pseudorasbora parva

TOP TEN PREDICTED INVASIVE ALIEN SPECIES FOR IRELAND - 2017

1. AMERICAN SIGNAL CRAYFISH

Pacifastacus leniusculus

PHOTO CREDIT: LORNE GILL/SCOTTISH NATURAL HERITAGE; PACIFASTACUS LENIUSCULUS 2.JPG, © MDE AT WIKIMEDIA COMMONS, CC-BY-SA 3.0

Pacifastacus leniusculus (North American signal crayfish) is the most widespread alien crayfish in Europe (29 invaded territories, UK included), introduced for stocking and aquaculture purposes. It is omnivorous, highly prolific (up to 400 eggs per female) and is adaptable to a wide range of environments. It can live up to 20 years, being sexually mature at the age of 2-3 years. It carries the crayfish plague (*Aphanomyces astaci*), lethal for native crayfish. Ireland has an important native population of *Austropotamobius pallipes* (Whiteclawed crayfish), which has a 100% mortality rate with crayfish plague. Its feeding habits, burrowing activity, reproductive rate and aggressiveness has a highly destructive effect on invaded ecosystems, outcompeting native crayfish, reducing local biodiversity and stability of river banks. Its management is challenging (an integrated approach is recommended), thus prevention of its introduction is recommended as the most practical approach.

- LIKELIHOOD OF INTRODUCTION -5
- LIKELIHOOD OF ESTABLISHMENT -5
- LIKELY IMPACT ON BIODIVERSITY -5
- LEVEL OF UNCERTAINTY -LOW

Current distribution (www.cabi.org)

- NATIVE RANGE - NORTH AMERICA
- PATHWAY – ANGLING
- VECTORS - CONTAMINATED EQUIPMENT

Profile created for each of the Top Ten species

Horizon scanning

……is about predicting the arrival, establishment, spread and impact of new IAS

- **In order to**

- comply with legislation (EU 1143/2014)
- mitigate the environmental and economic impacts associated with an established IAS.

This information can then be promptly used to direct policy and target resources, on a national or cross-jurisdictional level, towards prevention, early detection and rapid response for the most impactful IAS.

Thanks for listening!

Happy to answer your questions – now or during the rest of the week

Professor Frances Lucy
Eithne Davis

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