

One Health = Ecosystem Health: An Integrated Approach to Invasive Animals and Animal Pathogens

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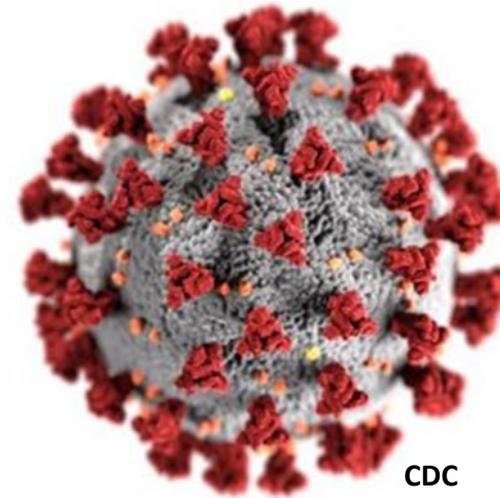


25 February 2021



Definition

- 'Invasive species' means, with regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health.
- 'Non-native species' or 'alien species' means, with respect to a particular ecosystem, an organism, including its seeds, eggs, spores, or other biological material capable of propagating that species, that occurs outside of its natural range.



Executive Order 13751: Safeguarding the Nation From the Impacts of Invasive Species

How do they get here?

Intentional Introduction

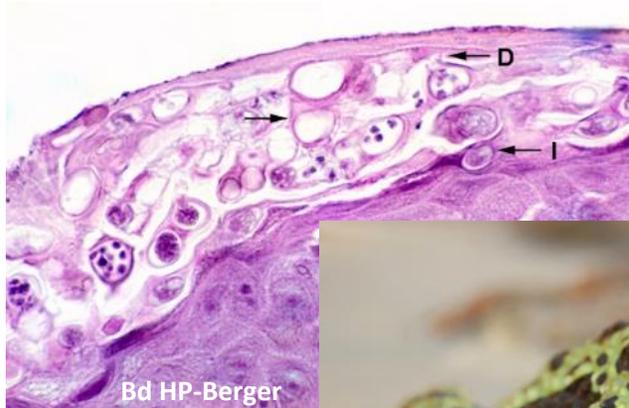
- Livestock and other farmed animals
- Game species
- Zoo animals
- Companion animals and exotic pets



How do they get here?

Accidental Introduction

- Animals (cargo, travelers)
- Insects (cargo, pet trade)
- Microbial organisms



Invasive Vertebrates

- Toxoplasmosis
- Rabies
- Tularemia
- Brucella suis, Brucella abortus
- *African Swine Fever*
- Bovine tuberculosis
- Salmonellosis, E.coli
- Ranavirus



Invasive Invertebrates (Vector-borne Dz)



- Avian Malaria
- West Nile Virus
- Dengue, Chikungunya, Zika
- Rickettsial diseases
- Sylvatic Plague
- Murine Typhus
- Trematode (flake) parasites



West Nile Virus
Ruffed Grouse
GHOW



New World Screwworm
Key Deer



Invasive Animal Pathogens

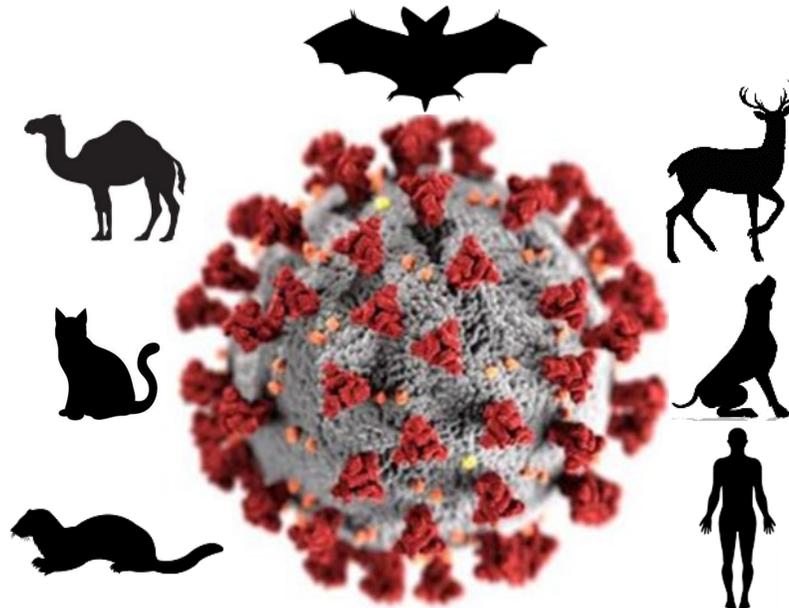
- WNS (*P. destructans*)
- Bd (*Batrachochytrium dendrobatidis*)
- **'Bsal'** (*B. salamandrivorans*)
- VHS (Type IVb)
- Whirling disease (*M. cerebralis*)



Whirling disease



Viral hemorrhagic septicemia



White nose syndrome /Pd



USFS



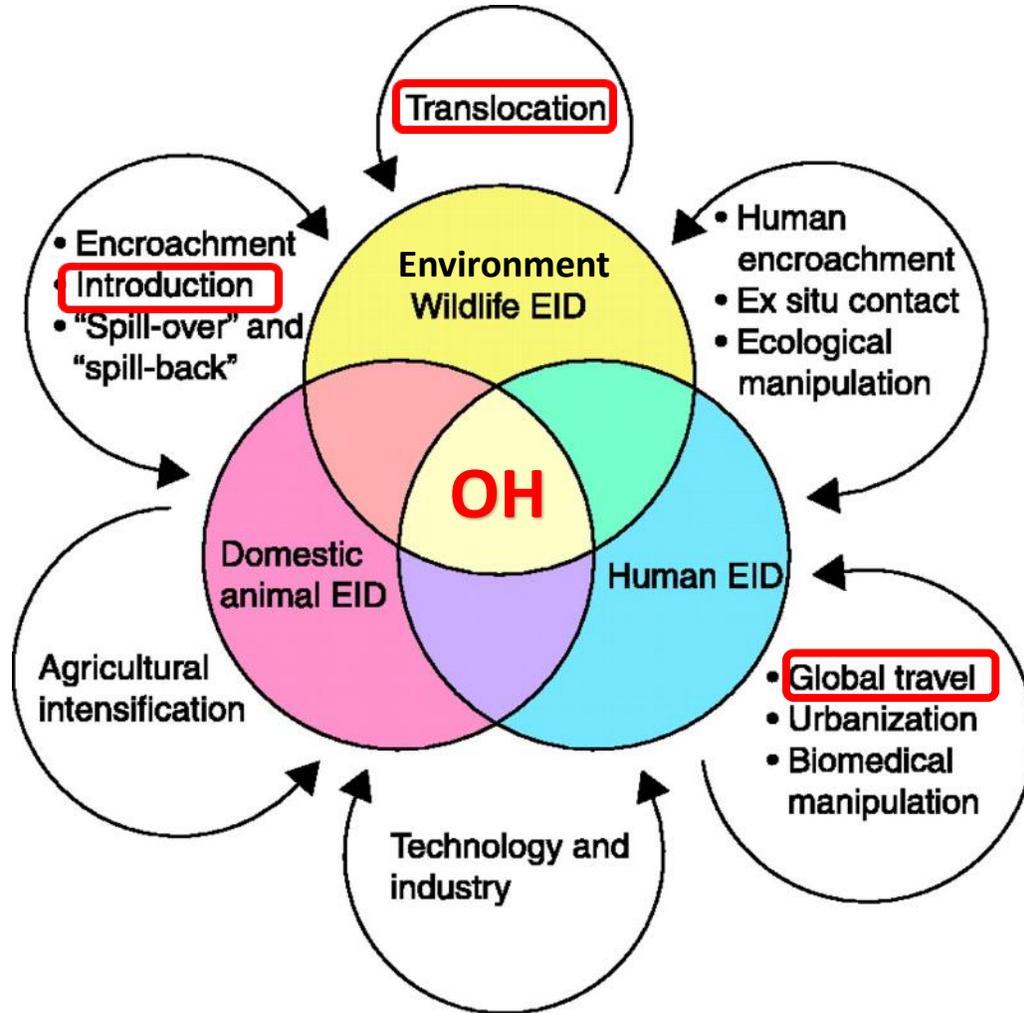
Bd HP-Berger

Chytrid disease/Bd



Harlequin frog SCBI

One Health = Ecosystem Health



Adapted from: P. Dazak, et-al. *Science* 287, 443 (2000)



INFECTIOUS DISEASE MOVEMENT IN A BORDERLESS WORLD

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

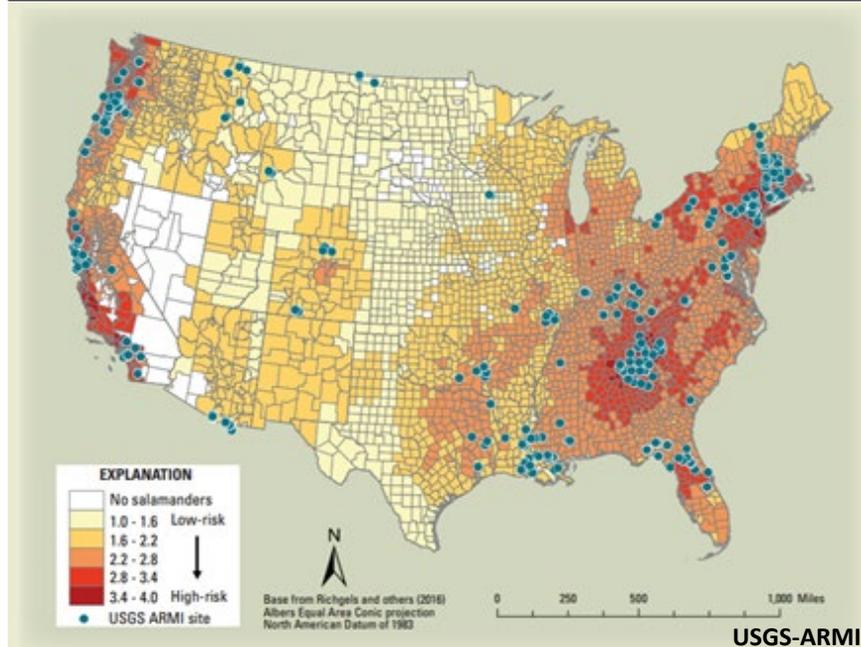
Workshop Summary

USFS Research and Management Actions

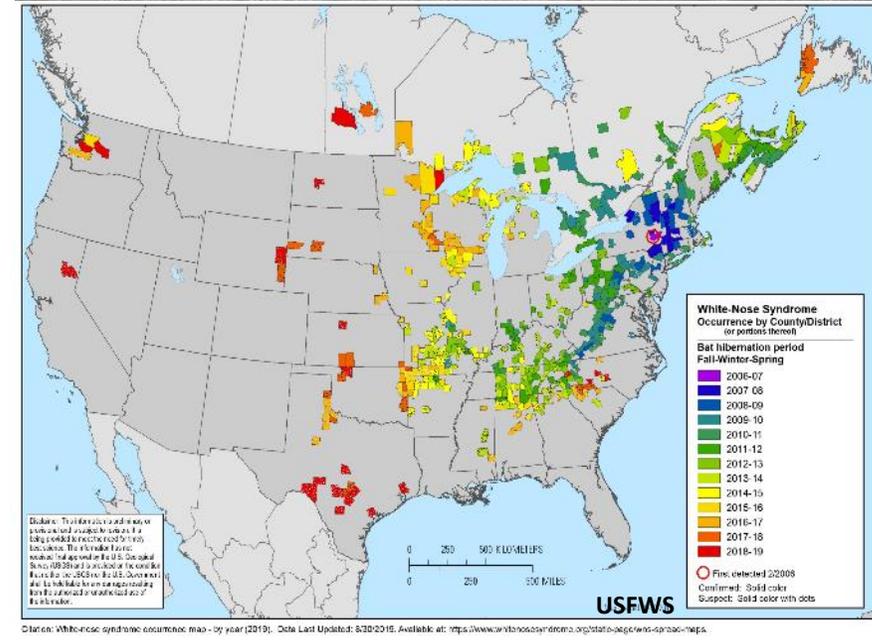
The North American Bsal Task Force



Salamander Chytrid Disease
Other names: *Bsal*, Chytridiomycosis



National WNS Response Team



<https://www.fs.usda.gov/inside-fs/new-herpetofauna-disease-alert-system-relies-information-recreationists>

<https://www.whitenosesyndrome.org/>

National Genomics Center for Wildlife and Fish Conservation



- Early detection of native and invasive species
- Dedicated to making results public and accessible via eDNAAtlas
 - <https://www.fs.fed.us/rm/boise/AWAE/projects/eDNAAtlas/the-edna-atlas-results.html>
- Highlights
 - a) Many states work with NGC pre- & post- invasive eradication
 - b) Use of eDNA to evaluate native and invasive fish interactions

North American Journal of
Fisheries Management

ARTICLE | [Full Access](#) |

Environmental DNA sampling informs fish eradication efforts: case studies and lessons learned

K.J. Carim, N.J. Bean, J.M. Connor, W.P. Baker, M. Jaeger, M.P. Ruggles, K.S. McKelvey, T.W. Franklin,
M.K. Young, M.K. Schwartz

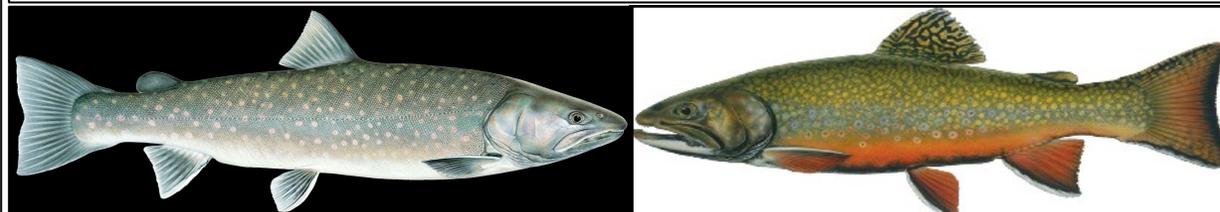
First published: 21 February 2020 | <https://doi.org/10.1002/nafm.10428>

esa

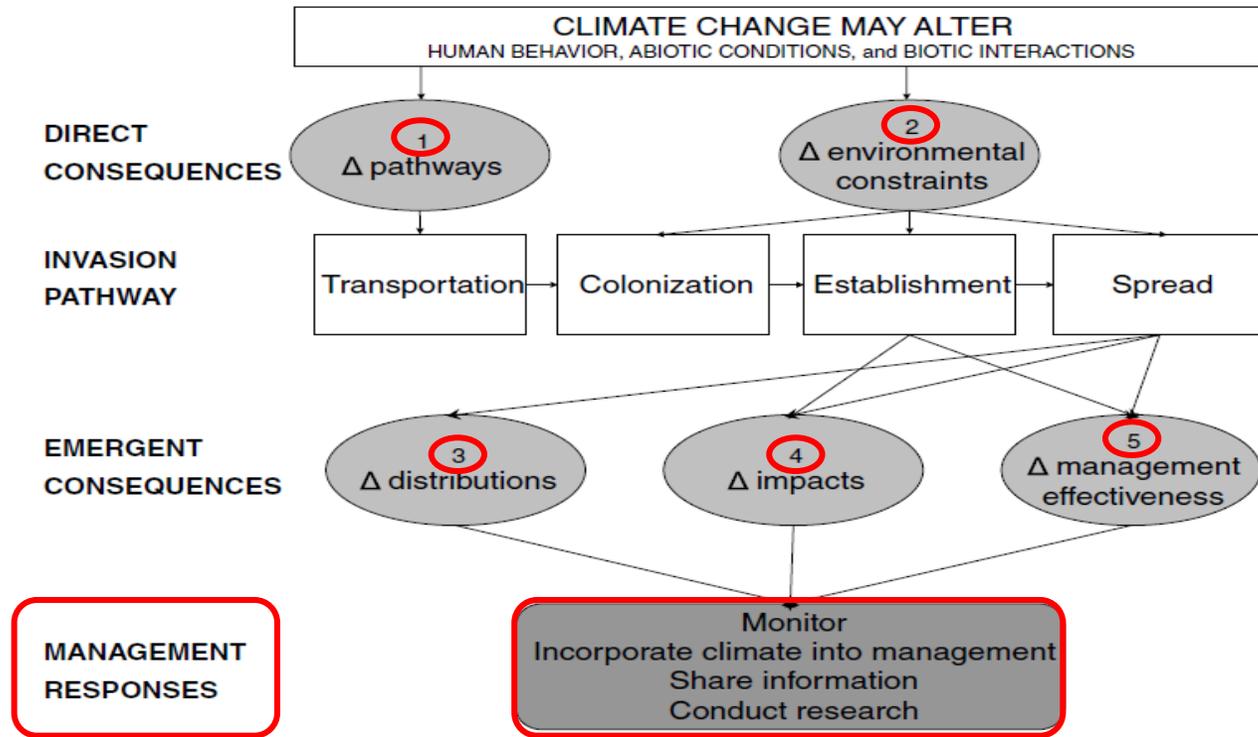
ECOSPHERE

Fine-scale environmental DNA sampling reveals climate-mediated interactions between native and invasive trout species

TAYLOR M. WILCOX ^{1,†} MICHAEL K. YOUNG,¹ KEVIN S. MCKELVEY,¹ DANIEL J. ISAAK,² DONA L. HORAN,²
AND MICHAEL K. SCHWARTZ¹



Consequences of Climate Change For Invasive Species



Japanese barberry/Ixodes/Lyme's rash - DCNR

Conservation Biology
Volume 22, No. 3, 2008

Enhance environmental monitoring and expand coordination among entities involved in invasive-species management.

Hellmann JJ, et.al (2008). "Five potential consequences of climate change for invasive species". Conservation Biology. 22 (3): 534–43

Climate Change Scorecard

Adaptation Strategies

R
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C
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USFS Office of Sustainability and Climate

Executive Order 13990 of January 20, 2021
Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis

Executive Order 14008 of January 27, 2021
Tackling the Climate Crisis at Home and Abroad

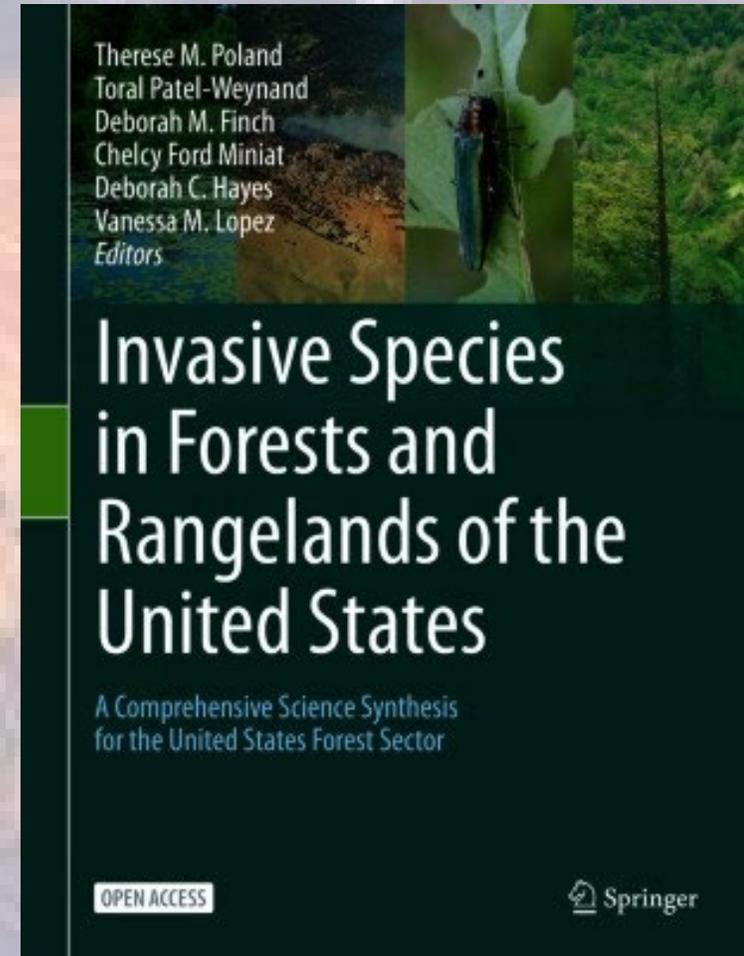
Collaboration is Key!

Thanks!

Any Questions?

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202-365-9359



<https://www.fs.usda.gov/treearch/pubs/61982>



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