Facing aquatic invasive species in Europe: from research to policy

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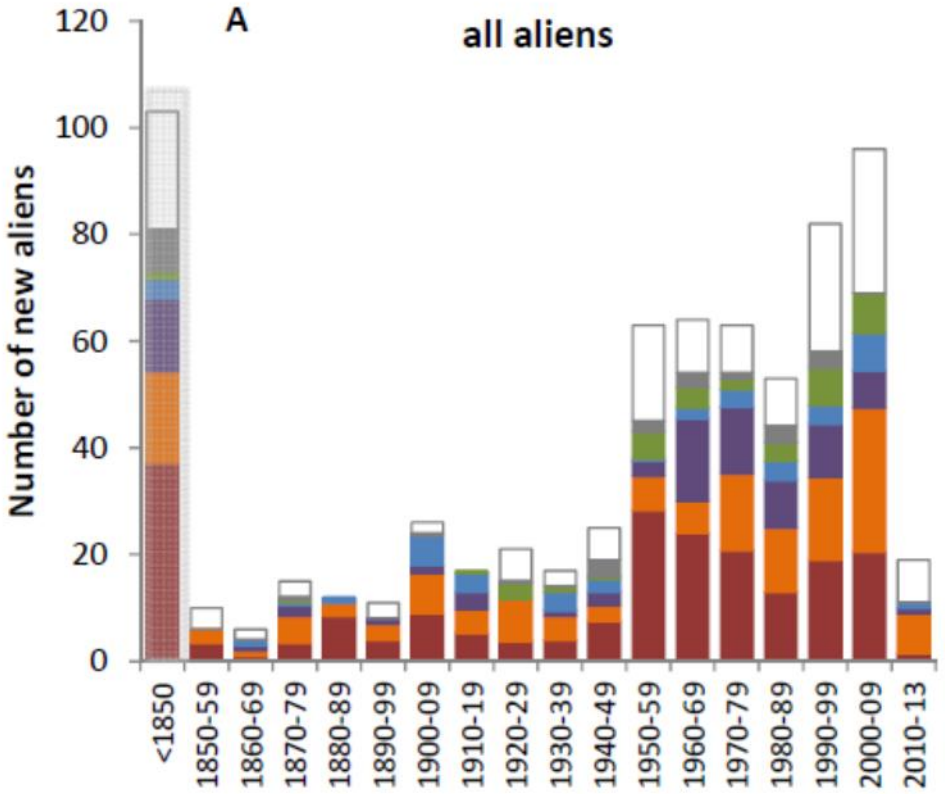
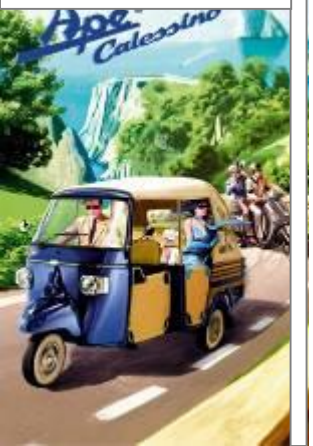
Europe is a hot spot for alien species

- It hosts more than 14,000 alien species (DAISIE 2009 and updates) with ecological impacts recorded for 11%, economic impacts for 13% (Vilà et al. 2010).
- There was an increase of 76% between 1970 and 2007 (Butchart et al. 2010).

Introductions of freshwater alien species have been continuously increasing throughout the years, especially in the last 60 years.



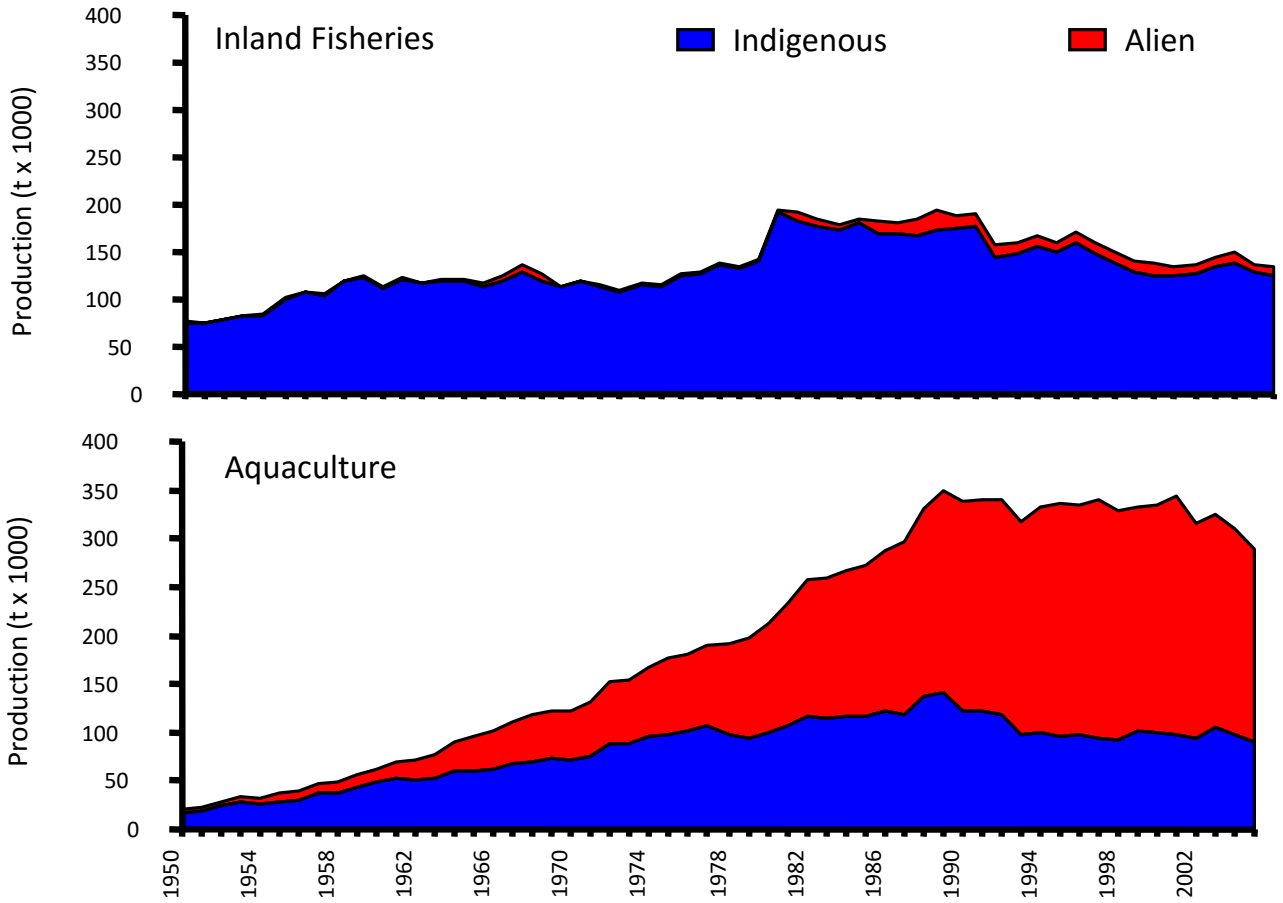
Nunes et al. 2015



In the last years, the introductions are increasing for…

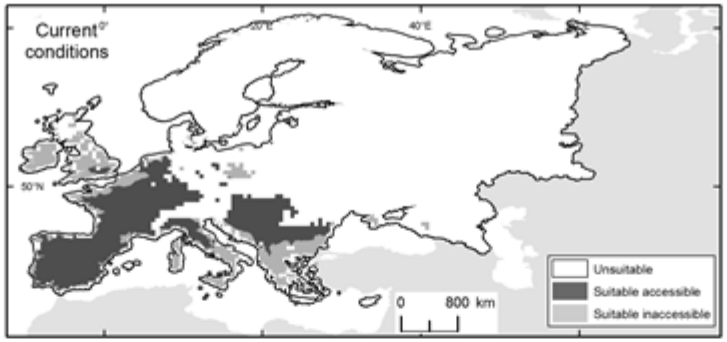
- human population growth (and thus trade);
- free circulation of goods (less control on trade);
- many vectors of introductions;
- lacking or insufficient or late legislation;
- little awareness among people.

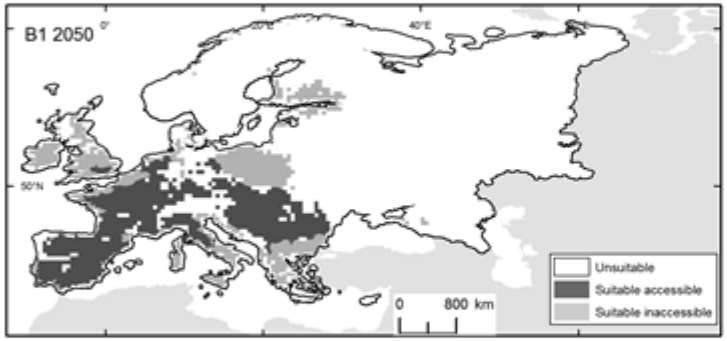
New advances in aquaculture: native and alien fishes in fisheries and aquaculture in European fresh waters.

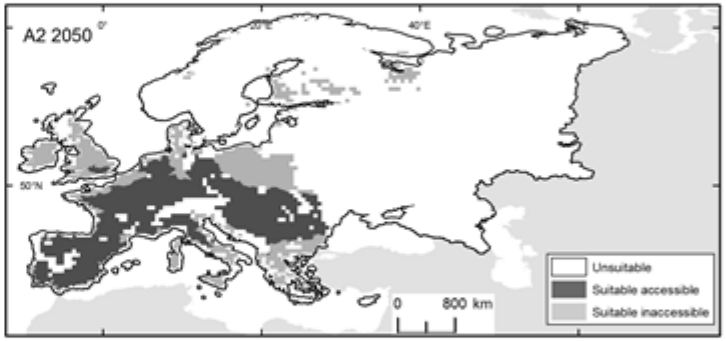


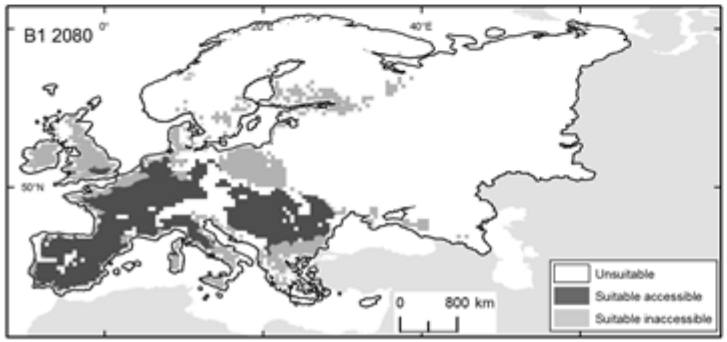
The opening of major inland waterway canals in Europe (>28,000 km of navigable rivers and constructed canals).

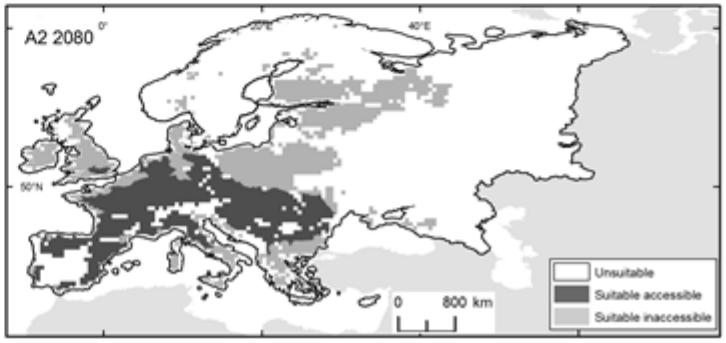
Climate change





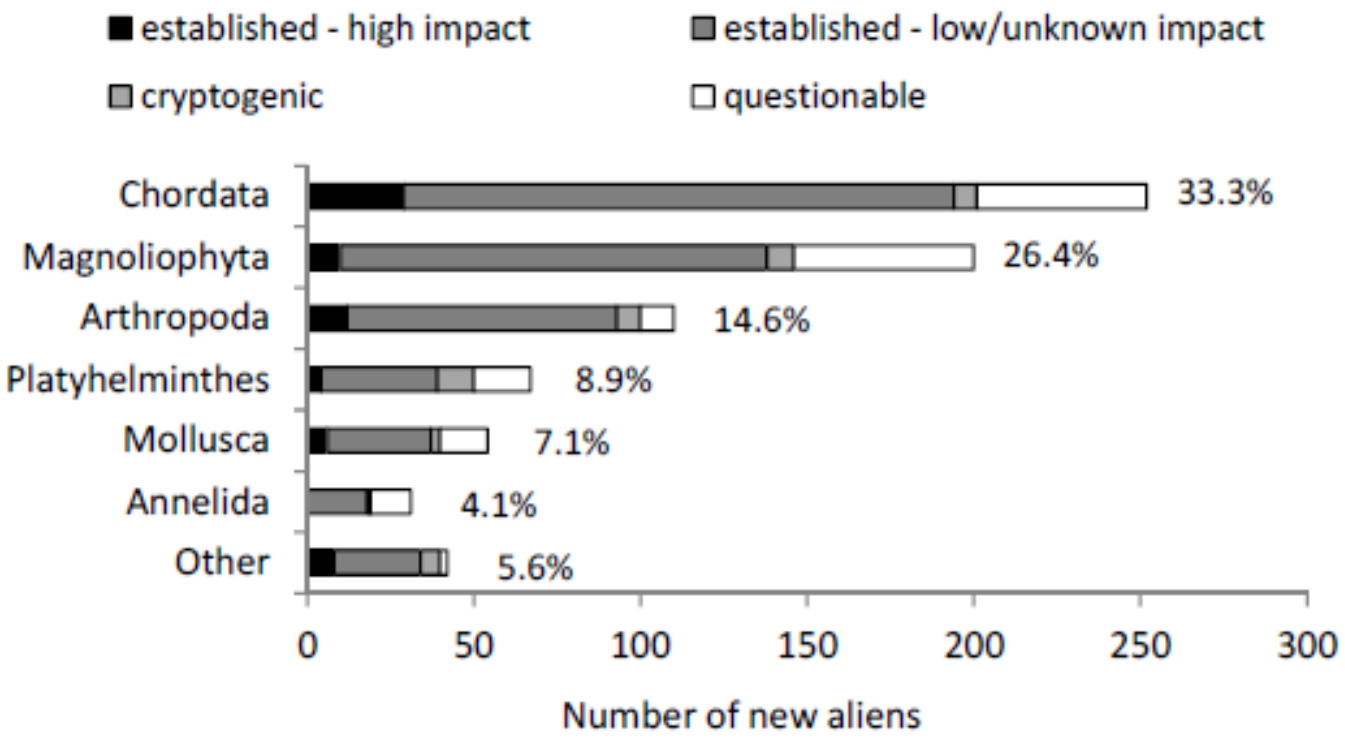




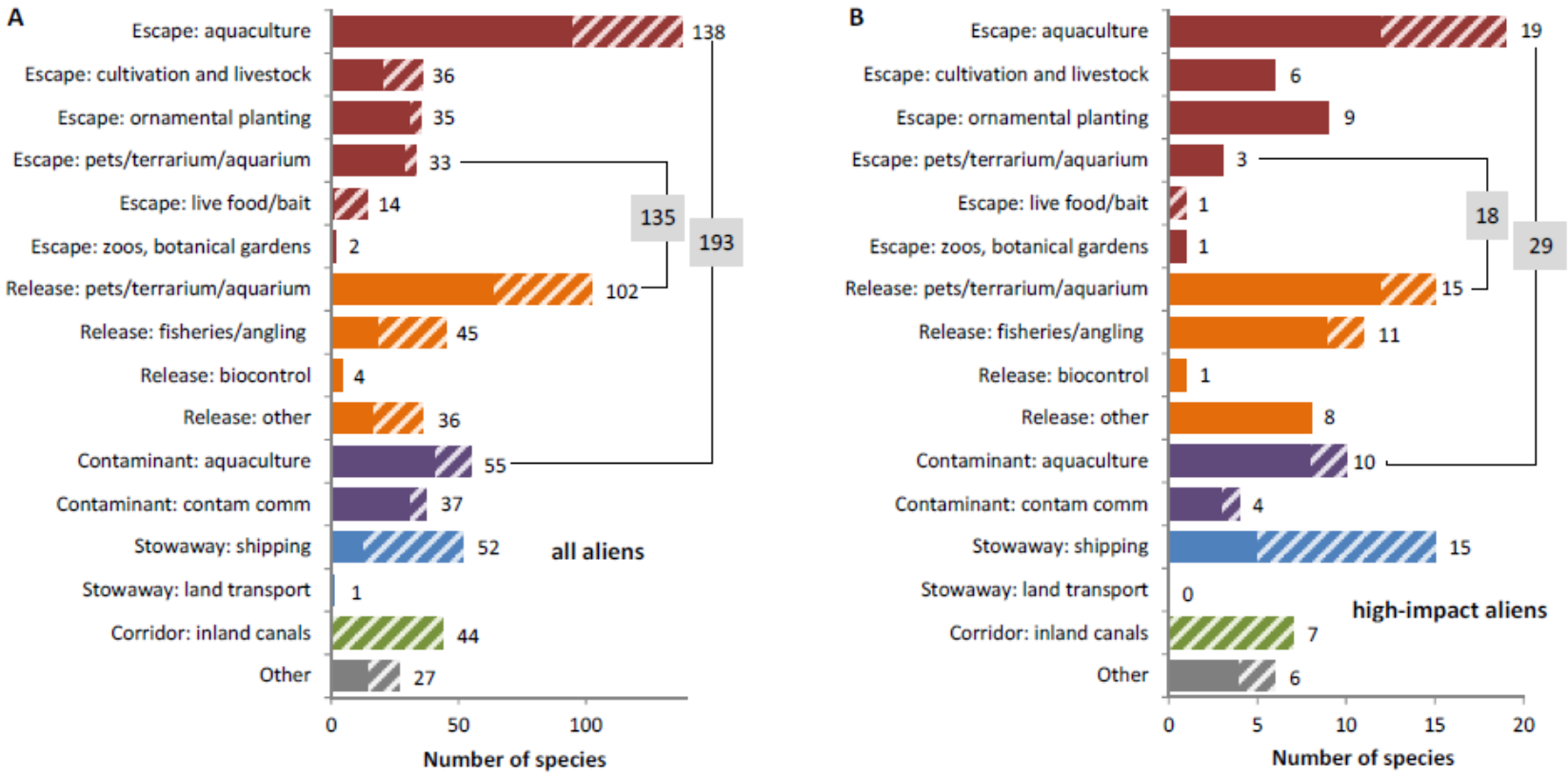


Capinha et al. 2013

In Europe, there are 756 alien freshwater species (49 % partly native to Europe; Nunes et al. 2015).



Species were introduced mainly through aquaculture, pet/aquarium trade and stocking activities (Nunes et al. 2015).



The pet/aquarium/terrarium trade, a pathway that has been usually received less attention, especially in Europe, represents a multi-billion dollar industry responsible for the introduction of numerous alien plants, fishes and invertebrates worldwide (Padilla & Williams 2004; Maceda-Veiga et al. 2013).

- The fungus *Batrachochytrium salamandrivorans* has already caused rapid declines in the European fire salamander populations.
- Its DNA suggests that the fungus is long-term endemic to Asia, with a recent incursion to Europe, where it has caused severe outbreaks in Belgium and the Netherlands.
- The cause behind the introduction of the fungus is suggested to be pet trade in Asian salamanders and newts, as they are traded in large numbers annually.

Internet trade: the last frontier

Table 1. List of invasive and potential invasive plant (P) and animal (A) species for Italy sold in the online shops. NA: North America, NCA=North-Central America, CSA=Central-South America, SA=South America.

P/A	Species	Origin	Pathway of introduction	Impact	Average price (€)	No. shops	Status in Italy	References	Notes
P	*Pistia stratiotes*	SA	ornamental	ecological, economic	3.6	1	emerging invasive	Celesti-Grapow et al. (2009)	
P	*Eichornia crassipes*	SA	ornamental	ecological, economic, social	6	2	emerging invasive	Celesti-Grapow et al. (2009)	
P	*Myriophyllum aquaticum*	SA	ornamental	ecological, economic, social	5	2	emerging invasive	Celesti-Grapow et al. (2009)	
P	*Bacopa monnieri*	Pantropical Subtropics	ornamental, other	ecological	3.8	2	absent	Celesti-Grapow et al. (2009)	potential invasive
P	*Hygrophila polysperma*	Asia	ornamental	ecological, economic	4.8	1	absent	Celesti-Grapow et al. (2009)	potential invasive
P	*Cabomba caroliniana*	SA	ornamental, shipping, trade	ecological, economic, social	5	3	absent	Celesti-Grapow et al. (2009)	potential invasive
A	*Xenopus laevis*	Africa	ornamental, research	ecological	6	3	invasive	Lillo et al. (2005)	
A	*Procambarus clarkii*	NCA	ornamental, culture, angling, biocontrol, smuggling	ecological, economic, social	10	2	invasive	Gherardi (2006)	
A	*Trachemys scripta*	NA	ornamental	ecological, social	16	1	invasive	Gherardi et al. (2008)	
A	*Gambusia holbrooki*	NA	biocontrol, ornamental	ecological	3	1	invasive	Gherardi et al. (2008)	
A	*Pomacea canaliculata*	CSA	culture, ornamental, smuggling	ecological, economic, social	2.9	1	absent	www.issg.org	potential invasive
A	*Xiphophorus maculatus*	NCA	ornamental	ecological	1.9	8	absent	www.fishbase.org	potential invasive
A	*Neocaridina davidii*	Asia	angling, ornamental	ecological	6.2	3	absent	Quante 2009	potential invasive

Mazza et al. 2015

www.shrimpfever.com

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The Canadian Shrimp Connection

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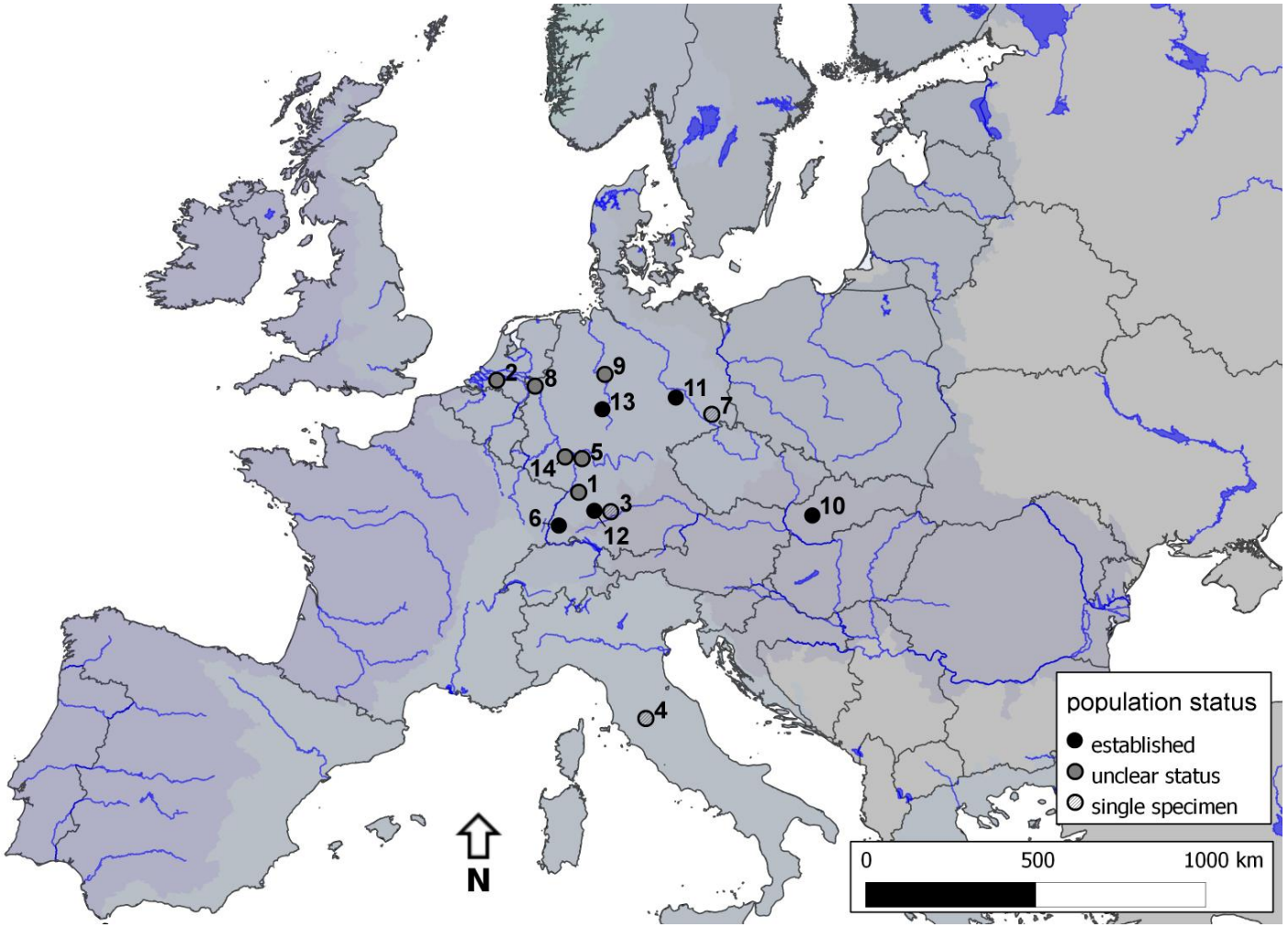
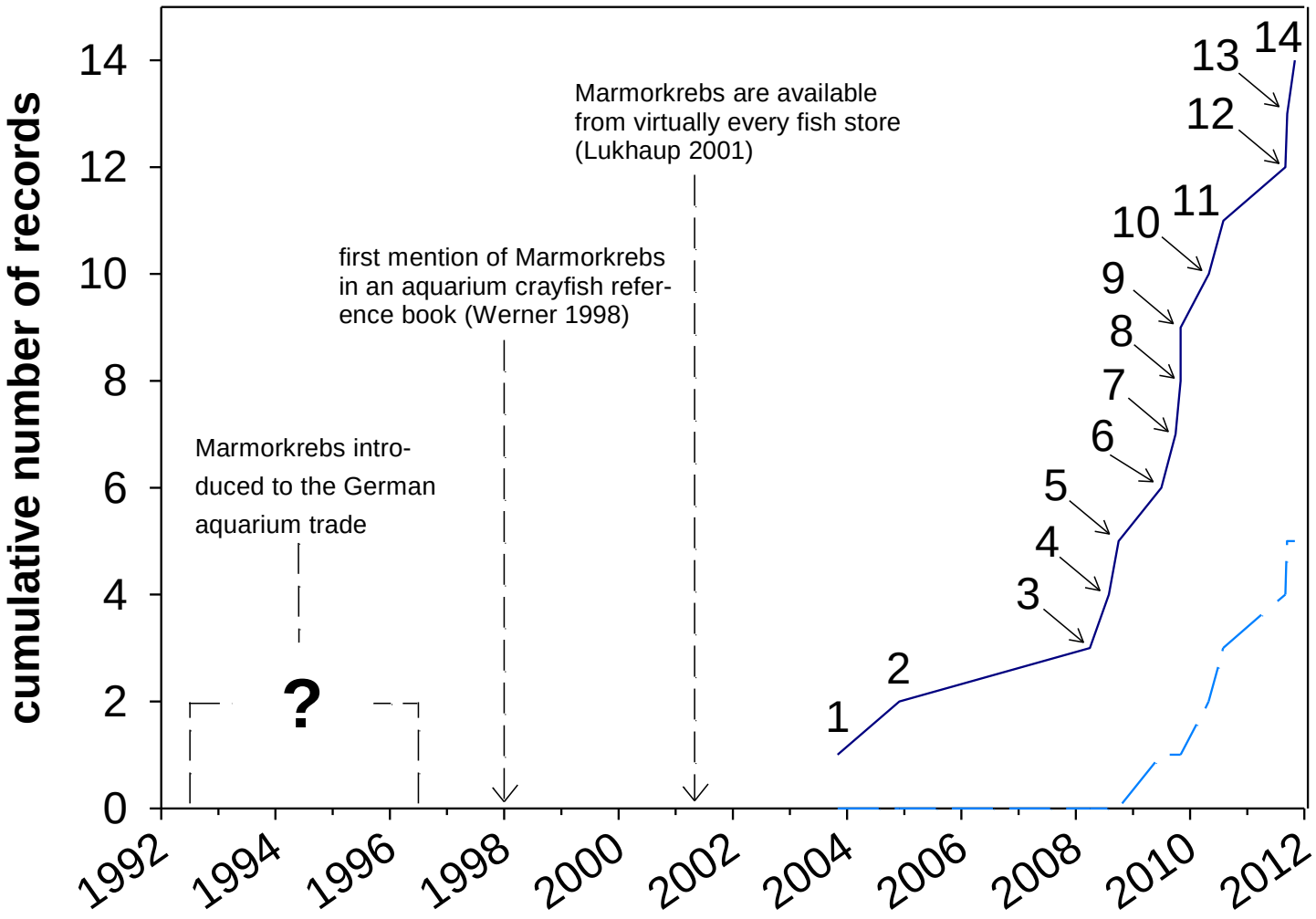
Marmorkrebs
(*Procambarus fallax* f. *virginalis*)

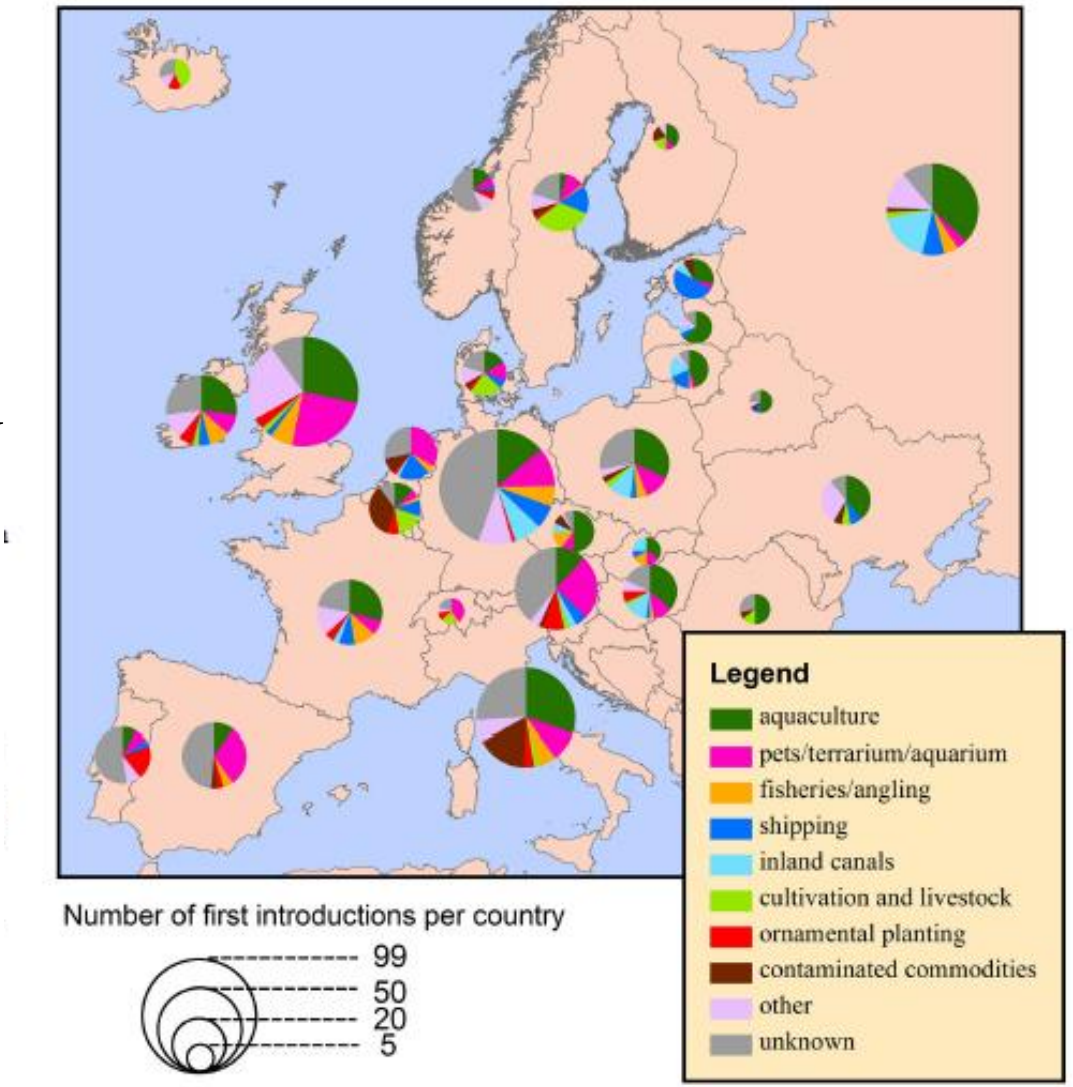


Chucholl et al. 2012

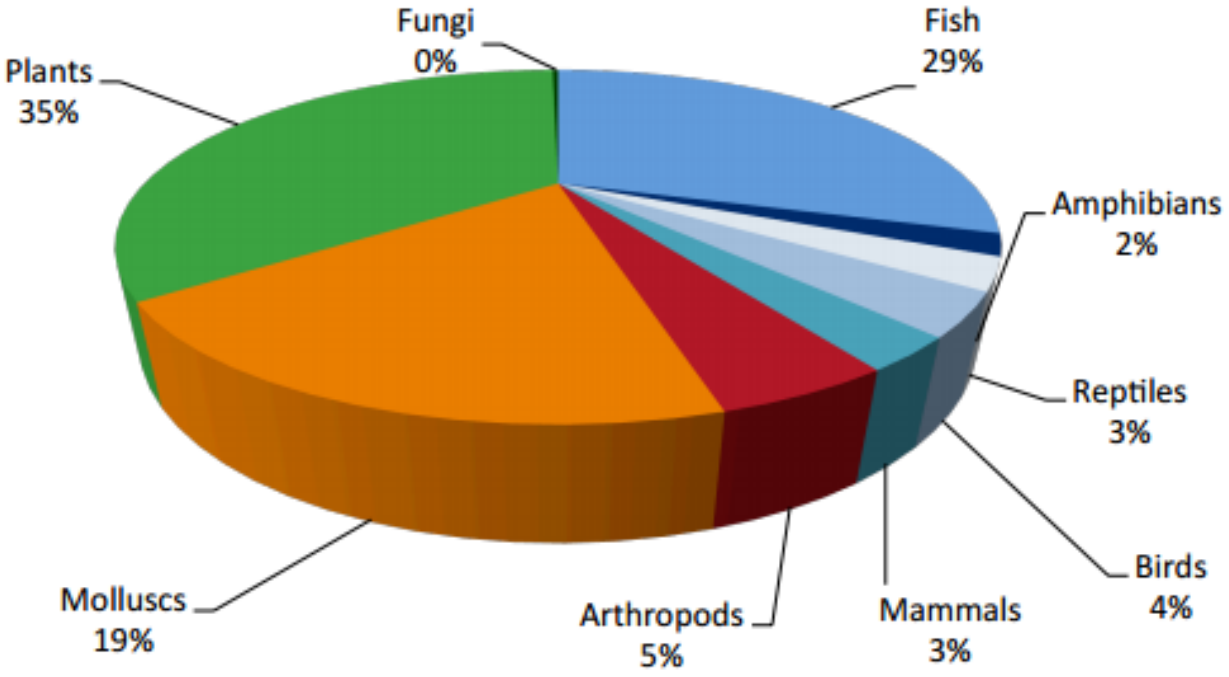


Chucholl et al. 2012

Germany, the United Kingdom and Italy are the main entry gateway of freshwater alien species (Nunes et al. 2015).



Percentage of native European species affected by invasive alien species (IAS) for the main taxonomic groups (Genovesi et al. 2015).



How to face the problem?

Europe promoted
several projects on IAS to increase the knowledge (and provide some useful tools).

DAISIE
(2003-2007; 6th European Framework)

Home | 100 of the Worst | About DAISIE | Search Species | Search Region | Search Experts | Register as an expert | European Summary

Delivering Alien Invasive Species Inventories for Europe

» **Arion vulgaris**
one of the 100 worst alien species in Europe, click **here** to see the full list.

Delivering Alien Invasive Species Inventories for Europe

Biological invasions by non-native or 'alien' species are one of the greatest threats to the ecological and economic well-being of the planet. Alien species can act as vectors for new diseases, alter ecosystem processes, change biodiversity, disrupt cultural landscapes, reduce the value of land and water for human activities and cause other socio-economic consequences for man.

To help those tackling the invasive species challenge, this website provides a 'one-stop-shop' for information on biological invasions in Europe. Please note that the DAISIE database behind this website is continually being updated. Read more about DAISIE.

DAISIE Handbook of alien species in Europe available

Search Species

Search for information on one of the 12122 alien species occurring in Europe.

Search Regions

Search regions to explore the alien species threats across Europe, for 79 inland and 57 coastal and marine areas.

Search Experts

Search for one of the 2440 experts on biological invasions in Europe





100 *worst species* (DAISIE)

Anguillicola crassus	**Anguillicolidae**
Aphanomyces astaci	**Saprolegniaceae**
Cercopagis pengoi	**Cercopagididae**
Corbicula fluminea	**Corbiculidae**
Cordylophora caspia	**Clavidae**
Crassula helmsii	**Crassulaceae**
Dikerogammarus villosus	**Pontogammaridae**
Dreissena polymorpha	**Dreissenidae**
Elodea canadensis	**Hydrocharitaceae**
Eriocheir sinensis	**Varunidae**
Gyrodactylus salaris	**Gyrodactylidae**
Mnemiopsis leidyi	**Bolinopsidae**
Neogobius melanostomus	**Gobiidae**
Procambarus clarkii	**Cambaridae**
Pseudorasbora parva	**Cyprinidae**
Salvelinus fontinalis	**Salmonidae**

IMPASSE
(2006-2008; 6th European Framework)

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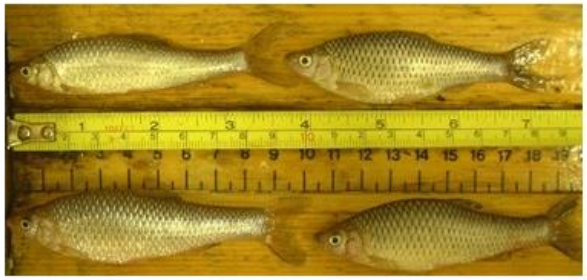
Environmental Impacts of Alien Species in Aquaculture (IMPASSE)

Last updated on 21/03/2016 Print this page

The IMPASSE project is a CA designed to support the Community provisions concerning alien and locally absent species in aquaculture (see COM (2006) 154, 4.4.2006).



IMPASSE

- Objectives
- Work Packages
- Partners
- Documents

COST ACTION TD1209: European Information System for Alien Species 2013-2017

http://www.brc.ac.uk/alien-challenge/home

General aim: facilitate enhanced knowledge gathering and sharing through a network of experts, providing support to a European Invasive Alien Species (IAS) information system which will enable effective and informed decision-making in relation to IAS.

Objective 1: Identify needs and formats for an Early Warning and Rapid Response (EWRR) System.

Objective 2: Review of pathways and priority species aligning with Strategic Goal B, target 9 of the CBD COP 10 Decision X/2

Objective 3: Review IAS impacts in Europe and impact assessment methods, propose standardized assessment methods and assess present and expected impacts of priority IAS species.

Objective 4: Explore existing data gaps in harmonisation and validation of information distributed in available sources in order to increase interoperability of data across the terrestrial, freshwater and marine environments. Identify needs and formats for IAS information by different user groups.

Aquainvad-ED
Innovative Training Network

Marie Curie 2014 ITN H2020 Aquainvad-ED (AQUAtic INVaders: Early Detection, Control and Management; 2015-2019; http://www.aquainvad-ed.com/)

Main aim: exploit novel tools combined with the power of crowd data sourcing (citizen science) to develop innovative methods for early detection, control and management of aquatic invasive species.

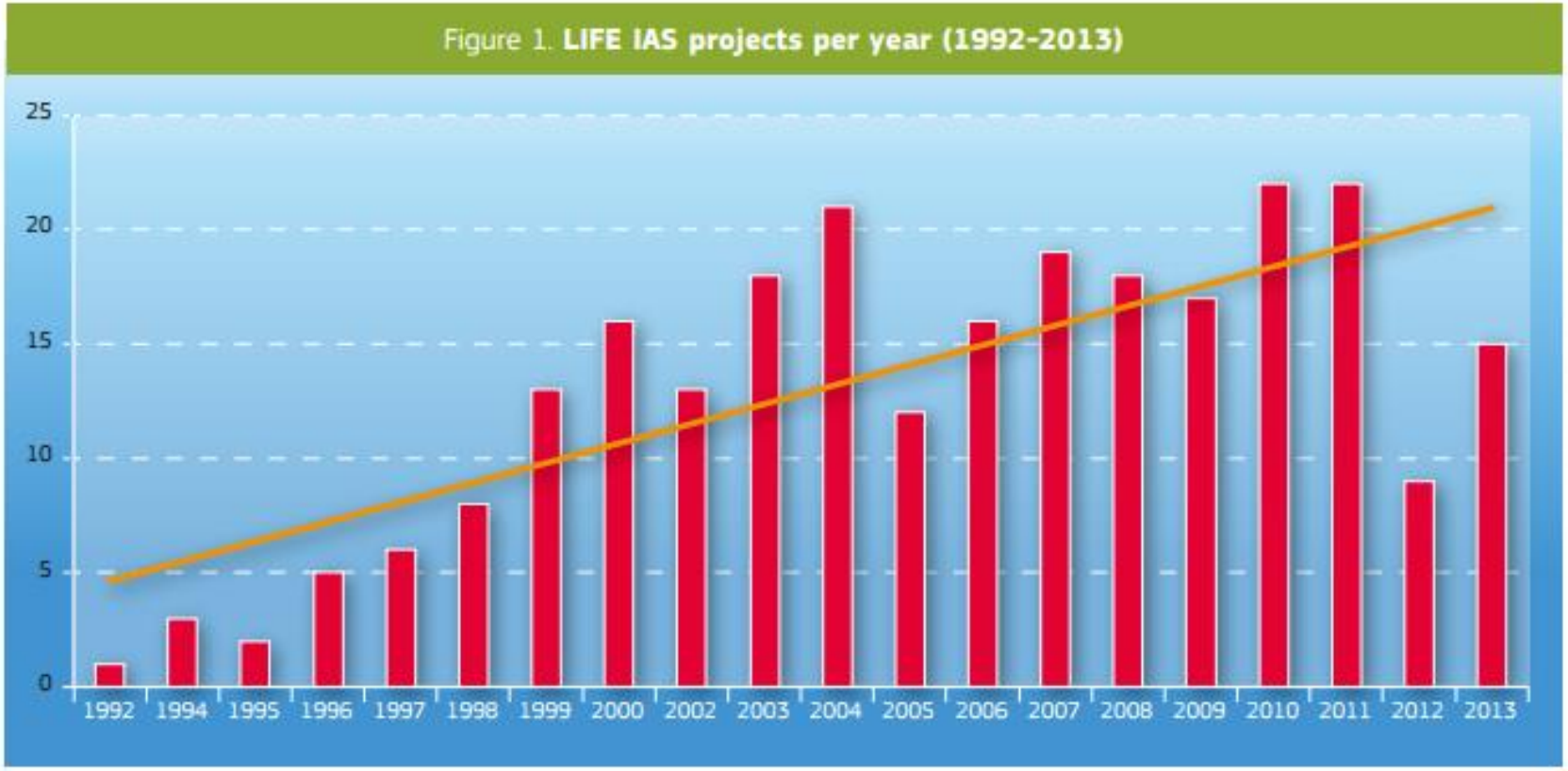
Europe promoted several LIFE projects on IAS for their management (promoting new techniques).

- Established in 1992, the LIFE program is the EU's funding instrument for supporting environmental, nature conservation and climate action projects throughout the EU (=concrete actions).
- In the last 20 years (even if there was not a specific strategy or regulation), 256 projects (52% exclusively on IAS) were financed to manage alien invasive species and mitigate their impacts in order to protect native species and ecosystems of conservation concern.

To date, the overwhelming majority (97%) of LIFE projects have focused on the eradication and management of IAS already established, with prevention (2%) and early detection and rapid eradication (1% of projects) only recently becoming areas of concern.

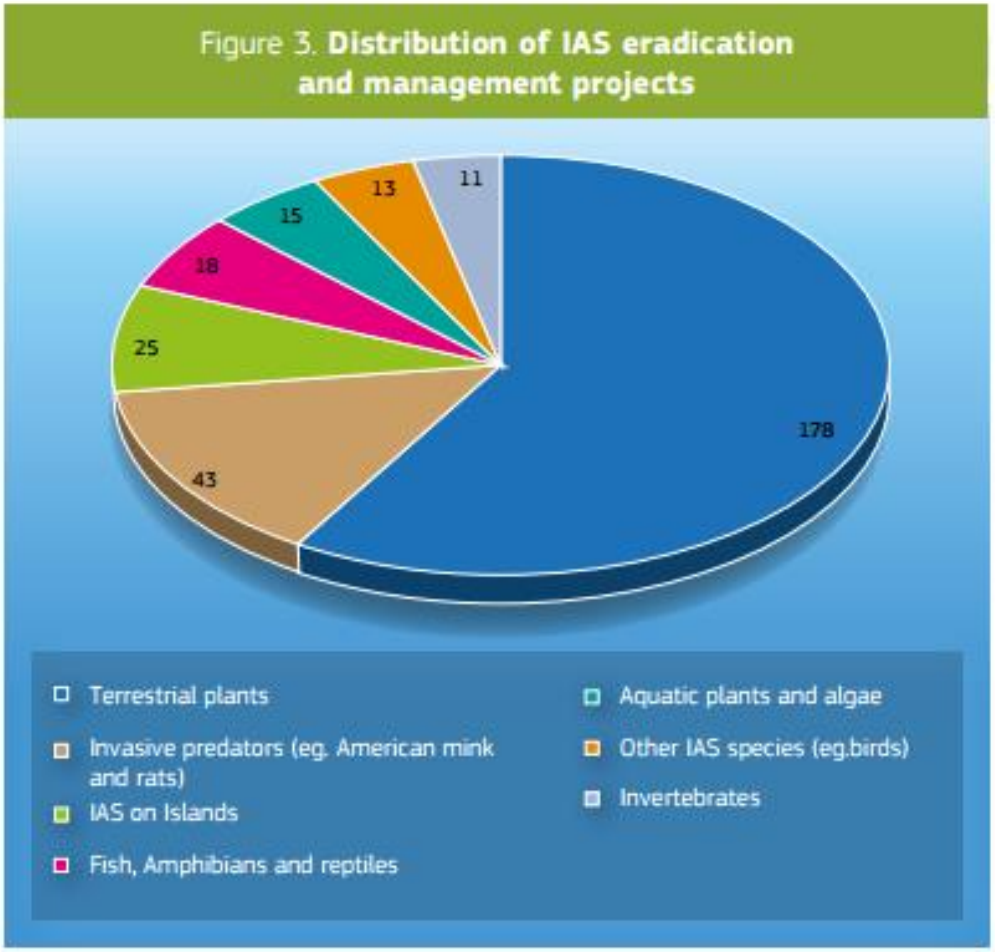
Silva et al. 2014

An increasing trend



Silva et al. 2014

Terrestrial plants are the most targeted

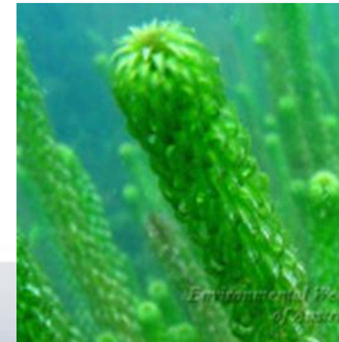


Silva et al. 2014


AUG 15 2005

The CAISIE project (LIFE07 NAT/IRL/000341) (2009-2013) strengthened biosecurity in Ireland, attracting the interest of practitioners and policy-makers across the globe.

The CAISIE project developed the world's first angler disinfection kit to help prevent the spread of IAS in Ireland

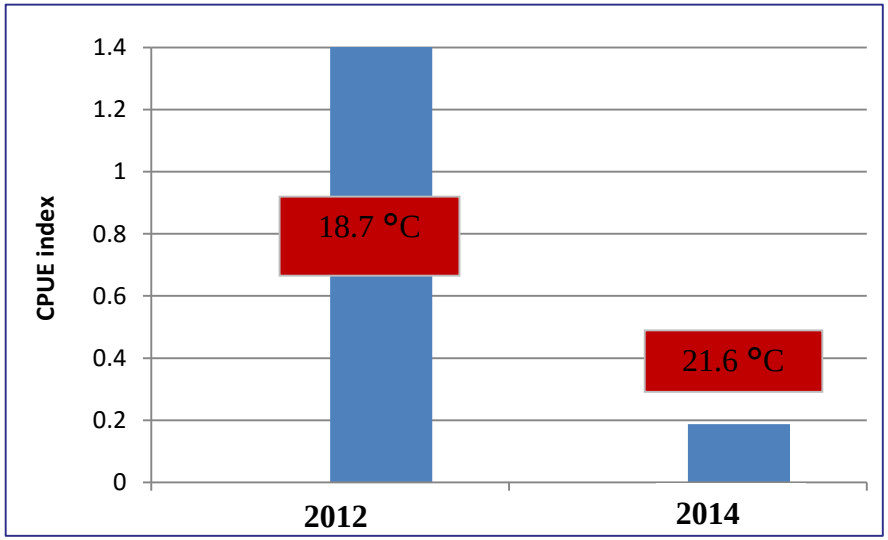


The CAISIE team pioneered the use of jute matting to eradicate the invasive alien weed, a method now used worldwide

Photo: ASTRALE EEIG/Justin Toland

LIFE10 NAT/IT/000239: Sterile Male Release Technique (SMRT) on the red swamp crayfish in North Italy

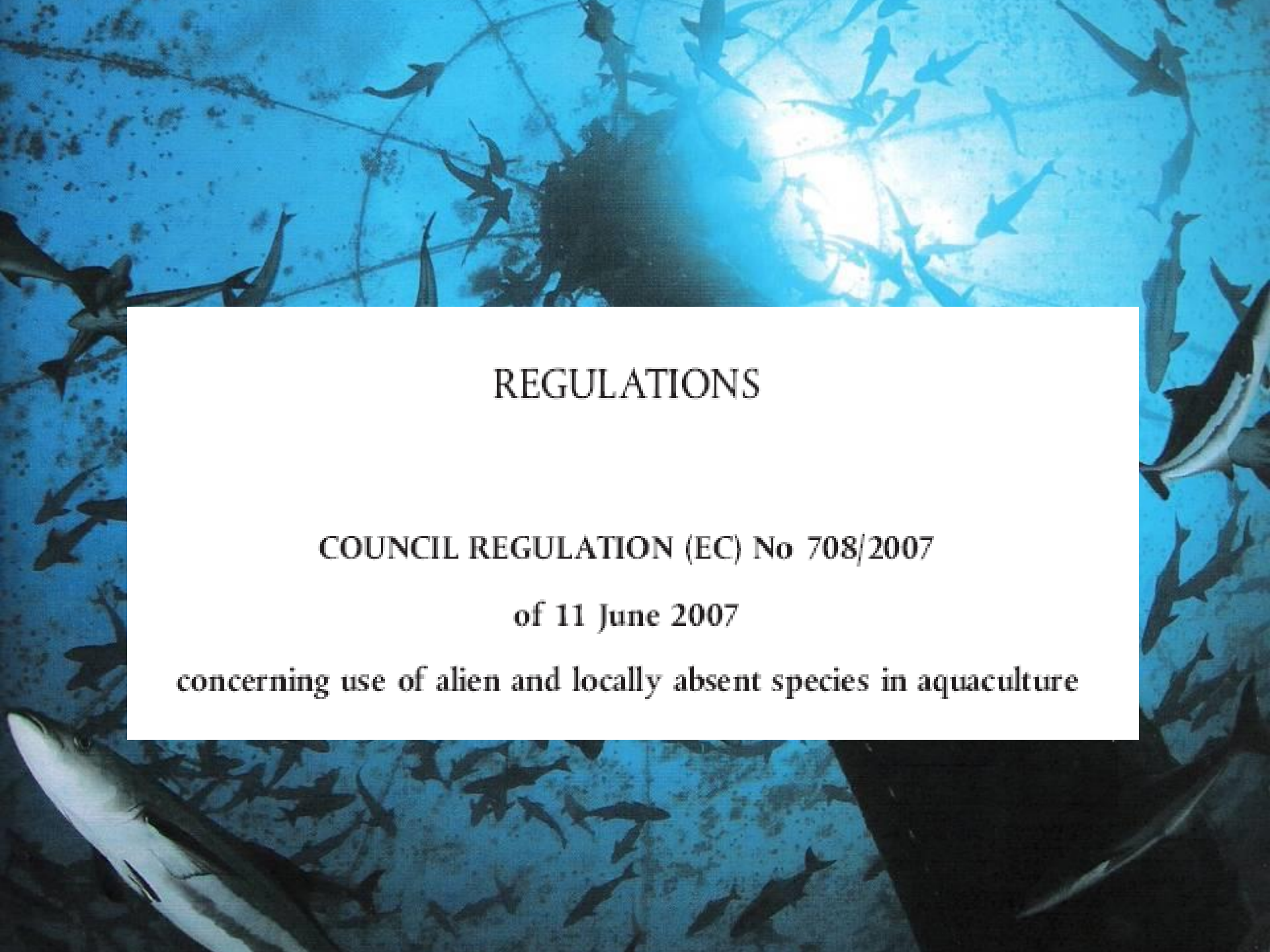
ESTIMATED POPULATION (CPUE): 10.419 individuals



Combination of trapping and SMRT

A population decrease of **87% in only two years of activity.**

Europe drafted two important regulations to manage IAS.



REGULATIONS

COUNCIL REGULATION (EC) No 708/2007

of 11 June 2007

concerning use of alien and locally absent species in aquaculture

AIMS

- Establish a procedure to rule the introductions of alien species/locally absent species.

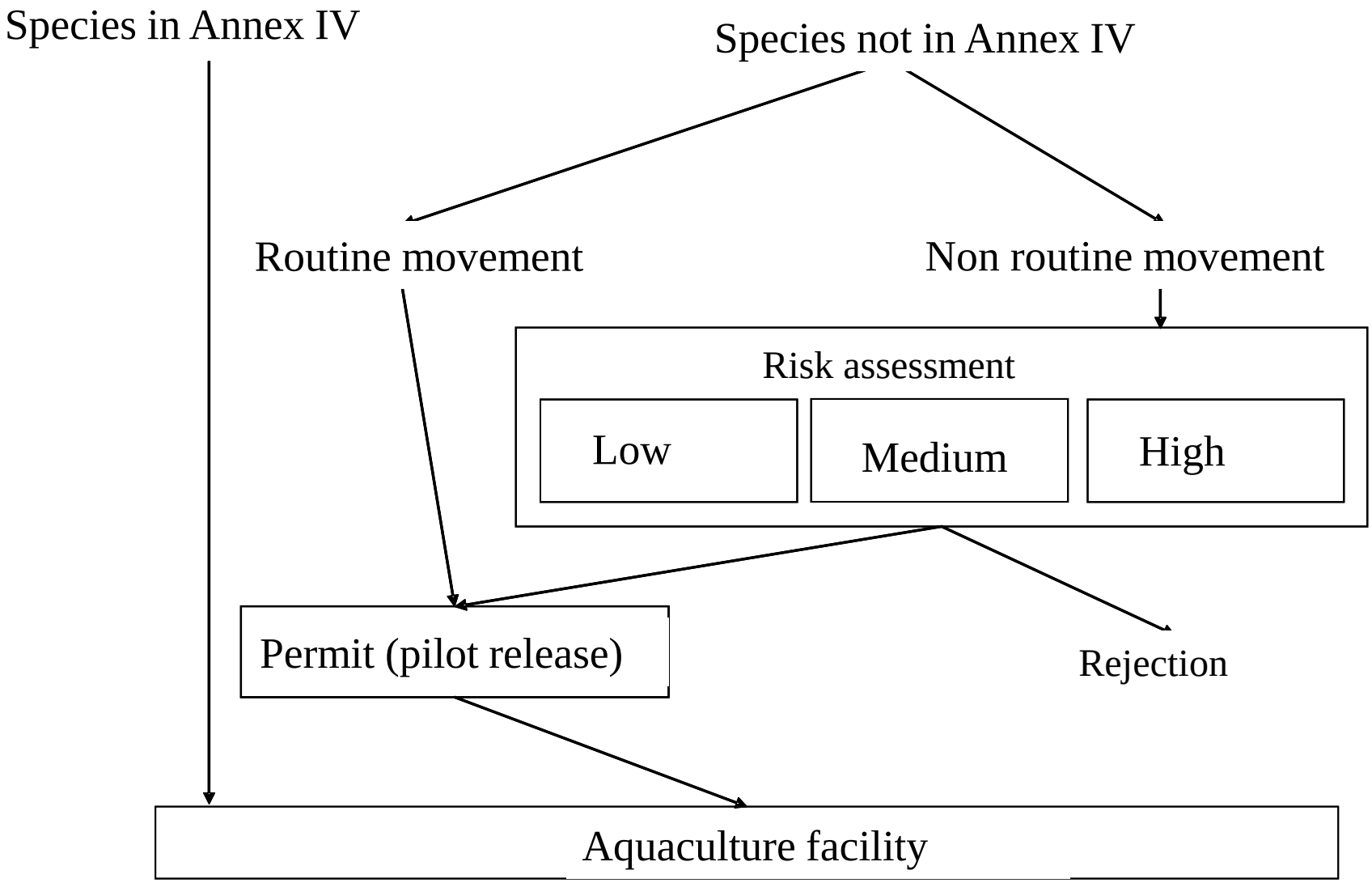
- Assess and minimize possible impacts of these species and “non target species».

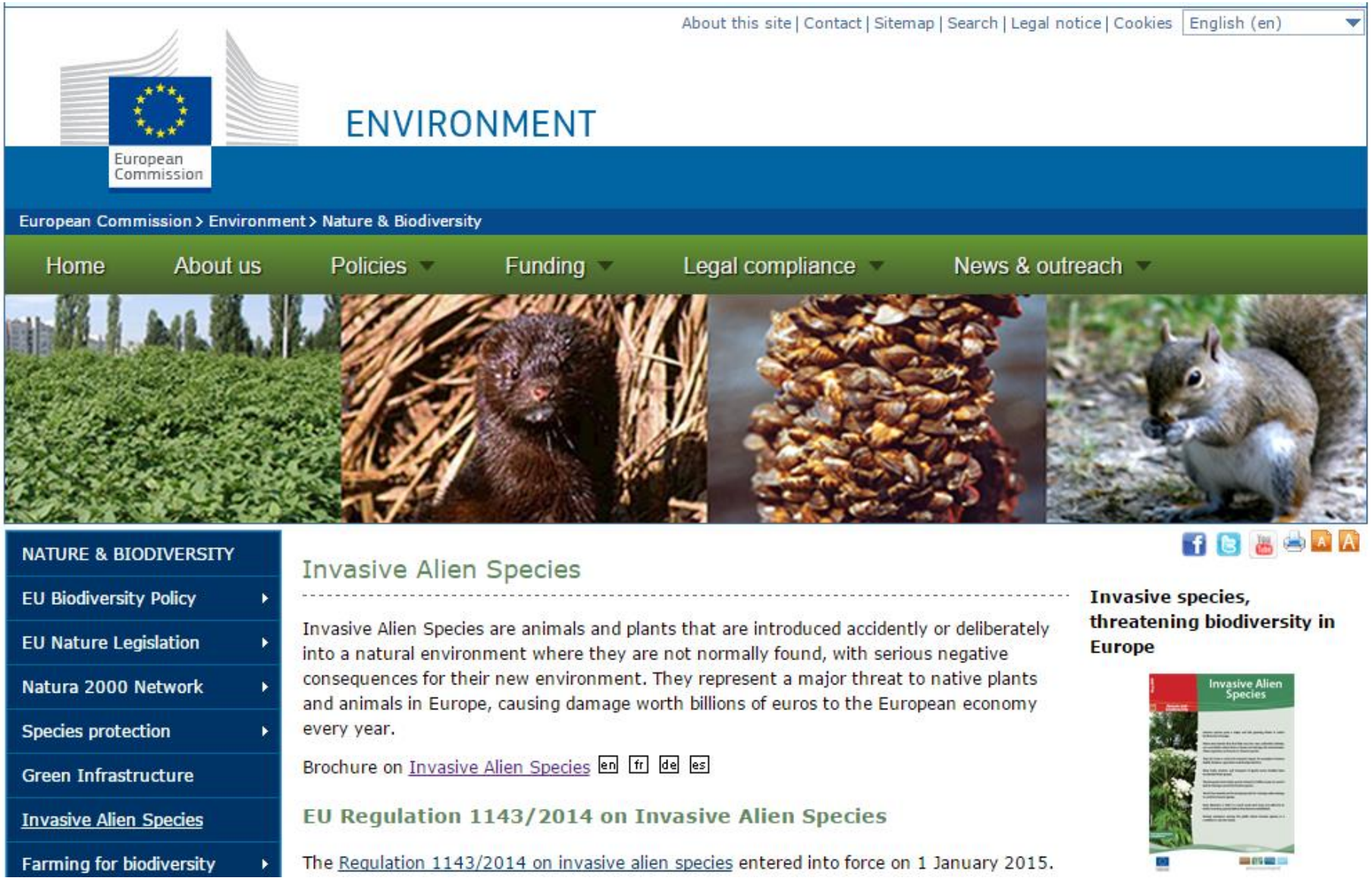
PART A — General
Acipenser baeri, Siberian sturgeon
A. gueldenstaeti, Russian sturgeon
A. nudiventris, Fringebarbel sturgeon
A. ruthenus, Sterlet sturgeon
A. stellatus, Starry sturgeon
A. sturio, Atlantic sturgeon
Aristichthys nobilis, Big head carp
Carassius auratus, Goldfish
Clarias gariepinus, African catfish
Coregonus peled, Northern Whitefish
Crassostrea gigas, Pacific cupped oyster
Ctenopharyngodon idella, Grass carp
Cyprinus carpio, Common carp
Huso huso, Beluga sturgeon
Hypophthalmichthys molitrix, Silver carp
Ictalurus punctatus, Channel catfish
Micropterus salmoides, Large-mouth bass
Oncorhynchus mykiss, Rainbow trout
Ruditapes philippinarum, Japanese or Manila clam
Salvelinus alpinus, Arctic char
Salvelinus fontinalis, Brook trout
Salvelinus namaycush, Great lake trout
Sander lucioperca, Pikeperch
Silurus glanis, European catfish
PART B — French overseas departments
Macrobrachium rosenbergii, Giant river prawn
Oreochromis mossambicus, Mozambique tilapia
O. niloticus, Nile tilapia
Sciaenops ocellatus, Red drum

Species in Annex IV (506/2008)

A white list

HOW THE REGULATION WORKS





Regulation EU No 1143/2014 on the prevention and management of the introduction and spread of invasive alien species

The original hypothesis: European Strategy on invasive alien species (proposal) by Genovesi & Shine (2003).

- No intentional introductions without permit
- *Risk assessment*
- Lists (*black* or *white*)
- <u>Control of trade</u>

Eight strategic principles to address the problem of IAS

- 1. Building awareness and support
- 2. Collecting, managing and sharing information
- 3. Strengthening national policy, legal and institutional frameworks
- 4. Regional co-operation and responsibility
- 5. Prevention
- 6. Early detection and rapid response
- 7. Mitigation of impacts
- 8. Restoration of native biodiversity

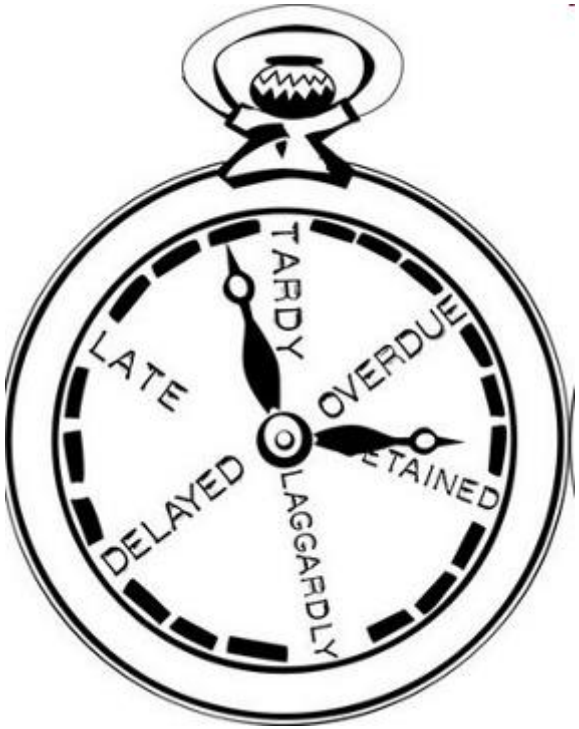
2010: year of biodiversity

2010 International Year of Biodiversity

Biodiversity is life

Biodiversity is our life

European Strategy was expected within 2010…



….but the Commission was in late!

The EU 2020 Biodiversity Strategy adopted in May 2011 deals with IAS in Target 5: Combat invasive alien species “By 2020, invasive alien species are identified, priority species controlled or eradicated, and pathways managed to prevent new invasive species from disrupting European biodiversity”.

Main principles of Regulation

- Hierarchical approach of CBD (prevention, early detection/rapid response; management)
- Only limited licensing for specific activities using IAS (e.g. research)
- Black list of EU concern species
- Black list of national concern species
- Control of pathway
- Common data support mechanisms
- Increase of awareness

Invasive Alien Species of Union Concern (Black list)

- Species with scientific evidence of their impacts and identified as invasive through detailed risk assessment procedures are included in the list.
- Species should be extra EU.
- Management actions are compulsory!!!

Key points

- Eradication methods should be effective and avoid possible undesired effects and pain or suffering if possible.

- Member States should set up, within June 2016, a surveillance system to speed up action in case an Invasive Alien Species of Union Concern is detected.

- They should assess the key pathways of introduction of listed species and develop action plans to prevent new unwanted arrivals (Aichi Target 9 Biodiversity Strategy 2020 and Target 5 EU Biodiversity Strategy).

- The Regulation applies to the EU black list and to national or regional black lists (that can include species partly native to EU).

- Coordinated actions among countries are encouraged.

Weak points

Provisions on ballast water have been removed.

Resource availability: no specific financing mechanisms have been set. The Regulation includes the possibility that Member States recover the costs of restoration through the polluter-pays principle (very challenging).

- Committee on Invasive Alien Species: supports the implementation of the Regulation and is composed by representatives of all Member States.

- Scientific Forum on Invasive Alien Species: gives advice on scientific questions related to the implementation of the Regulation and is composed by representatives of the scientific community appointed by the Member States.

- Working group on Invasive Alien Species: as sub-group of the Coordination Group on Biodiversity and Nature, provides concrete input to the implementation of the Regulation, while ensuring fair and representative participation.

Information support system

The European Commission has developed an information exchange mechanism to facilitate the implementation of the EU policy on invasive alien species: the European Alien Species Information Network (EASIN) is an online platform that aims to facilitate the exploration of existing information on alien species from distributed sources.

What about introduction of ornamental and game species?

Regulation on wild fauna and flora (EU 338/97)

It forbids the introductions of four invasive species: red eared slider (*Trachemys scripta elegans*); bullfrog (*Lithobates catesbeianus*); painted turtle (*Chrysemys picta*); ruddy duck (*Oxyura jamaicensis*).

In 2012, a decision by the European Commission bans the introduction of the genus *Pomacea* into the EU.

Codes of conduct

Strasbourg, 7 July 2011
[Inf01erev_2011.doc]

T-PVS/Inf (2011) 1 rev

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

31st meeting
Strasbourg, 29 November – 2 December 2011

EUROPEAN CODE OF CONDUCT ON PETS AND INVASIVE ALIEN SPECIES

Strasbourg, 5 December 2014
[tpvs11e_2014.docx]

T-PVS (2014) 11

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

34th meeting
Strasbourg, 2-5 December 2014

RECOMMENDATION N° 170 (2014) ON THE EUROPEAN CODE OF CONDUCT ON RECREATIONAL FISHING AND INVASIVE ALIEN SPECIES

Document prepared by the Directorate of Democratic Governance

Strasbourg, 8 October 2012
[Inf26erev_2011.doc]

T-PVS/Inf (2011) 26 revised

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

32nd meeting
Strasbourg, 27-30 November 2012

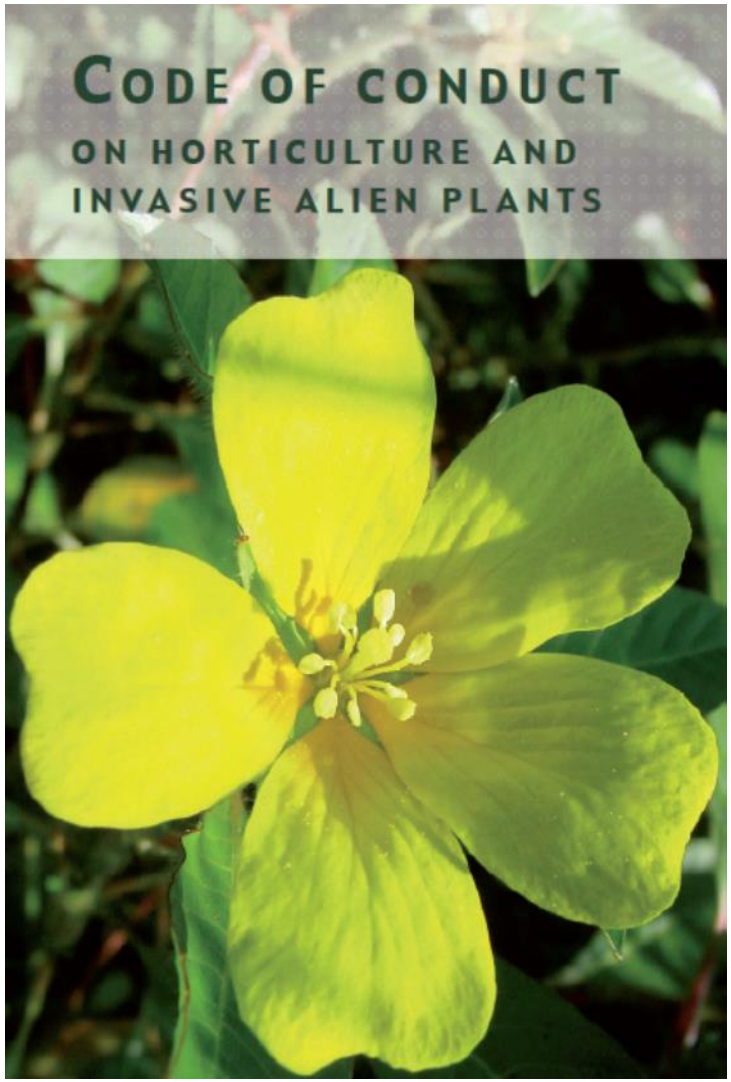
EUROPEAN CODE OF CONDUCT ON ZOOLOGICAL GARDENS AND AQUARIA AND INVASIVE ALIEN SPECIES

Code, rationale and supporting information

ISSG
Invasive Species Specialist Group

EUROPEAN ASSOCIATION OF ZOOS AND AQUARIA
EAZA

“Responsible gardening”



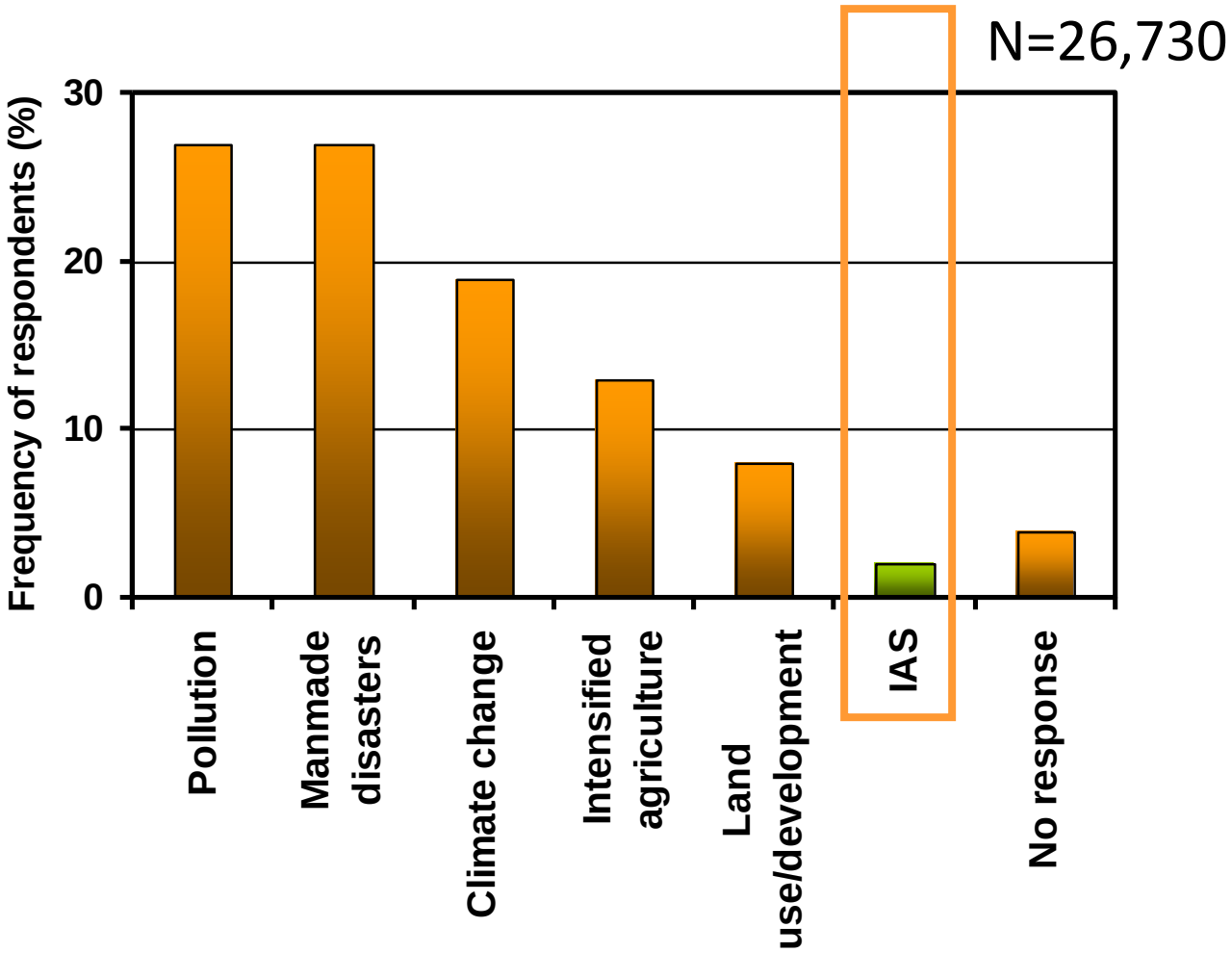

CHANGES
AHEAD

???

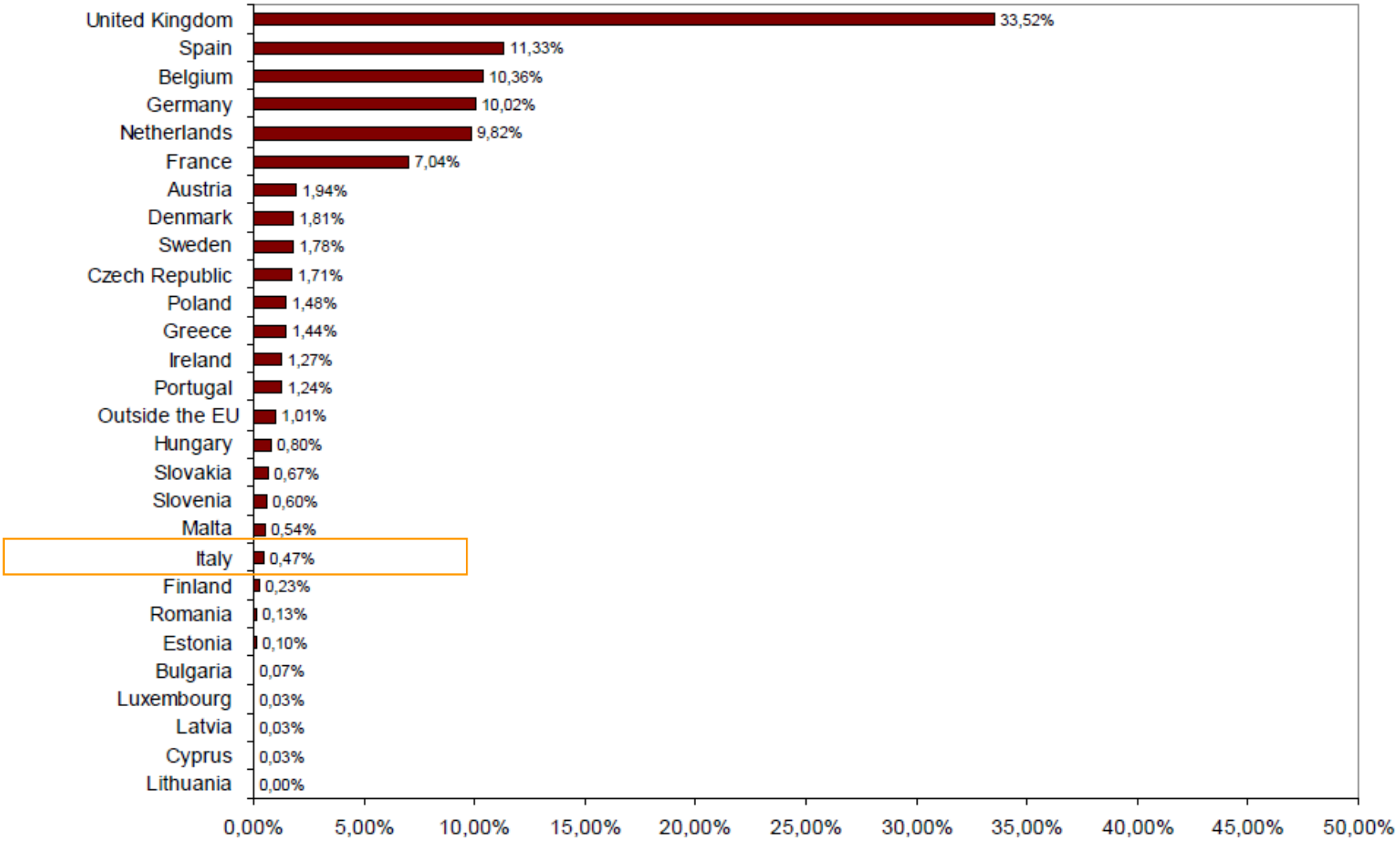
Even if fully implemented (which would significantly depend on the commitment of individual Member States and on the availability of adequate resources) this framework cannot alone wholly address the severe and rapidly growing threat of biological invasions (Genovesi et al. 2015).

We need to raise and increase the awareness of European citizens toward this threat and to achieve public engagement

European citizens (survey carried out for the EU Biodiversity Communication Campaign 2008-2010)

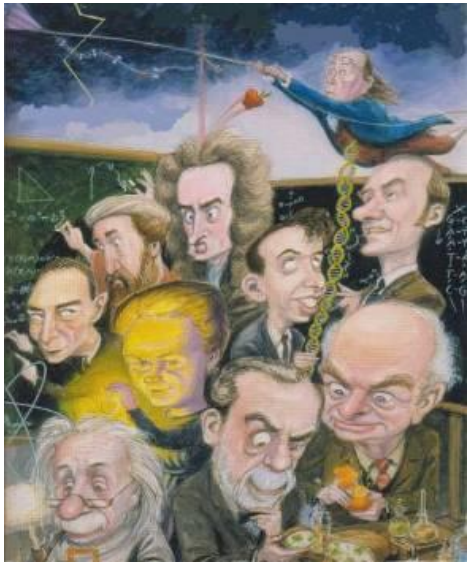


Public consultation on IAS (2012)



Take home message

This is a uniquely human problem, and we must all (science community, policy makers, wide public) cooperate.



Thank you!