



A RAD Response to Ecological Transformation

A Change in Thinking for the Change We Are Navigating

*Sagebrush Climate Adaptation Workshop
Boise State University
May 21-22, 2024*



RAD



National Conservation Training Center

(Resist, Accept, Direct)



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Resources

Just scratching the surface...



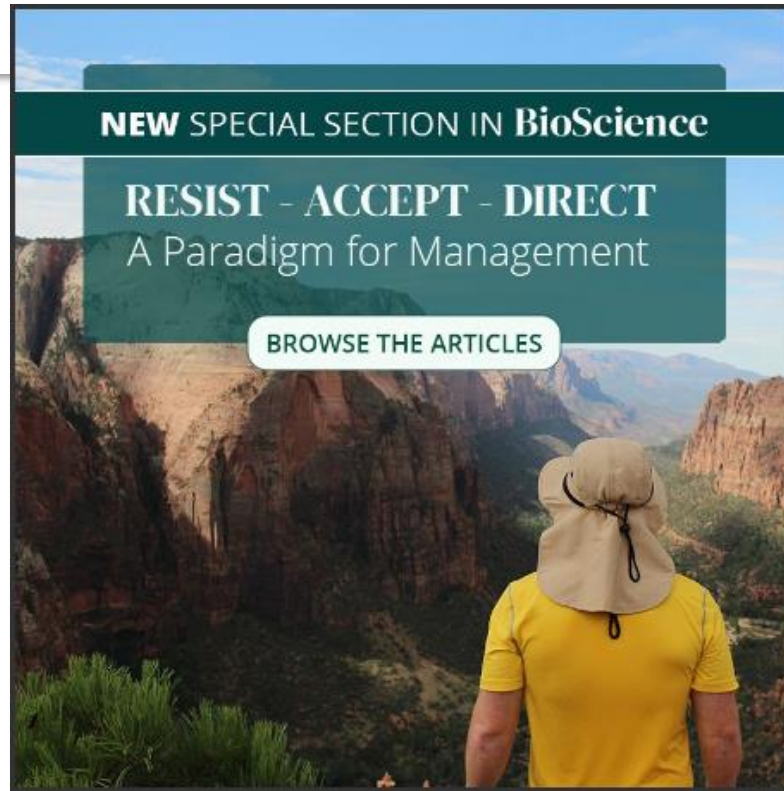
SCIENCE PRODUCTS NEWS CONNECT

CLIMATE ADAPTATION SCIENCE CENTERS | SCIENCE

Resist-Accept-Direct (RAD) Framework

ACTIVE

By [Climate Adaptation Science Centers](#)



Perspective

A Brave New World: Managing for Biodiversity Conservation under Ecosystem Transformation

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Abstract: Traditional conservation practices have primarily relied on maintaining biodiversity by preserving species and habitats in place. Many regions are experiencing unprecedented environmental conditions, shifts in species distribution and habitats, and high turnover in species composition, resulting in ecological transformation. Natural resource managers have lacked tools for identifying and selecting strategies to manage ecosystem transformation. A recently formalized decision support framework provides a way for managers to resist, accept, or direct (RAD) the trajectory of change. We begin by identifying how historical conservation practices are built into the RAD framework. Next, we describe how RAD can be used to implement climate change adaptation actions, using examples from the Mojave Desert to provide ecological context. Third, we discuss how the RAD framework can assist with the creation of conservation portfolios, facilitating the maintenance of overall biodiversity across a landscape. Preserving species assemblages in their current state, or restoring them to historical conditions, will not always be possible, and RAD allows for explicit deliberation about when and where to prioritize scarce resources. We conclude with a set of guidelines for conservation practitioners or managers moving forward. Although operating under an increasingly uncertain future is daunting, managers can utilize RAD to conserve biodiversity and effectively handle ecosystem transformation.

Keywords: biodiversity; conservation; natural resource managers; RAD; Mojave Desert; conservation portfolios



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Ecosystem transformation

Ecosystem transformation is change that re-arranges historical species composition and the ecological function of habitats

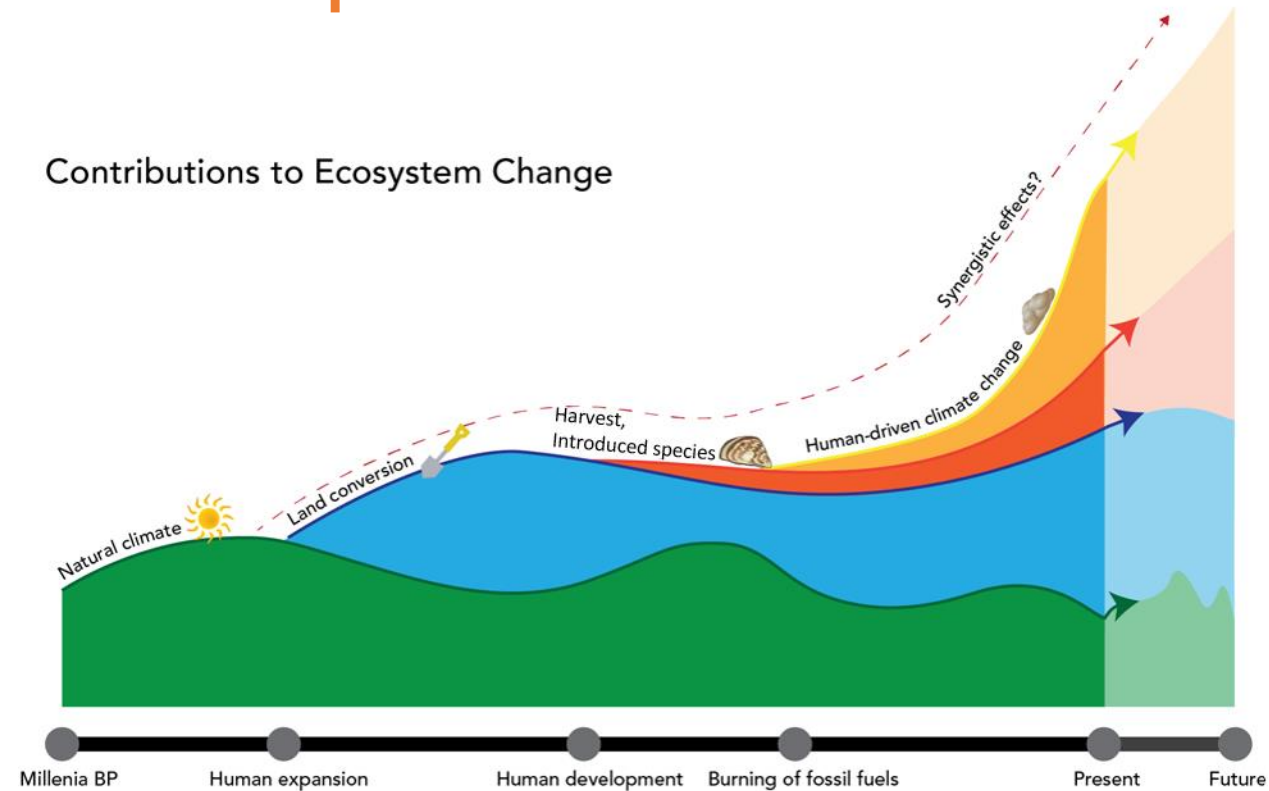


Ecology of ecosystem transformation

Ecosystem transformation is **nothing new...**

BUT, the current causes *are* unprecedented

- Anthropogenic climate change
- Land use change
- Invasive species
- Disease
- Habitat fragmentation
- ...



Thompson et al. 2021

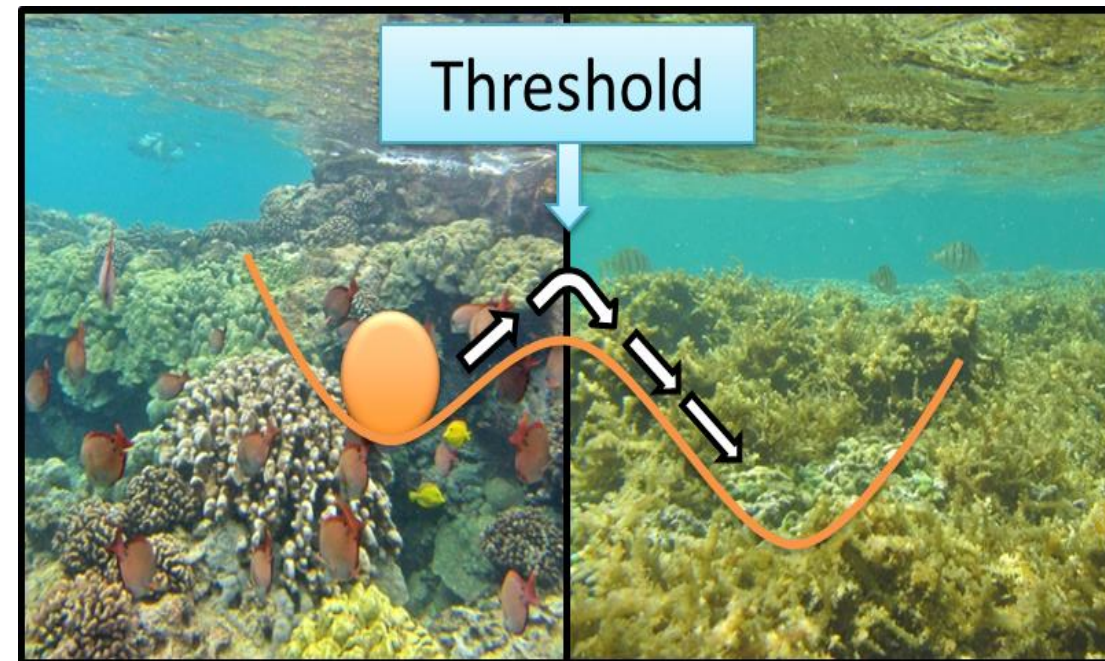
Ecology of **ecosystem transformation**

Ecosystem transformation is nothing new...

BUT, the current causes *are* unprecedented

AND, the relationships are hard to predict

- Novel communities
- Indirect effects
- Additive / synergistic effects
- Thresholds / tipping points
- ...

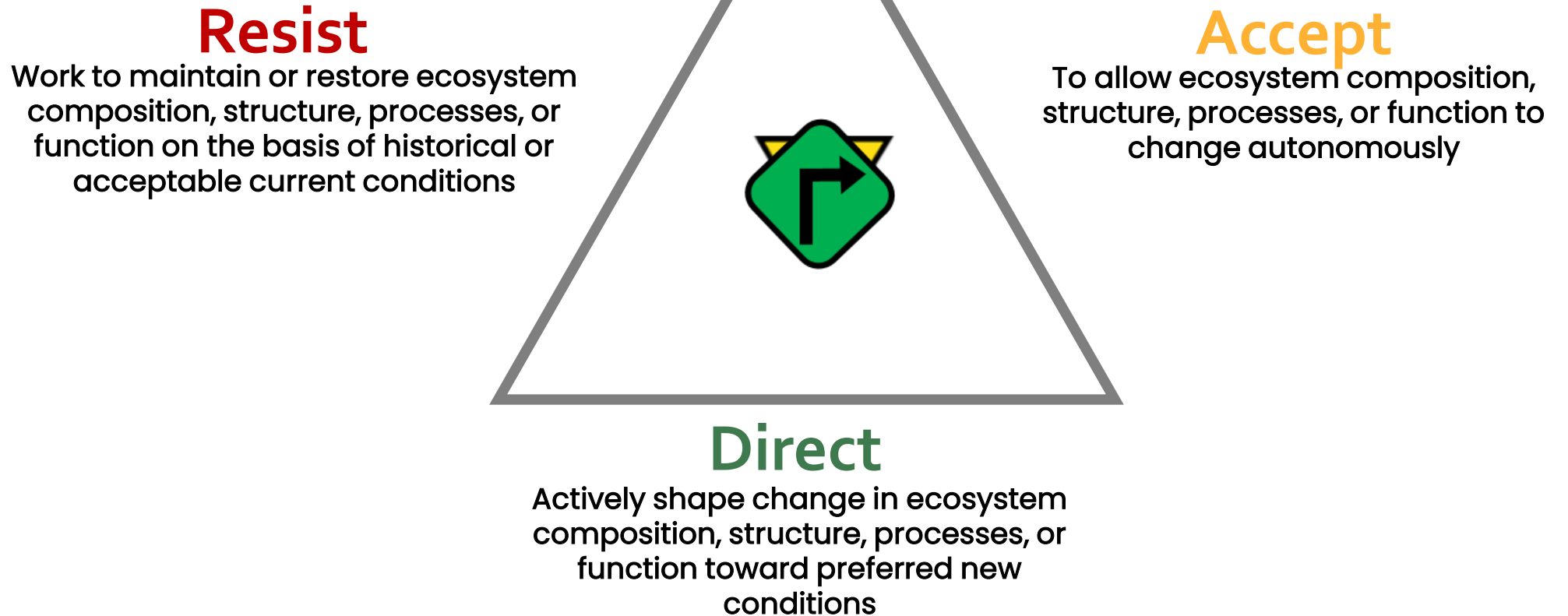


Ecosystem transformation

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The RAD framework



Putting RAD into action

Challenges for USFWS managers

USFWS Mission:

Working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.



RAD and wilderness areas

USFWS manages public lands for conservation

National Wildlife
Refuge System:
568 wildlife
refuges (NWRs)
including 21 NWRs
designated as
wilderness

Bitter Lake NWR/Salt Creek Wilderness,
New Mexico



Wichita Mountains NWR and Wilderness,
Oklahoma



RAD and threatened or endangered species

USFWS administers the Endangered Species Act (ESA)





Threatened and endangered species

Ongoing litigation

Conservation groups to sue Fish and Wildlife Service over wolverine non-listing

BY LAURA LUNDQUIST

OCTOBER 12, 2020

573 SHARES

A U.S. Fish and Wildlife Service decision to withdraw the wolverine from consideration for endangered species protection has prompted another lawsuit against the agency.

Conservation coalition sues over slashing of owl habitat

Wed Mar 31st, 2021 5:15pm

By Claudia Yaw

The (Centralia) Chronicle

The federal government's recent decision to slash critical habitat reserved for northern spotted owls is "without warning, justification or lawful process," according to nine West Coast conservation groups now suing U.S. Fish and Wildlife Service (USFWS) over the decision.

Nonprofit to sue U.S. Fish and Wildlife for not protecting Hawaiian honeycreeper

By NINA YU

Oct. 13, 2020

Conservation Groups Sue USFWS to Save Wild Red Wolves

CHAPEL HILL, N.C. – On behalf of Red Wolf Coalition, Defenders of Wildlife, and Animal Welfare Institute, the Southern Environmental Law Center today [sued the U.S. Fish and Wildlife Service](#) in the U.S. District Court for the Eastern District of North Carolina for violations of the Endangered Species Act caused by new, illegal agency policies that bar the use of proven management measures to save wild red wolves.

"The Fish and Wildlife Service is managing this species for extinction," said Sierra Weaver, senior attorney at the Southern Environmental Law Center which represents the conservation organizations in court. "Faced with a wild population of only seven known animals, the Fish and Wildlife Service is now claiming—without basis—that it's not allowed to take proven, necessary measures to save the wild red wolves. The service urgently needs to restart red wolf releases from captivity, which it did regularly for

Lack of policy support

Roadblocks to Assisted Migration

INSIGHTS

POLICY FORUM

Florida torreya (*Torreya taxifolia*) is a species native to Florida that is currently undergoing unregulated assisted colonization to other US states.

CONSERVATION

Global policy for assisted colonization of species

Coordinated policies are needed for the translocation of species for conservation

By Jedediah F. Brodie^{1,2}, Susan Lieberman³, Axel Moehrenschrager^{4,5,6}, Kent H. Redford^{7,8,9}, Jon Paul Rodríguez¹⁰, Mark Schwartz¹¹, Philip J. Seddon¹², James E. M. Watson^{13,14,15}

Negotiations in advance of the 15th meeting of the Conference of the

spectively) and so need to match advances in knowledge and evidence on the immediate and devastating impacts of climate change. Over just the past few years, the frequency and severity of extreme weather events have accelerated. By one recent estimate, one-third of species may now have an increased risk of

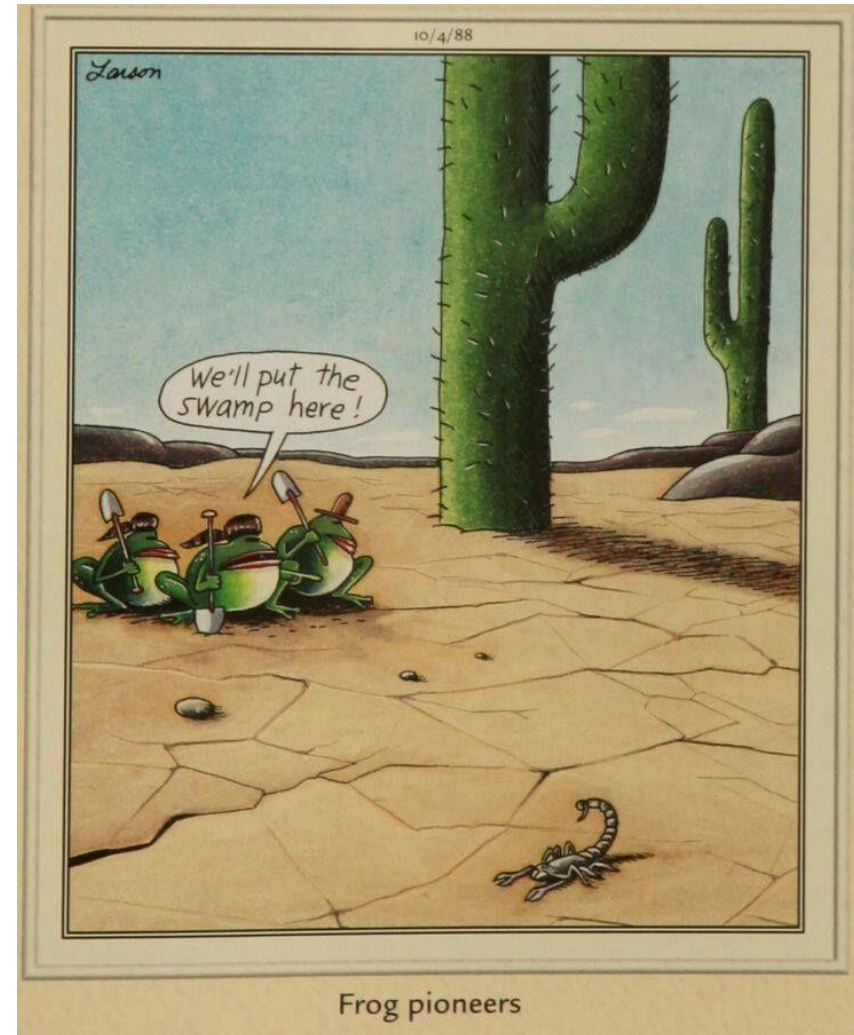
facilitate species conservation by moving individuals of species that cannot disperse around these barriers, allowing them to escape from shrinking climate refugia and to establish populations in new locations that have the conditions needed for population persistence. But despite having been dis-



Additional barriers to RAD implementation

Faced by natural resource managers

- **Lack of coordination across agencies, NGOs, private companies, geographic areas, or jurisdictions**
- Lack of funding
- Limited staff or high staff turnover
- Shifting political administrations and priorities
- State, city, or other municipal prohibitions
- Societal resistance



RAD



Creating nesting habitat for crocodiles

Crocodile Lake NWR



Creating nesting habitat for crocodiles

Crocodile Lake NWR



Invasive vegetation

Blackwater National Wildlife Refuge



ACCEPT

Invasive vegetation

Blackwater National Wildlife Refuge

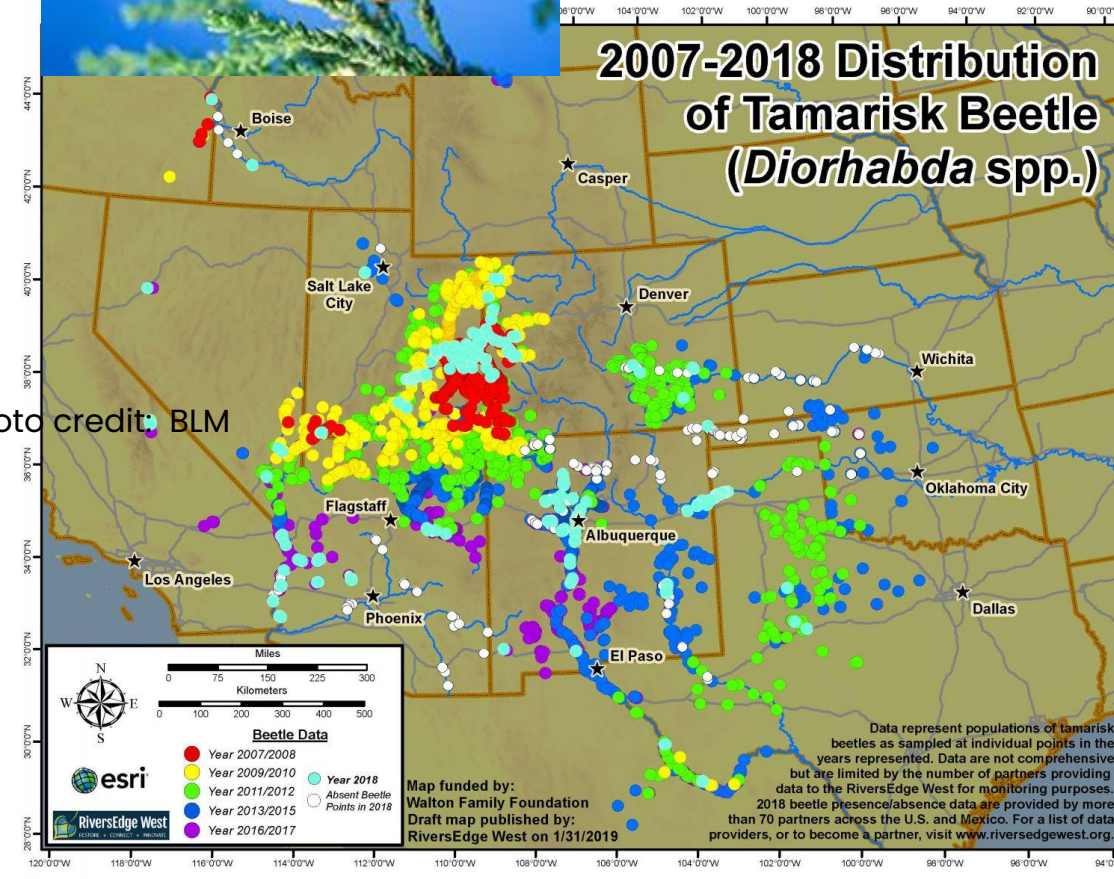


Removing invasive riparian vegetation

To maintain native riparian habitat for endangered birds



Photo credit: BLM



Removing invasive riparian vegetation *To maintain native riparian habitat for endangered birds*



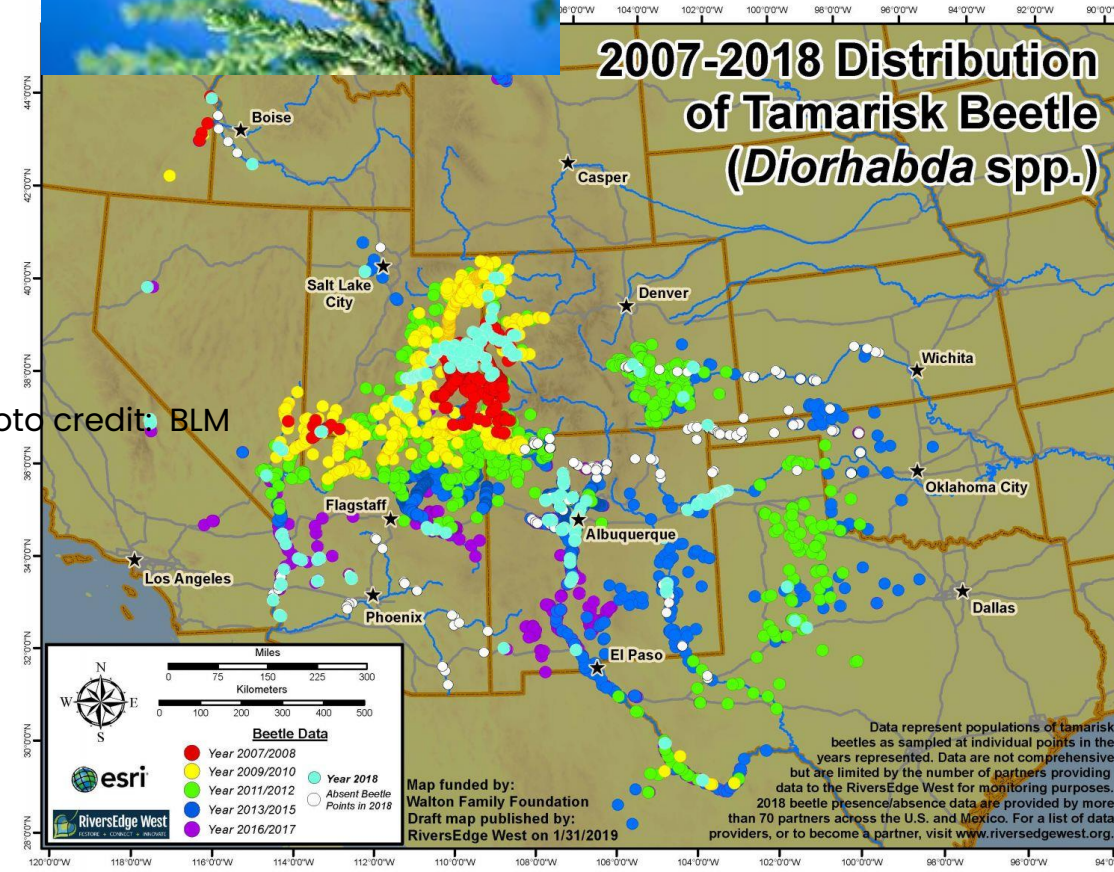
After manual removal



Native cottonwood and willow recovery



Photo credit: BLM



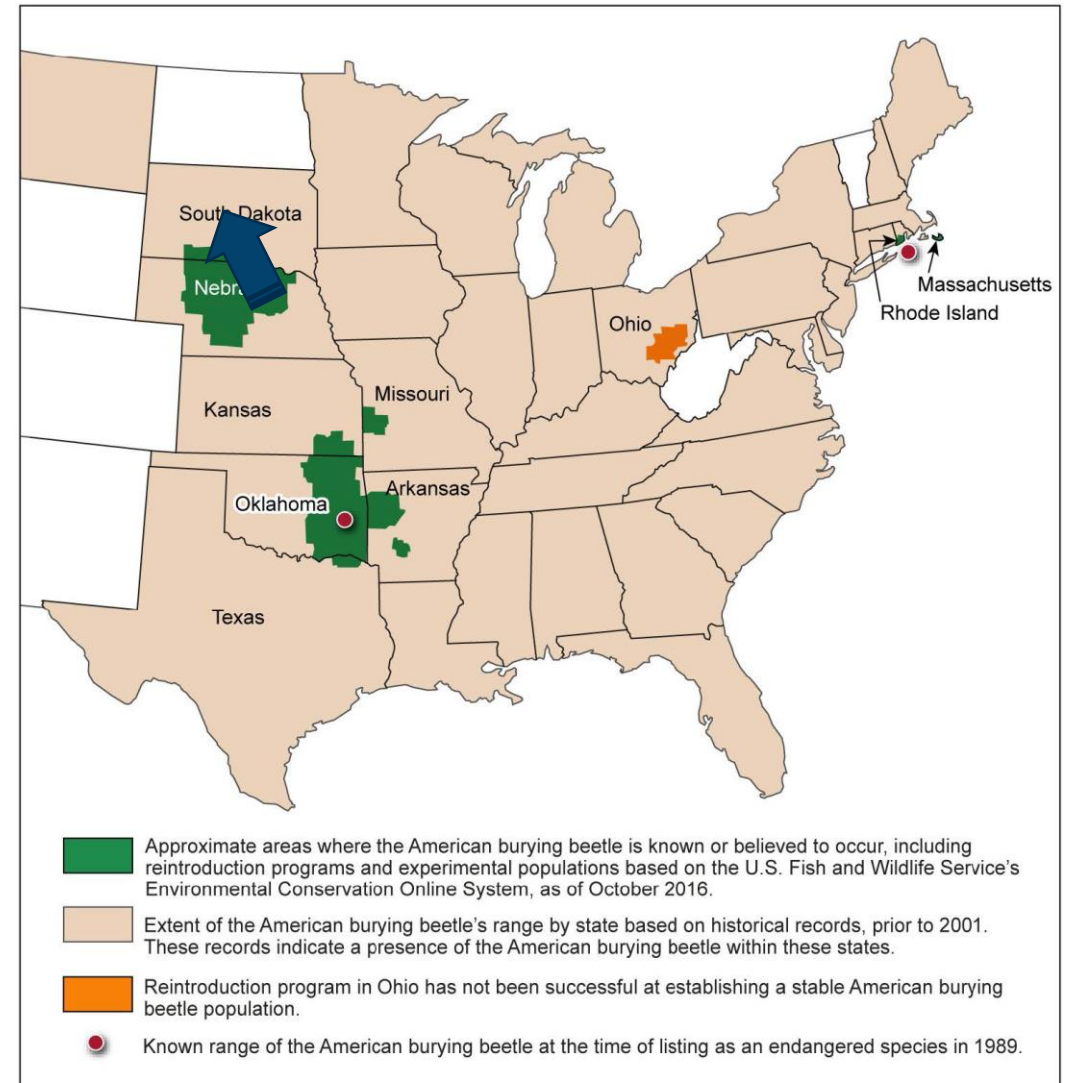
Conserving future habitats

American Burying Beetle (*Nicrophorus americanus*)



Listed as endangered in 1989
Down listed to threatened in 2020

Figure 6: Current and Reported Historical Range of the American Burying Beetle in the United States, as of October 2016



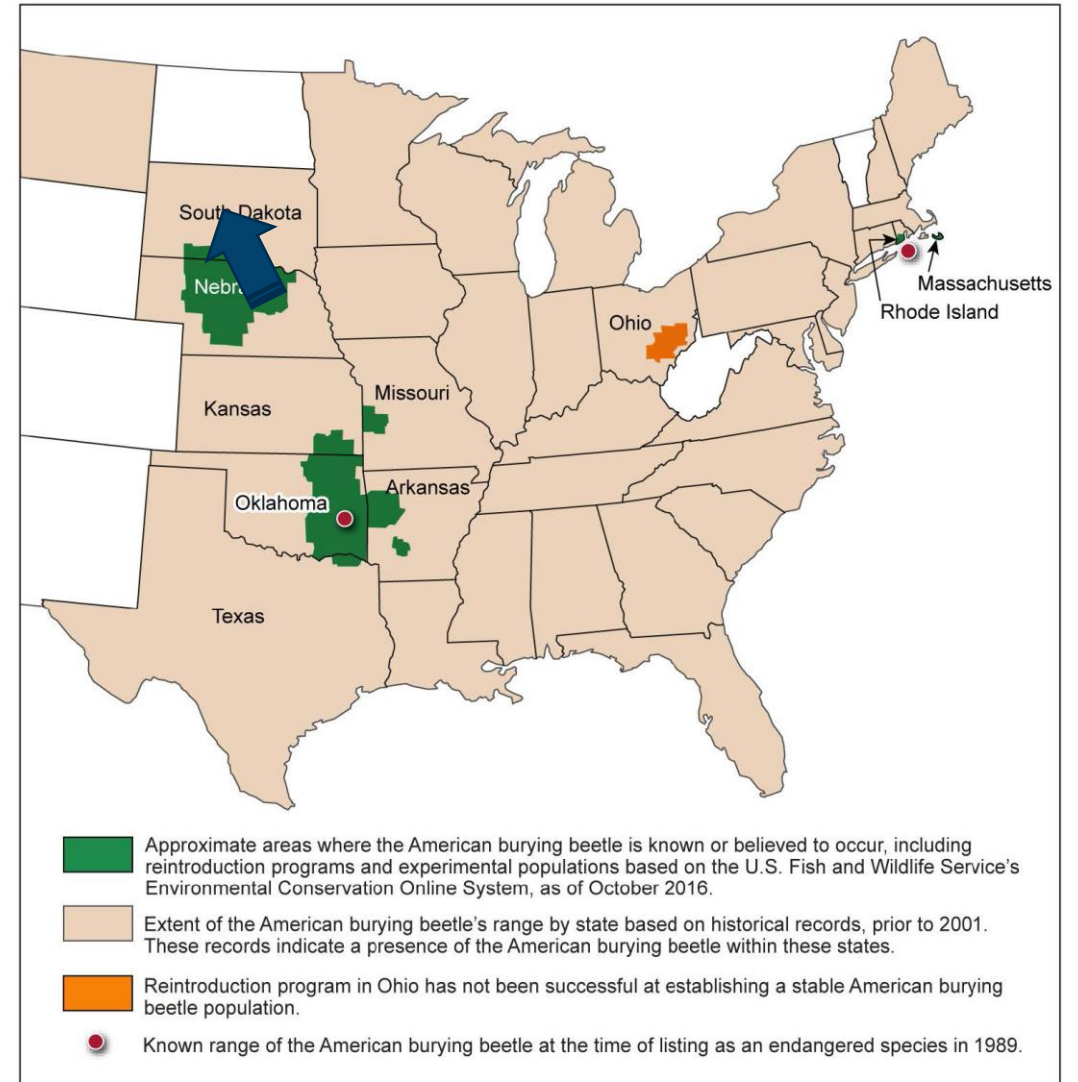
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Figure 6: Current and Reported Historical Range of the American Burying Beetle in the United States, as of October 2016



Sources: GAO analysis of U.S. Fish and Wildlife Service documents; Map Resources (map). | GAO-17-154



Northward expansion of mangroves

Chassahowitzka National Wildlife Refuge

- Native mangrove species moving north up the coast
- Colonizing salt marshes



- Marshes disappearing due to sea level rise, mangroves maintain an ecological foothold



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RAD IMPLEMENTATION GUIDEBOOK

Deliberative
Engagement

Application at
Multiple
Scopes

Adaptive
Management



RAD IMPLEMENTATION GUIDEBOOK

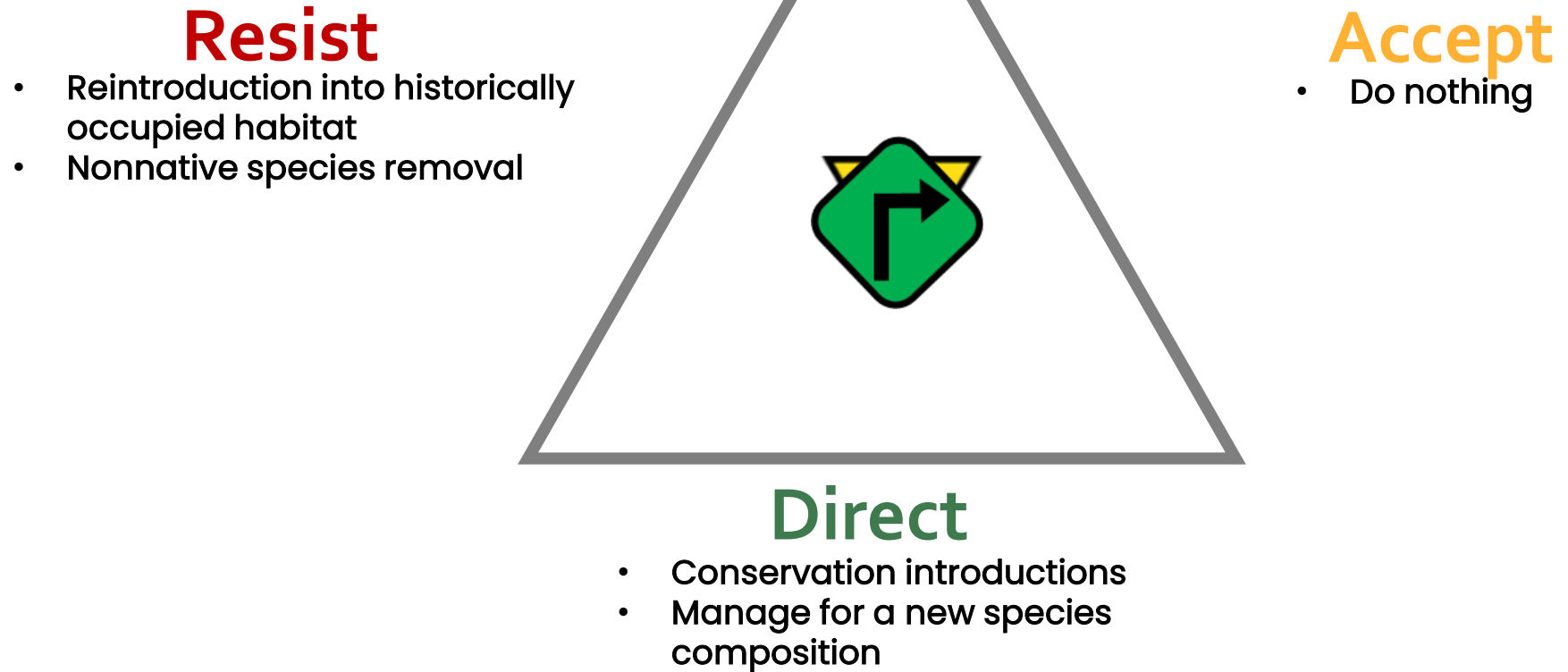
RAD
Menus

RAD
Portfolios

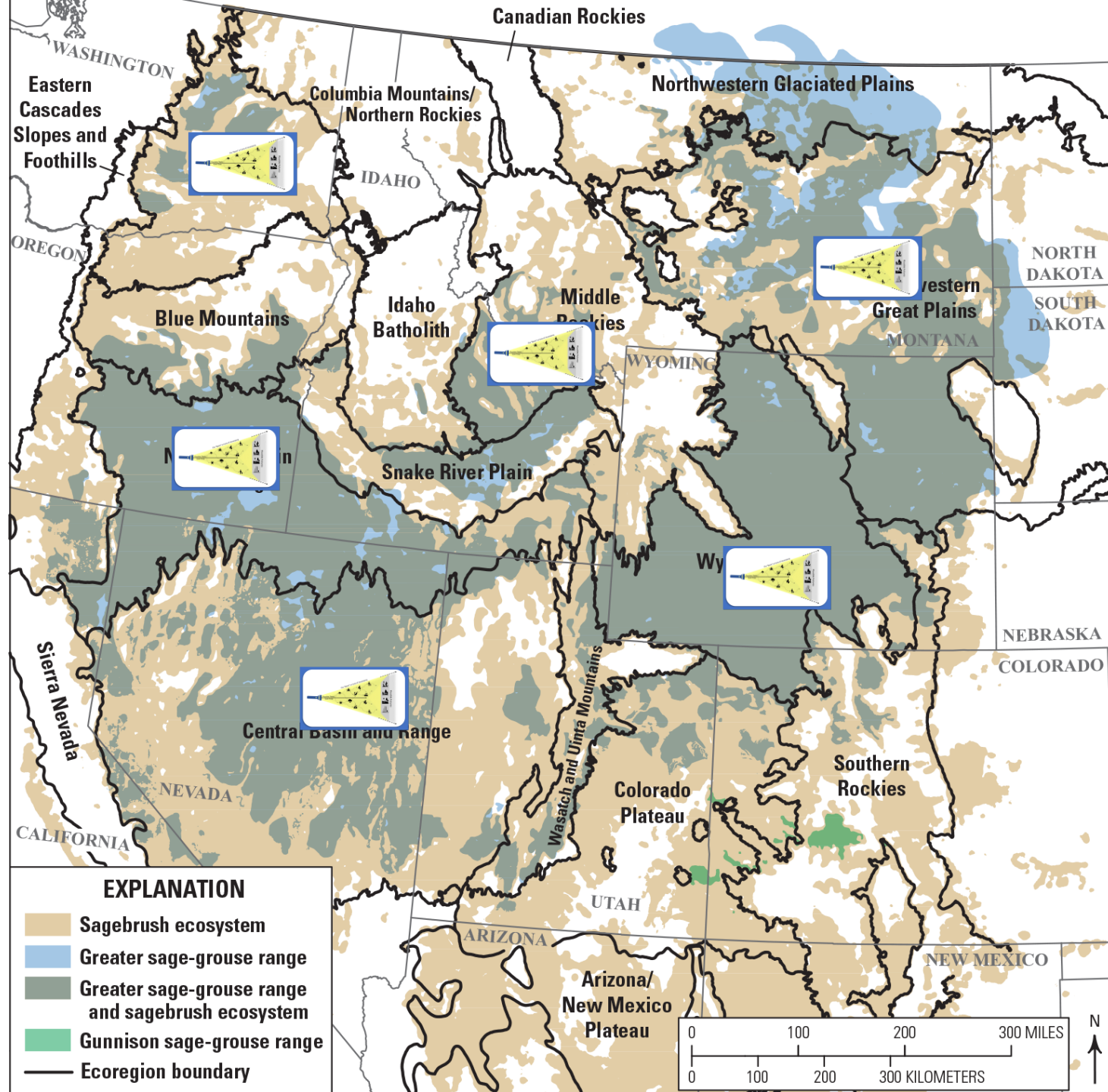
RAD
Decision
Context



Bull Trout Recovery



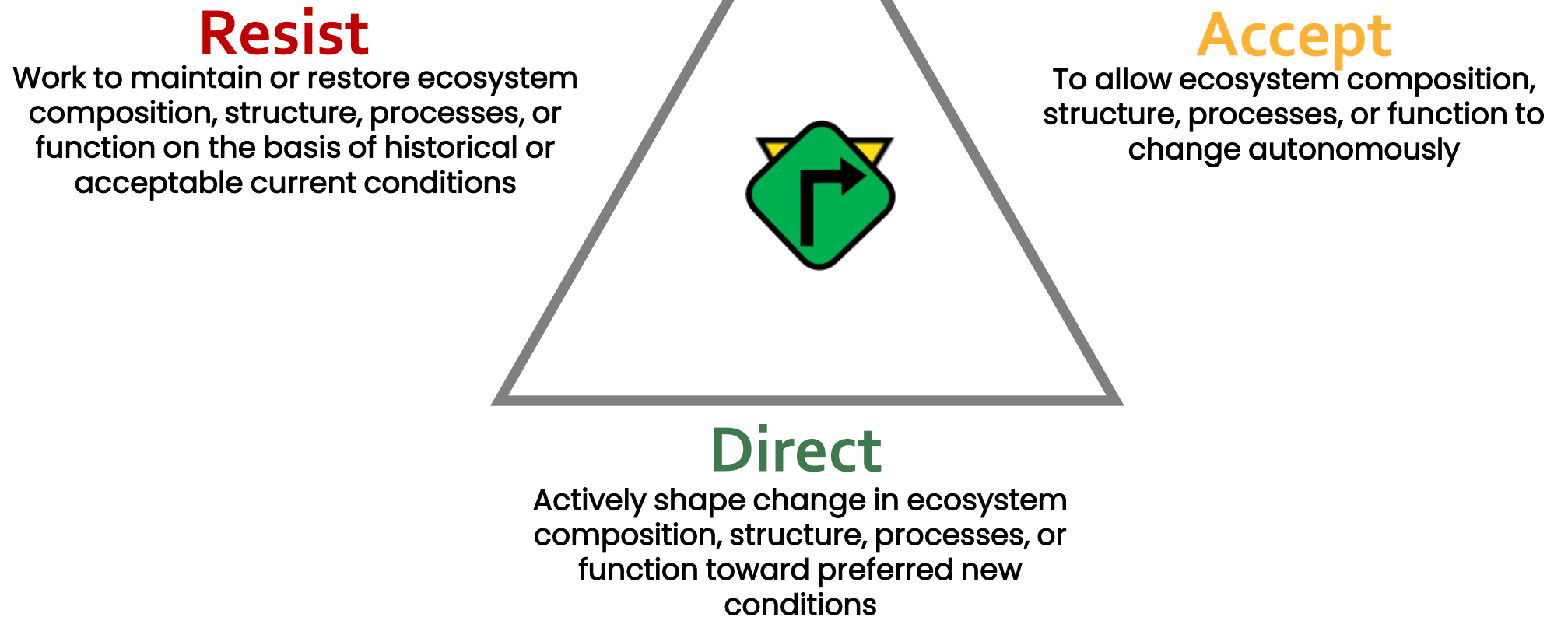
RAD PORTFOLIOS



RAD DECISION CONTEXT



Sagebrush Conservation



Implementing RAD management approaches

Guidelines and tips

Avoid paralysis

Conduct experiments and use pilot

Con

Mainta

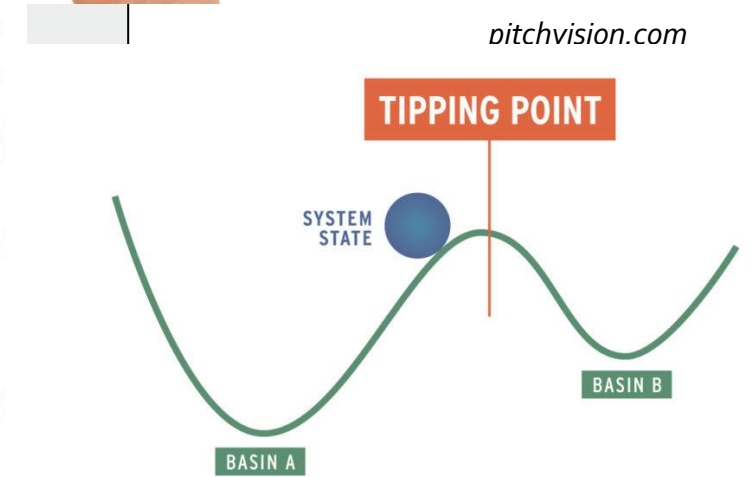


Illustration by Andrew Bernier, adapted from Walker, B. & Salt, D. (2006) Resilience Thinking: Sustaining Ecosystems and People in a Changing World. Island Press: Washington, DC.



Thank you

