Invasive gebietsfremde Arten – Einfuhr, Etablierung und Auswirkungen

Jonathan Jeschke

IGB
Leibniz-Institut für Gewässerökologie und Binnenfischerei

Freie Universität Berlin

BBIB
Berlin-Brandenburgisches Institut für Biodiversitätsforschung

Durch MENSCHEN

Transport in exotisches Gebiet

Freilassung

Gebietsfremde Arten

Unterschied zu sich natürlich ausbreitenden Arten: Wegnahme von Ausbreitungs-barrieren durch den Menschen

Referenzdatum für Neobiota: 1492

Durch MENSCHEN

Transport in exotisches Gebiet

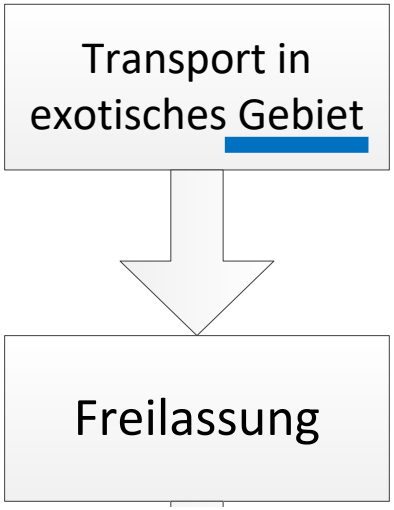
↓

Freilassung

Gebietsfremde Arten

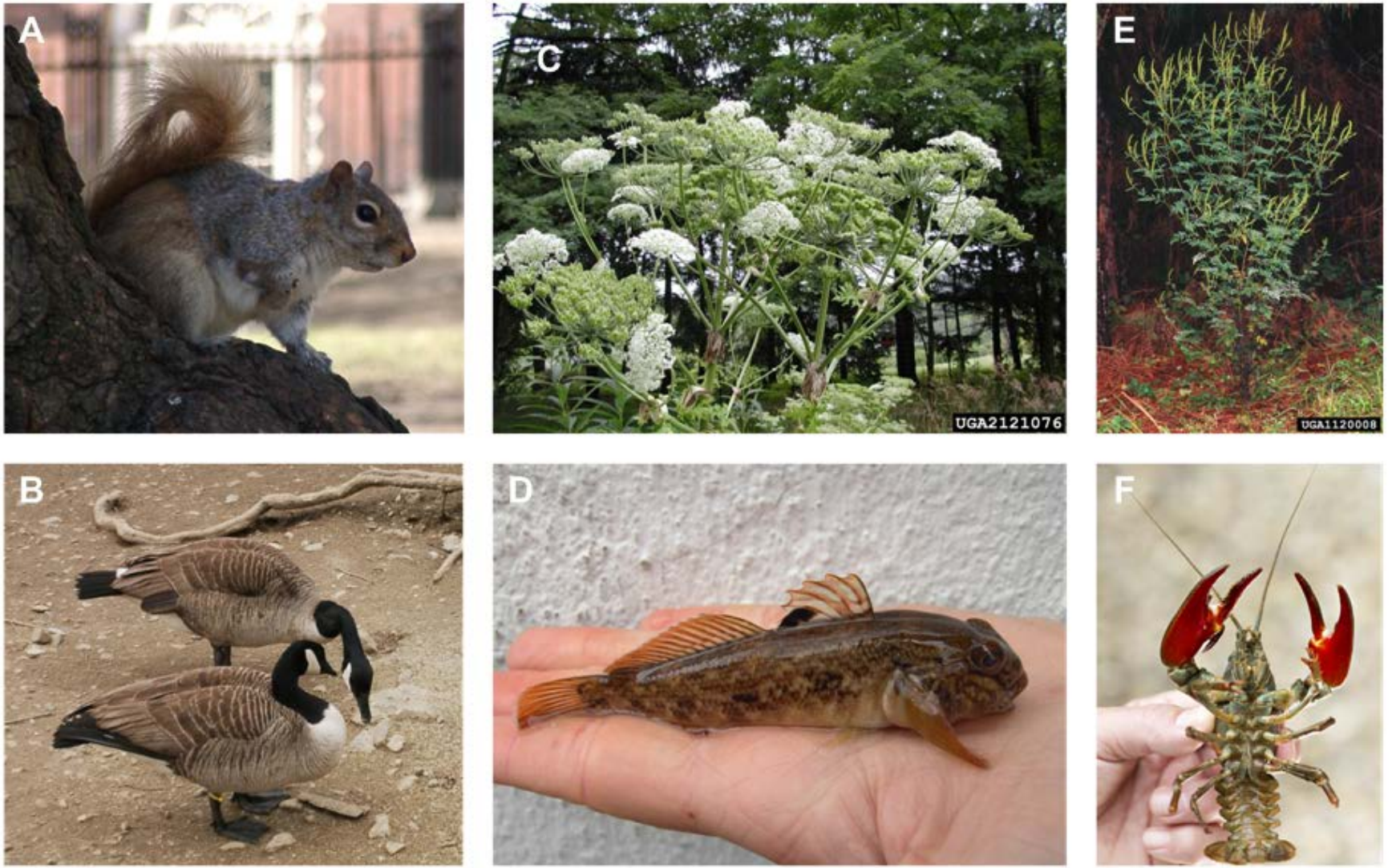
Unterschied zu sich natürlich ausbreitenden Arten: Wegnahme von Ausbreitungs-barrieren durch den Menschen

Fotos: J. Jeschke



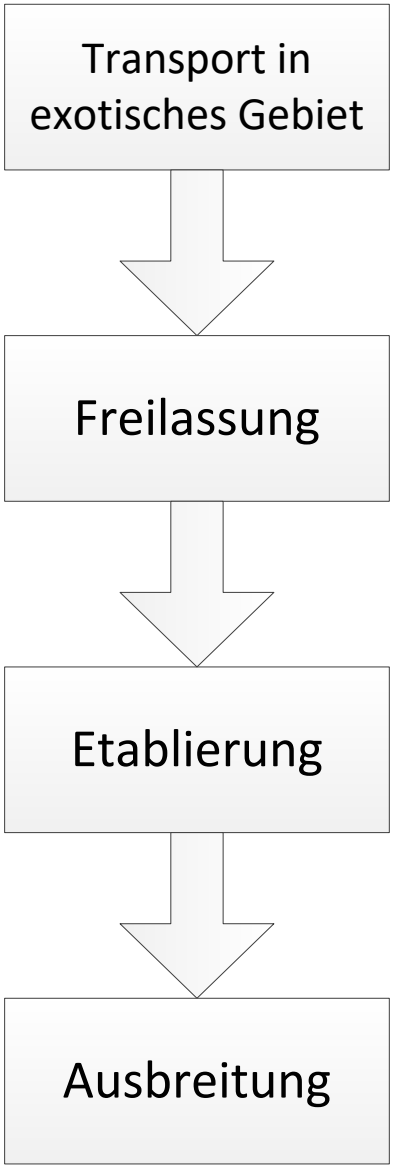
Gebietsfremde Arten

Referenz**gebiet**



A) Grauhörnchen; C) Herkulesstaude; E) Beifuß-Ambrosie;
B) Kanadagans; D) Schwarzmund-Grundel; F) Signalkrebs

Fotos aus: Keller, Geist, Jeschke & Kühn (2011) *Environmental Sciences Europe*

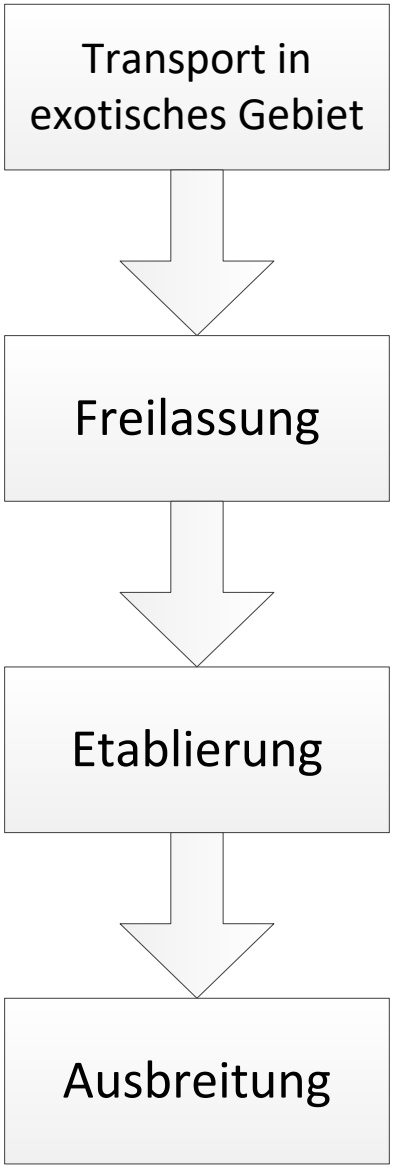


Gebietsfremde Arten

Etablierte gebietsfremde Arten

Invasive gebietsfremde Arten

Blackburn *et al.* (2011) *TREE*, Jeschke *et al.* (2013) *Ambio*



Invasive gebietsfremde Art laut EU-Verordnung:

eine gebietsfremde Art, die die Biodiversität und damit verbundene Ökosystem-leistungen gefährdet oder nachteilig beeinflusst.

Invasive gebietsfremde Arten

Blackburn *et al.* (2011) *TREE*, Jeschke *et al.* (2013) *Ambio*

Invasive gebietsfremde Art laut EU-Verordnung:
eine gebietsfremde Art, die die Biodiversität und damit verbundene Ökosystem-leistungen gefährdet oder nachteilig beeinflusst.

Invasive gebietsfremde Art von unionsweiter Bedeutung:
eine invasive gebietsfremde Art, deren nachteilige Auswirkungen für so erheblich eingeschätzt wurden, dass sie ein konzertiertes Vorgehen auf Unionsebene erfordern

→ Unionsliste

Die Unionsliste

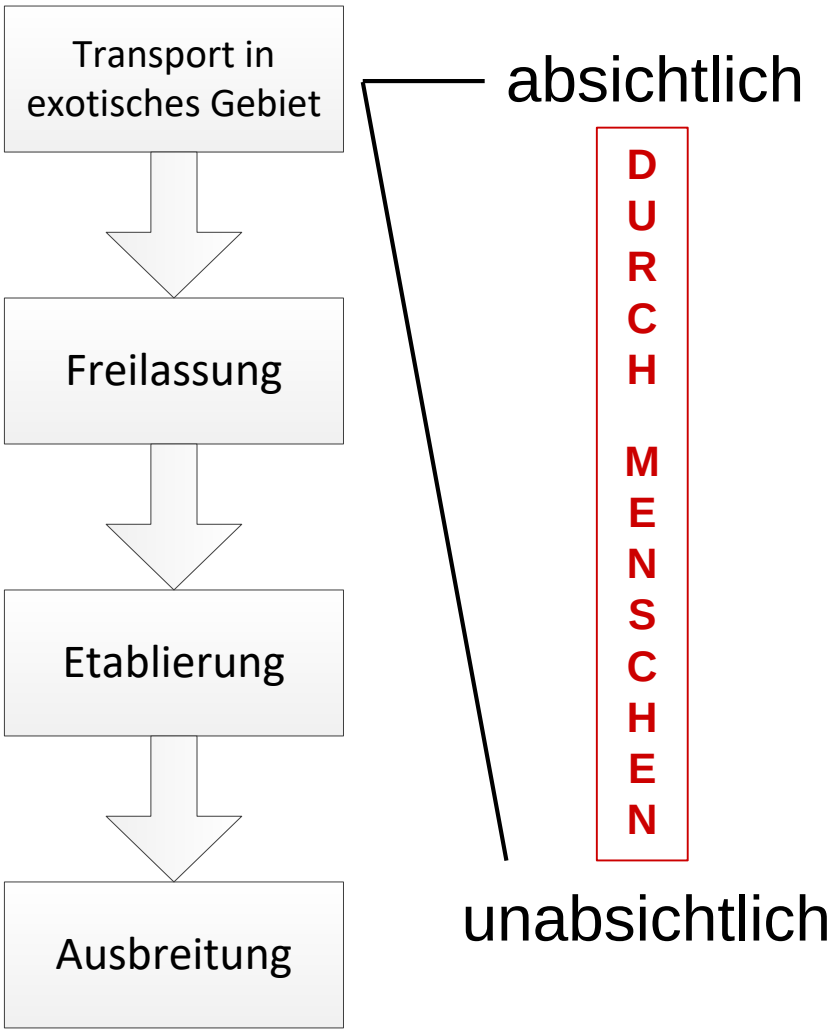
- = Liste invasiver gebietsfremder Arten von unionsweiter Bedeutung
- Seit August 2016 in Kraft
- Enthält aktuell 66 Tier- und Pflanzenarten:
  22 Wirbeltiere, 8 Wirbellose, 36 Pflanzenarten
  (Infos z.B. hier: https://neobiota.bfn.de/unionsliste.html)

Fotos aus: Keller, Geist, Jeschke & Kühn (2011) *Environmental Sciences Europe*

Überblick

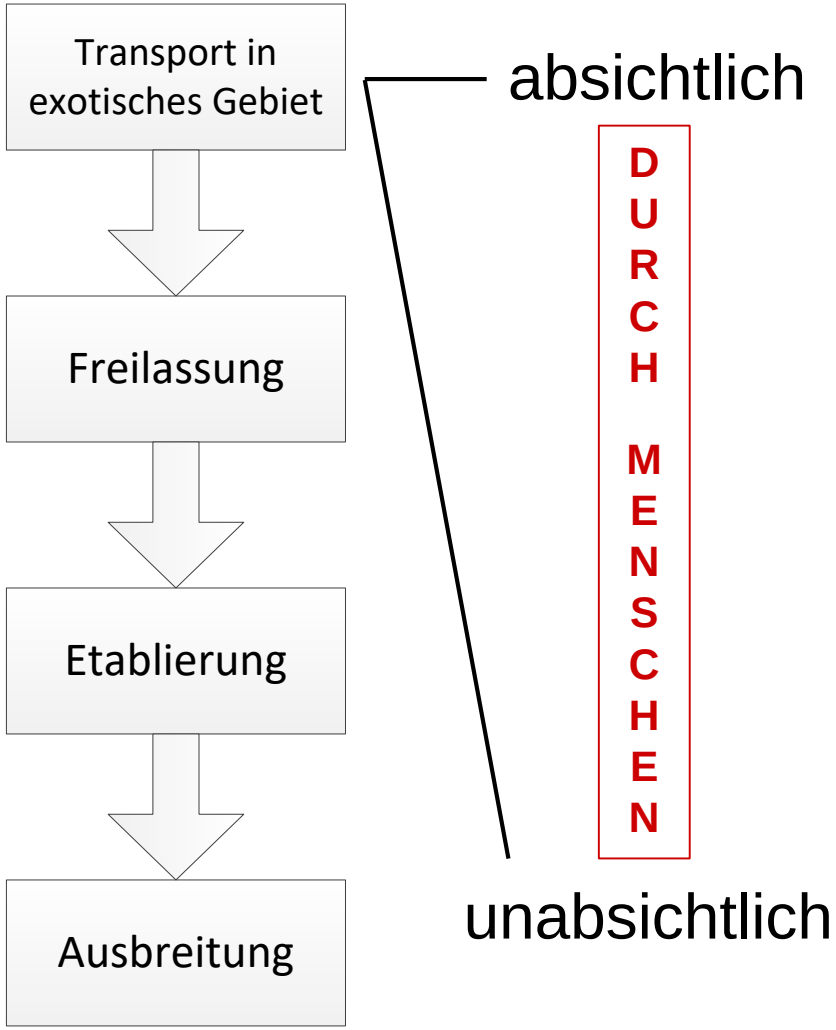
- Begriffsklärung
- Einfuhr invasiver Arten
- Etablierung & Ausbreitung invasiver Arten
- Auswirkungen invasiver Arten

Einfuhr invasiver Arten



Jeschke *et al.* (2013) *Ambio*

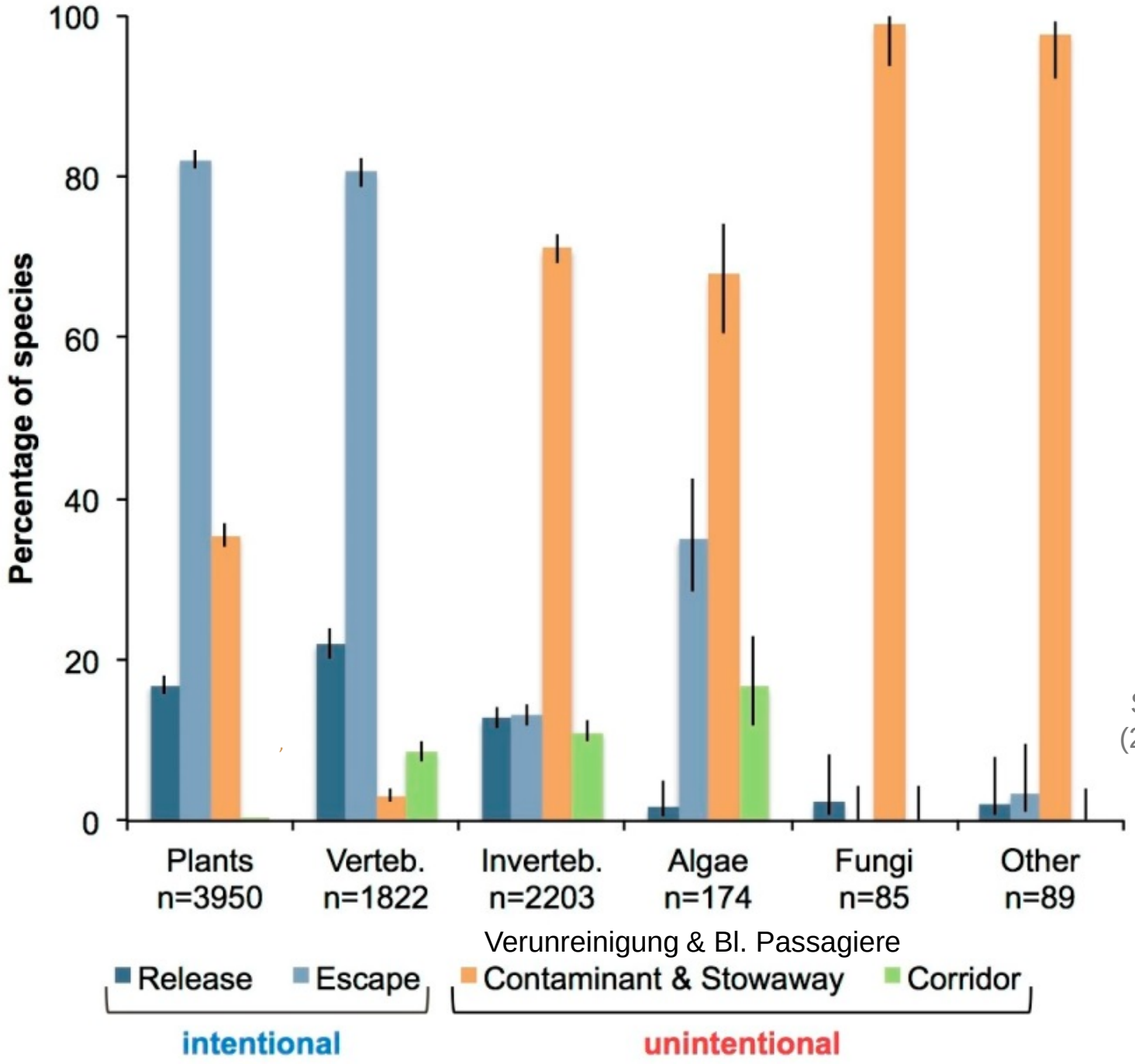
Einfuhr invasi



Jeschke *et al.* (2013) *Ambio*

Foto: Bernd Wolfram

Foto: Bram Koese



Verunreinigung & Bl. Passagiere

ISSG Invasive Species Specialist Group

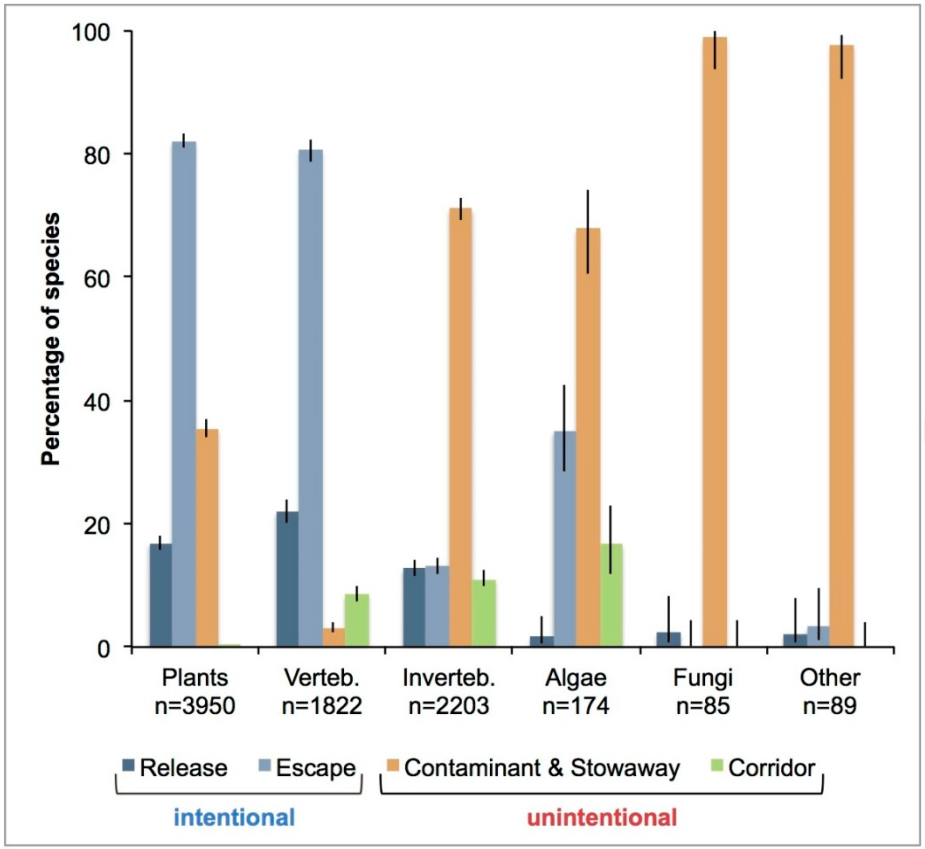
GLOBAL INVASIVE SPECIES DATABASE

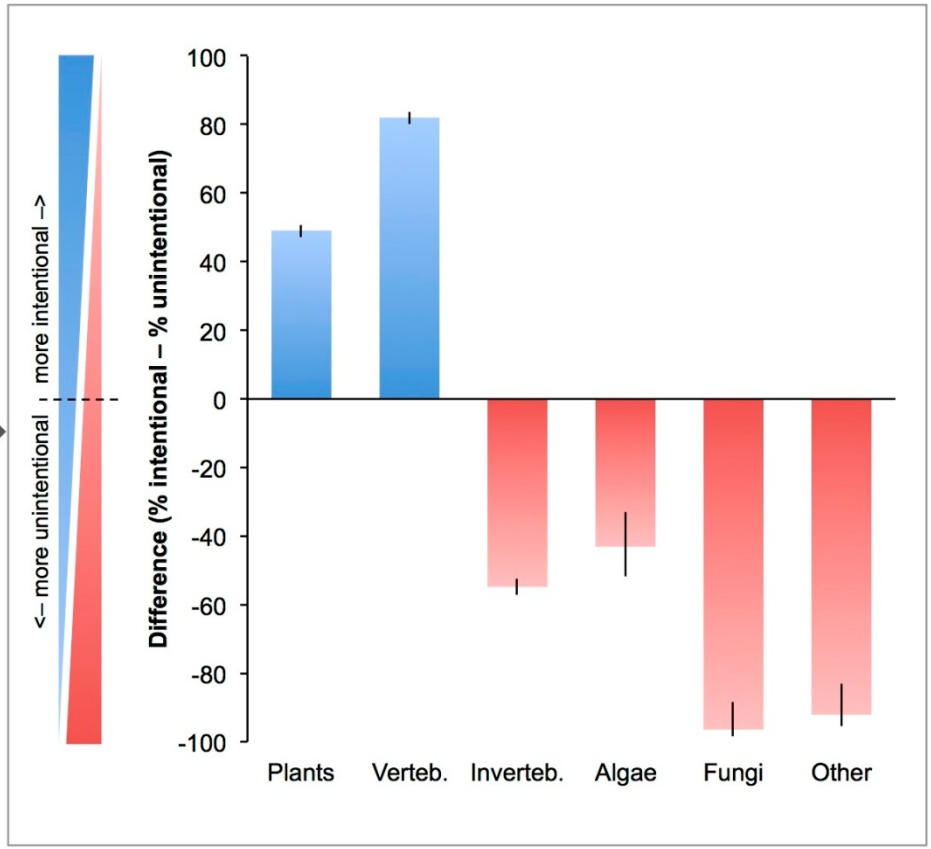
Invasive Alien Species Pathway Management Resource

Delivering Alien Invasive Species Inventories for Europe

Saul … & Jeschke (2017) *J. Appl. Ecol.*

8323 Arten





ISSG Invasive Species Specialist Group
GLOBAL INVASIVE SPECIES DATABASE
Invasive Alien Species Pathway Management Resource

Delivering Alien Invasive Species Inventories for Europe

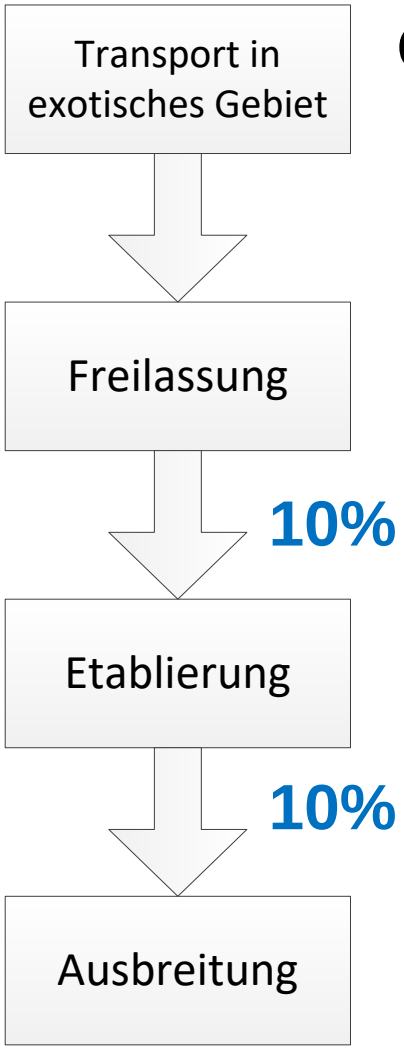
Saul … & Jeschke (2017) *J. Appl. Ecol.*

8323 Arten

Überblick

- Begriffsklärung
- Einfuhr invasiver Arten
- Etablierung & Ausbreitung invasiver Arten
- Auswirkungen invasiver Arten

Zehnerregel (Tens rule)

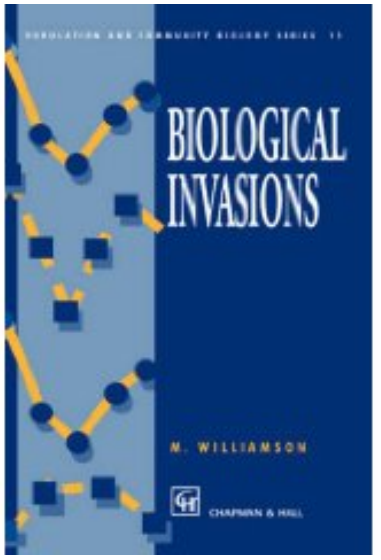


Ca. 10% der eingeführten Arten etablieren sich, von denen sich wiederum ca. 10% ausbreiten.

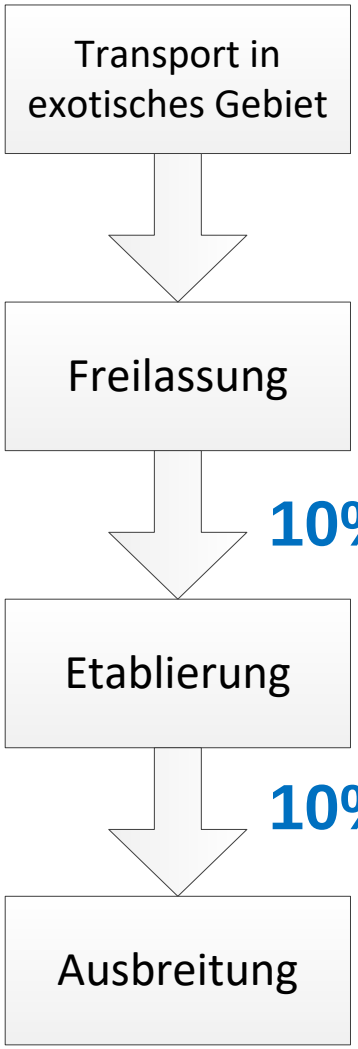
Beispiel: 100 Arten

10 Arten

1 Arten



Zehnerregel (Tens rule)

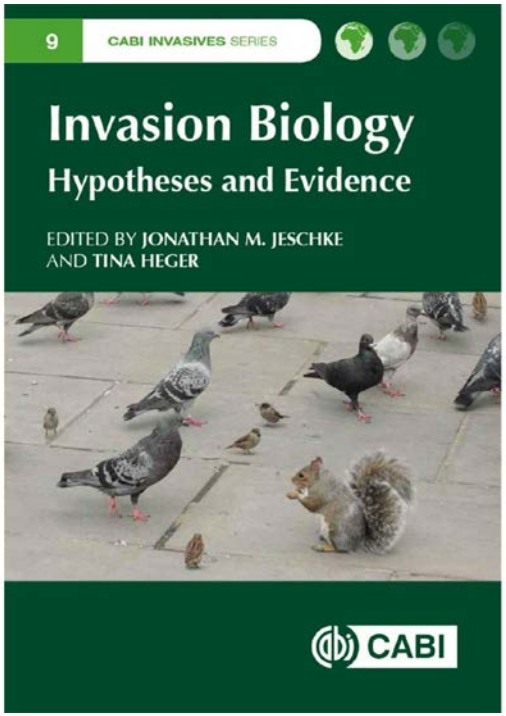


Beobachtet:

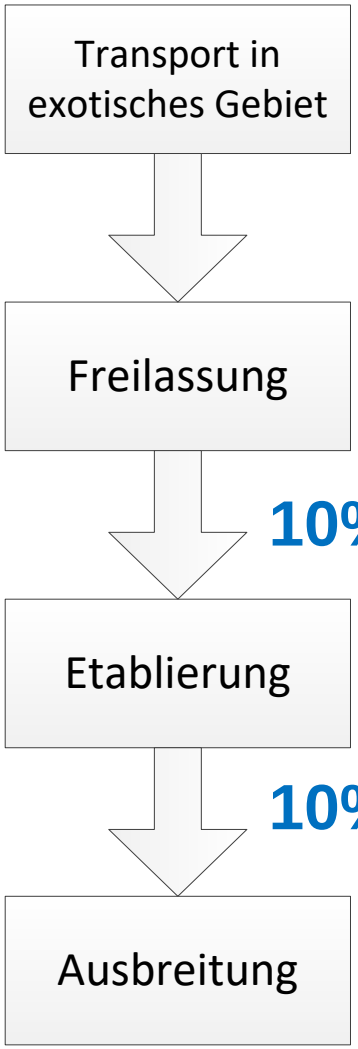
42±6% (n=50)

32±11% (n=9)

Jeschke & Pyšek (2018)
Invasion Biology



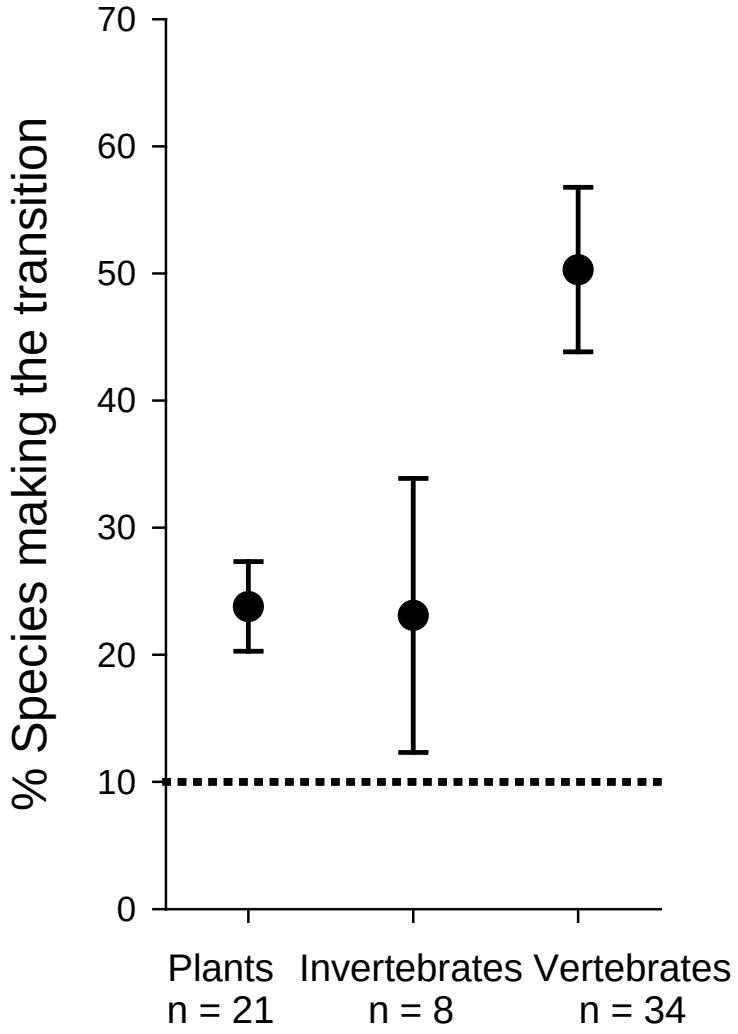
Zehnerregel (Tens rule)



Beobachtet:

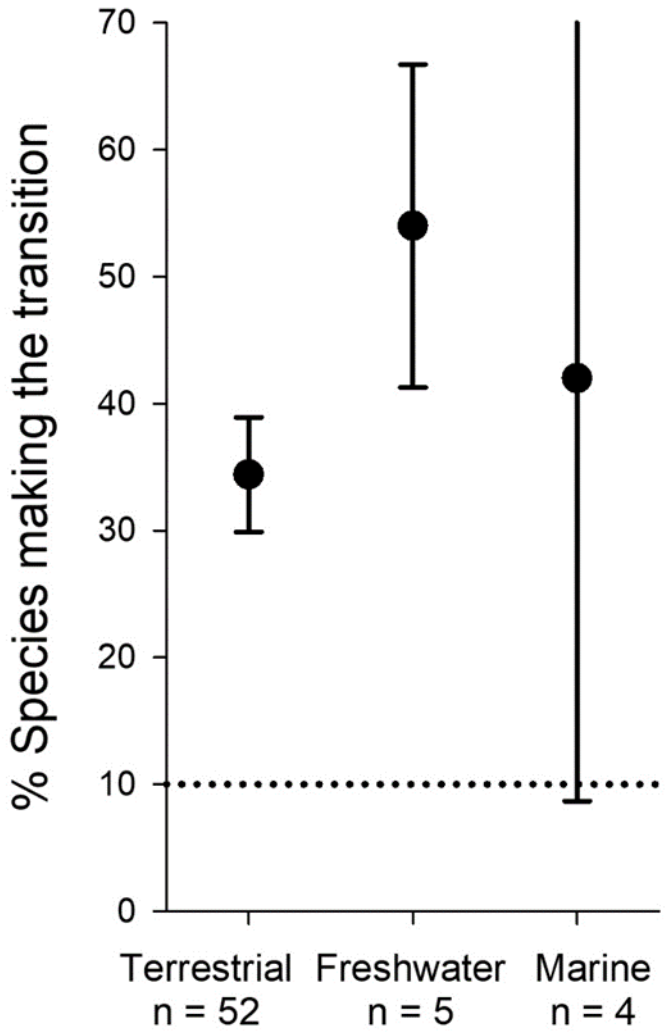
42±6% (n=50)

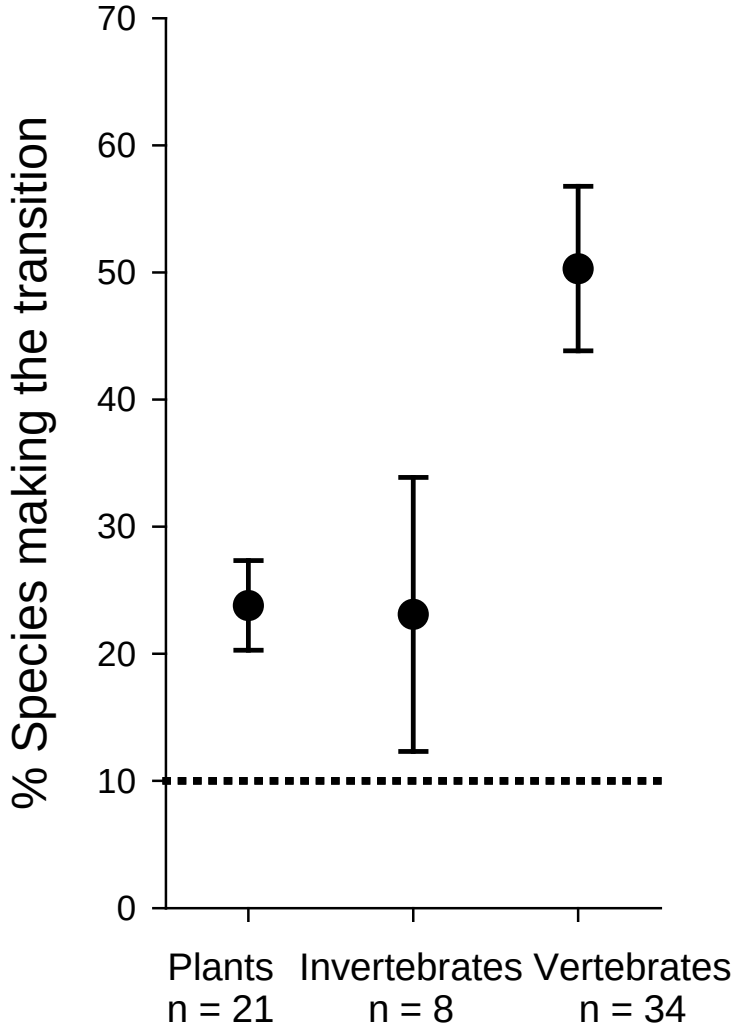
32±11% (n=9)



Jeschke & Pyšek (2018)
Invasion Biology

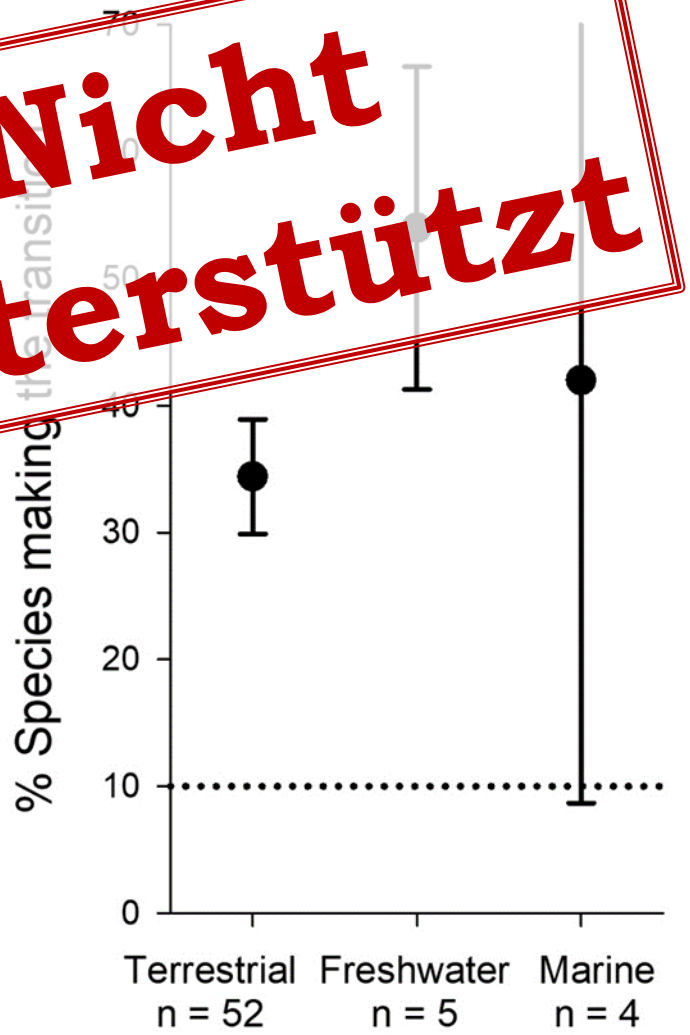
Zehnerregel (Tens rule)

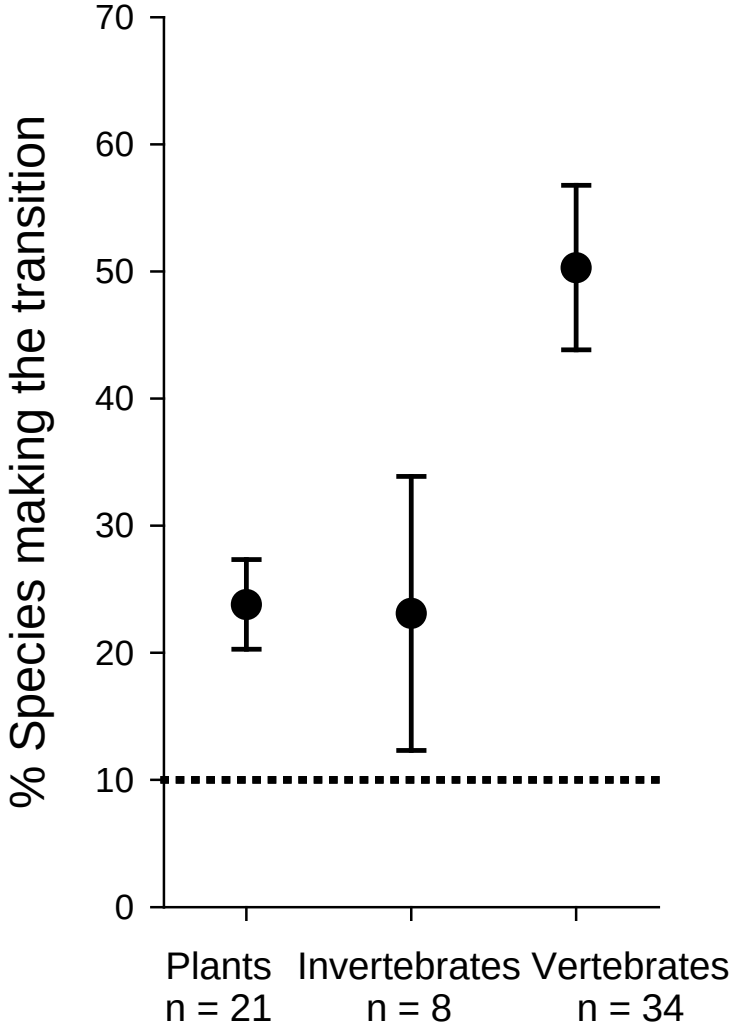




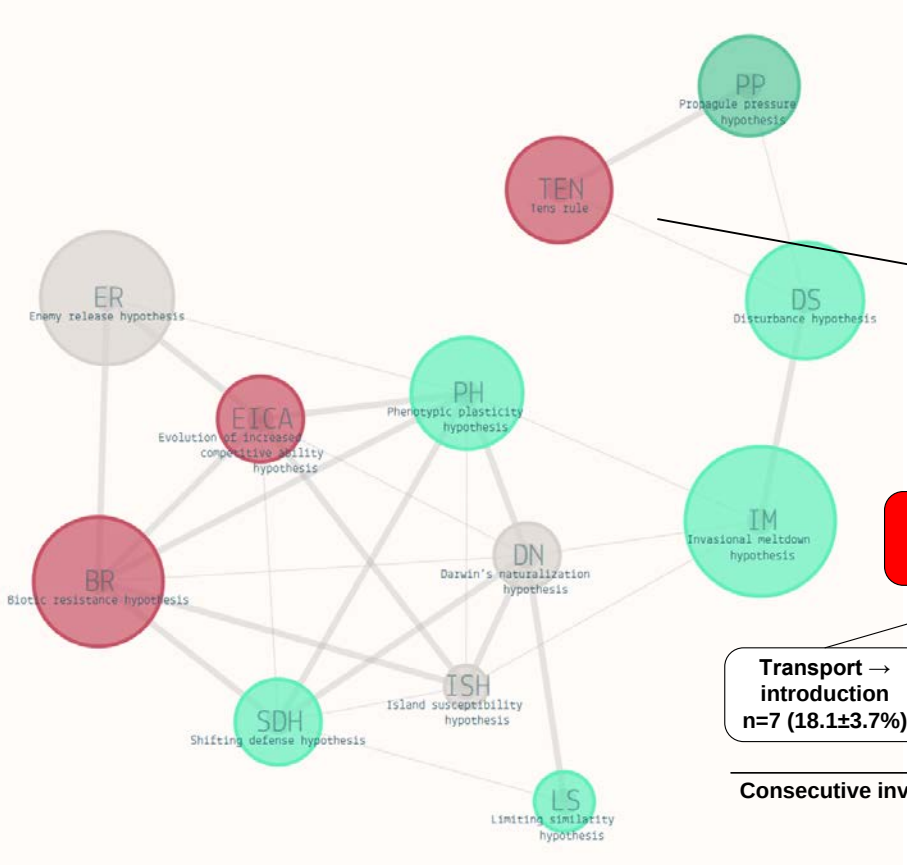
Zehnerregel (Tens rule)

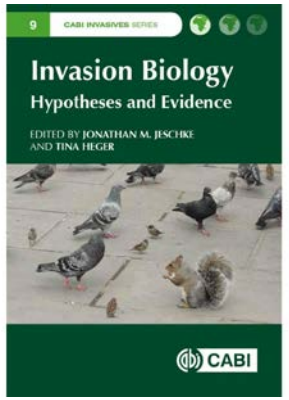
Nicht unterstützt





Übersicht über Hypothesen zu invasiven Arten und deren empirische Unterstützung





Tens rule n=102

Invasion tens rule n=66 (37.7±4.3%)

Impact tens rule n=36

Transport → introduction n=7 (18.1±3.7%)

Introduction → establishment n=50 (41.6±5.5%)

Establishment → spread n=9 (32.1±10.8%)

Establishment → impact n=18 (23.9±5.5%)

Introduction → impact* n=18 (16.1±4.3%)

Consecutive invasion stages for invasion tens rule

hi-knowledge.org
dive into science

Meta-Daten

Überblick

- Begriffsklärung
- Einfuhr invasiver Arten
- Etablierung & Ausbreitung invasiver Arten
- Auswirkungen invasiver Arten 

Unterschiedliche Definitionen …

Conservation Biology

Essay

Defining the Impact of Non-Native Species

JONATHAN M. JESCHKE,* SVEN BACHER,† TIM M. BLACKBURN,‡§ JAIMIE T. A. DICK,**
FRANZ ESSL,†† THOMAS EVANS,‡‡ MIRIJAM GAERTNER,§§ PHILIP E. HULME,***
INGOLF KÜHN,†††‡‡‡***** AGATA MRUGAŁA,§§§ JAN PERGL,**** PETR PYŠEK,****§§§
WOLFGANG RABITSCH,†††† ANTHONY RICCIARDI,‡‡‡‡ DAVID M. RICHARDSON,§§
AGNIESZKA SENDEK,††† MONTSERRAT VILÀ,§§§§ MARTEN WINTER,‡‡‡
AND SABRINA KUMSCHICK§§

*Department of Ecology and Ecosystem Management, Restoration Ecology, Technische Universität München, 85350, Freising-Weihenstephan, Germany, email jonathan.jeschke@gmx.net
†Unit Ecology & Evolution, Department of Biology, University of Fribourg, Chemin du Musée 10, 1700, Fribourg, Switzerland
‡Institute of Zoology, Zoological Society of London, Regent's Park, NW1 4RY, London, United Kingdom
§Distinguished Scientist Fellowship Program, King Saud University, Riyadh, 1145, Saudi Arabia
**Institute for Global Food Security, School of Biological Sciences, Queen's University Belfast, M.B.C., 97 Lisburn Road, Belfast, BT9 7BL, Northern Ireland, United Kingdom
††Department of Conservation Biology, Vegetation and Landscape Ecology, University of Vienna, Rennweg 14, 1030, Vienna, Austria
‡‡Silwood Park Campus, Department of Life Sciences, Imperial College London, Buckhurst Road, Ascot, Berkshire, SL5 7PY, United Kingdom
§§Centre for Invasion Biology, Department of Botany and Zoology, Stellenbosch University, Private Bag X1, Matieland, 7602, South

Unterschiedliche Definitionen …

1) Directionality

- Are only unidirectional considered or are bidirectional changes considered?

3) Ecological and/or socio-economic changes

- Are ecological and/or socio-economic changes considered?

Defining *impact*

2) Classification and measurement

- Is the definition as neutral as possible or are human values explicitly included?
- Is the term *impact* only used if the change caused by a non-native species exceeds a certain threshold, or is it used for *any* change?

4) Scale

- Which spatio-temporal scale is considered?
- Which taxonomic/functional groups and level of organization are considered?
- Consideration of per-capita change, population density, and range?

Unterschiedliche Definitionen …

3) Ecological and/or socio-economic changes

- Are **ecological** and/or socio-economic changes considered?

Laut **EU-Verordnung** ist eine „invasive gebietsfremde Art“ eine gebietsfremde Art, die die Biodiversität und damit verbundene Ökosystem-leistungen gefährdet oder nachteilig beeinflusst.

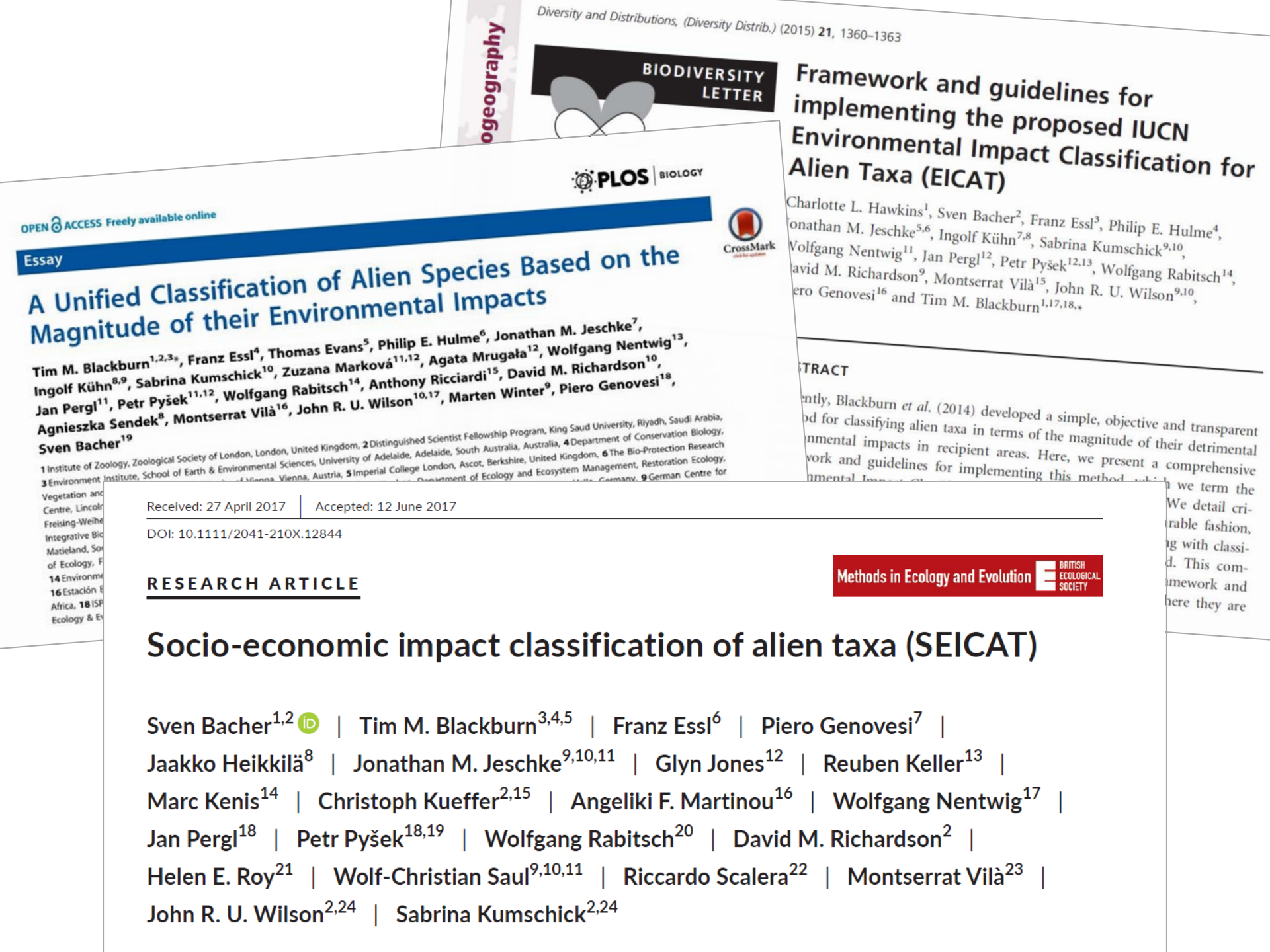
Auswirkungen invasiver Arten in Europa

Table 2. Total number and percentage of alien species known to have an ecological or economic impact for different taxonomic groups in Europe*

Taxonomic group	*Total*	*Ecological impact (%)*	*Economic impact (%)*
Terrestrial plants	5789	326 (5.6)	315 (5.4)
Terrestrial invertebrates	2481	342 (13.8)	601 (24.2)
Terrestrial vertebrates	358	109 (30.4)	138 (38.5)
Freshwater flora and fauna	481	145 (30.1)	117 (24.3)
Marine flora and fauna	1071	172 (16.1)	176 (16.4)

*DAISIE database search at 12 Feb 2008

Vilà *et al.* (2010) *Front. Ecol. Environ.*



Diversity and Distributions, (Diversity Distrib.) (2015) 21, 1360–1363

BIODIVERSITY LETTER

Framework and guidelines for implementing the proposed IUCN Environmental Impact Classification for Alien Taxa (EICAT)

Charlotte L. Hawkins[1], Sven Bacher[2], Franz Essl[3], Philip E. Hulme[4], Jonathan M. Jeschke[5,6], Ingolf Kühn[7,8], Sabrina Kumschick[9,10], Wolfgang Nentwig[11], Jan Pergl[12], Petr Pyšek[12,13], Wolfgang Rabitsch[14], David M. Richardson[9], Montserrat Vilà[15], John R. U. Wilson[9,10], Piero Genovesi[16] and Tim M. Blackburn[1,17,18,*]

ABSTRACT

Recently, Blackburn *et al.* (2014) developed a simple, objective and transparent method for classifying alien taxa in terms of the magnitude of their detrimental environmental impacts in recipient areas. Here, we present a comprehensive framework and guidelines for implementing this method, which we term the

PLOS | BIOLOGY

OPEN ACCESS Freely available online

Essay

A Unified Classification of Alien Species Based on the Magnitude of their Environmental Impacts

Tim M. Blackburn[1,2,3*], Franz Essl[4], Thomas Evans[5], Philip E. Hulme[6], Jonathan M. Jeschke[7], Ingolf Kühn[8,9], Sabrina Kumschick[10], Zuzana Marková[11,12], Agata Mrugała[12], Wolfgang Nentwig[13], Jan Pergl[11], Petr Pyšek[11,12], Wolfgang Rabitsch[14], Anthony Ricciardi[15], David M. Richardson[10], Agnieszka Sendek[8], Montserrat Vilà[16], John R. U. Wilson[10,17], Marten Winter[9], Piero Genovesi[18], Sven Bacher[19]

1 Institute of Zoology, Zoological Society of London, London, United Kingdom, 2 Distinguished Scientist Fellowship Program, King Saud University, Riyadh, Saudi Arabia, 3 Environment Institute, School of Earth & Environmental Sciences, University of Adelaide, Adelaide, South Australia, Australia, 4 Department of Conservation Biology, Vegetation and Centre, Lincoln Freising-Weihe Integrative Bio Matieland, So of Ecology, F 14 Environme 16 Estación E Africa, 18 ISP Ecology & Ev Vienna, Vienna, Austria, 5 Imperial College London, Ascot, Berkshire, United Kingdom, 6 The Bio-Protection Research Department of Ecology and Ecosystem Management, Restoration Ecology, 9 German Centre for

Received: 27 April 2017 | Accepted: 12 June 2017

DOI: 10.1111/2041-210X.12844

RESEARCH ARTICLE

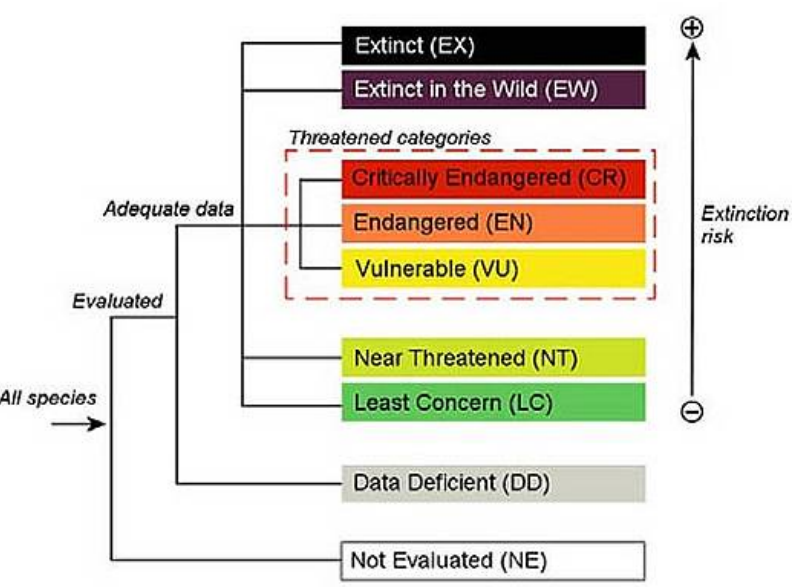
Methods in Ecology and Evolution | BRITISH ECOLOGICAL SOCIETY

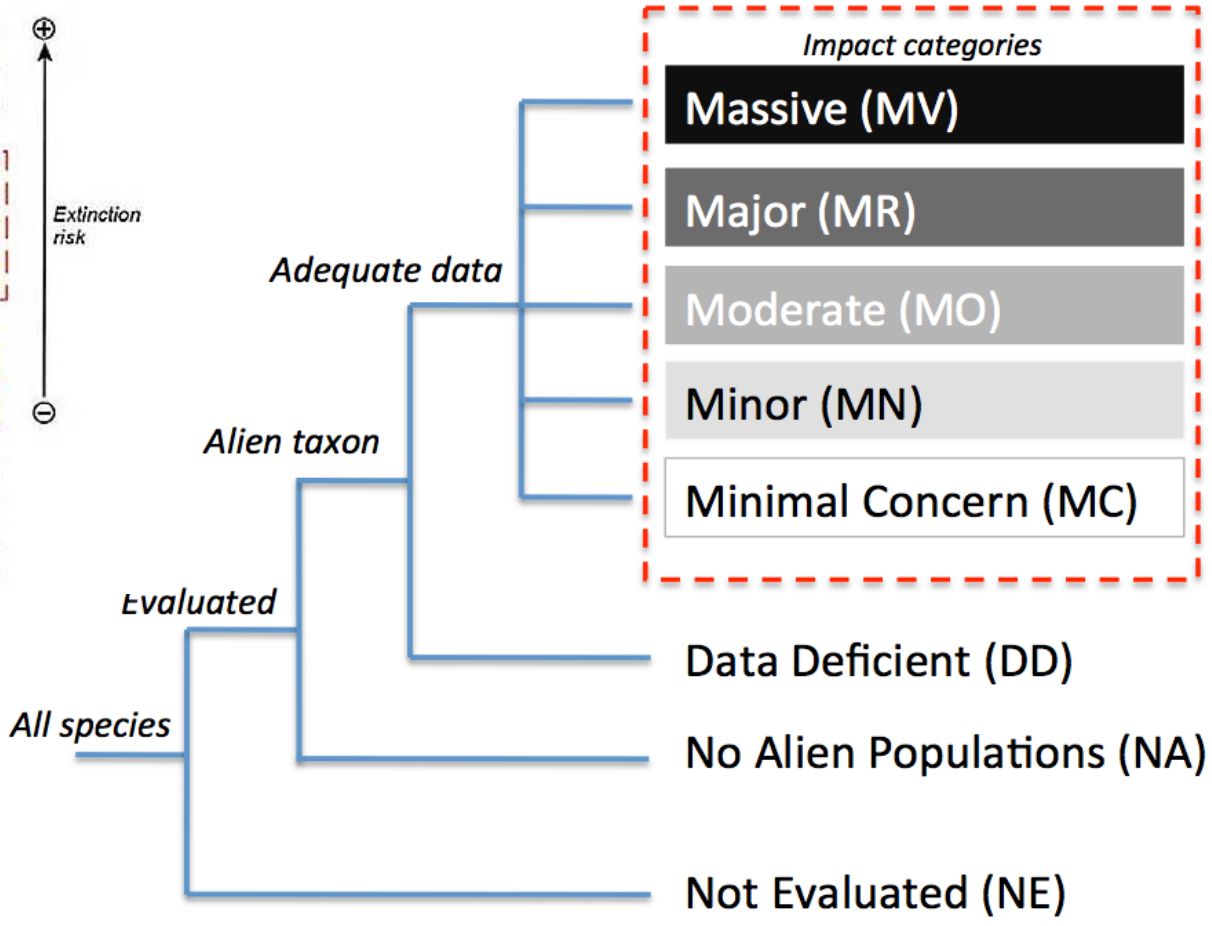
Socio-economic impact classification of alien taxa (SEICAT)

Sven Bacher[1,2] | Tim M. Blackburn[3,4,5] | Franz Essl[6] | Piero Genovesi[7] | Jaakko Heikkilä[8] | Jonathan M. Jeschke[9,10,11] | Glyn Jones[12] | Reuben Keller[13] | Marc Kenis[14] | Christoph Kueffer[2,15] | Angeliki F. Martinou[16] | Wolfgang Nentwig[17] | Jan Pergl[18] | Petr Pyšek[18,19] | Wolfgang Rabitsch[20] | David M. Richardson[2] | Helen E. Roy[21] | Wolf-Christian Saul[9,10,11] | Riccardo Scalera[22] | Montserrat Vilà[23] | John R. U. Wilson[2,24] | Sabrina Kumschick[2,24]

IUCN Red List

S/EICAT





GLOBAL INVASIVE SPECIES DATABASE

Vielen Dank für Ihre Aufmerksamkeit!

GEFÖRDERT VOM

Deutsche Forschungsgemeinschaft DFG

Bundesministerium für Bildung und Forschung

biodiversa

VolkswagenStiftung

Alexander von Humboldt Stiftung/Foundation

hi-knowledge.org
dive into science