Department Climate Policy

Scott Whitcomb

Acting Natural Resources Deputy

January 12, 2023

Climate and Natural Resources

- Climate has always been considered in managing our natural resources
- Stable climate is predictable, a changing climate is unpredictable
- All aspects of mission potentially affected
  - Infrastructure, forests, recreation, cultural resources

Climate Action

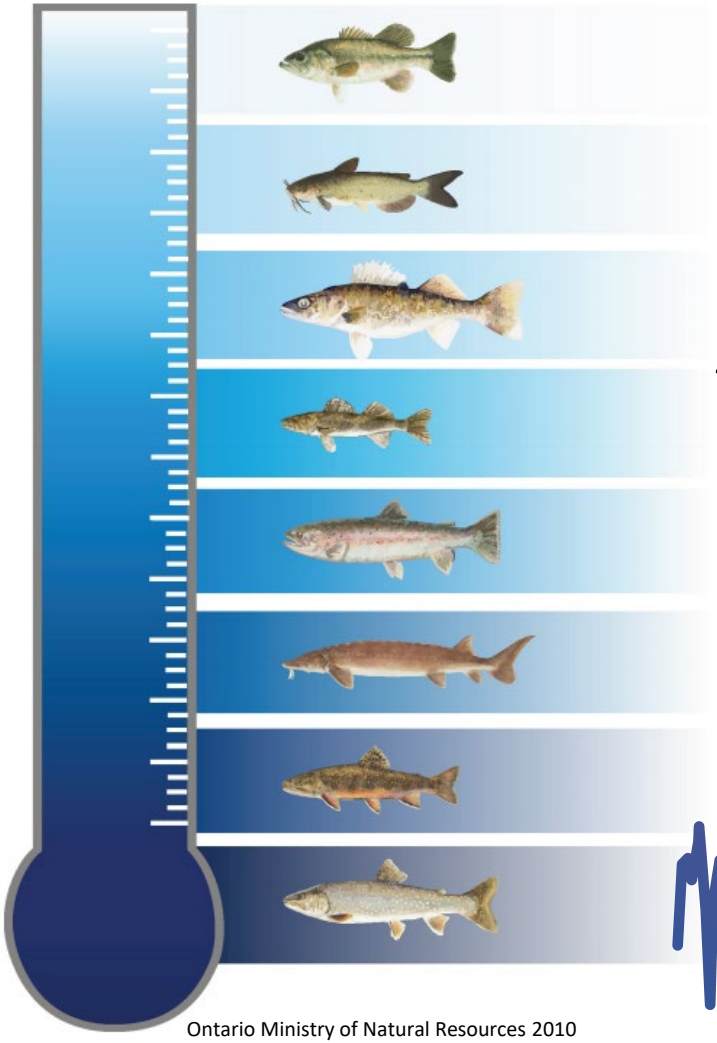
- Executive Branch (EO, ED)
- US Climate Alliance
- Department initiatives
  - Sprint Teams
  - Carbon Credits
  - Utility Scale Solar
  - Facilities
  - Mass timber

Need for Climate Policy

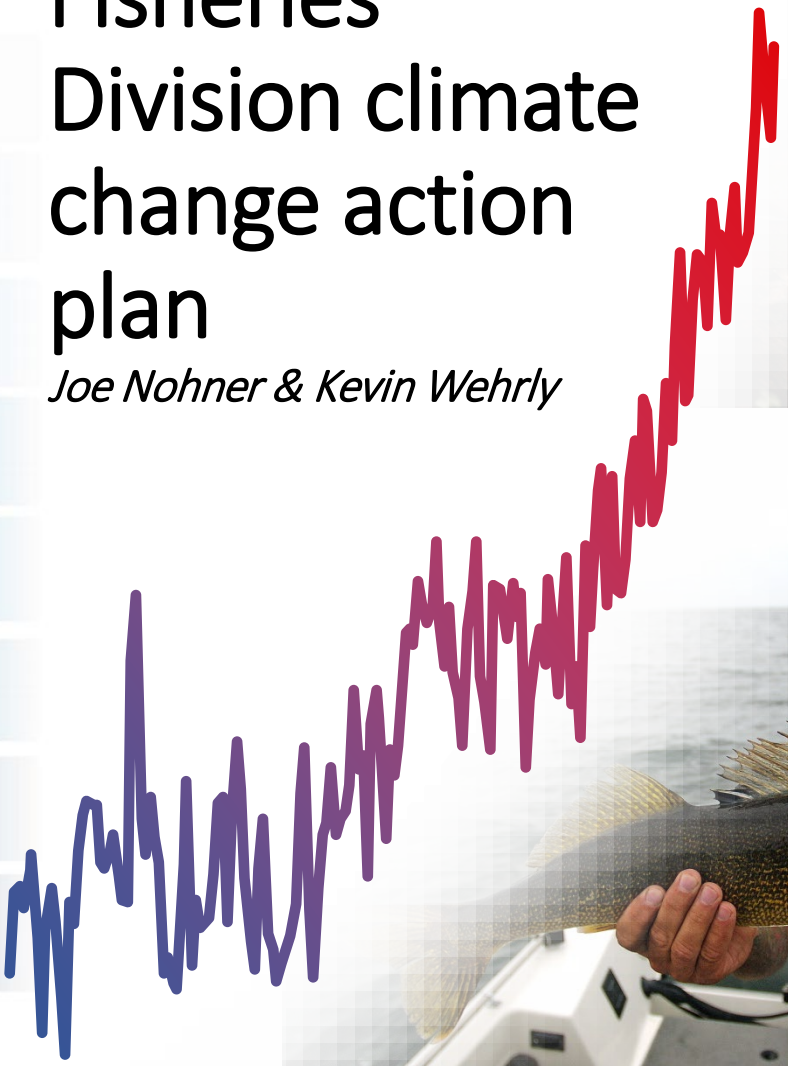
- Direct and prioritize actions strategically
- Focus on mitigation and adaptation
- Build policy and processes that support strategy and operations
- Define roles and responsibilities
  - Divisions
  - Sprint Teams
  - Office of Public Lands

Fisheries Division climate change action plan

Joe Nohner & Kevin Wehrly



Ontario Ministry of Natural Resources 2010



Fisheries Division Climate Change Action Plan

Goals

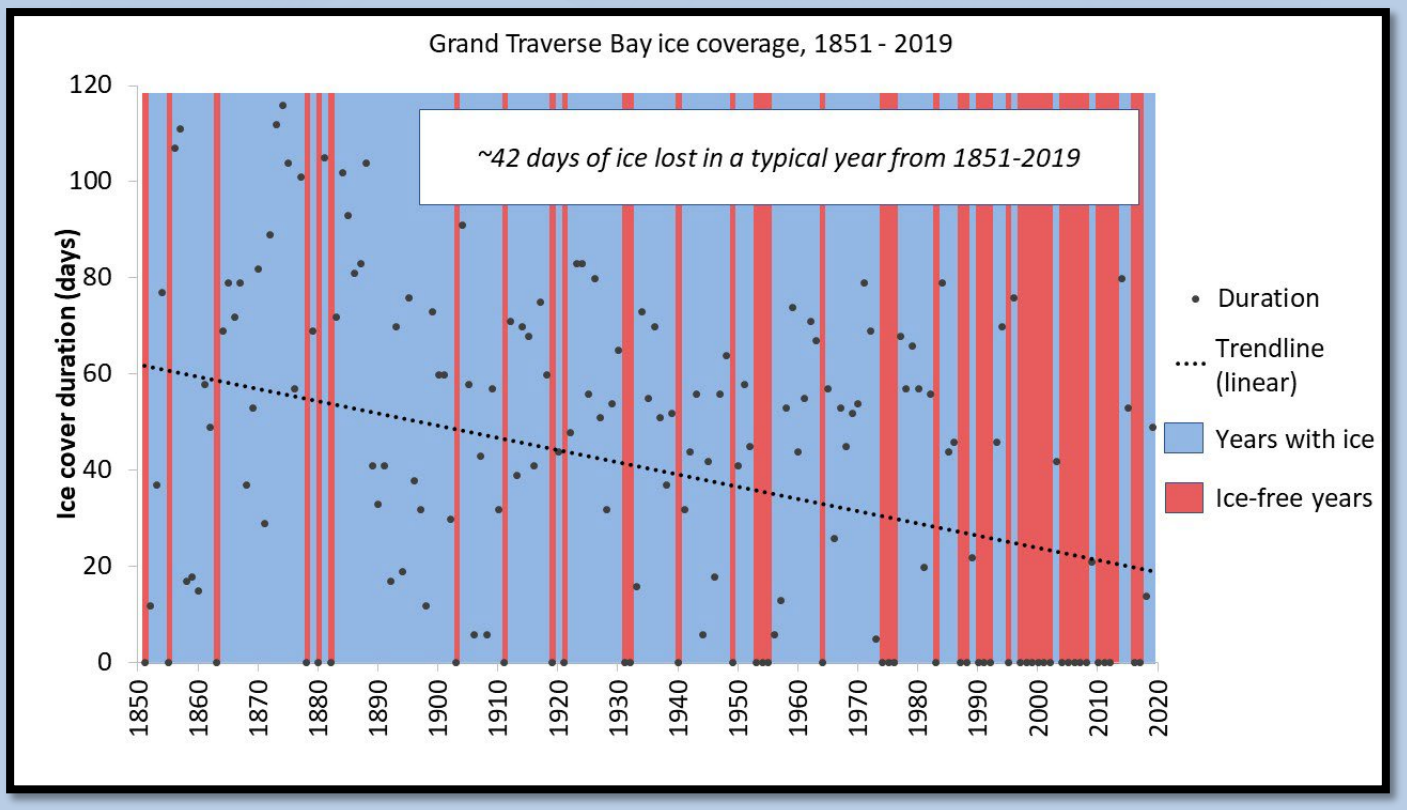
1. Increase understanding and communication about climate change
2. Consider climate change in policy, management, & operations decisions
3. Identify and address climate knowledge gaps
4. Reduce Fisheries' climate change impact

Increase understanding and communication about climate change

Consider climate change in policy, management, & operations decisions

Photo: Gavin MacDonald, Conservation Resource Alliance

Identify and address climate knowledge gaps



Data: The Watershed Center Grand Traverse Bay

Reduce Fisheries' climate change impact

Wildlife and Climate Change

Wildlife Division

Christopher Hoving, PhD

Adaptation Specialist

Outline

- Which wildlife are vulnerable and why
- Wildlife Division leadership in climate adaptation field

Data and research needed to inform regulations setting

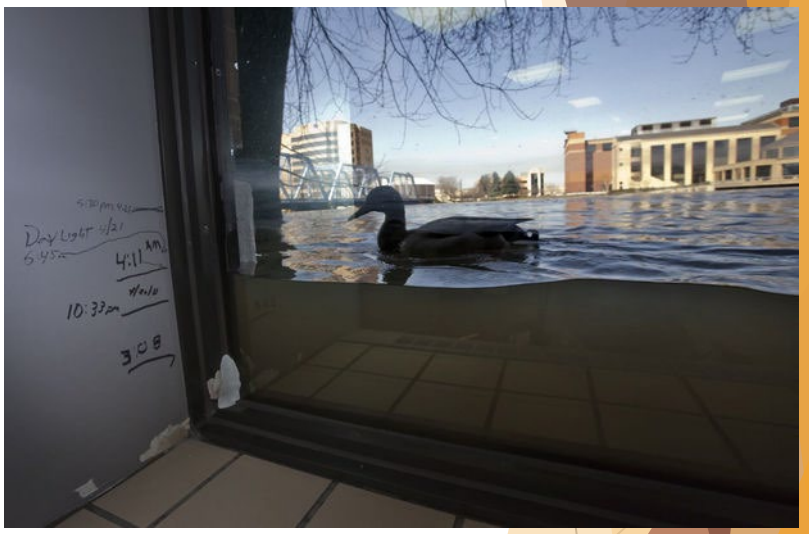
- What species are vulnerable?
- Why are they vulnerable?
- Research and monitoring
- Linking research to management

Recent research on Michigan wildlife and climate trends

- Vulnerability assessment of all terrestrial game species (Hoving et al 2013)
- Snowshoe hare, snow, and temperature (Sultaire et al 2021)
- Future of ruffed grouse in Michigan (Pomara and Zuckerberg 2017)
- The future of winter severity in Michigan (Notaro et al 2014)
- Waterfowl migration changes by species (Notaro et al 2016)

Specific vulnerability studies: Notaro et al. 2016

- USGS, Michigan DNR, and Ducks Unlimited research
- Waterfowl modeled to shift fall migration by end of century
  - Green Winged Teal: 25 days
  - Mallard : 40 days, if ever
- Shift later in fall by 3 to 5 days per decade
- Not just a moving target
- Calendar gap between early and late migrants will continue to widen

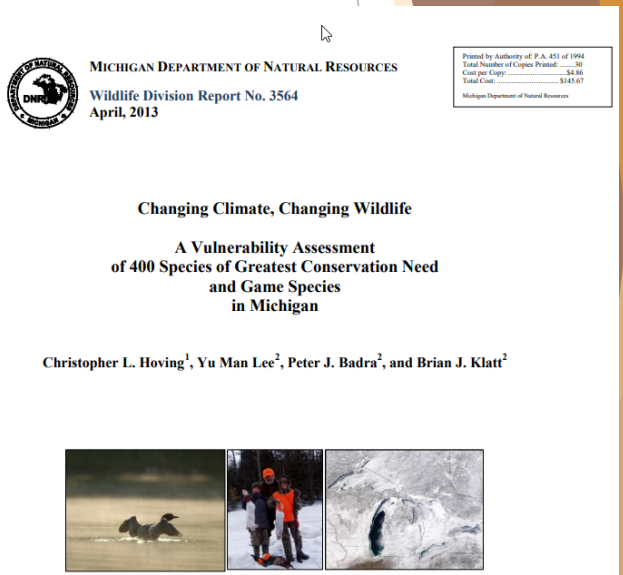


Specific vulnerability studies: Notaro et al. 2016

- Late migrants like mallards may not migrate out of the state by end of century
- Michigan's gain will be southern states' loss
- Habitat needs for resident waterfowl differ from migration

Wildlife Division is a National Leader on Climate Adaptation

- Research and monitoring
  - Only state with comprehensive climate vulnerability assessment of all terrestrial game species



MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Wildlife Division Report No. 3564
April, 2013

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Michigan Department of Natural Resources

Changing Climate, Changing Wildlife

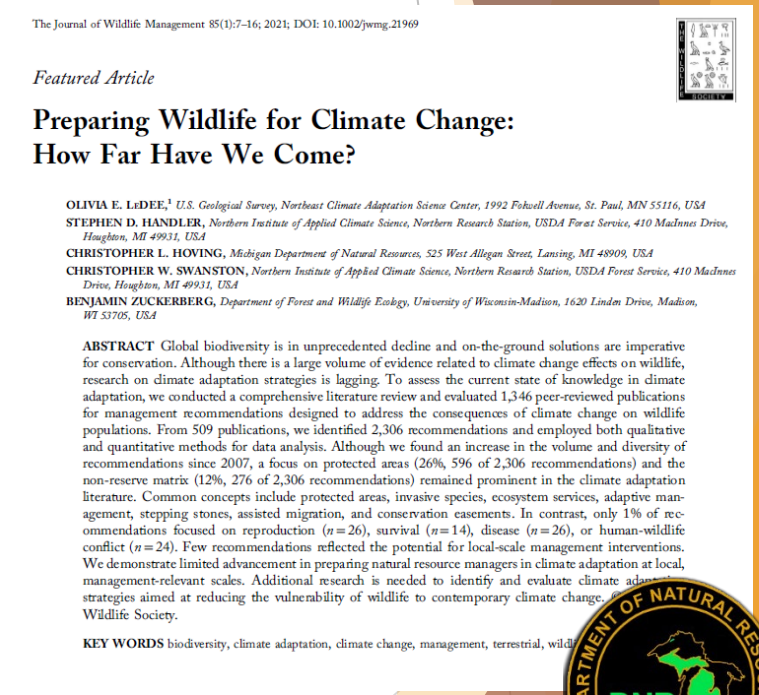
A Vulnerability Assessment of 400 Species of Greatest Conservation Need and Game Species in Michigan

Christopher L. Hoving[1], Yu Man Lee[2], Peter J. Badra[2], and Brian J. Klatt[2]

Hoving et al 2013

Wildlife Division is a National Leader on Climate Adaptation

- Research and monitoring
  - Only state with comprehensive climate vulnerability assessment of game species
  - Literature review of climate adaptation strategies



The Journal of Wildlife Management 85(1):7–16; 2021; DOI: 10.1002/jwmg.21969

Featured Article

Preparing Wildlife for Climate Change: How Far Have We Come?

OLIVIA E. LEDEE,[1] *U.S. Geological Survey, Northeast Climate Adaptation Science Center, 1992 Folwell Avenue, St. Paul, MN 55116, USA*
STEPHEN D. HANDLER, *Northern Institute of Applied Climate Science, Northern Research Station, USDA Forest Service, 410 MacInnes Drive, Houghton, MI 49931, USA*
CHRISTOPHER L. HOVING, *Michigan Department of Natural Resources, 525 West Allegan Street, Lansing, MI 48909, USA*
CHRISTOPHER W. SWANSTON, *Northern Institute of Applied Climate Science, Northern Research Station, USDA Forest Service, 410 MacInnes Drive, Houghton, MI 49931, USA*
BENJAMIN ZUCKERBERG, *Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, 1620 Linden Drive, Madison, WI 53705, USA*

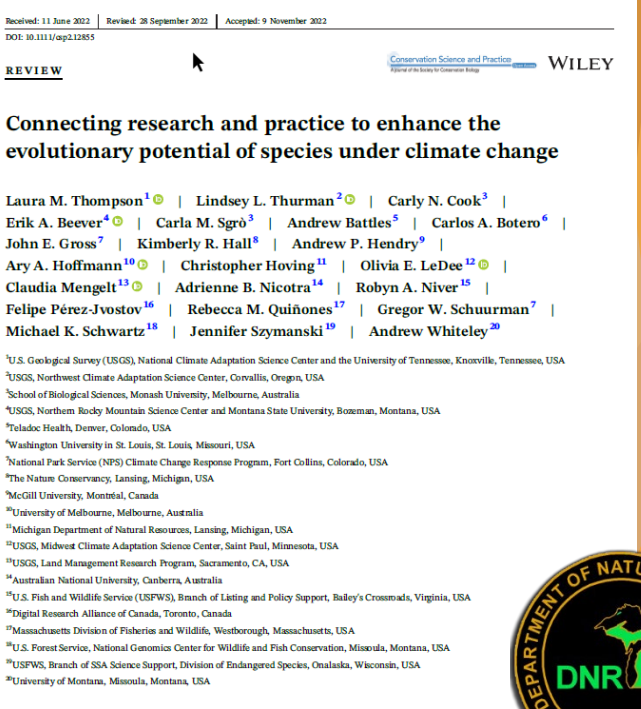
ABSTRACT Global biodiversity is in unprecedented decline and on-the-ground solutions are imperative for conservation. Although there is a large volume of evidence related to climate change effects on wildlife, research on climate adaptation strategies is lagging. To assess the current state of knowledge in climate adaptation, we conducted a comprehensive literature review and evaluated 1,346 peer-reviewed publications for management recommendations designed to address the consequences of climate change on wildlife populations. From 509 publications, we identified 2,306 recommendations and employed both qualitative and quantitative methods for data analysis. Although we found an increase in the volume and diversity of recommendations since 2007, a focus on protected areas (26%, 596 of 2,306 recommendations) and the non-reserve matrix (12%, 276 of 2,306 recommendations) remained prominent in the climate adaptation literature. Common concepts include protected areas, invasive species, ecosystem services, adaptive management, stepping stones, assisted migration, and conservation easements. In contrast, only 1% of recommendations focused on reproduction ($n = 26$), survival ($n = 14$), disease ($n = 26$), or human-wildlife conflict ($n = 24$). Few recommendations reflected the potential for local-scale management interventions. We demonstrate limited advancement in preparing natural resource managers in climate adaptation at local, management-relevant scales. Additional research is needed to identify and evaluate climate adaptation strategies aimed at reducing the vulnerability of wildlife to contemporary climate change. © 2020 The Wildlife Society.

KEY WORDS biodiversity, climate adaptation, climate change, management, terrestrial, wildl

LeDee et al 2021

Wildlife Division is a National Leader on Climate Adaptation

- Research and monitoring
  - Only state with comprehensive climate vulnerability assessment of game species
  - Review of climate adaptation strategies
  - Integrating genetics in climate adaptation



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REVIEW

Conservation Science and Practice
WILEY

Connecting research and practice to enhance the evolutionary potential of species under climate change

Laura M. Thompson[1] | Lindsey L. Thurman[2] | Carly N. Cook[3] | Erik A. Beever[4] | Carla M. Sgrò[3] | Andrew Battles[5] | Carlos A. Botero[6] | John E. Gross[7] | Kimberly R. Hall[8] | Andrew P. Hendry[9] | Ary A. Hoffmann[10] | Christopher Hoving[11] | Olivia E. LeDee[12] | Claudia Mengelt[13] | Adrienne B. Nicotra[14] | Robyn A. Niver[15] | Felipe Pérez-Jvostov[16] | Rebecca M. Quiñones[17] | Gregor W. Schuurman[7] | Michael K. Schwartz[18] | Jennifer Szymanski[19] | Andrew Whiteley[20]

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Thompson et al 2023

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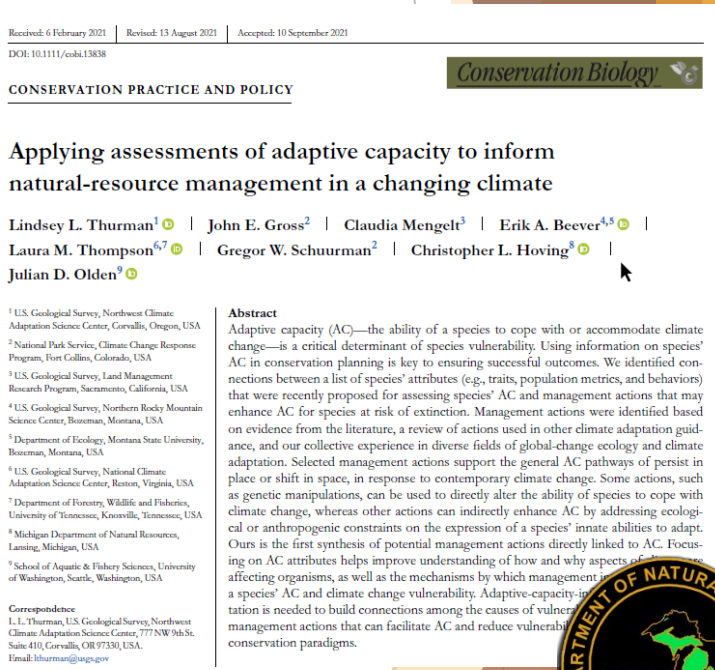
  - Review of climate adaptation strategies
  - Integrating genetics in climate adaptation
- Decision support tools
  - Better linking vulnerability to management



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Conservation Biology

CONSERVATION PRACTICE AND POLICY

Applying assessments of adaptive capacity to inform natural-resource management in a changing climate

Lindsey L. Thurman[1] | John E. Gross[2] | Claudia Mengelt[3] | Erik A. Beever[4,5] | Laura M. Thompson[6,7] | Gregor W. Schuurman[2] | Christopher L. Hoving[8] | Julian D. Olden[9]

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Abstract
Adaptive capacity (AC)—the ability of a species to cope with or accommodate climate change—is a critical determinant of species vulnerability. Using information on species' AC in conservation planning is key to ensuring successful outcomes. We identified connections between a list of species' attributes (e.g., traits, population metrics, and behaviors) that were recently proposed for assessing species' AC and management actions that may enhance AC for species at risk of extinction. Management actions were identified based on evidence from the literature, a review of actions used in other climate adaptation guidance, and our collective experience in diverse fields of global-change ecology and climate adaptation. Selected management actions support the general AC pathways of persist in place or shift in space, in response to contemporary climate change. Some actions, such as genetic manipulations, can be used to directly alter the ability of species to cope with climate change, whereas other actions can indirectly enhance AC by addressing ecological or anthropogenic constraints on the expression of a species' innate abilities to adapt. Ours is the first synthesis of potential management actions directly linked to AC. Focusing on AC attributes helps improve understanding of how and why aspects of [illegible] affecting organisms, as well as the mechanisms by which management [illegible] a species' AC and climate change vulnerability. Adaptive-capacity-[illegible] tation is needed to build connections among the causes of vulner[illegible] management actions that can facilitate AC and reduce vulnerabi[illegible] conservation paradigms.

Thurman et al 2021

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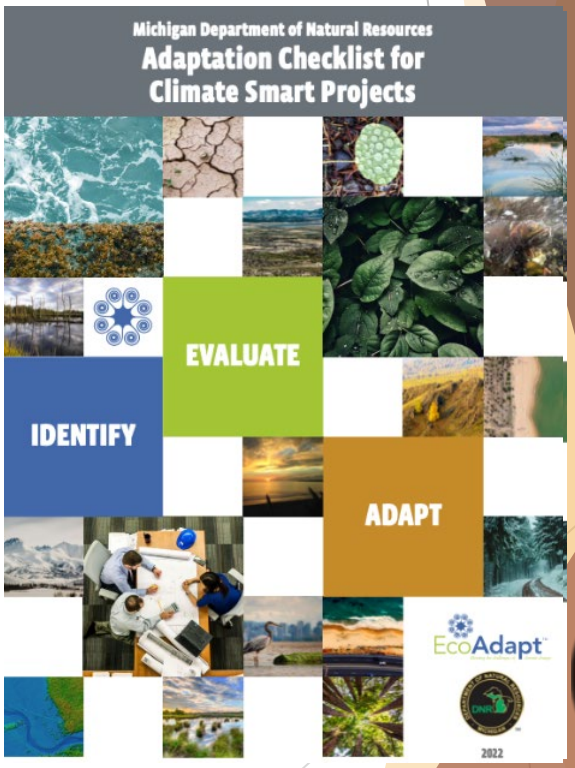
- Decision support tools
  - Better linking vulnerability to management
  - Project management checklist



Hansen et al 2022

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  - Project management checklist
  - Wildlife management menu and workbook

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DOI: 10.1002/wsb.1331

EMERGING RESEARCH

WILDLIFE SOCIETY BULLETIN | THE WILDLIFE SOCIETY

A menu of climate change adaptation actions for terrestrial wildlife management

Stephen D. Handler[1] | Olivia E. Ledee[2] | Christopher L. Hoving[3] | Benjamin Zuckerberg[4] | Christopher W. Swanston[1]

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Funding information
US Department of Interior Northeast Climate Adaptation Science Center; USDA Forest Service

Abstract

The real-world application of climate change adaptation practices in terrestrial wildlife conservation has been slowed by a lack of practical guidance for wildlife managers. Although there is a rapidly growing body of literature on the topic of climate change adaptation and wildlife management, the literature is weighted towards a narrow range of adaptation actions and administrative or policy recommendations that are typically beyond the decision space and influence of wildlife professionals. We developed a menu of tiered adaptation actions for terrestrial wildlife management to translate broad concepts into actionable approaches to help managers respond to climate change risks and meet desired management
The menu includes actions related to managi
populations as well as managing wildlife habitat
this resource to be used with the Adaptatio
structured decision-support tool for climate
describe real-world examples in which manag

Handler et al 2021

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Handler et al 2021

Thank you