DoD Natural Resources Program

Enabling the Mission, Defending the Resources

2021 Conserving Biodiversity on Military Lands - A Handbook for Natural Resources

July 28, 2022

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2021 Conserving Biodiversity on Military Lands - A Handbook for Natural Resources

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DoD Legacy Resource Management Program

Presentation Outline

- History of “Conserving Biodiversity on Military Lands” Handbook
- Project Goals, Approach, and Lessons Learned
- The Handbook
  - Overview
  - Highlights of Key Chapters
- Q&A

History

1996: Original publication

"Conserving Biodiversity on Military Lands - A Handbook for Natural Resources Managers"

- Lead organization – The Nature Conservancy

2008: Update

"Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers, 2008 Edition"

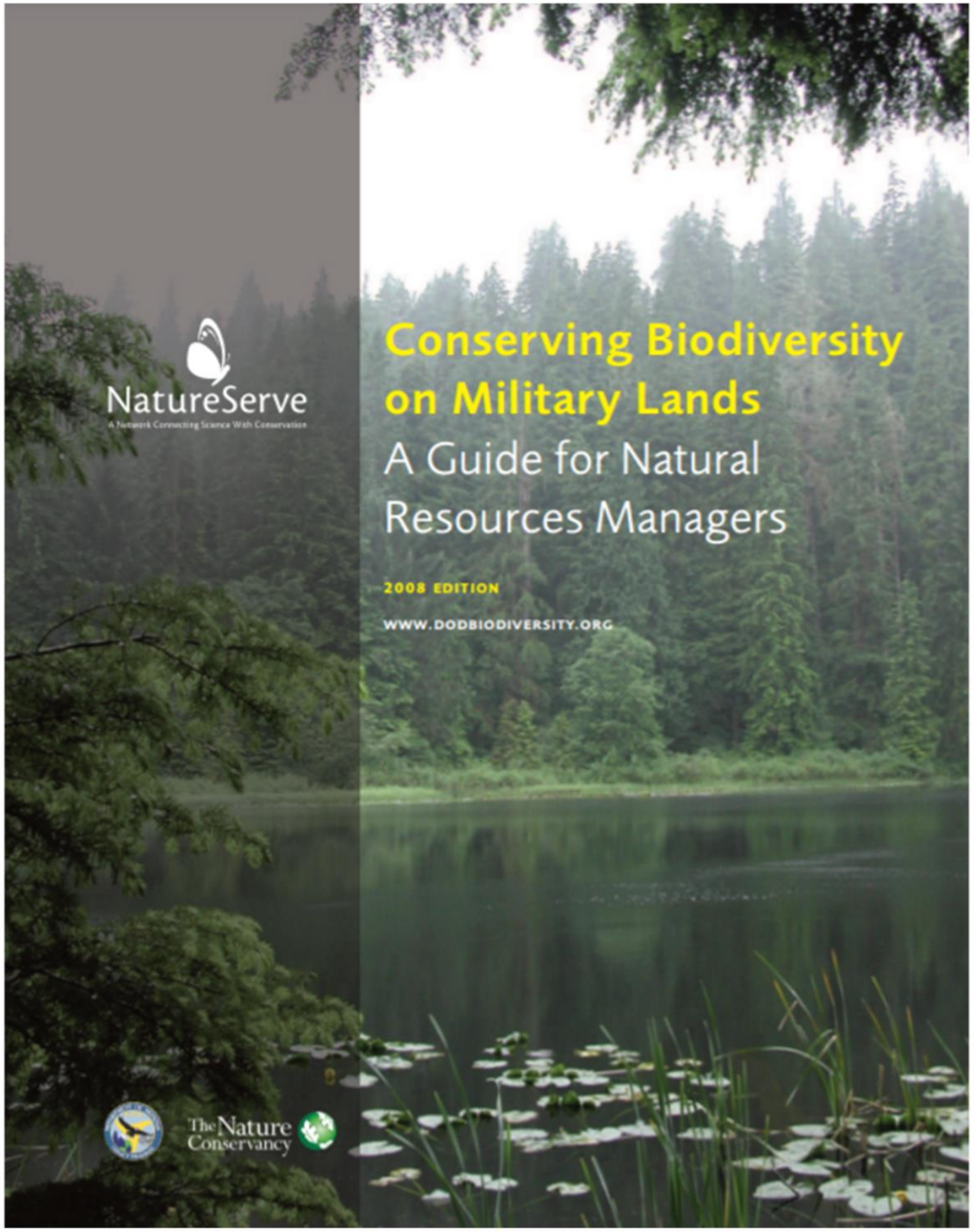
- Lead organization - NatureServe

2021: Update

"Conserving Biodiversity on Military Lands: A Guide for Natural Resource Managers, 3rd Edition"

- Lead organization – NatureServe

All publications supported by DoD Legacy Resource Management Program



Goals and Objectives

Goal: To support the health of ecosystems on and around military lands, that allows continued use of these lands for military testing and training.

Objectives:

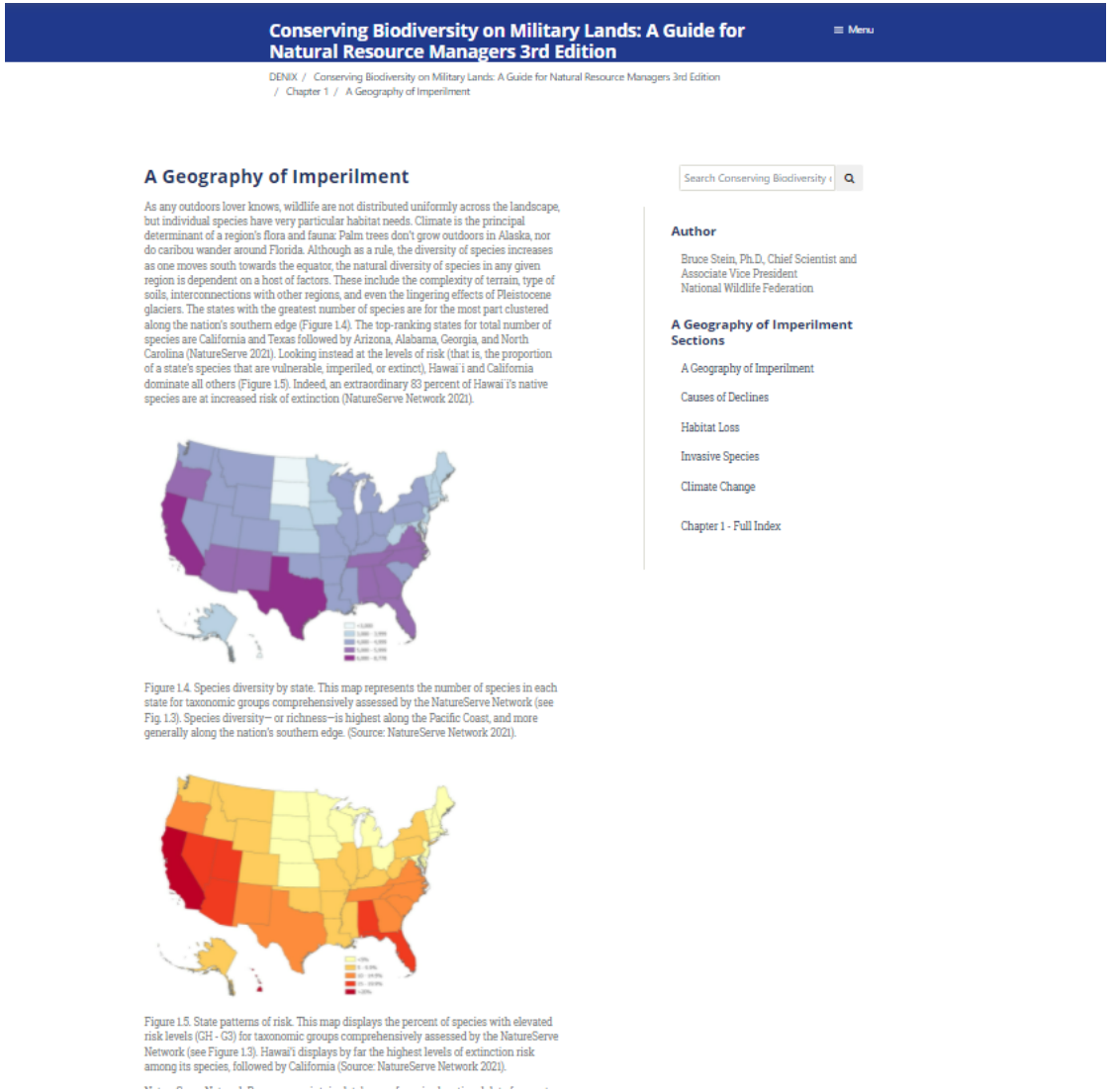
- Gather input from DoD installation staff on needs to support biodiversity conservation on and around military lands
- Update 2008 handbook content and create new content to address priority topics identified by DoD staff

Project Approach & Lessons Learned

- Two phase project
  - Phase 1: Update content
  - Phase 2: Transfer content to platform that support interactive training
- Phase 1:
  - Identify conservation resources available
  - Survey of DoD natural resource staff
  - Prioritize topics for content development
  - Identifying experts for content development
  - Updates to Handbook
    - Evaluate/reorganize structure
    - New analyses
    - Content development

Focus of New Content

- ecosystem condition assessment
- climate change impacts
- landscape-scale management
- monitoring
- T&E species management
- conservation successes
- role of Integrated Natural Resource Management Plans



Final content available on DoD Legacy Program's DENIX site:
https://www.denix.osd.mil/biodiversity/

Primary Contributors:

NatureServe

National Wildlife Federation

σ² Sound Science
For Better Decisions

Center for Environmental Management
MILITARY LANDS
COLORADO STATE UNIVERSITY

Conserving Biodiversity on Military Lands

Part I: Introduction and Key Challenges

Chapter 1: Meeting the Military Mission Through Conserving Biodiversity, Bruce Stein, NWF

Chapter 2: Understanding Biodiversity Conservation, Bob Unnasch, Sound Science LLC

Chapter 3: Challenges at the Nexus of Science and Policy, Pete Cutter, formerly with NatureServe

Part II: Conservation in Practice in the DoD Context

Chapter 4: Laws, Policies, and Programs Related to Conservation and Natural Resource Management on and Around DoD Lands, J. Douglas Ripley, retired USAF, James van Ness, retired USAF

Chapter 5: The Integrated Natural Resources Management Plan: Foundations and Key Topics, David S. Jones, CEMML

Chapter 6: Partnerships to Achieve Conservation Goals and Sustain Training, Dave Jones, CEMML

Chapter 7: Funding Natural Resources Conservation on Military Lands, Dave Jones, CEMML

Park III: Key Topics in Conservation Management

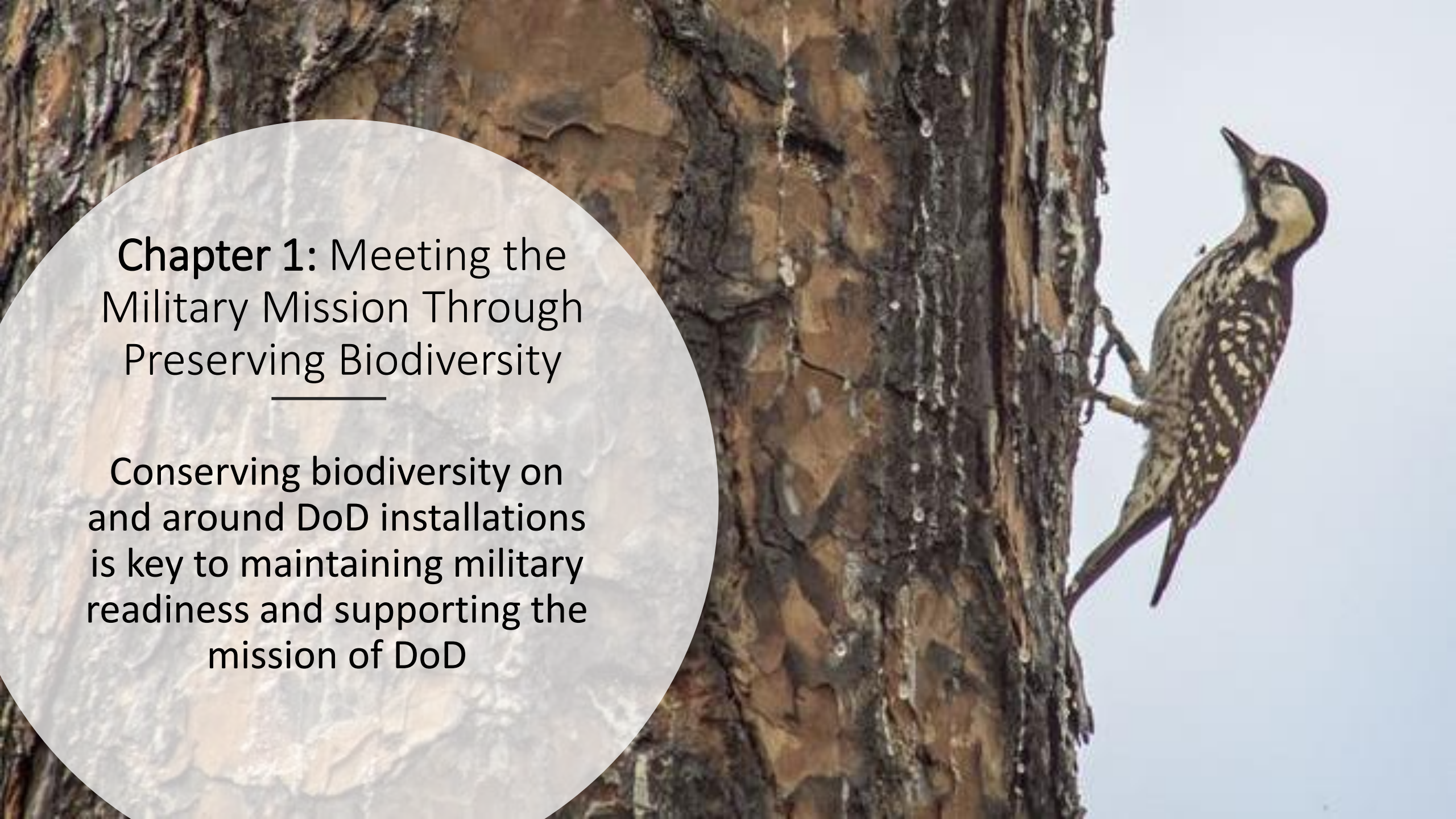
Chapter 8: Managing Landscapes and Ecosystems, Patrick Comer, NatureServe

Chapter 9: Managing for Threatened, Endangered and At-Risk Species, Bruce Young, NatureServe

Chapter 10: Invasive Species Management, Troy Weldy, The Nature Conservancy

Chapter 11: Balancing Biodiversity Conservation with Multiple Uses, Dorothy Gibb, AH Env. Consultants and Joseph Ferris, Parsons Brinckerhoff

Case Studies

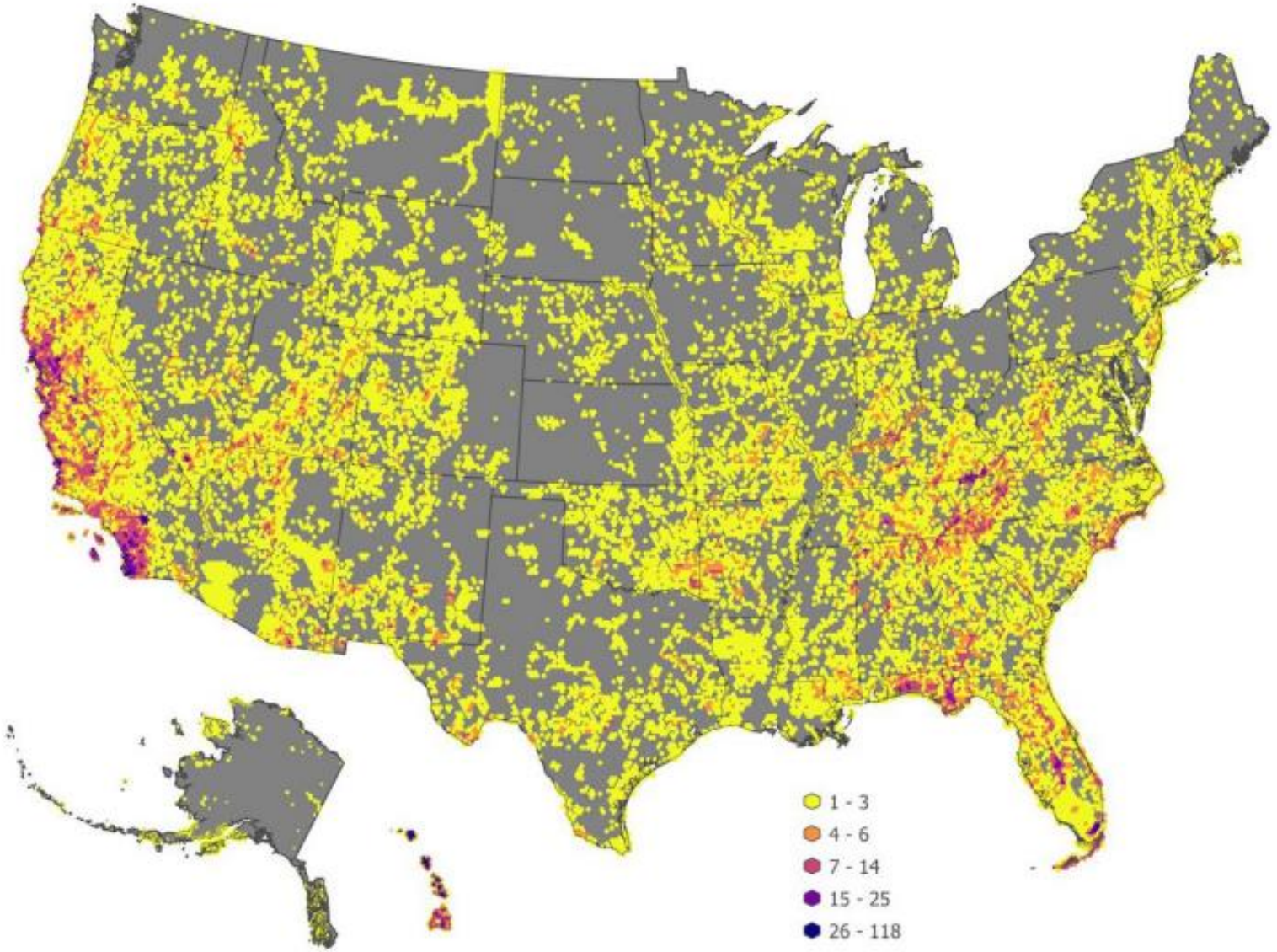


Chapter 1: Meeting the Military Mission Through Preserving Biodiversity

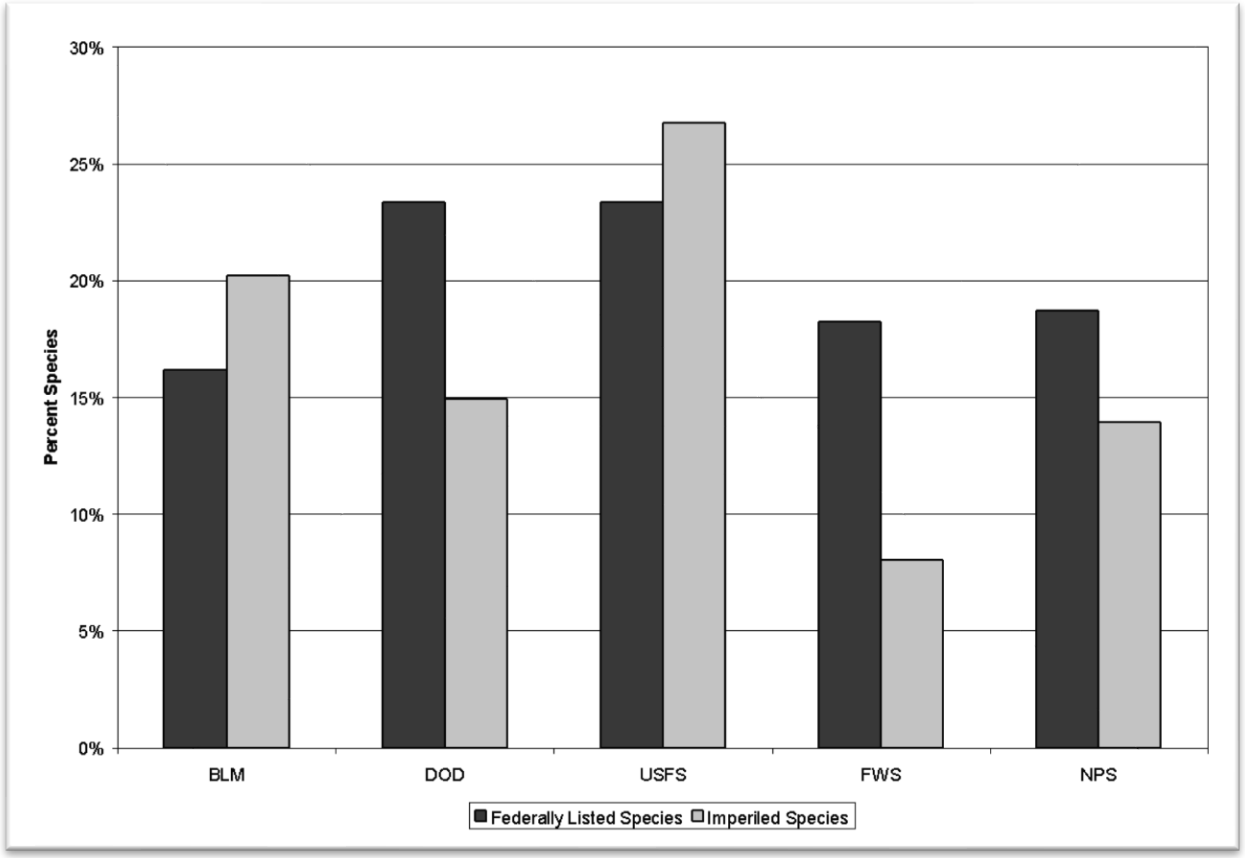
Conserving biodiversity on and around DoD installations is key to maintaining military readiness and supporting the mission of DoD

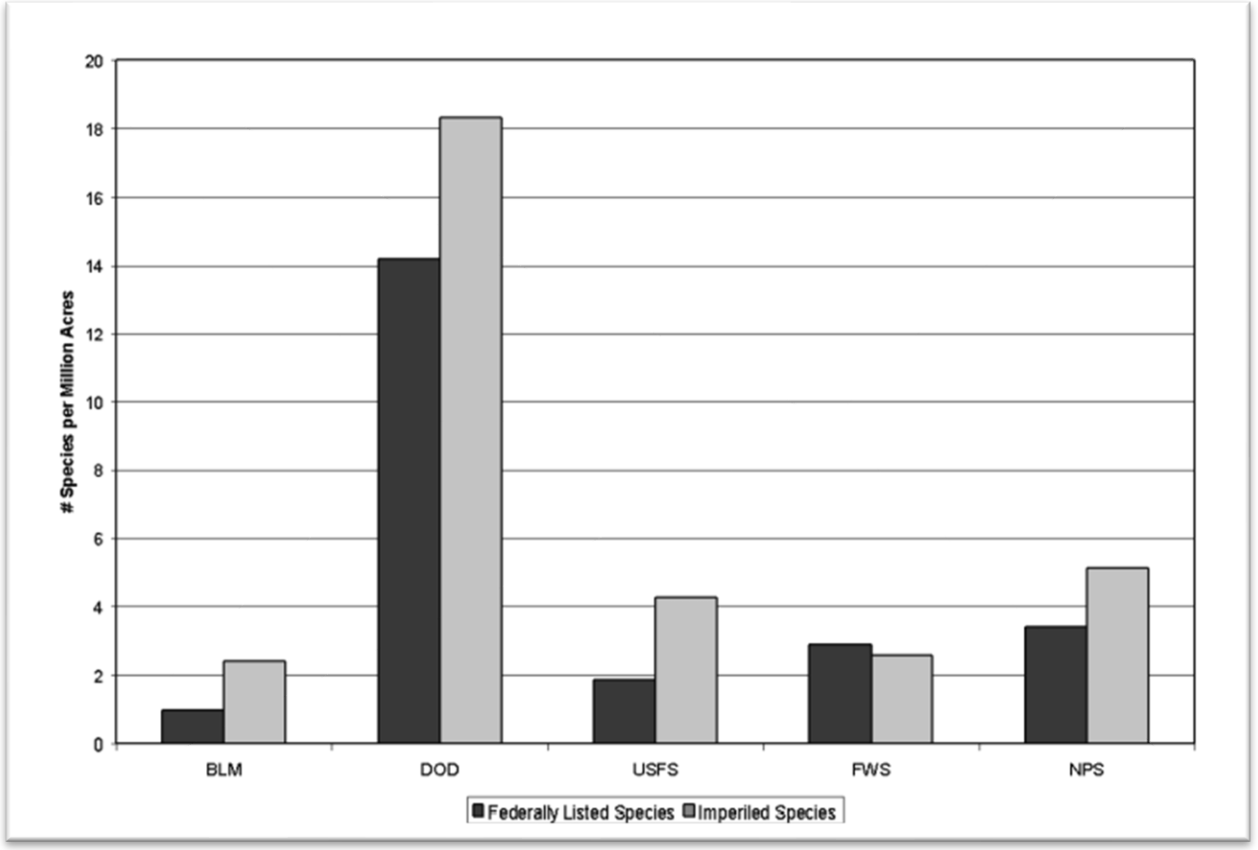
Chapter 1: U.S. Distribution of Imperiled Species

Source: NatureServe Network Biodiversity Location Dataset 2021



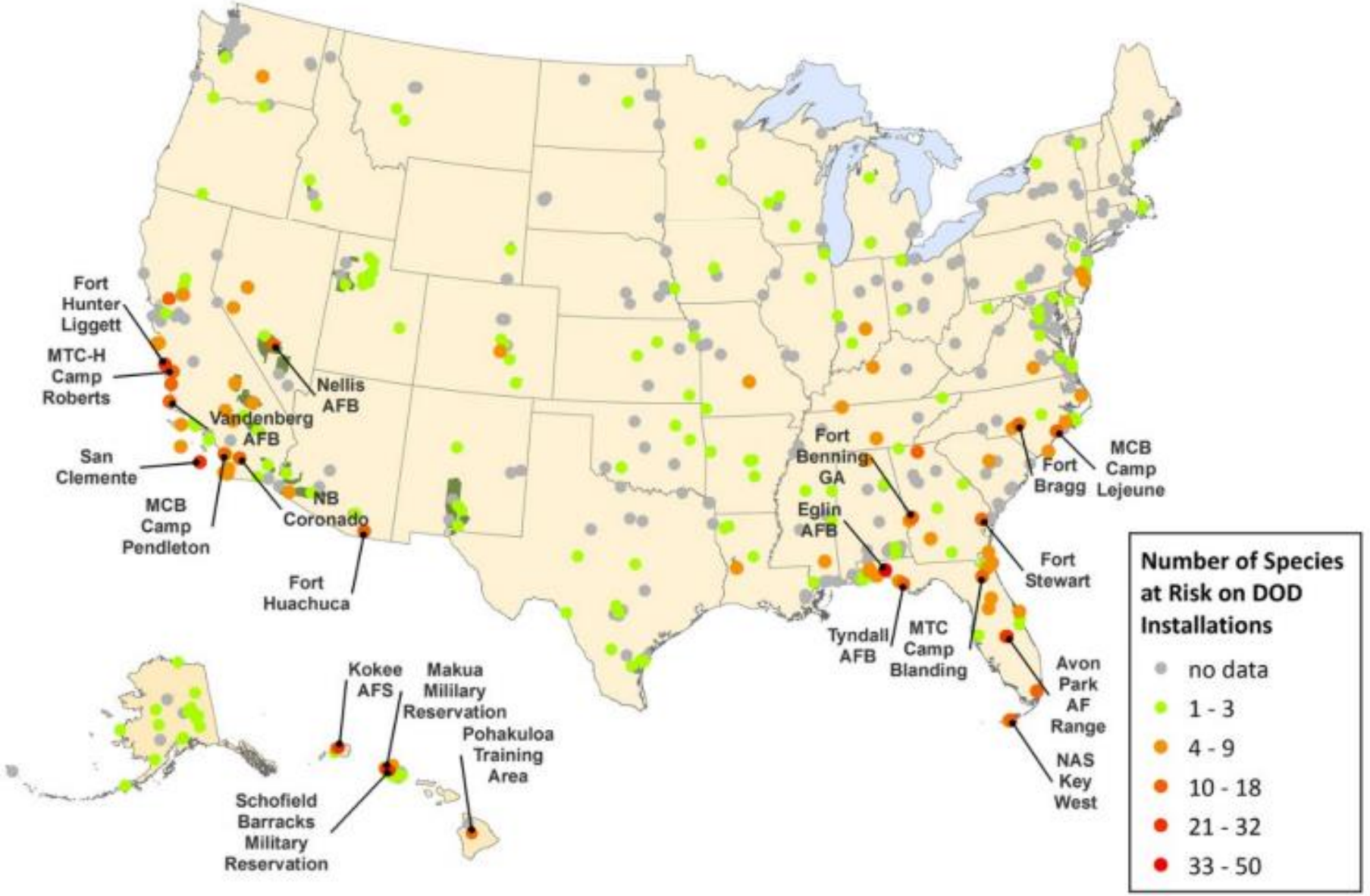
Chapter 1: Species on Federal Lands with ESA Status or NatureServe Imperiled Status





Chapter 1: Species at-risk on or near DoD installations

Source: NatureServe Network Biodiversity Location Dataset 2021



Chapter 1: Biodiversity Conservation = Ecosystem Services

- Increased recognition of the value of biodiversity to people through the provision of “ecosystem services” (MEA 2005, IPBES 2019)
- Including the benefits that these services provide to DoD facilities and infrastructure (McDowell et al. 2020)
- Protective benefit of “natural infrastructure,” through reducing risks from natural hazards such as floods, wildfires, and landslides (Glick et al. 2020)
- Biodiversity plays a crucial role in regulating and sustaining water supplies that promote water security and reduce flood risk to communities and infrastructure

Chapter 1: Emerging Trends in DoD Biodiversity Conservation

- Buffer land protection
- Flexibility in species protection
- Climate adaptation

Chapter 1: Lessons Learned from Fort Bragg

- Focus on the military mission
- Think regionally and work across boundaries
- Rely on the best available science
- Form partnerships and establish trust

Chapter 2: Understanding Biodiversity Conservation

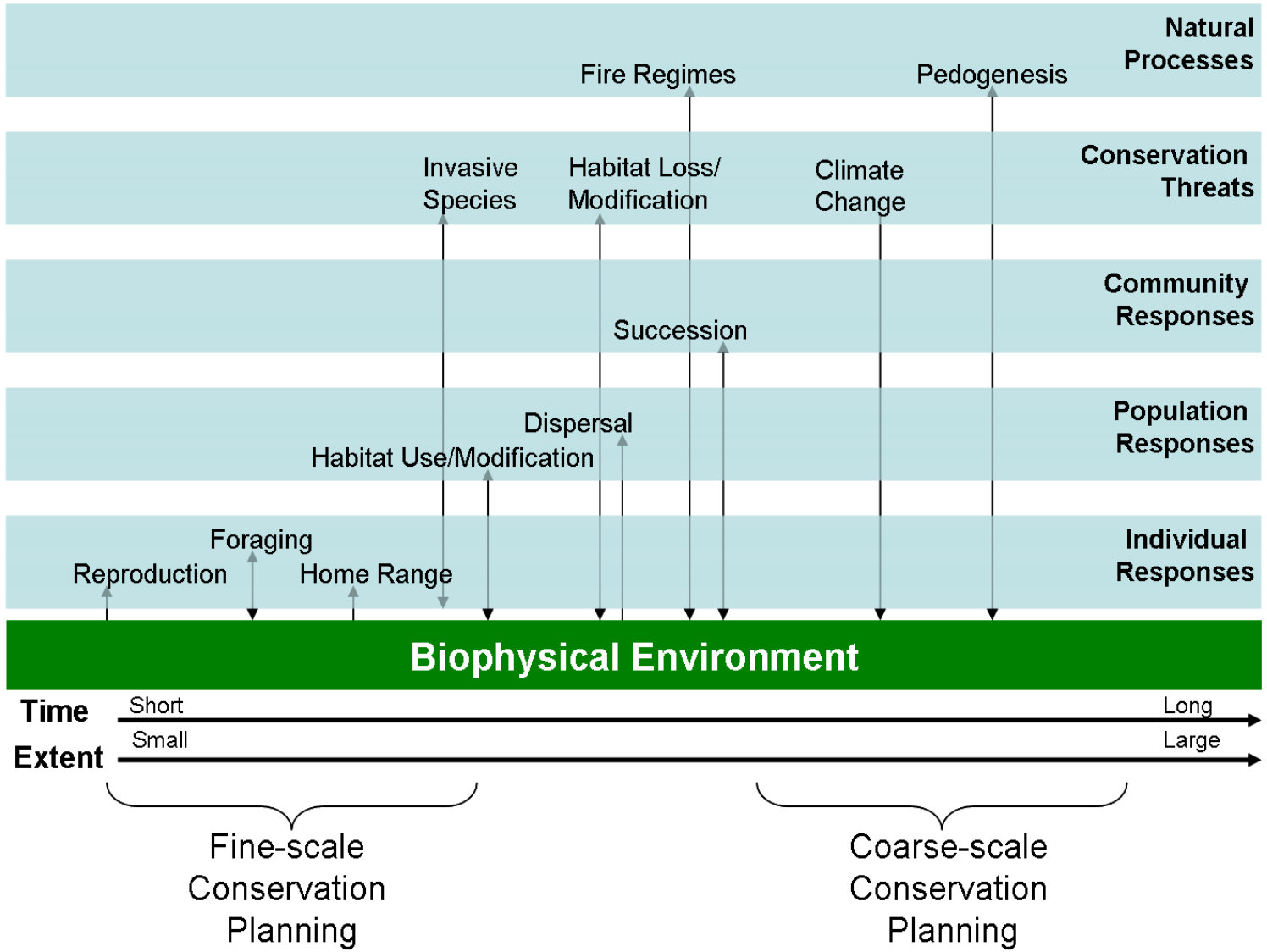
The last word in ignorance is the man who says of an animal or plant: 'what good is it?'. If the land mechanism as a whole is good then every part is good whether we understand it or not. If the biota in the course of eons has built something we like but do not understand then who but a fool would discard seemingly useless parts. To keep every cog and wheel is the first precaution of intelligent tinkering.

Aldo Leopold, *Round River*

Chapter 2: Ecosystem Management

John McColgan

Chapter 2: Ecological Integrity

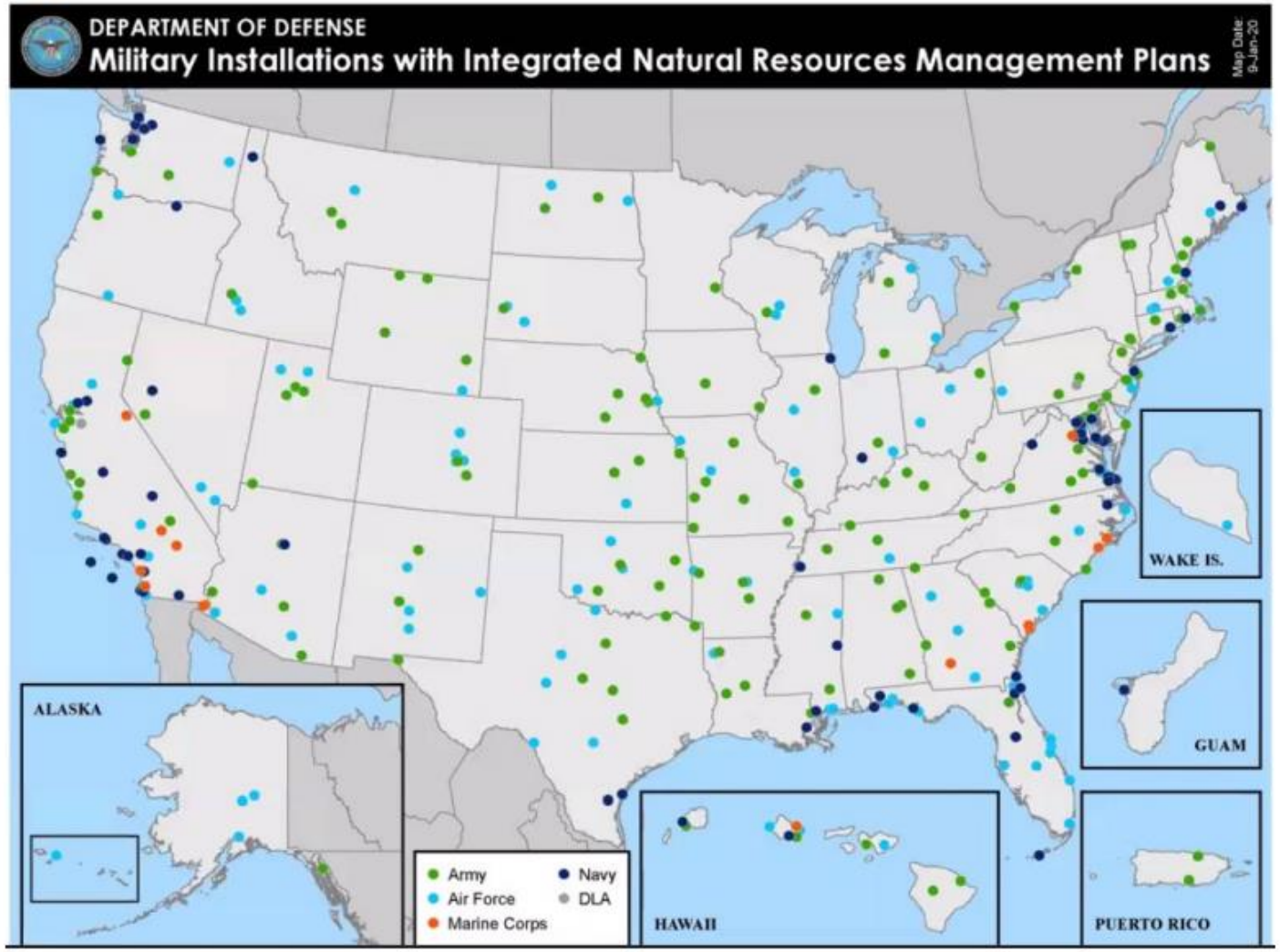

Natural Processes
Fire Regimes
Pedogenesis
Conservation Threats
Invasive Species
Habitat Loss/ Modification
Climate Change
Community Responses
Succession
Population Responses
Dispersal
Habitat Use/Modification
Individual Responses
Foraging
Reproduction
Home Range
Biophysical Environment
Time
Short
Long
Extent
Small
Large
Fine-scale Conservation Planning
Coarse-scale Conservation Planning

Chapter 5. The INRMP - Foundations and Key Topics

<u>New/Updated Content</u>

- INRMP drivers and underpinnings
- The mission and the INRMP
- INRMPs and critical habitat designation
- Integrating state wildlife action plan (SWAP) priorities
- DoD species at risk (SAR)
- Managing for climate change through INRMPs
- INRMP review, revisions and updates
- Monitoring INRMP implementation and effectiveness

Chapter 5: Locations of Military Installations with INRMPs



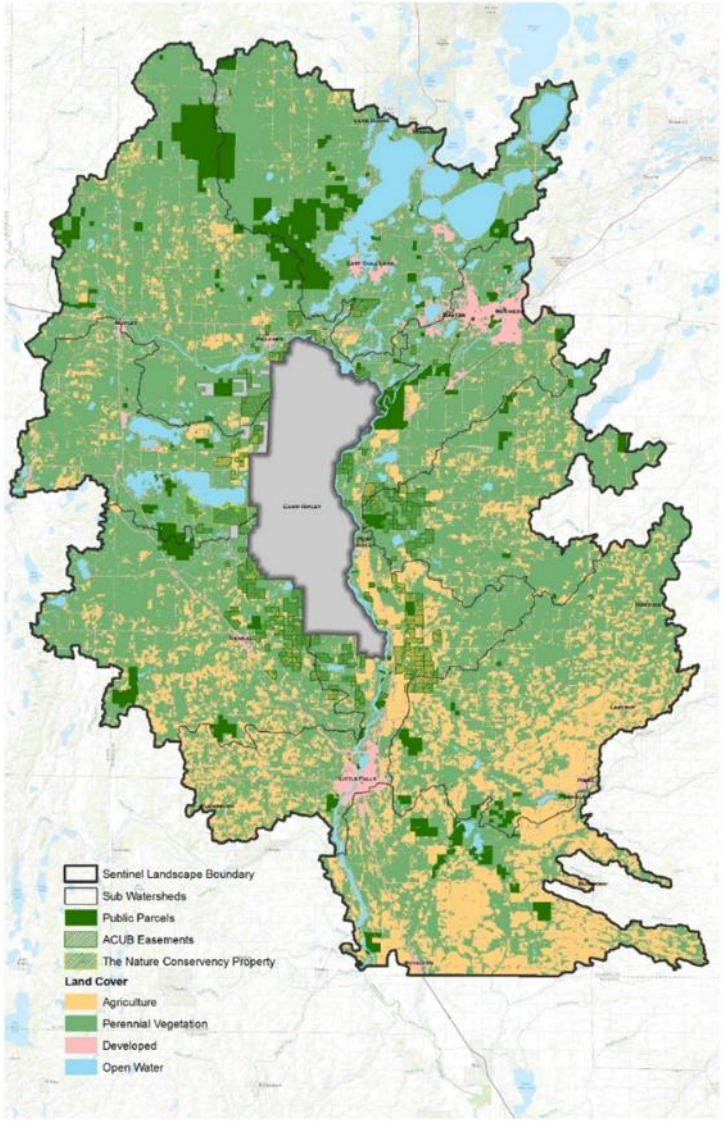
Chapter 5: How DoD might improve its conservation efforts on and around military lands - Li and Male (2020)

- Evaluate the effectiveness of INRMP projects/activities: What are the outcomes of INRMP projects. Many INRMP objectives focus on implementation.
- Increase funding to enable federal and state wildlife agencies to engage more effectively in plan development.
- Add capacity at the FWS to improve the planning and review process.

Chapter 6. Partnerships to Achieve Conservation Goals and Sustain Training

<u>New/Updated Content</u>

- The benefits of partnerships
- Characteristics of successful partnerships
- Buffering umbrella: minimizing encroachment and conflict, sustaining training
  - Army Compatible User Buffer Program (ACUB)
  - DoD Readiness and Environmental Protection Integration (REPI) Program
  - Sentinel Landscapes Partnership
- Conservation partnerships – updated examples

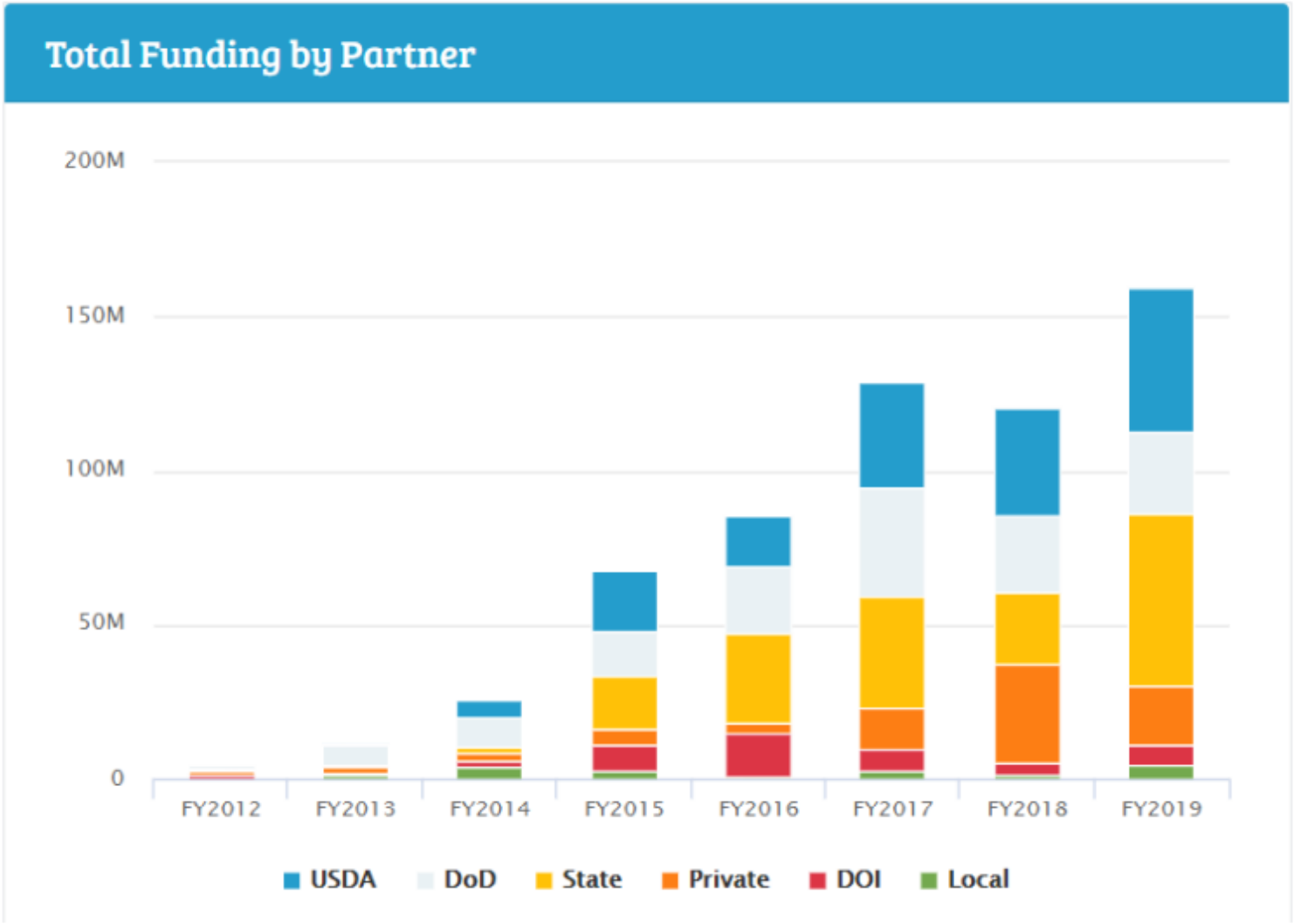


Chapter 7: Funding Natural Resources Conservation on Military Lands

<u>New/Updated Content</u>

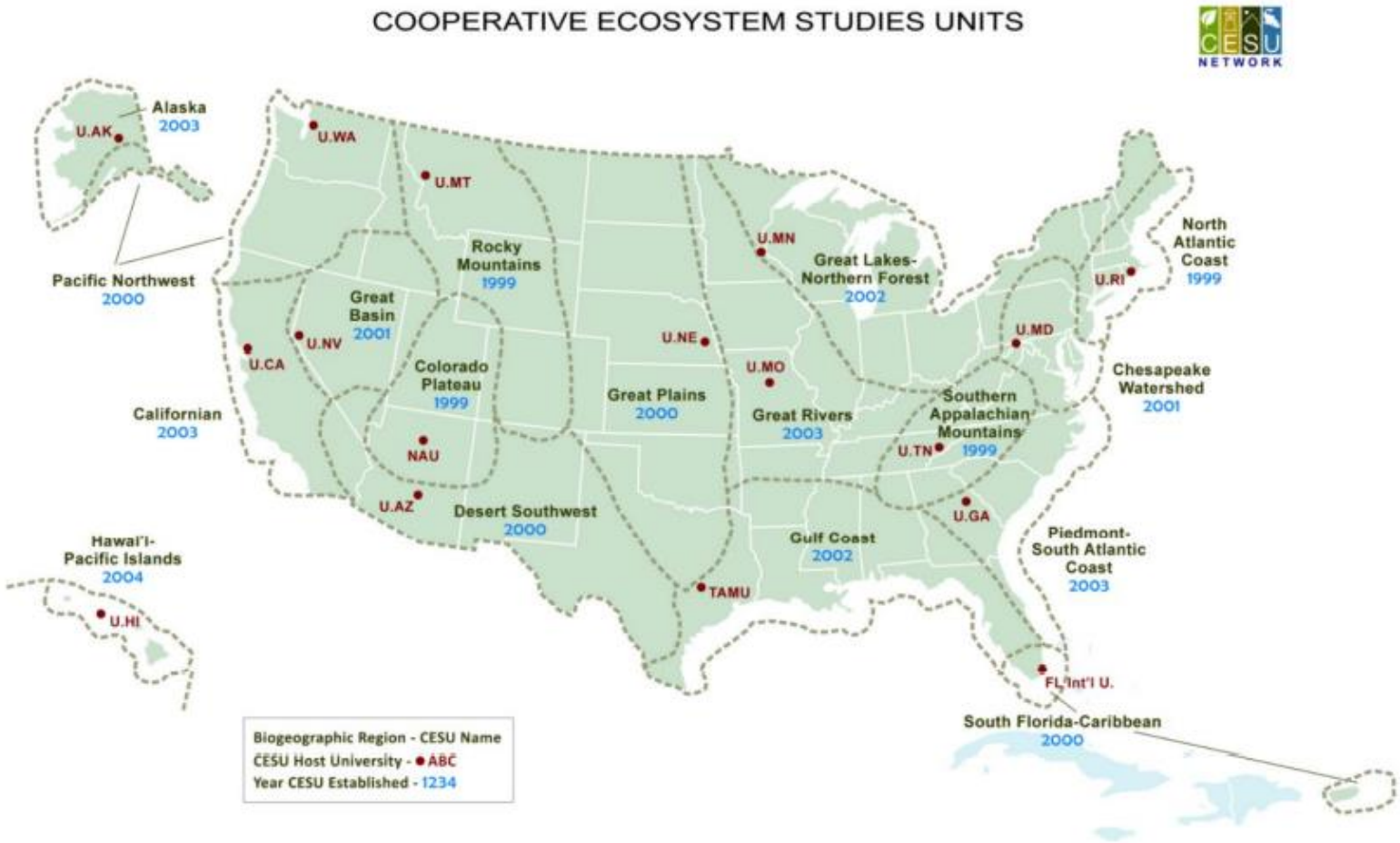
- Natural resources funding sources
  - Appropriated and non-appropriated funding
- Other funding sources
  - Legacy, SERDP/ESTCP
  - Partnership funding - ACUB, REPI, Sentinel Landscapes

Chapter 7: Sentinel Landscapes funding by partner by year (millions of dollars)



Chapter 7: New/Updated Content

- Funding implementation – contracts and agreements



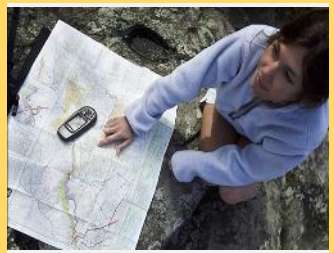
Chapter 8: Managing Landscapes and Ecosystems

What is it?

"Coarse Filter/Fine Filter Approach"

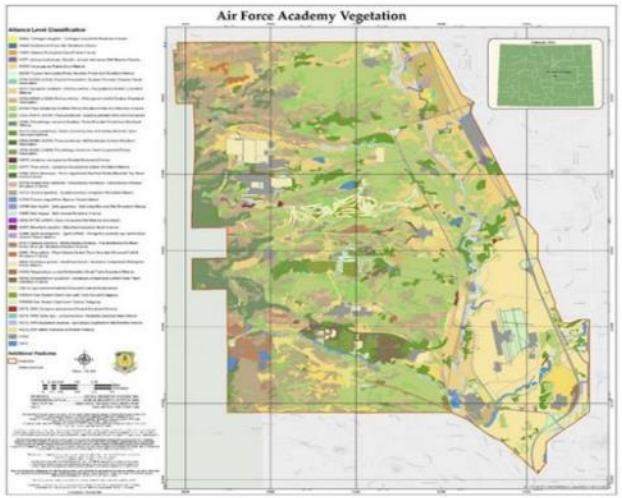
- **Natural Ecosystems**
  - ➢ *"keep common species common"*

- **Focal at-Risk Habitats**
  - Vulnerable communities or assemblages
  - Movement corridors
  - Migratory stopovers



Where is is?

- **Focal at-Risk Species**
  - imperiled, declining, endemic, vulnerable, "umbrella"
  - *(habitats and/or extant subpopulations)*

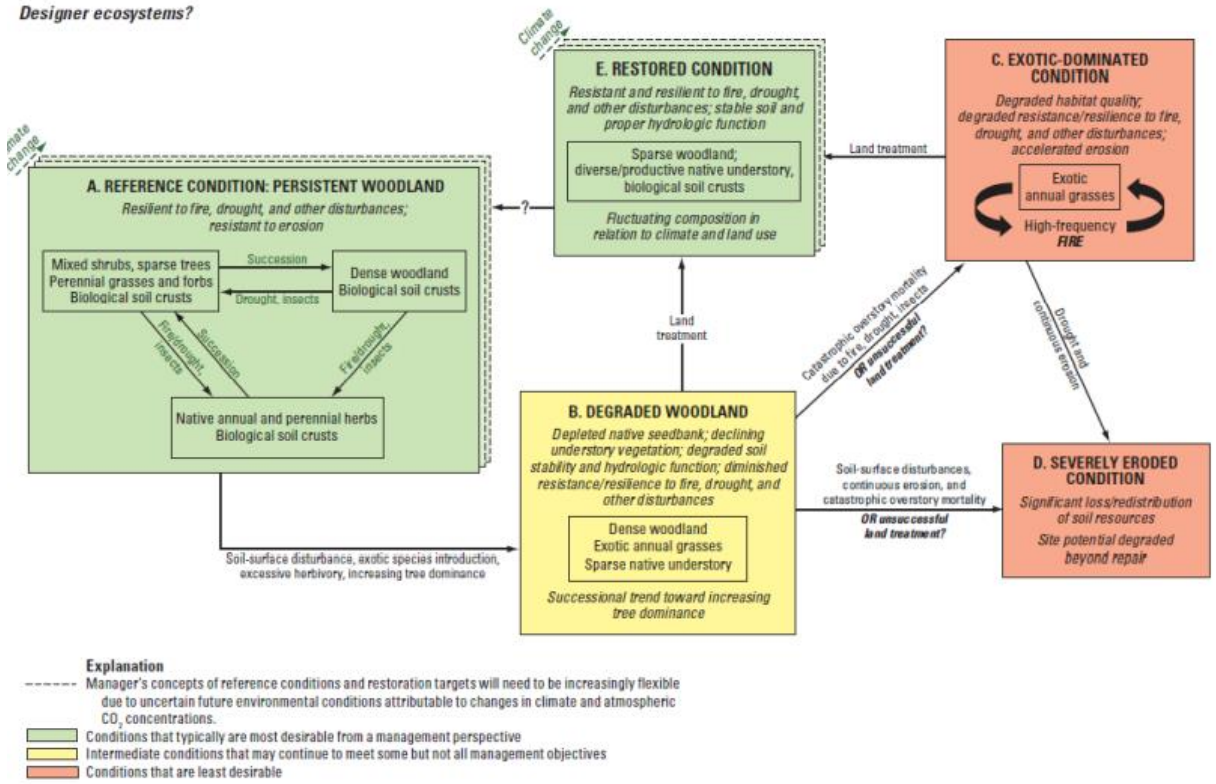


"Coarse filter"

"Fine filter"

Chapter 8.1. Understanding landscape and ecosystem dynamics

- Disturbance Regimes
- Variability in Ecosystem Dynamics
- What is ecosystem Stress?
- Not in Isolation *(i.e., landscape disturbance)*
- Military disturbances and associated ecosystem consequences
- Management Implications

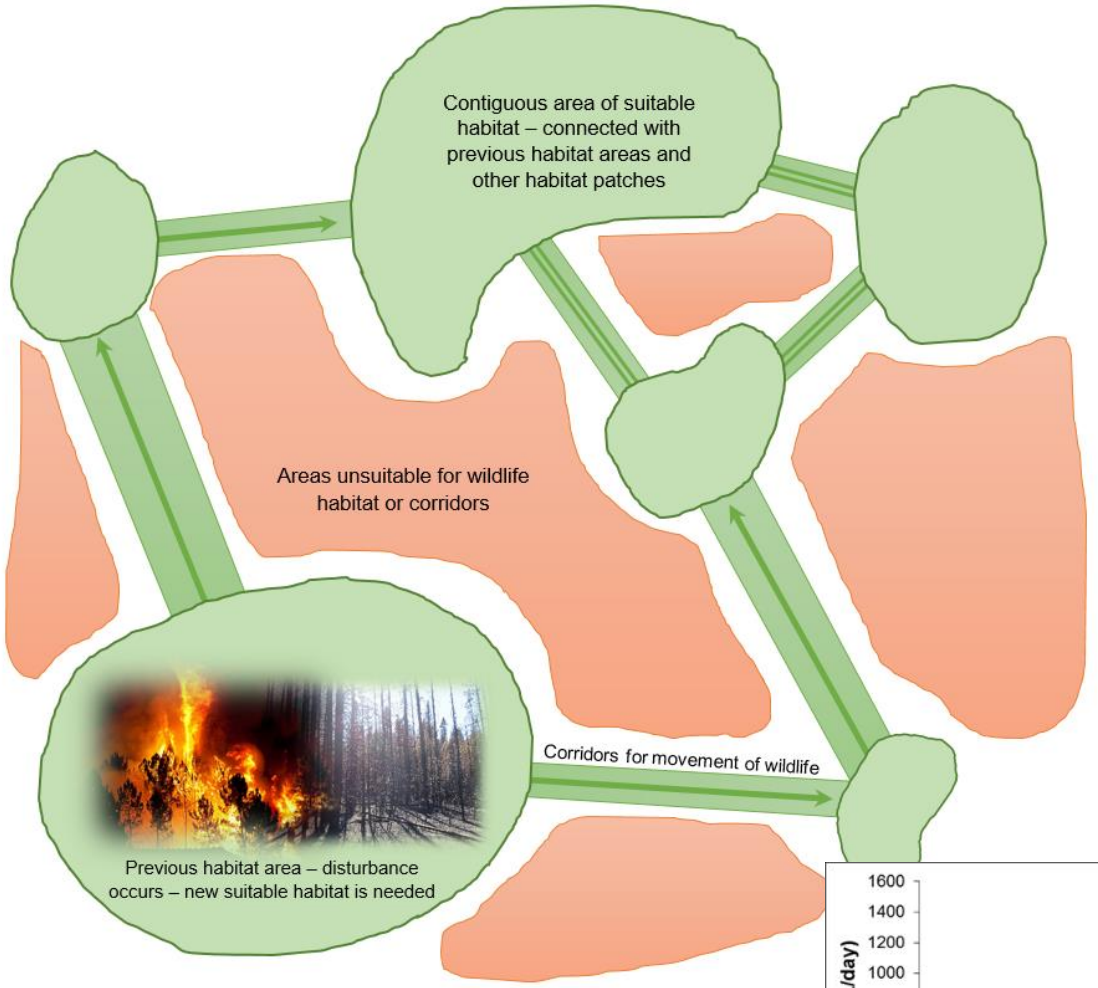


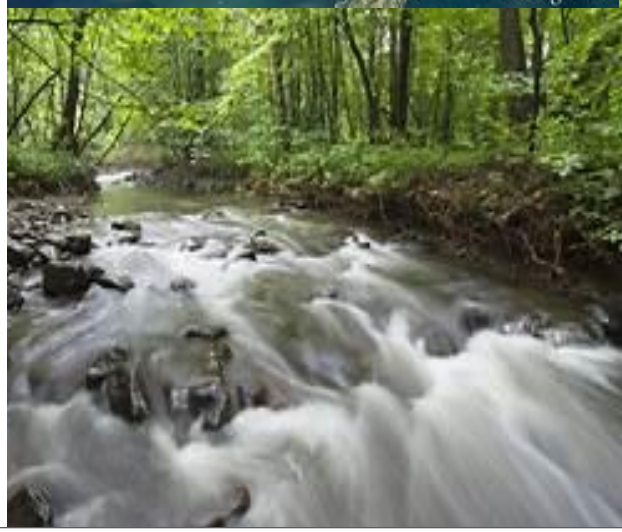
Box 8.3: Conceptual ecological models to understand ecosystem dynamics

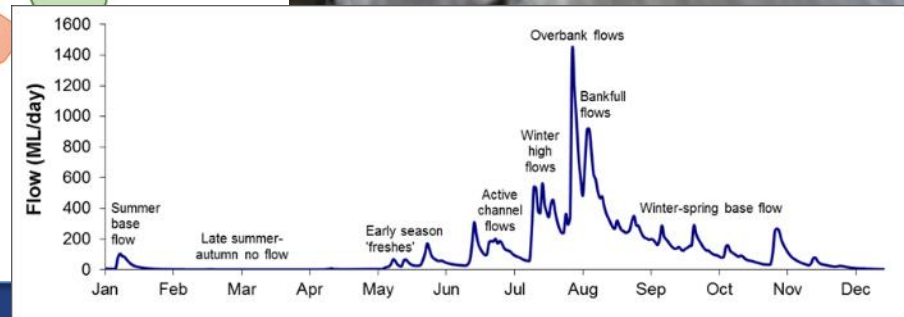
Figure 8.3. General state-and-transition model for pinyon-juniper (persistent woodland) ecosystems. Dashed boxes associated with the reference (A) and restored (D) condition indicate that managers' concepts of reference conditions and restoration targets will need to be increasingly flexible due to uncertain future environmental conditions attributable to changes in climate and atmospheric CO2 concentrations (Miller et al. 2010).

8.2. Fragmentation and Connectivity

- Reconnecting fragmented biodiversity
- Resources



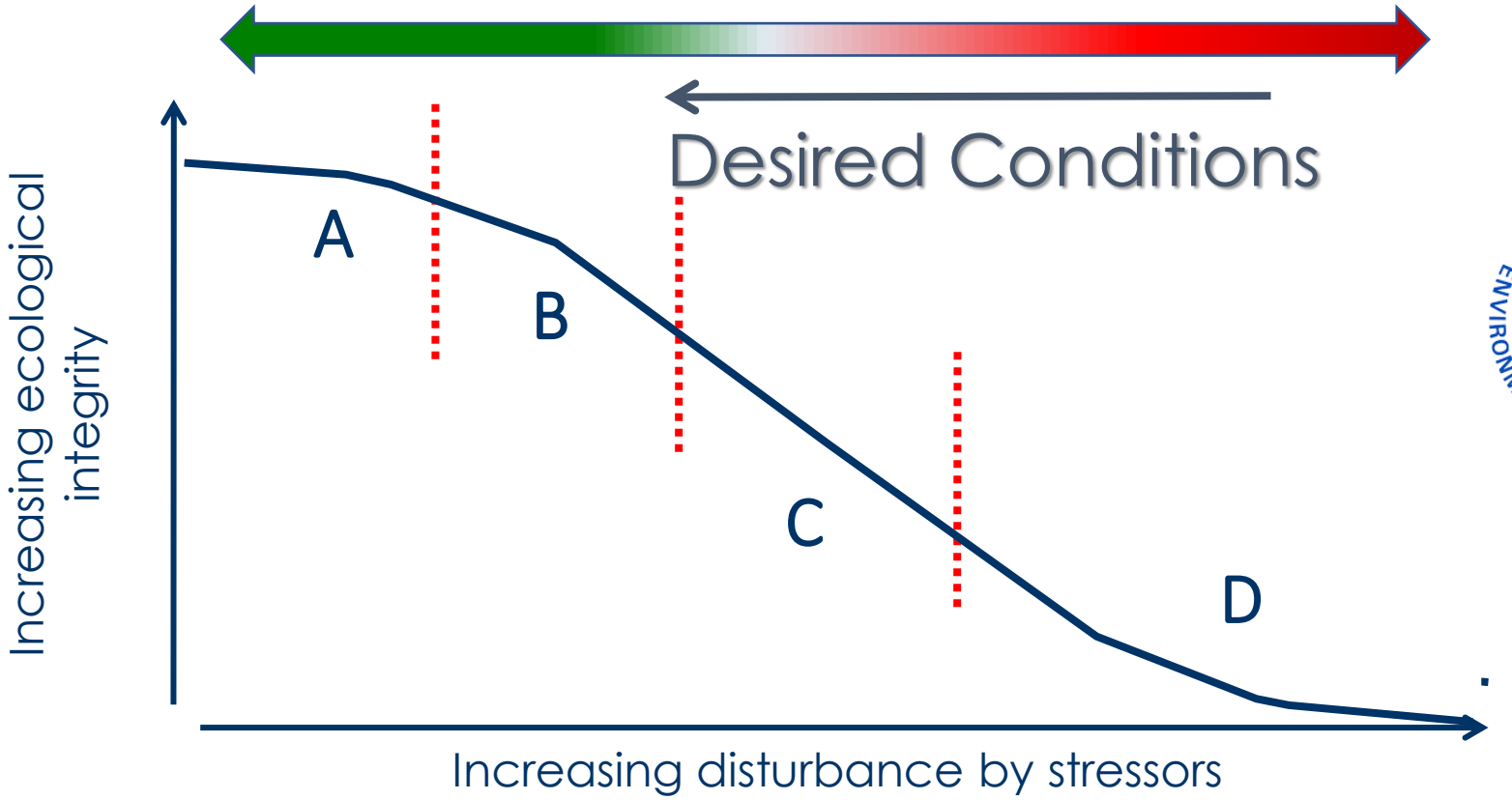




How is it doing?

8.3. Assessing ecosystem condition

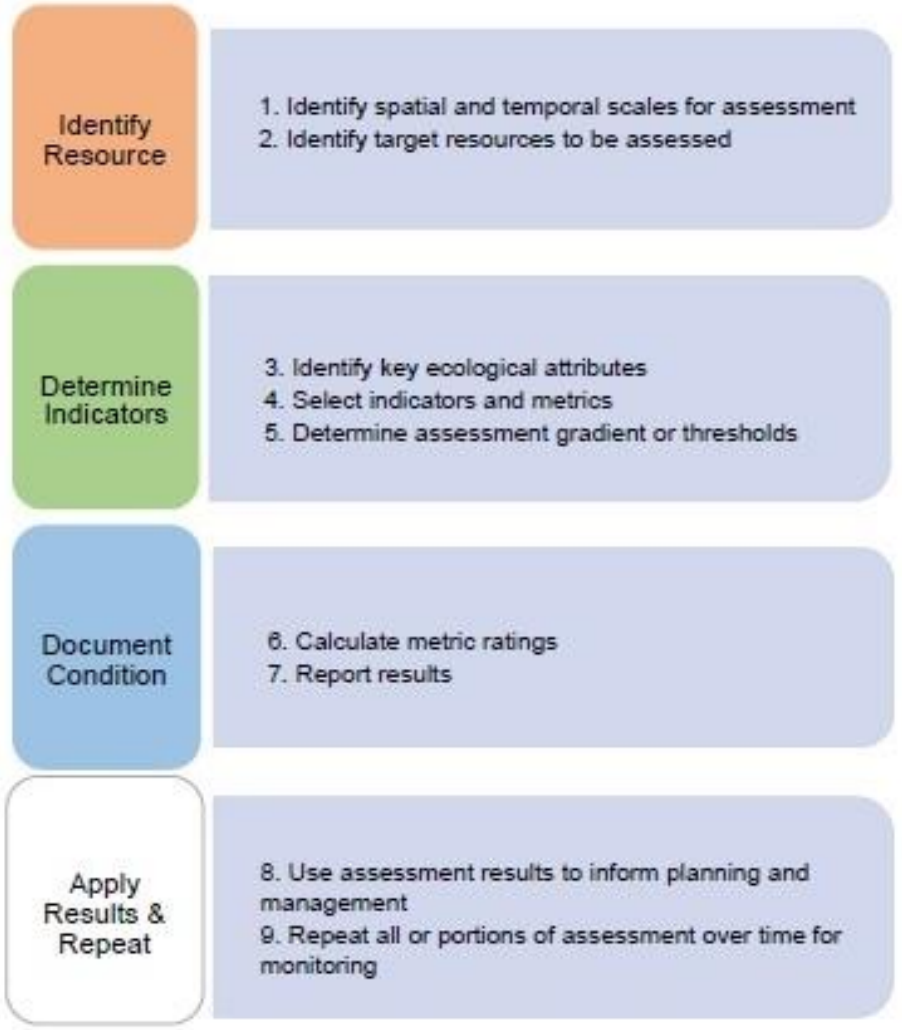
*Ecological Integrity = The ability of an ecological system to support and maintain a community of organisms that has the biotic **composition, diversity, and functional organization** comparable to those of natural habitats within a region*[1]



[1] Parrish, J.D., D. P. Braun, and R.S. Unnasch. 2003. Are we conserving what we say we are? Measuring ecological integrity within protected areas. BioScience 53: 851-860.

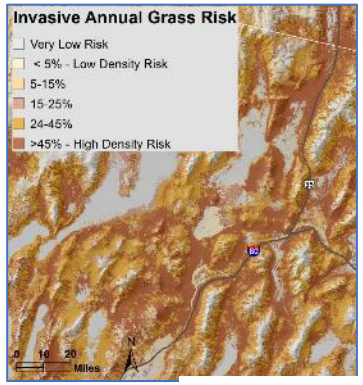
8.3. Assessing ecosystem condition

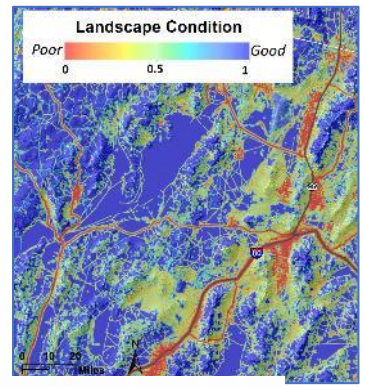
- Management questions and ecosystem condition
- Framework for assessing ecological integrity
- Resources

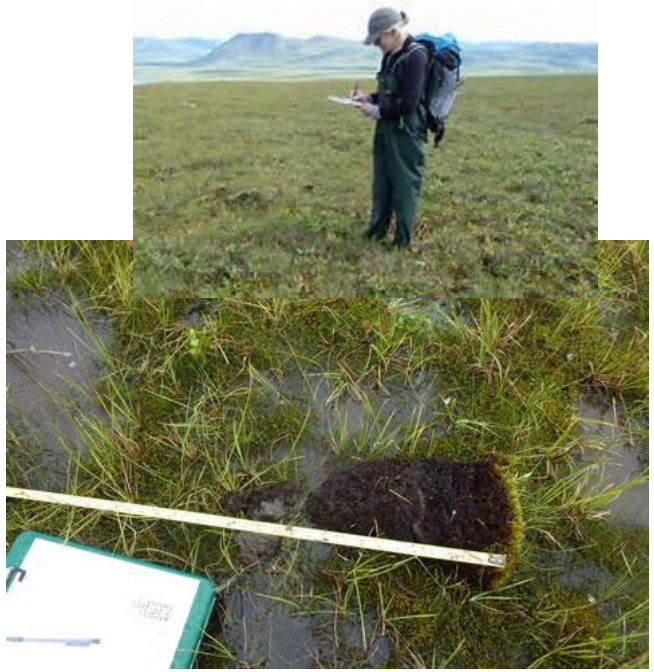


Determining Indicators and Levels of Effort

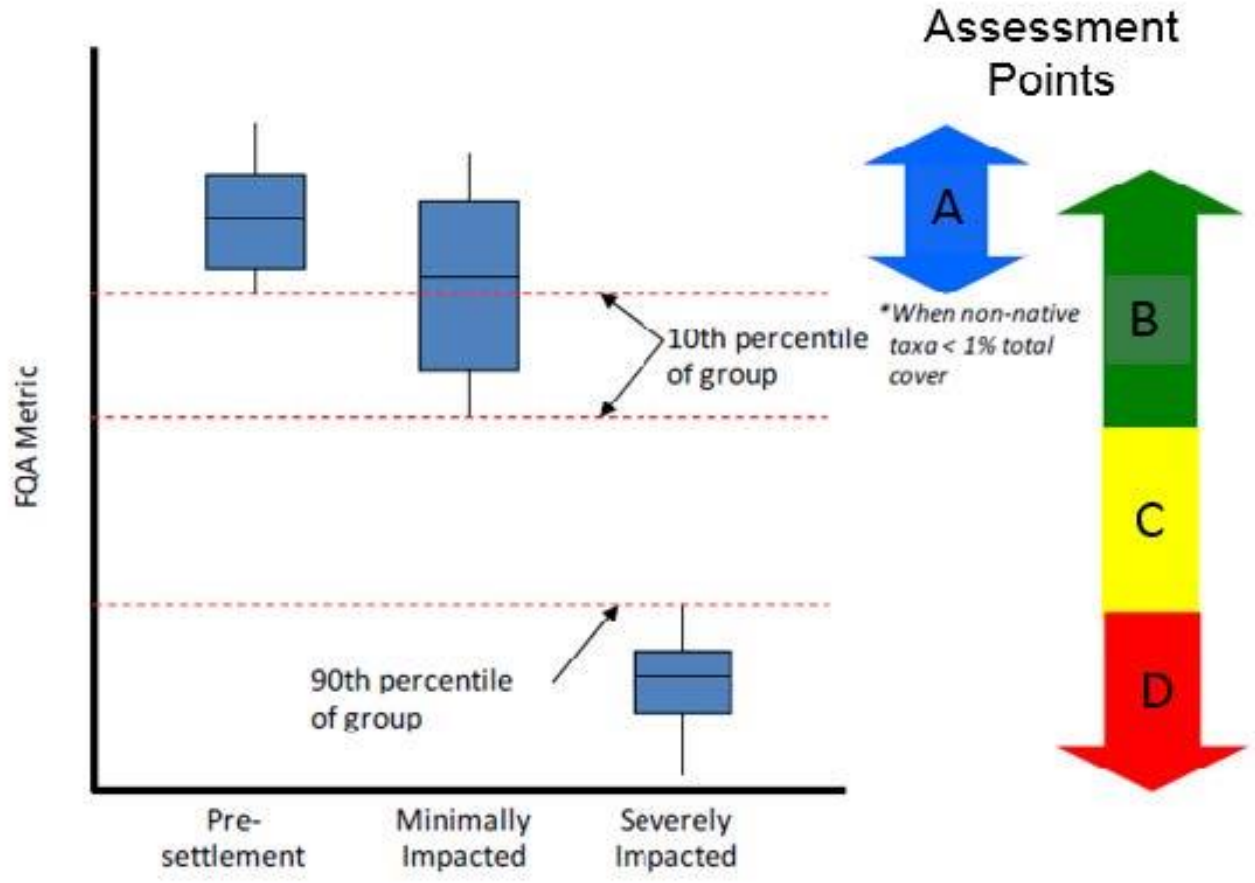
		Indicators	Applications
Level 1 –	**Remote Sensing**	Landscape patterns On-site indicators visible remotely	➢ Support Status and Trends ➢ Regional conservation assessment & planning ➢ Multi-site monitoring
Level 2 -	**Rapid Field Observation**	Field indicators (stressor vs. ecological condition metrics)	➢ Site assessment ➢ Restoration, management monitoring progress
Level 3 -	**Intensive sampling**	Detailed quantitative field indicators. Calibrated indicators (e.g., indices of condition or integrity, FQA).	➢ Reference sites for specific indicators ➢ Rigorous performance measures for restoration







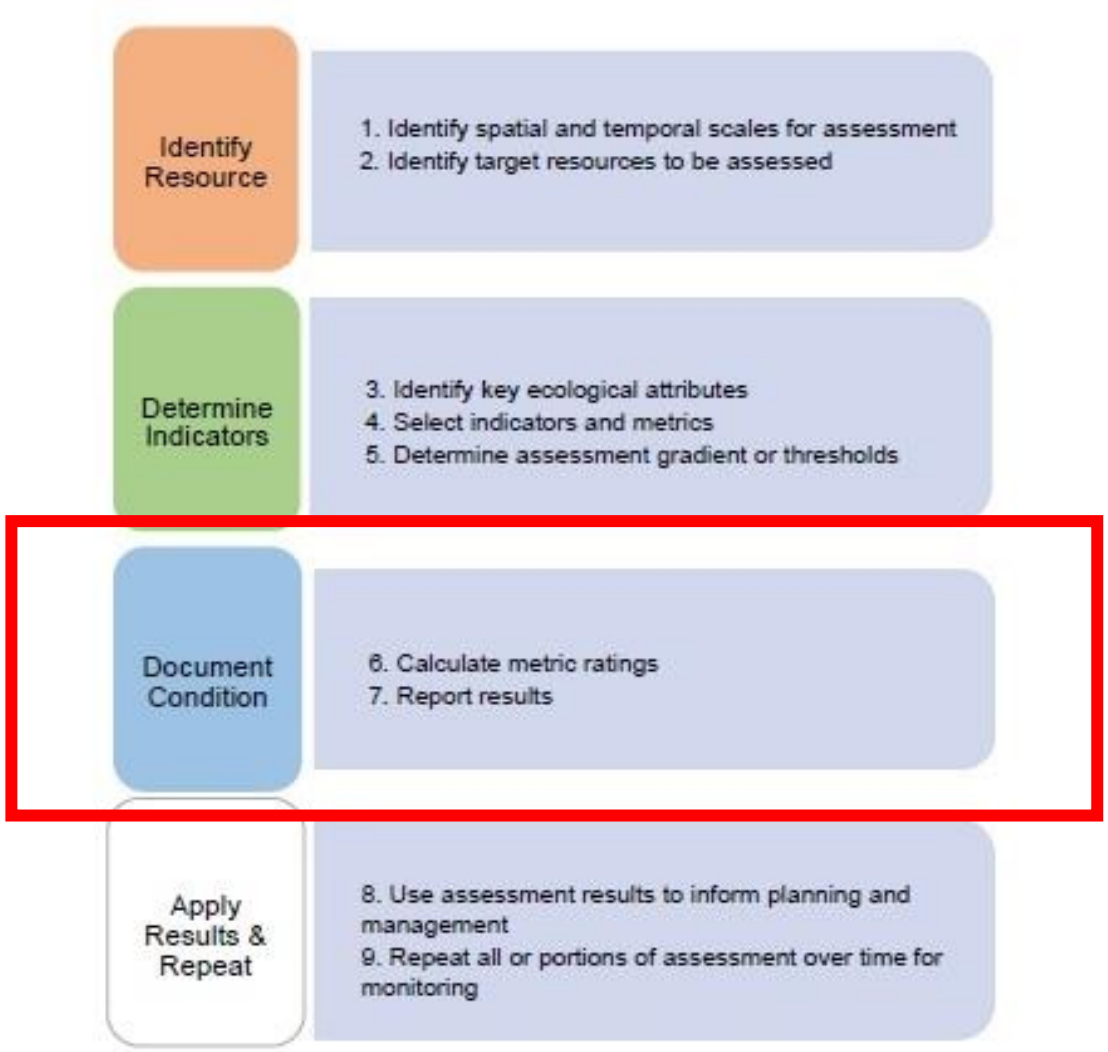
Ecological Integrity Criteria and Indicators for Pinyon-Juniper Woodland, with Key Ecological Attributes[1], Indicators, and Ratings from Excellent to Poor. Indicator measurements are Tier: 1 = Remote Sensing, 2 = Rapid Field Measurement, 3 =Intensive Field Measurement.

Category	Key Ecological Attribute	Indicator	Tier	Indicator Description
				
		Expected Cryptobiotic	2,3	Expected ranges in percent cover of undisturbed biological soil crust

Indicator Rating Criteria

A = Very Good	B = Good	C = Fair	D = Poor
Landscape Condition Model Score >0.8		Landscape Condition Model Score 0.80 – 0.5	Landscape Condition Model Score < 0.5
Cover of native plants = 90-100%	Cover of native plants 80-90%	Cover of native plants 50 to 80%	Cover of native plants <50%
None present.	Invasive species present, but sporadic (<3% cover).	Invasive species prevalent (3–10% absolute cover).	Invasive species abundant (>10% absolute cover).
90-100% similarity	71-90% similarity	50-70% similarity	<50% similarity
Biological crusts are intact. Natural microrelief is undisturbed. Soil erosion is not accelerated by anthropogenic activities. Accelerated	Biological crusts intact in at least 80% of the occurrence. Soil erosion may be accelerated in small patches, or lightly so throughout the occurrence. Soil	Biological crusts are removed from more than 25% of the area, or are in various stages of degradation throughout the	Biological crusts are >75% removed, occurring only in small pockets naturally protected from livestock and

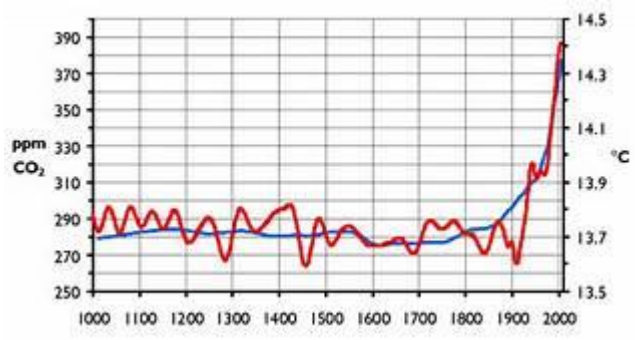
8.3. Document condition



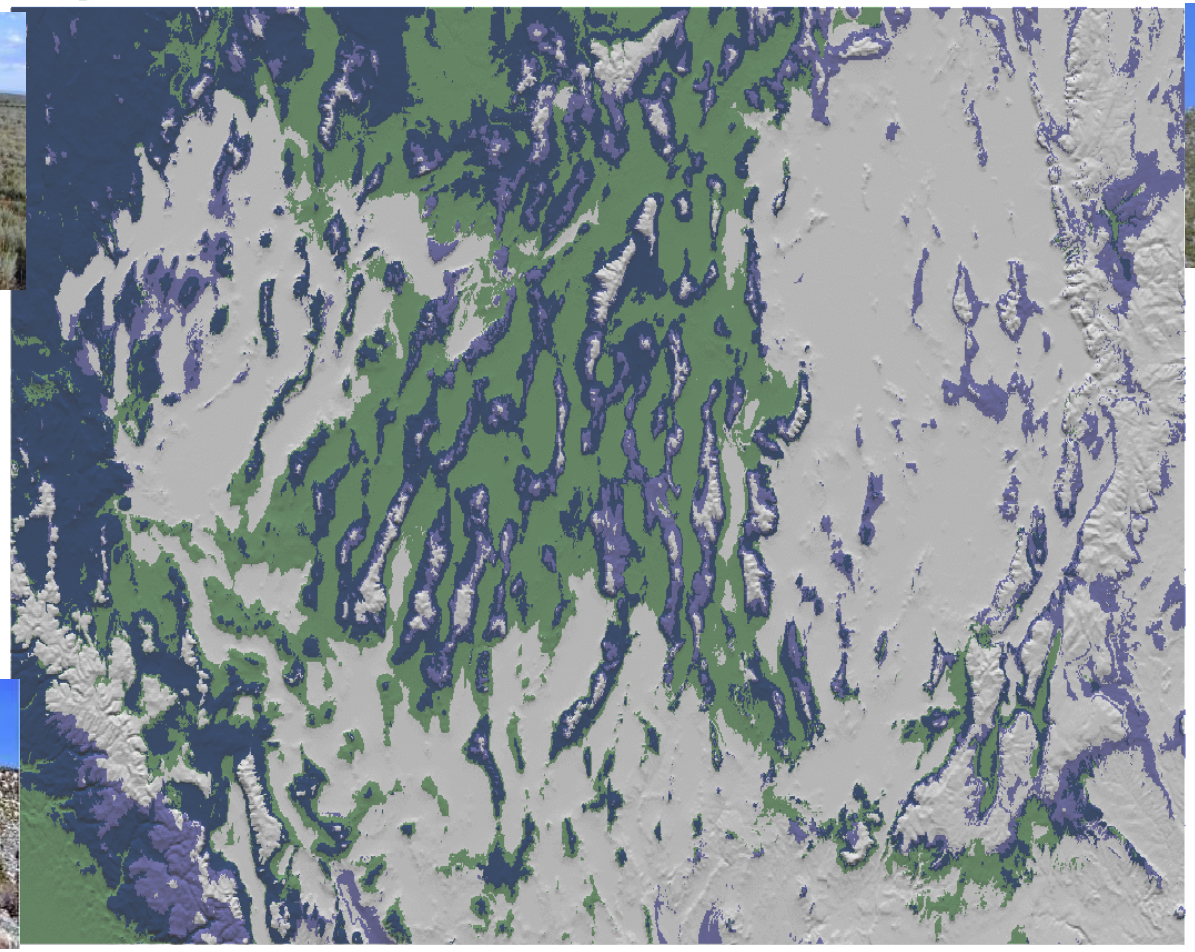
PRIMARY FACTOR		ROBINSON	
MAJOR ATTRIBUTE			WET
Metric		MARSH	MEADOW
ECOLOGICAL INTEGRITY		**B-**	**C+**
LANDSCAPE CONTEXT	[0.3]	**B+**	**B-**
LANDSCAPE	[0.33]	A-	A-
L1. Contiguous Natural Land Cover		B	A
L2. Land Use Index		A	B
BUFFER	[0.66]	B-	B-
B1. Perimeter with Natural Buffer		A	B
B2. Width of Natural Buffer		A	A
B3. Condition of Natural Buffer		C	C
CONDITION	[0.7]	**C+**	**C-**
VEGETATION	[0.55]	C-	D
V1. Native Plant Species Cover		C-	D
V2. Invasive Nonnative Plant Species Cover		D	D
V3. Native Plant Species Composition		B	D
V4. Vegetation Structure		nr	nr
V5. Woody Regeneration [opt.]		na	na
V6. Coarse Woody Debris [opt.]		na	na
HYDROLOGY	[0.35]	B+	B-
H1. Water Source		B	B
H2. Hydroperiod		B	B
H3. Hydrologic Connectivity		B	C
SOIL	[0.1]	B+	A+
S1. Soil Condition*		B	A

8.4. Climate change adaptation

Climate Change and Ecosystem Response



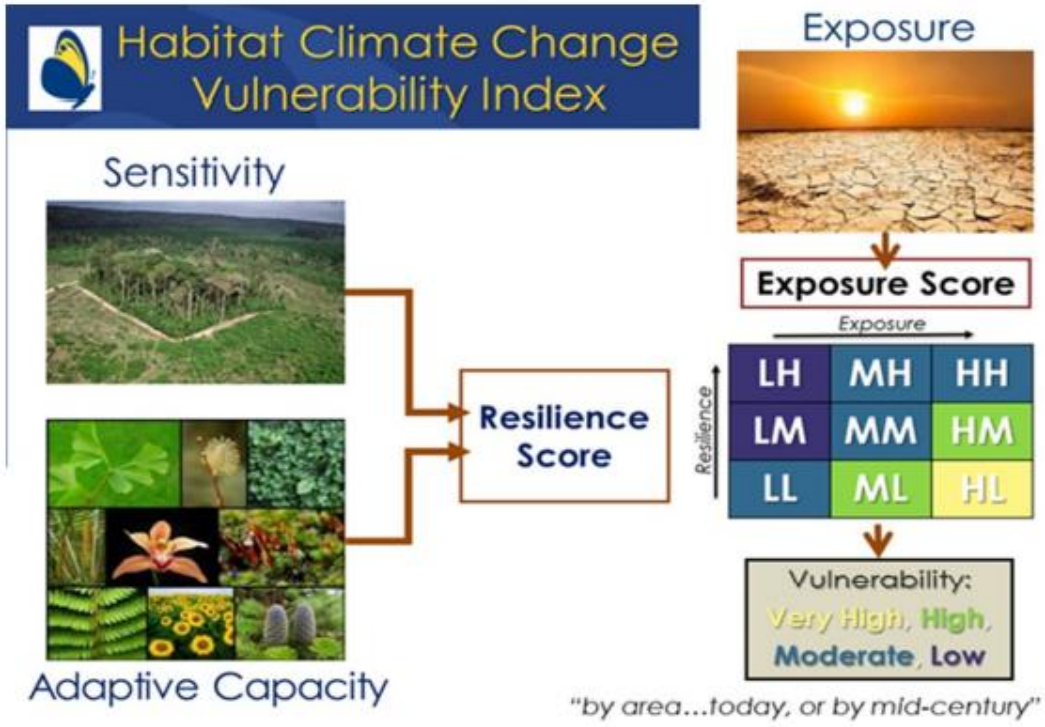
Sage 1950 - 1980 P-J



Characteristic Climate for Pinyon-Juniper vs. Big Sagebrush (dark blue = both)

8.4. Climate change adaptation

- Climate change vulnerability assessment
- Climate change adaptation
- Resistance vs. resilience vs. transformation strategies
- Resources



Resistance vs. resilience vs. transformation strategies

Low CC vulnerability

RESISTANCE	Maintain the same composition, structure and function	e.g., take measures to protect large intact blocks, preventing invasives

Moderate – High CC vulnerability

RESILIENCE	Allow temporary changes in composition and structure, but recover to functional state	e.g., invasive plant removal and restore fire regime to maintain type

Very High CC vulnerability

RESPONSE (Facilitated Transformation)	Actively or passively facilitate changes from one state to another	e.g., experimentally manage for type conversions while minimizing obvious biodiversity loss

Adaptation Strategies from Millar et al. 2007, Ecological Applications and USFS Climate Change Resource Center

8.5. Monitoring ecosystems and landscapes

- Types of monitoring
- Establishing monitoring goals and objectives
- Monitoring Indicators
- Resources

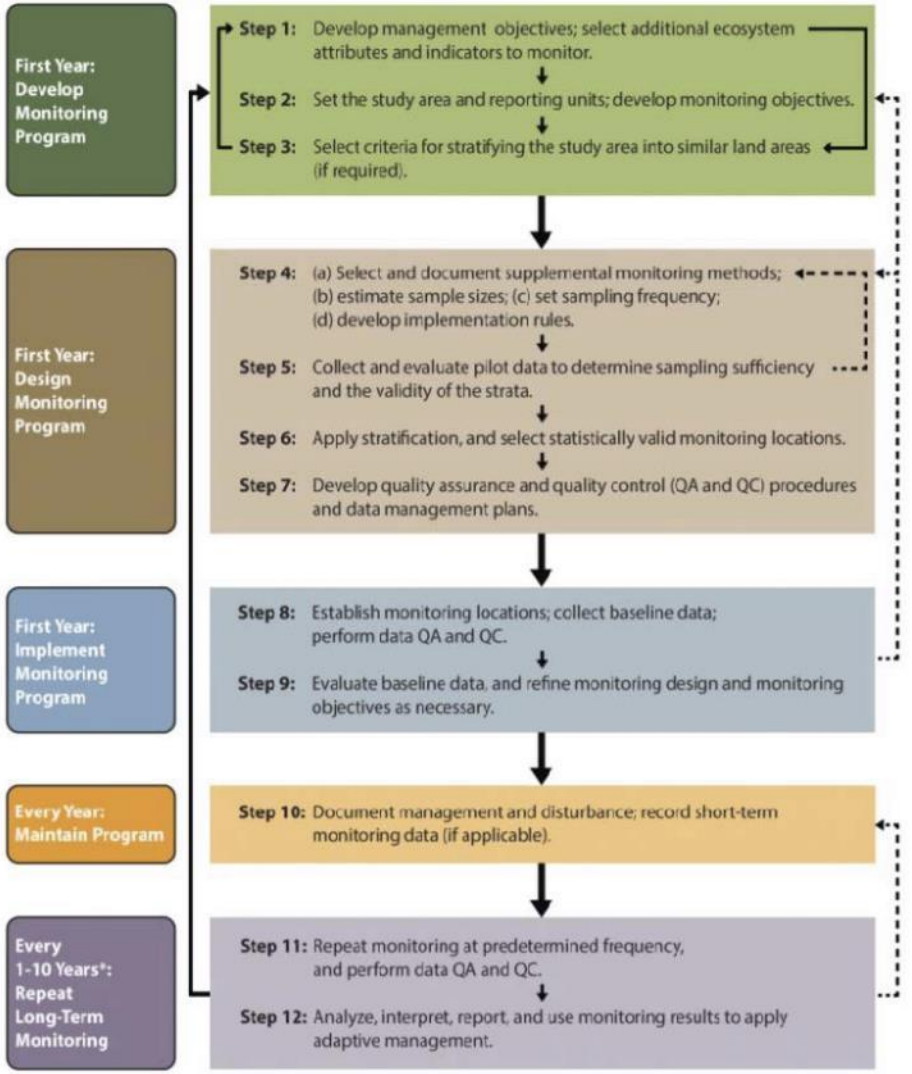


Figure 8.8 Monitoring design guidelines from Herrick et al. (2017) for use by the Bureau of Land Management.

Chapter 9: Threatened, Endangered, & Sensitive Species

Management objectives

- **T & E species:** Prevent extinction, facilitate recovery
- **Sensitive species:** Prevent need for ESA listing

Recommendations

- **Become familiar with the Endangered Species Act**
  - FWS versus NOAA
  - Critical habitat
  - Recovery plan
  - Section 7 Consultation
- **Establish effective partnerships**
  - FWS, state wildlife agencies
  - Academic collaborators
  - Partners in Flight, Partners in Amphibian & Reptile Conservation, etc.

floridastateparks.org

© Jim Morefield

Chapter 9: TES Species Management

Assess: What TES species occur on your base?

- Surveys, habitat models, threat assessments

Plan: Identify protection strategies

- Habitat enhancement, restoration, fire management, invasive species control, ex situ, translocation

Act: Implement strategies

- Carry out conservation actions

Monitor: Are actions effective?

- Population, habitat trends; threat abatement success

Maryland DNR

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Nwtrek.org

Case Studies

https://denix.osd.mil/biodiversity/home/

Chapter 10

Invasive Species Management

Chapter 11

Balancing Biodiversity Conservation with Multiple Uses

Documents

Biodiversity Handbook

Case Studies

Fact Sheet

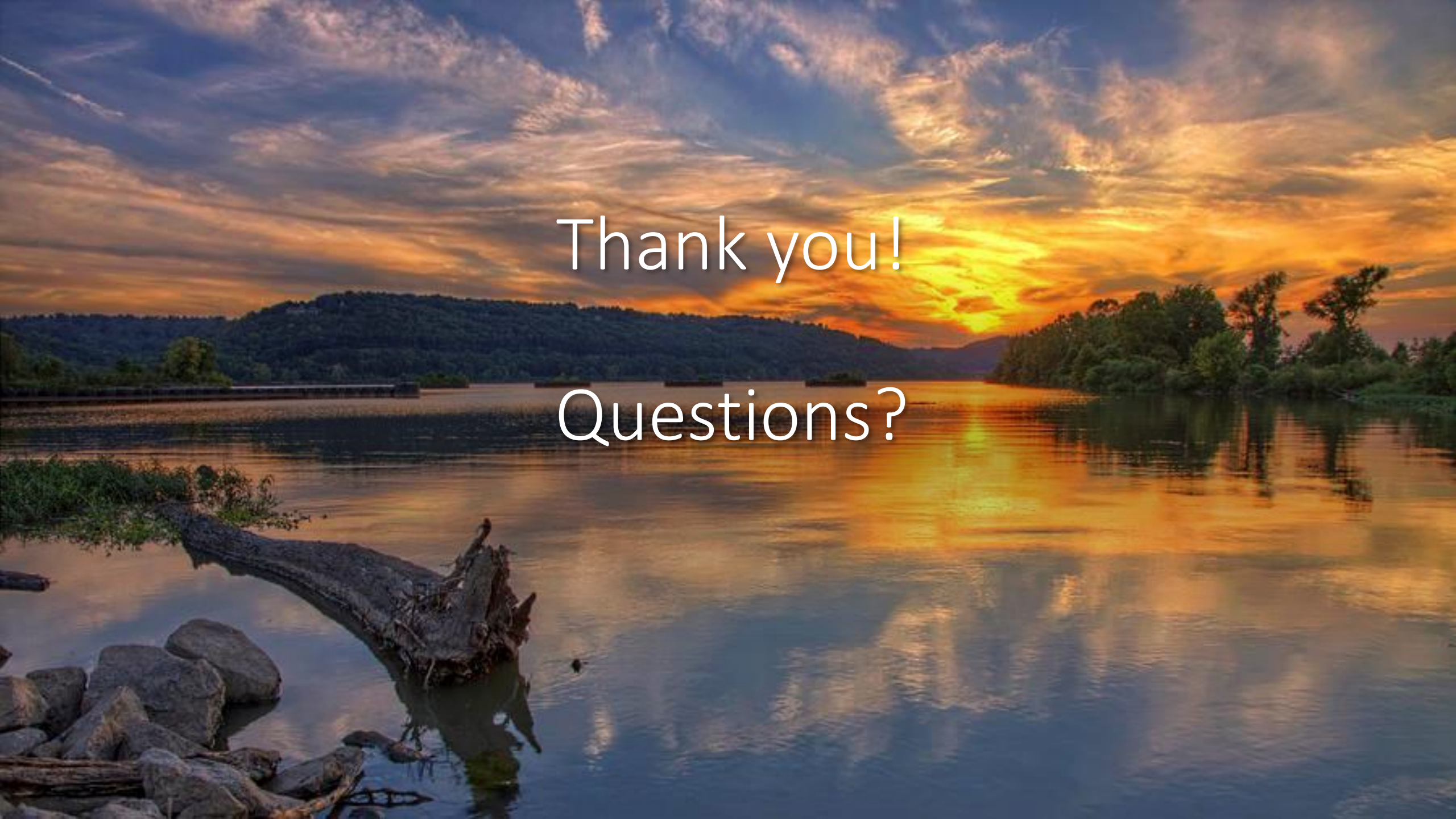





Case Studies

- Approach
- Outcomes
- Highlights and Notes

Case Studies


Thank you!
Questions?