Science Facing Alien

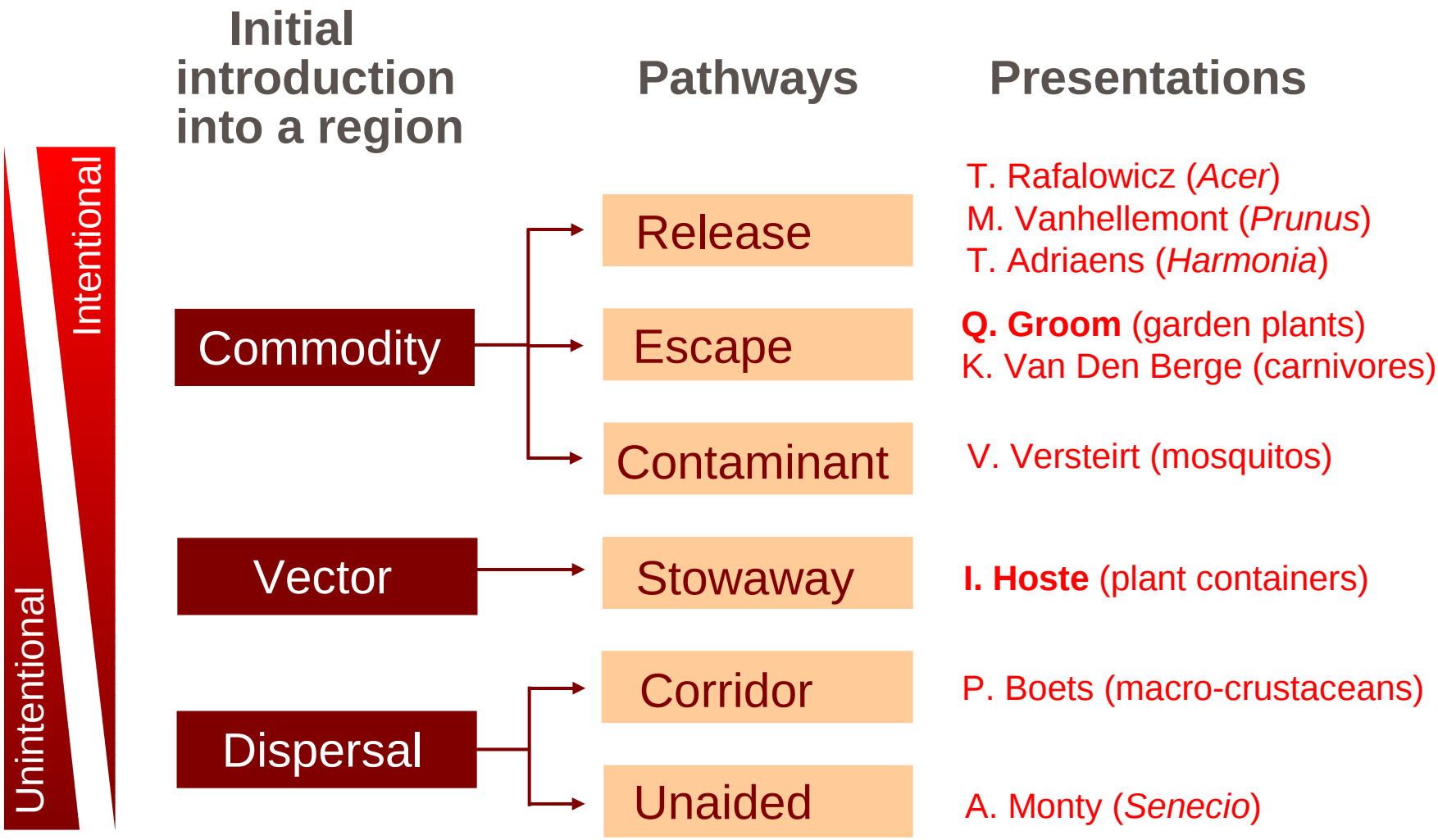
Brussels, May 11th 2009

1. What have we learnt today?

2. A Belgian research perspective

Session 1: pathways and dispersion

P.E. Hulme et al. (2008) Grasping at the routes of biological invasions: a framework for integrating pathways into policy. Journal of Applied Ecology.



Session 1: site invasibility

The characteristics of the recipient ecosystem determine invasion success and dynamics:

1. Habitat degradation and landscape urbanisation

Landscape alteration by human activities and eutrophication may increase the rate of biological invasions (Adriaens et al., Boets et al. Branquart et al., Martin et al., Packet et al., Saad et al., Stiers et al.).

But undisturbed habitats like forest ecosystems or oligotrophic water bodies are not immune to invasion (Rafalowicz et al., Stevens et al., Stiers et al., Vanhellemont et al.).

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2. Other drivers may facilitate invasions

- game herbivory (Vanhellemont et al.)
- fish stocking & aquaculture (Martin et al., Packet et al.)

3. Brackish waters are prone to invasions (Piesschaert et al.)

Session 1: invasions & climate change

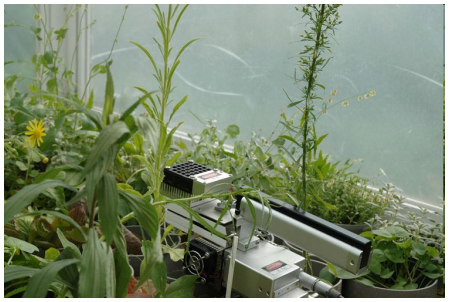
In competition experiments, simulated climate warming modifies current competitive interactions between native and invasive terrestrial plants (Nijs et al.).

Predictions for tomorrow:

> Some current strong invaders may fade out, others may be stimulated;

> New invaders may emerge from the pool of currently non-invasive aliens;

> We need to prepare for a situation that we do not know today.



Session 1: detection & early warning

Several monitoring programmes may help in detecting new invasions:

- Numerous field survey by INBO scientists (vascular plants,aquatic invertebrates, fish, birds, mammals, etc.),
- Mosquito monitoring (MODIRISK BelSPO project).

Session 2: impacts on species

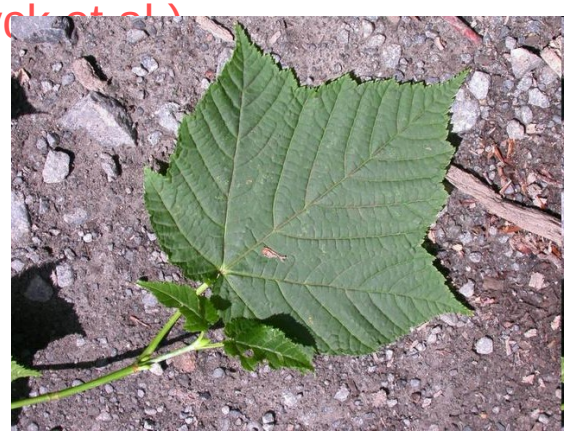
- Competition interactions often lead to a reduction in native species abundance and may even cause local species extinction on the long term (Saad et al., Stiers et al., Strubbe et al.);
- Intraguild predators may greatly affect the structure of invertebrate communities (Boets et al., Adriaens et al., Hautier et al.);
- Hybridisation with invasive species and pathogen pollution may quickly drive species to extinction (Branquart et al., Percsy & Percsy, Spanoghe et al.)

Session 2: impacts on ecosystems

- Invasive plants can enhance nutrient uptake and productivity of the ecosystem (Dassonville et al.);
- Invasive plants may also impact plant-dependent organisms (e.g. detritivorous and phytophagous invertebrates) and may alter food webs (Dassonville et al., Domken et al., Stiers et al., Vanparys et al.)

Session 3: risk assessment

- Results from different risk analysis tools provide similar results (Verreycken et al., Weiserbs);
- Risk assessments are strongly limited by the availability of data about species' impacts on native biodiversity and ecosystem functioning (Branquart et al., Verreycken et al., Weiserbs). See e.g. watch list species;
- Scientists have the responsibility to document new invasion histories (Adriaens et al., Rafalowicz et al., Stuyck et al.)



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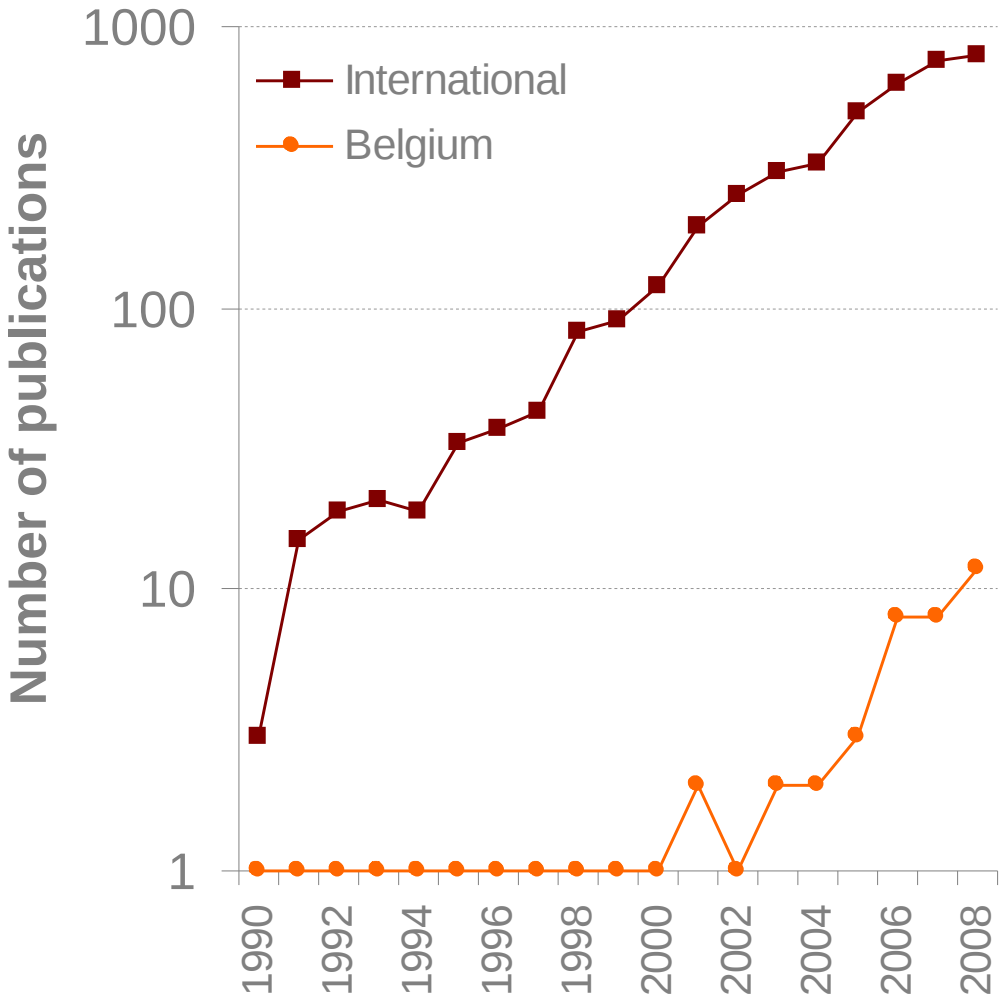
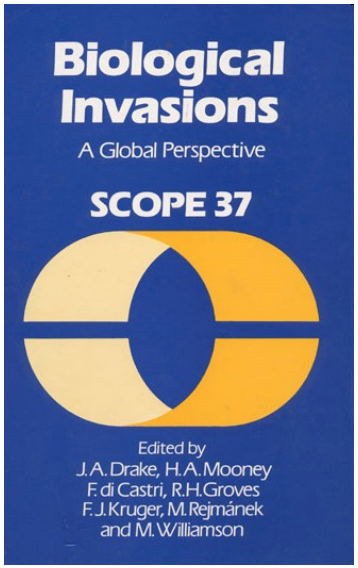
WoS publications on invasions



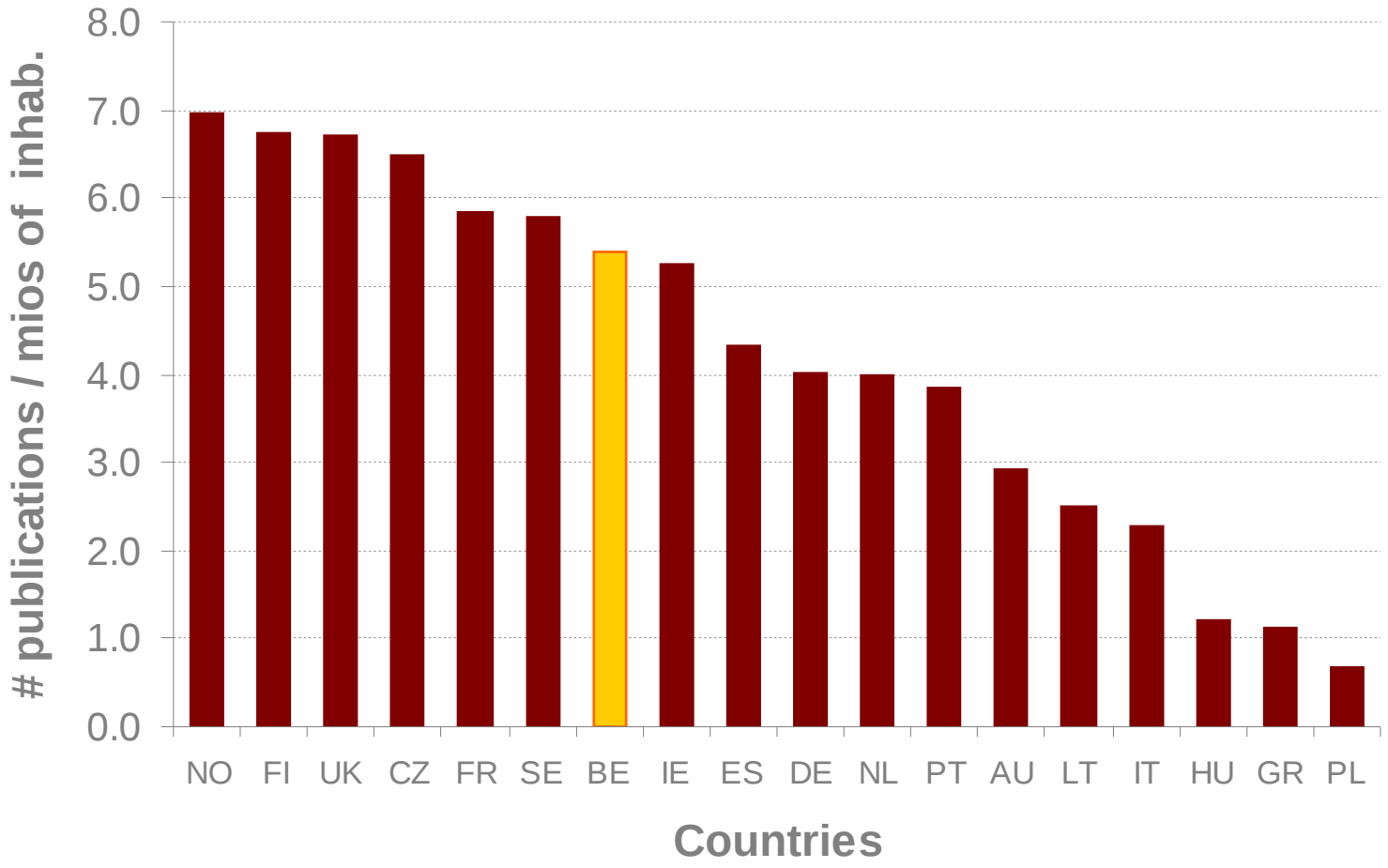


Web of Science

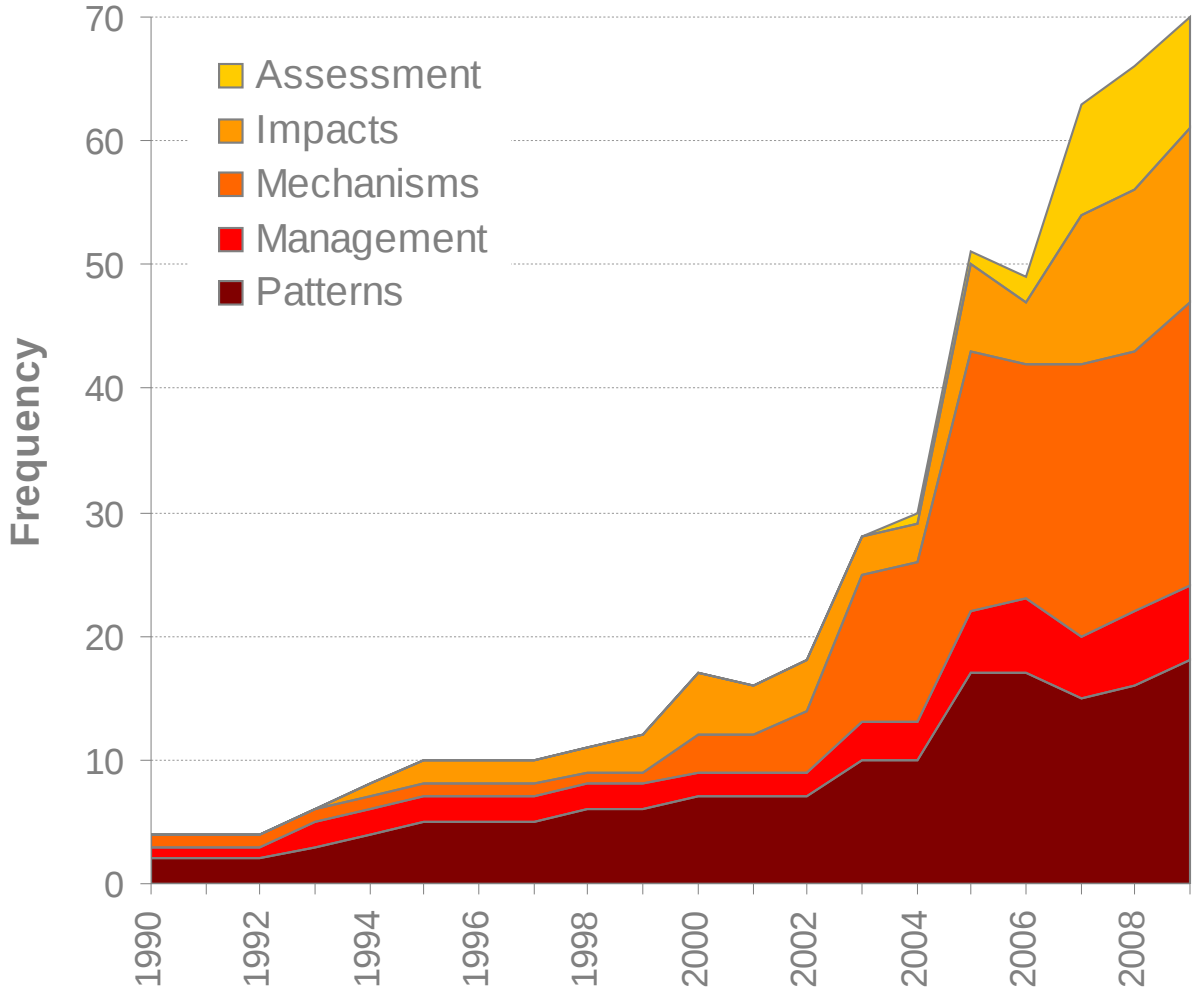
Topic = “invasive species” OR “biological invasion”

Accessed on 29 April 2009

WoS publications on invasions



Belgian research projects on invasions



Early detection & rapid response

1. Detection

Alert network
*Early detection of suspected **new** invaders*

Species diagnostic
Identification & vouchering

2. Assessment

Invasion description & reporting
Local distribution, population density, trends...

Rapid risk analysis
Establishment, spread & impacts

3. Response

Rapid response management
Eradication, containment, mitigation, no action

General appraisal
Monitoring of treatment success and costs

POLICYFORUM

ECOLOGY

Will Threat of Biological Invasions Unite the European Union?

New data on the extent of biological invasions pose major regulatory and political challenges to European institutions.

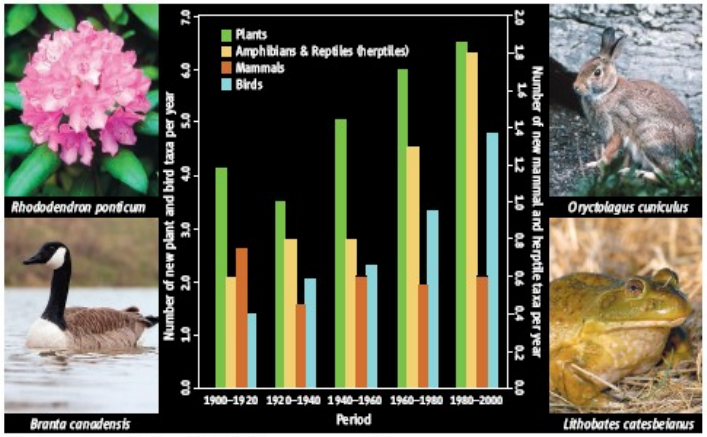
Philip E. Hulme,[1]* Petr Pyšek,[2] Wolfgang Nentwig,[3] Montserrat Vilà[4]

Europe is the source of many of the world's worst invasive species, including Austrian pine (*Pinus nigra*), Norway maple (*Acer platanoides*), Spanish slug (*Arion lusitanicus*), German wasp (*Vespula germanica*), Scotch broom (*Cytisus scoparius*), and English starling (*Sturnus vulgaris*). However, the perspective of Europe as the source rather than recipient of invasive species is in urgent need of revision in light of the Delivering Alien Invasive Species Inventories for Europe (DAISIE) project (www.europe-aliens.org). This continent-wide assessment of the scale and impact of biological invasions reveals that Europe's maritime and land borders have been breached by >11,000 alien species. Over half of these are terrestrial plants. Aquatic and terrestrial invertebrates account for >30% of species, whereas only ~5% are vertebrates. Compared with estimates from little more than a decade ago, the new data on aliens identify more than five times as many bird species, a threefold increase in mammal species, and twice as many plants established in Europe (*1*). Europe is home to numerous species from other continents, e.g., Canada goose (*Branta canadensis*), American bullfrog (*Lithobates catesbeianus*), Argentine ant (*Linepithema humile*), Egyptian goose (*Alopochen aegyptiacus*), Indian strawberry (*Duchesnea indica*), Chinese mitten crab (*Eriocheir sinensis*), Japanese oyster (*Crassostrea gigas*), and New Zealand flatworm (*Arthurdendyus triangulatus*).

Even the crudest estimate of total known monetary impact of alien species in Europe is close to €10 billion (about U.S. $13 billion) annually (*2*). This figure is an underestimate, as potential economic and environmental impacts are unknown for almost 90% of the alien species found in Europe (*3*). Alien species predate, hybridize with, parasitize, and out-compete a wide range of native European taxa and, as a result, reduce biodiversity, threaten endangered species, and alter ecosystems (*4*).

To date, the European Union's (EU's) response to the problems of alien species has been driven by commitments to international agreements such as the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) and the Convention on Biological Diversity (CBD). Yet these commitments have not always been supported by action. Under the CBD, EU member states rate implementation of Article 8h "to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species" as a significantly lower priority than nations outside Europe (*4*) and only two EU states (France and Spain) have ratified the International Convention for the Control and Management of Ships' Ballast Water and Sediments. More recently, signatories to the CBD have agreed to achieve a significant reduction of the current rate of biodiversity loss by 2010, and this includes providing evidence of actions to reduce the number and cost of biological invasions (*5*). In response, Europe has committed itself to using the cumulative number of alien species in its territory as one indicator of progress toward the 2010 goals (*6*). Yet, progress to date has been poor, with average annual rates of alien species establishment in Europe having progressively increased over the last century for many taxa (see figure, above).

Therefore, the European Commission has put forward a proposal to the European Council and Parliament for an EU strategy on invasive species (*2*). The strategy emphasizes prevention as the most cost-effective way forward and presents three new policy options: maximize the use of existing legal instruments; adapt existing legislation through specific amendments; or establish a comprehensive, dedicated legal framework to address biological invasions.



Alien taxa newly recorded as established in Europe per annum (*1*).

[1]The Bio-Protection Research Centre, Lincoln University, Post Office Box 84, Canterbury, New Zealand. [2]Institute of Botany, Academy of Sciences of the Czech Republic, CZ-252 43 Průhonice, and Department of Ecology, Charles University, CZ-128 01 Viničná 7, Prague, Czech Republic. [3]Institute of Ecology and Evolution, University of Bern, Baltzerstrasse 6, CH-3012 Bern, Switzerland. [4]Estación Biológica de Doñana (EBD-CSIC), Avinguda Américo Vespucio, E-41092 Sevilla, Spain.

*Author for correspondence: philip.hulme@lincoln.ac.nz