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Biophysical metrics for quantifying nonuse values: examples from three ecosystem types in the United States

Colin Phifer • ORISE Fellow



** The views expressed in this presentation are those of the author(s) and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency. **

Office of Research and Development
Freshwater Ecology Branch, Western Ecology Division, National Health and Environmental Effects Research Laboratory
Corvallis, OR, USA

Tuesday, December 4, 2018

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Alternative title:
An ecologist's perspective on existence values and why they're important to wetlands, forests and farms

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Many thanks to my co-authors

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Our talk's destination

- Ecologist doing economics?
- Reference systems
- Metrics for wetlands and two terrestrial systems
  - –Wetlands
  - –Forests
  - –Farms
- Synthesis

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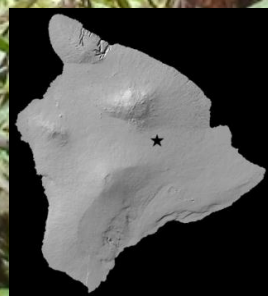
Total economic valuation: Forests

Use values

- $600k–$24M Harvesting
- $1B–3B Recreation
- $4.5B–8.5B Water quality
- $1–3B Aesthetics

Tangible

Source: TNC Hawaii 2012



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TEV: Nonuse values

- Bequest
- Existence values: people benefit from knowing a species or place exists

No obvious “footprint” for existence values

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Metrics of ecological integrity (i.e. hand-off)

- Easy to understand metric of **ecosystem health** can be useful (Johnston et al. 2011, Zhao et al. 2013)
- **Current condition** is often contrast with some **reference condition** (Bishop et al. 2017)

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Ecologist challenge:



1) Define reference condition
2) Identify appropriate metric

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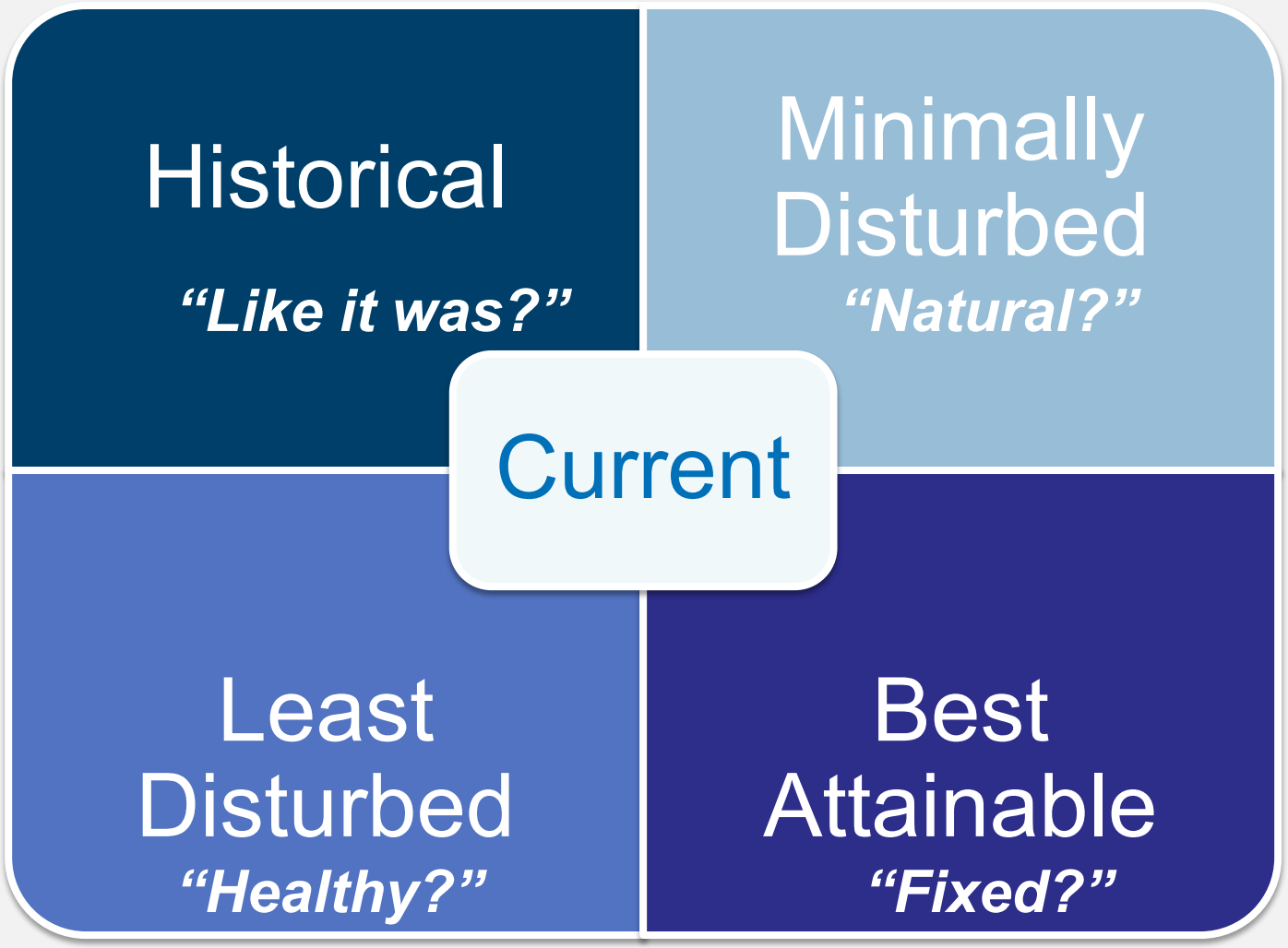
Ecosystem reference condition



Source: adapted from Stoddard et al. 2006

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1st gen. metrics for existence values – *a hypothesis*

Methods

- Ecosystem experts IDed biophysical metrics

Criteria

- Reflect ecosystem's "health" or "integrity"
- Existing regional and national datasets
- Spatially explicit (ideally)

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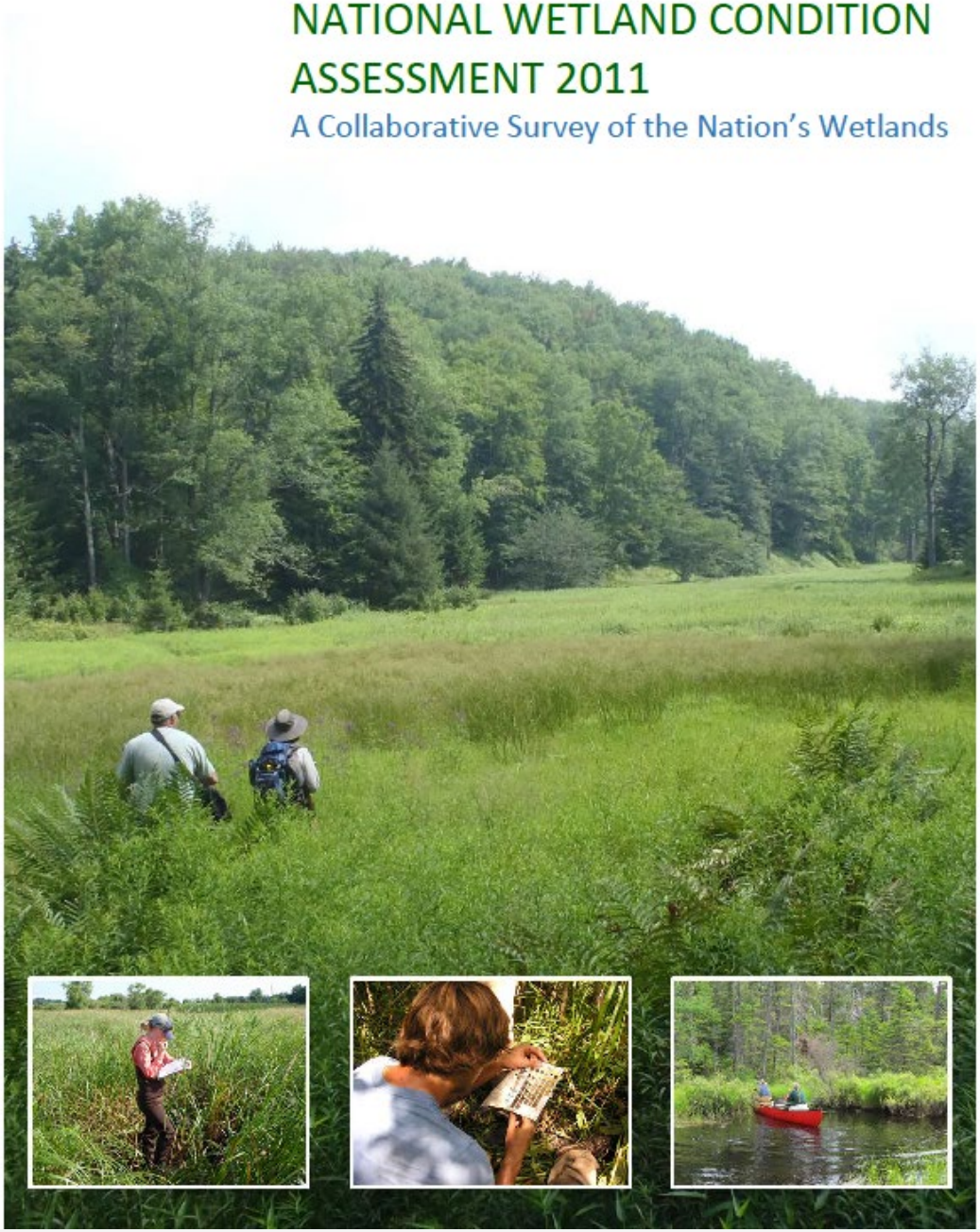
Wetlands

Metric: Plant Community (VMMI)

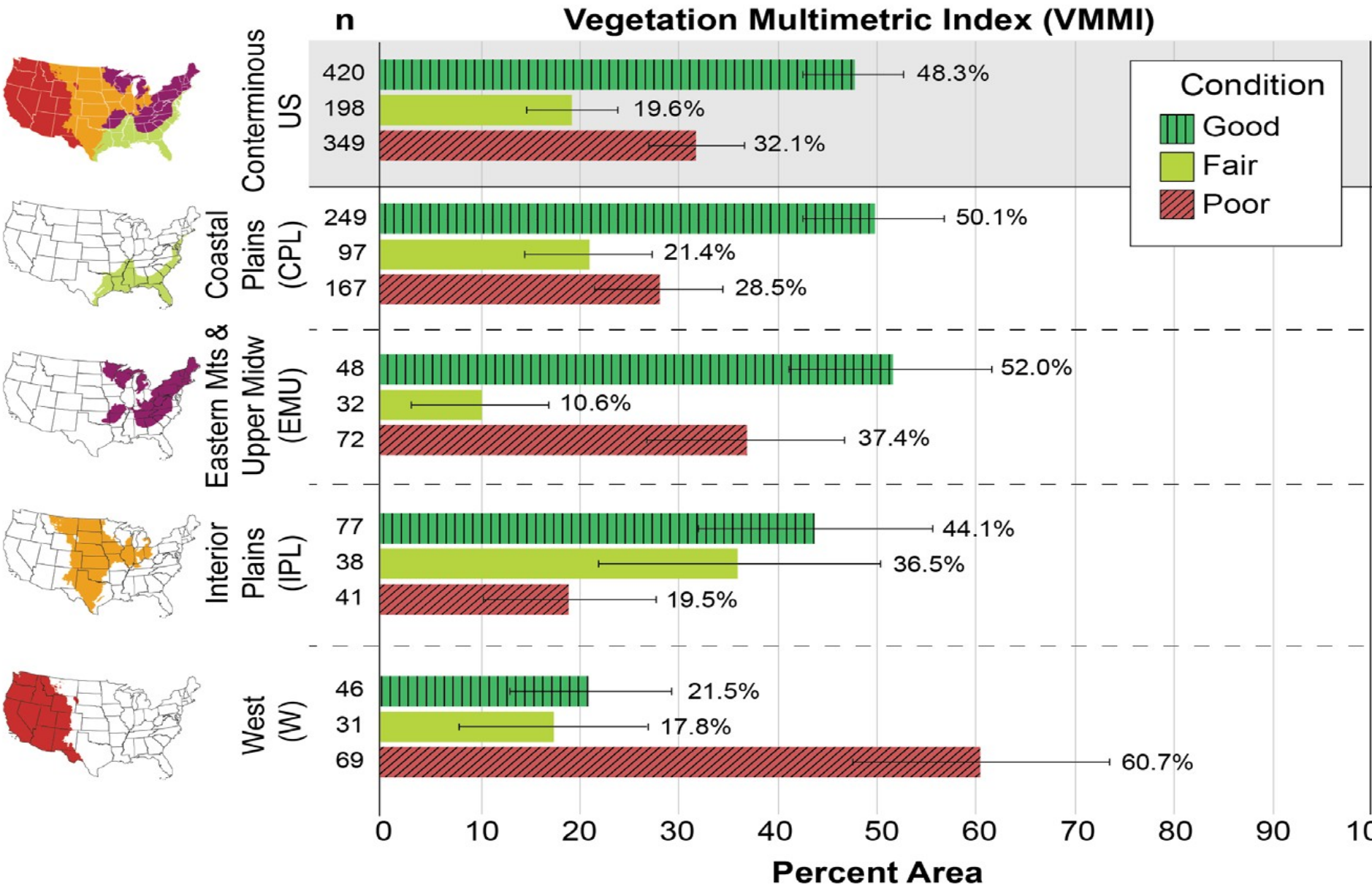
- Species composition
- Species tolerance
- Scored 0-100

Reference condition: Least disturbed



Source: EPA 2011

Wetland VMMI results



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Forests

US Forest Service

Metric: Terrestrial Condition Assessment

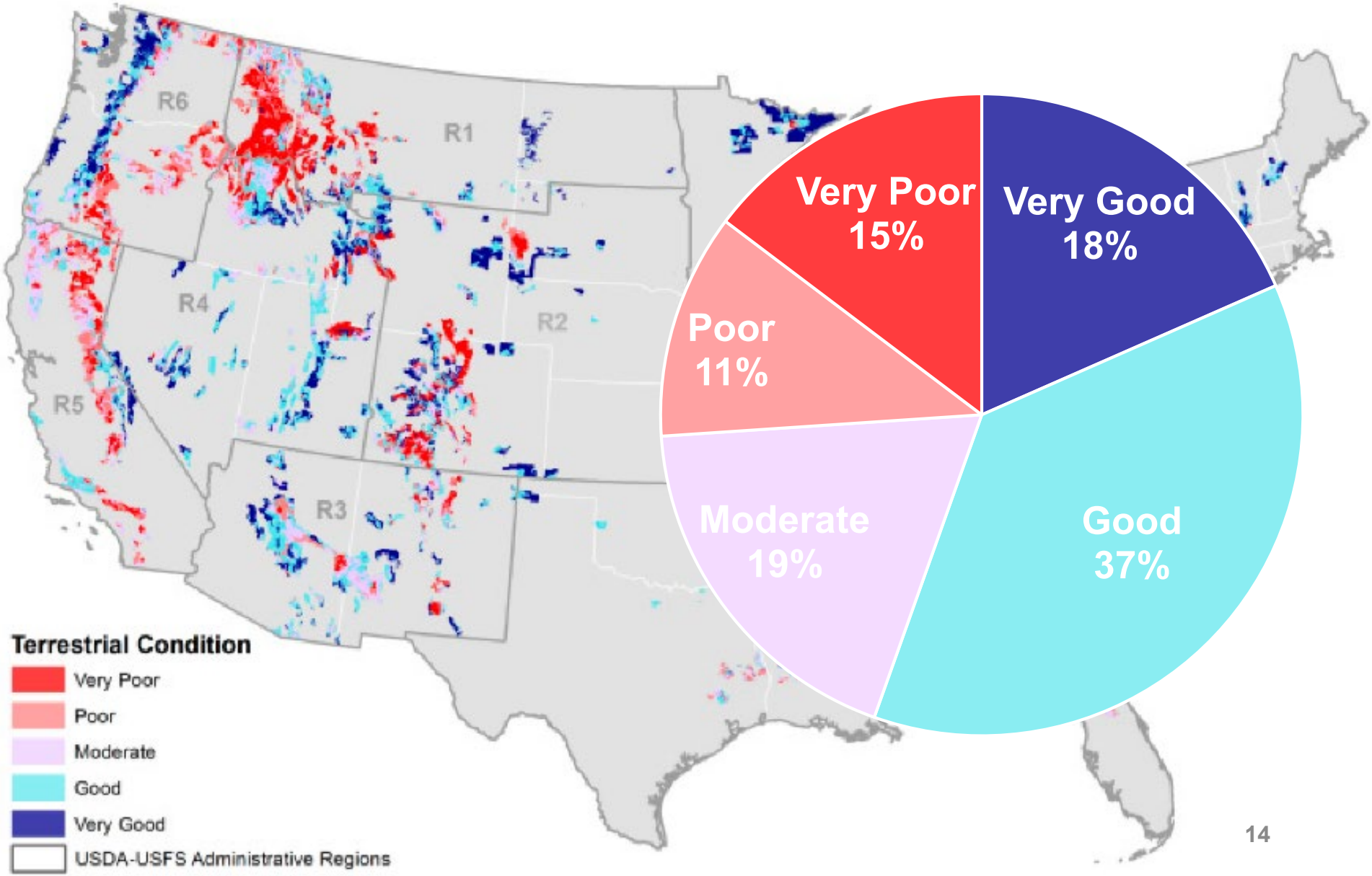
- 11 GIS datasets
- Categorical
  - (V. Poor – V. Good)

Reference condition:

- Historical vegetation condition and ecosystem process

Source: Cleland et al. 2017

TCA spatial results



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Agricultural systems

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Agricultural systems

What does nature provide for existence values?

Agricultural systems

Potential metrics for existence values

- Wild bee abundance
- Soil productivity index
- Water availability
- … and more … ???

Reference condition

-

Agricultural systems

Potential metrics for existence values

- Wild bee abundance
- Soil productivity index
- Water availability

… and more … ???

Reference condition

- ???

Your ideas?

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Existence values metric summary

Ecosystem	Reference	Metric	Type
Wetlands	Least disturbed	VMMI	Index
Forests	Historical *	TCA	Categorical
Agricultural	??	??	??

** Includes current stressors*

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Synthesis

- **Ecologist need to work with economist to identify meaningful metrics that capture represent ecosystem health and communicate it**
- Reference comparison must be carefully understood
- First generation metrics for nonuse existence values for wetlands and terrestrial systems – *our hypotheses*
- Unable to identify nature-based metric for existence values for Agricultural systems

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Thank you for listening – questions?

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