

CORRESPONDENCE

Non-natives: 141 scientists object

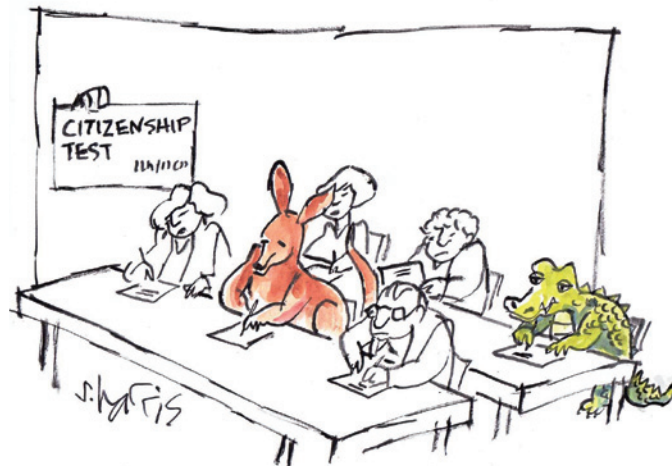
We the undersigned feel that in advocating a change in the environmental management of introduced species (*Nature* 474, 153–154; 2011), Mark Davis and colleagues assail two straw men.

First, most conservation biologists and ecologists do not oppose non-native species per se — only those targeted by the Convention on Biological Diversity as threatening “ecosystems, habitats or species”. There is no campaign against all introductions: scarcity of resources forces managers to prioritize according to the impact of troublesome species, as in the Australian Weed Risk Assessment.

Second, invasion biologists and managers do not ignore the benefits of introduced species. They recognize that many non-native species curtail erosion and provide food, timber and other services. Nobody tries to eradicate wheat, for instance. Useful non-native species may sometimes still need to be managed because they have a negative impact, such as tree invasions that cause water loss in the South African fynbos.

Davis and colleagues downplay the severe impact of non-native species that may not manifest for decades after their introduction — as occurred with the Brazilian pepper shrub (*Schinus terebinthifolius*) in Florida (J. J. Ewel in *Ecology of Biological Invasions of North America and Hawaii* (eds H. A. Mooney and J. A. Drake) 214–230; Springer, 1986). Also, some species may have only a subtle immediate impact but affect entire ecosystems, for example through their effect on soils.

Pronouncing a newly introduced species as harmless



can lead to bad decisions about its management. A species added to a plant community that has no evolutionary experience of that organism should be carefully watched.

For some introductions, eradication is possible. For example, 27 invasive species have been eradicated from the Galapagos Islands, mitigating severe adverse effects on endemic species. Harmful invasive species have been successfully kept in check by biological, chemical and mechanical means.

The public must be vigilant of introductions and continue to support the many successful management efforts.

Daniel Simberloff* *University of Tennessee, Tennessee, USA.*

dsimberloff@utk.edu

**On behalf of 141 signatories (see go.nature.com/fl1eqjn).*

Non-natives: put biodiversity at risk

Bias against non-native species is not xenophobic (*Nature* 474, 153–154; 2011) — it has a sound scientific foundation.

The non-native status of a species is highly relevant to assessing its potential environmental and economic

impact. Unrestrained growth and environmental damage follow when there are no natural enemies in newly colonized areas. This is not necessarily a sign of an invader's superior evolutionary fitness: it may lead to a population collapse due to overexploitation of resources.

Non-native species can increase the variety of species in a community, but it is an oversimplification to equate this with increased biodiversity, of which species richness is only one component. Surviving populations of native species may shrink or become restricted to poor-quality marginal habitats. Such unevenness hardly contributes to a more diverse community.

The genetic diversity of invaded communities may decrease because of bottlenecks: native genotypes disappear as populations fall, whereas the invaders originate from very few initial colonizers.

Establishment of non-native species inevitably decreases global diversity. Australia, for example, was unique in having no placental mammals; their introduction by humans made the continent ecologically more similar to the rest of the world. **Andrei Alyokhin** *University of Maine, Maine, USA.*

andrei.al yokhin@umit.maine.edu

Non-natives: plusses of invasion ecology

Contrary to the implications of Mark Davis and colleagues (*Nature* 474, 153–154; 2011), invasion ecology has given us valuable insight into the effects of new species on ecological function and into some of the precipitous changes we may face in the coming decades.

Invasion ecologists generally assert that only a very small fraction of non-native species harm their new ecosystems. This position emerged as early as 1986 and was mainstream in the era that Davis and colleagues claim as the nadir of ecological nativism.

It is unfair to characterize any scientific discipline solely by past failures and to ignore its successes. Invasion ecology is making real progress with defining impact and characterizing risk. Let's not throw up our hands in despair just yet.

Julie L. Lockwood *Rutgers, The State University of New Jersey, USA.*

lockwood@aesop.rutgers.edu

Martha F. Hoopes *Mount Holyoke College, Massachusetts, USA.*

Michael P. Marchetti *California State University, California, USA.*

Non-natives: four risk factors

Mark Davis *et al.* set an unrealistically high bar for those making management decisions about exotic species (*Nature* 474, 153–154; 2011). Control is often easier, cheaper and more effective soon after detection (R. A. Haack *et al.* *Annu. Rev. Entomol.* 55, 521–546; 2010). We agree that research on ecosystem impact is necessary, but such studies can take years. Meanwhile, we suggest that

Supplementary information to: Non-natives: 141 scientists object

Full list of co-signatories to a Correspondence published in *Nature* **475**, 36 (2011); doi: 10.1038/475036a.

Daniel Simberloff *University of Tennessee, Knoxville, Tennessee, USA.*

dsimberloff@utk.edu

Jake Alexander *Institute of Integrative Biology, Zurich, Switzerland.*

Fred Allendorf *University of Montana, Missoula, Montana, USA.*

James Aronson *CEFE/CNRS, Montpellier, France.*

Pedro M. Antunes *Algoma University, Sault Ste. Marie, Ontario, Canada.*

Sven Bacher *University of Fribourg, Fribourg, Switzerland.*

Richard Bardgett *Lancaster University, Lancaster, UK.*

Sandro Bertolino *University of Turin, Grugliasco, Italy.*

Melanie Bishop *Macquarie University, Sydney, Australia.*

Tim M. Blackburn *Zoological Society of London, London, UK.*

April Blakeslee *Smithsonian Environmental Research Center, Edgewater, Maryland, USA.*

Dana Blumenthal *USDA Agricultural Research Service, Fort Collins, Colorado, USA.*

Alejandro Bortolus *Centro Nacional Patagónico-CONICET, Puerto Madryn, Argentina.*

Ralf Buckley *Griffith University, Southport, Queensland, Australia.*

Yvonne Buckley *CSIRO Ecosystem Sciences and The University of Queensland, ARC Centre of Excellence in Environmental Decisions, St Lucia, Queensland, Australia.*

Jeb Byers *The University of Georgia, Athens, Georgia, USA.*

Ragan M. Callaway *University of Montana, Missoula, Montana, USA.*

Faith Campbell *The Nature Conservancy, Arlington, Virginia, USA.*

Karl Campbell *Island Conservation, Santa Cruz, California, USA.*

Marnie Campbell *Central Queensland University, Queensland, Australia.*

James T. Carlton *Williams College — Mystic Seaport, Mystic, Connecticut, USA.*

Phillip Cassey *University of Adelaide, Adelaide, South Australia, Australia.*

Jane Catford *The University of Melbourne, Melbourne, Victoria, Australia.*

Laura Celesti-Gradow *Sapienza University of Rome, Rome, Italy.*

John Chapman *Hatfield Marine Science Center, Oregon State University, Newport, Oregon, USA.*

Paul Clark *Natural History Museum, London, UK.*

Andre Clewell *Tall Timbers Research Station, Tallahassee, Florida, USA.*

João Canning Clode *Smithsonian Environmental Research Center, Edgewater, Maryland, USA.*

Andrew Chang *Smithsonian Environmental Research Center, Edgewater, Maryland, USA.*

Milan Chytrý *Masaryk University, Brno, Czech Republic.*

Mick Clout *University of Auckland, Auckland, New Zealand.*

Andrew Cohen *Center for Research on Aquatic Bioinvasions, Richmond, California, USA.*

Phil Cowan *Landcare Research, Palmerston North, New Zealand.*

Robert H. Cowie *University of Hawaii, Honolulu, Hawaii, USA.*

Alycia W. Crall *Colorado State University, Fort Collins, Colorado, USA.*

Jeff Crooks *Tijuana River National Estuarine Research Reserve, Imperial Beach, California, USA.*

Marty Deveney *South Australian Aquatic Sciences Centre, West Beach, Australia.*

Kingsley Dixon *Kings Park and Botanic Garden, West Perth, Australia.*

Fred C. Dobbs *Old Dominion University, Norfolk, Virginia, USA.*

David Cameron Duffy *University of Hawaii Manoa, Honolulu, Hawaii, USA.*

Richard Duncan *Lincoln University, Lincoln, New Zealand.*

Paul R. Ehrlich *Stanford University, Stanford, California, USA.*

Lucius Eldredge *Bishop Museum, Honolulu, Hawaii, USA.*

Neal Evenhuis *Bishop Museum, Honolulu, Hawaii, USA.*

Kurt D. Fausch *Colorado State University, Fort Collins, Colorado, USA.*

Heike Feldhaar *University of Osnabrück, Osnabrück, Germany.*

Jennifer Firn *Queensland University of Technology, Brisbane, Queensland, Australia.*

Amy Fowler *Smithsonian Environmental Research Center, Edgewater, Maryland, USA.*

Bella Galil *National Institute of Oceanography, Haifa, Israel.*

Emili Garcia-Berthou *Universitat de Girona, Girona, Spain.*

Jonathan Geller *Moss Landing Marine Laboratories, Moss Landing, California, USA.*

Piero Genovesi *Italian National Institute for Environmental Protection and Research, Rome, Italy.*

Esther Gerber *CABI Europe, Delemont, Switzerland.*

Francesca Gherardi *Universita' di Firenze, Firenze, Italy.*

Stephan Gollasch *Hamburg, Germany.*

Doria Gordon *University of Florida, Gainesville, Florida, USA.*

Jim Graham *Colorado State University, Fort Collins, Colorado, USA.*

Paul Gribben *University of Technology, Sydney, Australia.*

Blaine Griffen *Smithsonian Environmental Research Center, Edgewater, Maryland, USA.*

Edwin D. Grosholz *University of California, Davis, California, USA.*

Chad Hewitt *Central Queensland University, Queensland, Australia.*

José L. Hierro *CONICET-Universidad Nacional de La Pampa, La Pampa, Argentina.*

Philip Hulme *Lincoln University, Lincoln, New Zealand.*

Pat Hutchings *Australian Museum, Sydney, Australia.*

Vojtěch Jarošík *Charles University, Prague, Czech Republic.*

Chris Johnson *University of Tasmania, Hobart, Tasmania, Australia.*

Ladd Johnson *Université Laval, Ville de Québec, Quebec, Canada.*

Emma L. Johnston *University of New South Wales, Sydney, Australia.*

Carl G. Jones *Durrell Wildlife Conservation Trust, Jersey, Channel Islands, UK.*

Reuben Keller *University of Chicago, Chicago, Illinois, USA.*

Carolyn M. King *University of Waikato, Hamilton, New Zealand.*

Bart G. J. Knols *Academic Medical Center, Amsterdam, The Netherlands; K&S Consulting, Dodewaard, the Netherlands.*

Johannes Kollmann *Technische Universität München, Freising, Germany.*

Thomas Kompas *The Australian National University, Canberra, Australia.*

Peter M. Kotanen *University of Toronto at Mississauga, Mississauga, Ontario, Canada.*

Ingo Kowarik *Technische Universität Berlin, Berlin, Germany.*

Ingolf Kühn *Helmholtz-Zentrum für Umweltforschung, Halle, Germany.*

Sabrina Kumschick *Colorado State University, Fort Collins, Colorado, USA.*

- Brian Leung** McGill University, Montreal, Quebec, Canada.
Andrew Liebhold USDA Forest Service, Morgantown, West Virginia, USA.
Hugh MacIsaac University of Windsor, Windsor, Ontario, Canada.
Richard Mack Washington State University, Pullman, Washington, USA.
Deborah G. McCullough Michigan State University, East Lansing, Michigan, USA.
Robbie McDonald The Food and Environmental Research Agency, Department for Environment, Food, and Rural Affairs, Stonehouse, UK.
David M. Merritt United States Forest Service, Fort Collins, Colorado, USA.
Laura Meyerson University of Rhode Island, Kingston, Rhode Island, USA.
Dan Minchin Marine Organism Investigations, Killaloe, Ireland.
Harold A. Mooney Stanford University, Stanford, California, USA.
Jeffrey T. Morissette United States Geological Survey, Fort Collins Science Center, Fort Collins, Colorado, USA.
Peter Moyle University of California, Davis, California, USA.
Heinz Müller-Schärer Université de Fribourg/Pérolles, Fribourg, Switzerland.
Brad R. Murray University of Technology Sydney, Sydney, Australia.
Stefan Nehring Bundesamt für Naturschutz, Bonn, Germany.
Wendy Nelson National Institute of Water and Atmospheric Research, Wellington, New Zealand.
Wolfgang Nentwig University of Bern, Bern, Switzerland.
Stephen J. Novak Boise State University, Boise, Idaho, USA.
Anna Occhipinti Università di Pavia, Pavia, Italy.
Henn Ojaveer University of Tartu, Pärnu, Estonia.
Bruce Osborne University College Dublin, Dublin, Ireland.
Richard S. Ostfeld Cary Institute of Ecosystem Studies, Millbrook, New York, USA.
John Parker Smithsonian Environmental Research Center, Edgewater, Maryland, USA.
Judith Pederson Worcester, Massachusetts, USA.
Jan Pergl Academy of Sciences of the Czech Republic, Pruhonice, Czech Republic.
Megan L. Phillips University of Technology Sydney, Sydney, Australia.
Petr Pyšek Academy of Sciences, Pruhonice, Czech Republic.
Marcel Rejmánek University of California, Davis, California, USA.
Anthony Ricciardi McGill University, Montreal, Quebec, Canada.
Carlo Ricotta University of Rome 'La Sapienza', Rome, Italy.
David Richardson Stellenbosch University, Matieland, South Africa.
Gil Rilov National Institute of Oceanography, Haifa, Israel.
Euan Ritchie Deakin University, Burwood, Victoria, Australia.
Peter A. Robertson Food and Environment Research Agency, York, UK.
Joe Roman University of Vermont, Burlington, Vermont, USA.
Gregory Ruiz Smithsonian Environmental Research Center, Edgewater, Maryland, USA.
Hanno Schaefer Harvard University, Cambridge, Massachusetts, USA.
Britta Schaffelke Australian Institute of Marine Science, Townsville, Australia.
Kristina A. Schierenbeck California State University, Chico, California, USA.
Don C. Schmitz Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida, USA.
Evangelina Schwindt Centro Nacional Patagónico-CONICET, Puerto Madryn, Argentina.
Jim Seeb University of Washington, Seattle, Washington, USA.
L. David Smith Smith College, Northampton, Massachusetts, USA.
Gideon F. Smith University of Pretoria, Pretoria, South Africa.
Thomas Stohlgren Colorado State University, Fort Collins, Colorado, USA.
David L. Strayer Cary Institute of Ecosystem Studies, Millbrook, New York, USA.
Donald Strong University of California, Davis, California, USA.
William J. Sutherland University of Cambridge, Cambridge, UK.
Thomas Therriault Pacific Biological Station, Nanaimo, British Columbia, Canada.
Wilfried Thuiller Université Joseph Fourier, Grenoble, France.
Mark Torchin Smithsonian Tropical Research Institute, Balboa, Panama.
Wim van der Putten Netherlands Institute of Ecology, Wageningen, the Netherlands.
Montserrat Vilà Estación Biológica de Doñana, Sevilla, Spain.
Betsy Von Holle University of Central Florida, Orlando, Florida, USA.
Inger Wallentinus University of Gothenburg, Goteborg, Sweden.
David Wardle Swedish University of Agricultural Sciences, Umeå, Sweden.
Mark Williamson University of York, York, UK.
John Wilson Stellenbosch University, Matieland, South Africa.
Marten Winter Helmholtz-Zentrum für Umweltforschung, Halle, Germany.
Lorne M. Wolfe Georgia Southern University, Statesboro, Georgia, USA.
Jeff Wright The University of Tasmania, Launceston, Australia.
Marjorie Wonham Quest University, Squamish, British Columbia, Canada.
Chela Zabin Smithsonian Environmental Research Center, Edgewater, Maryland, USA.