

Measuring Ecological Integrity Across Jurisdictions and Scale

Jimmy Kagan



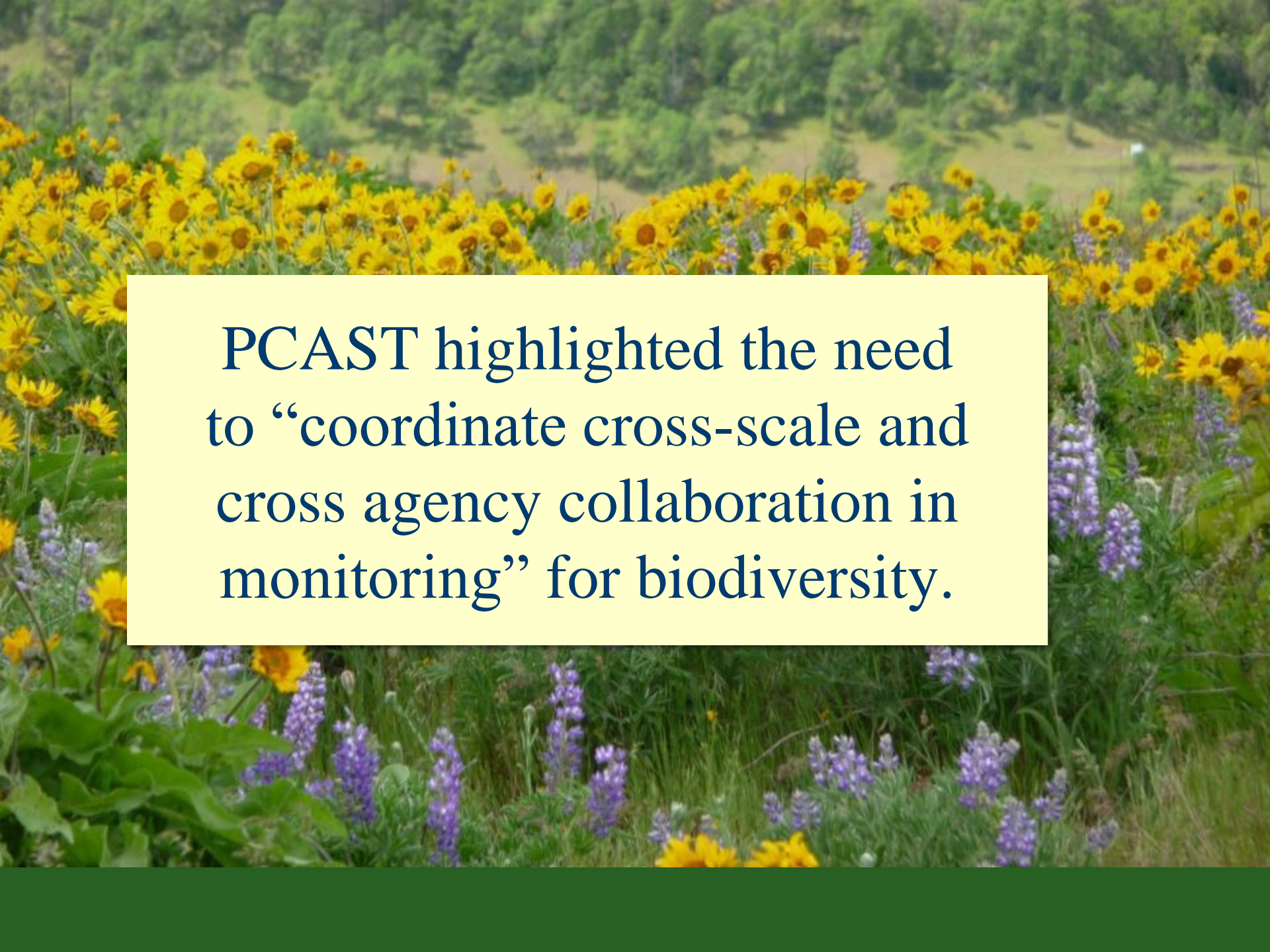
OSU | PSU | UO



Oregon

Biodiversity
Information Center





PCAST highlighted the need to “coordinate cross-scale and cross agency collaboration in monitoring” for biodiversity.

Forest planning rule

To aid managers in describing ecosystems when conducting Forest Land Management Plan revisions and to provide a basis for monitoring ecosystem integrity and the diversity of plant and animal communities.

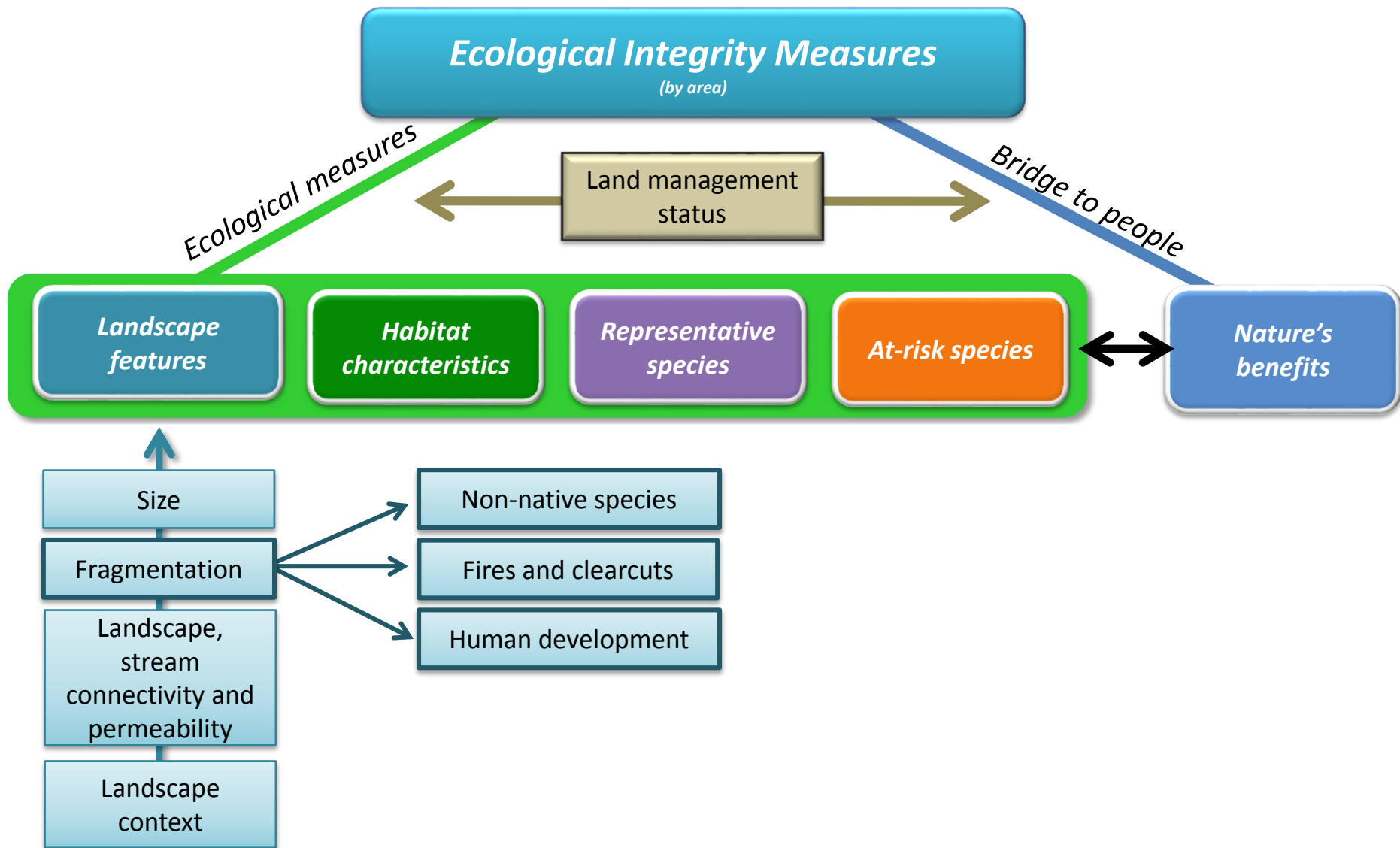
The challenge:

What is the simplest combination of measures that reveal the current condition of biodiversity and can demonstrate positive or negative change over time?

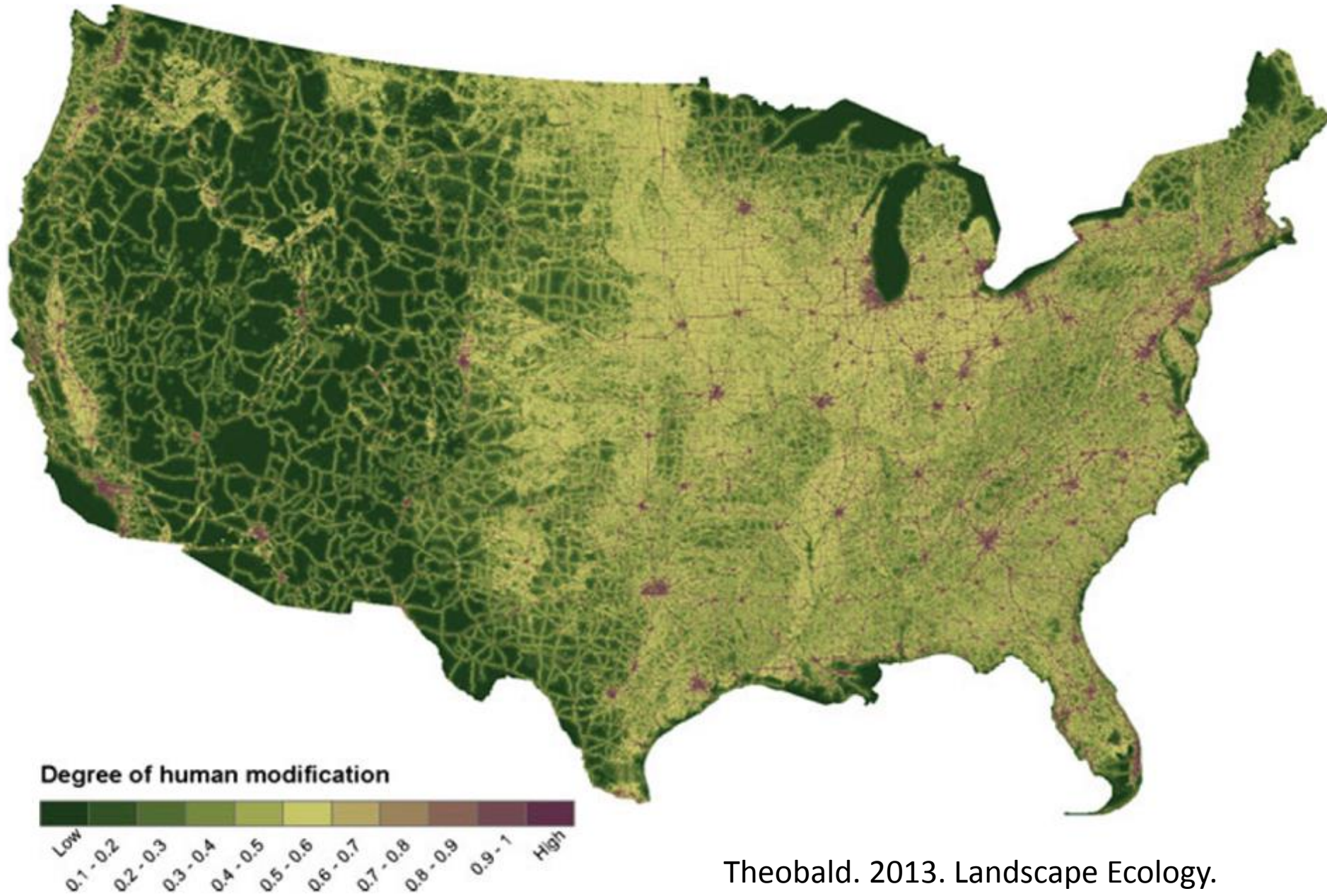


Characteristics / design criteria

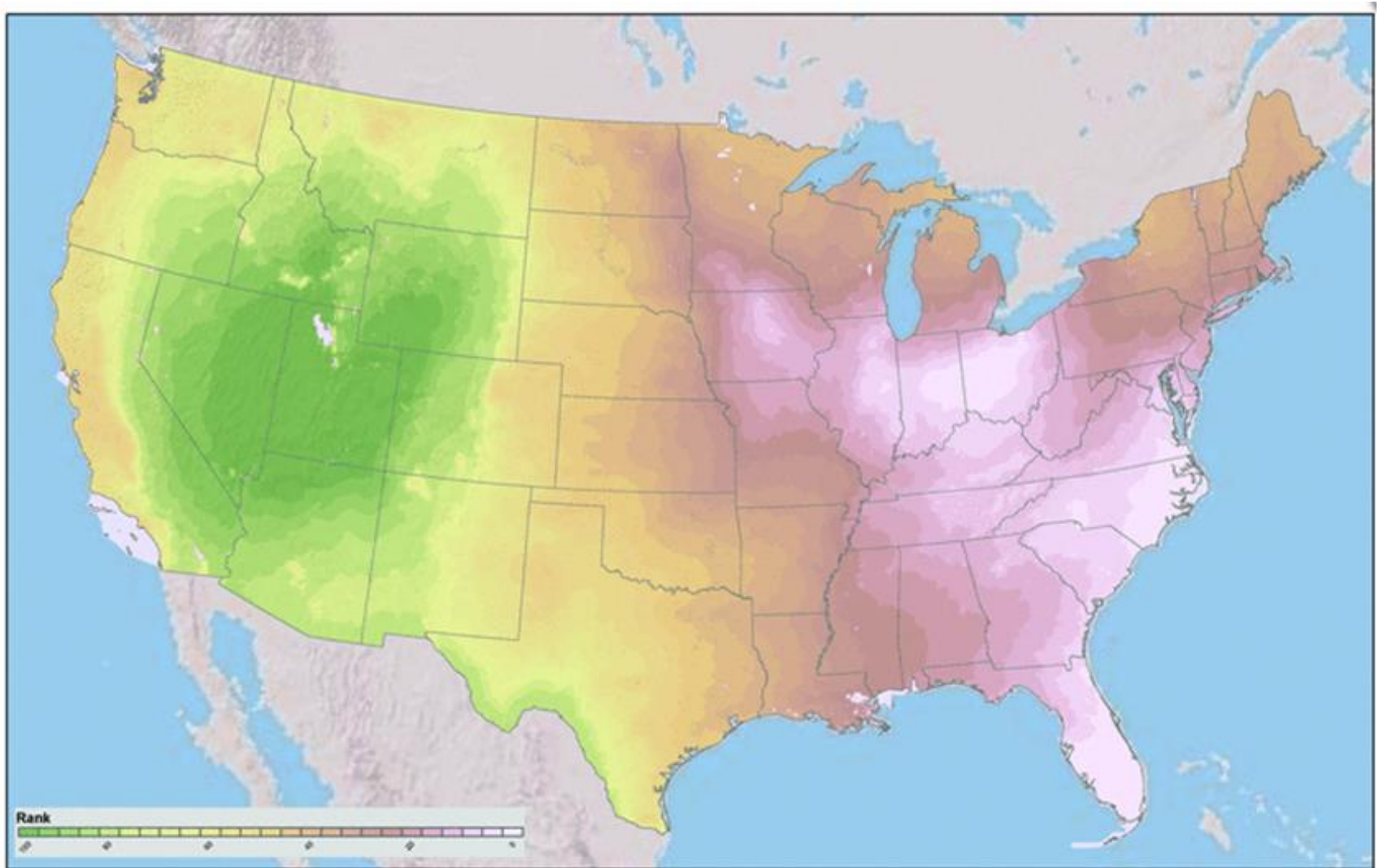
- Uses, enhances existing data
- Multiple spatial, temporal scales
- Repeatable, updatable, feasible, transparent
- Incorporates data from variety of sources



Human Modification Nationwide



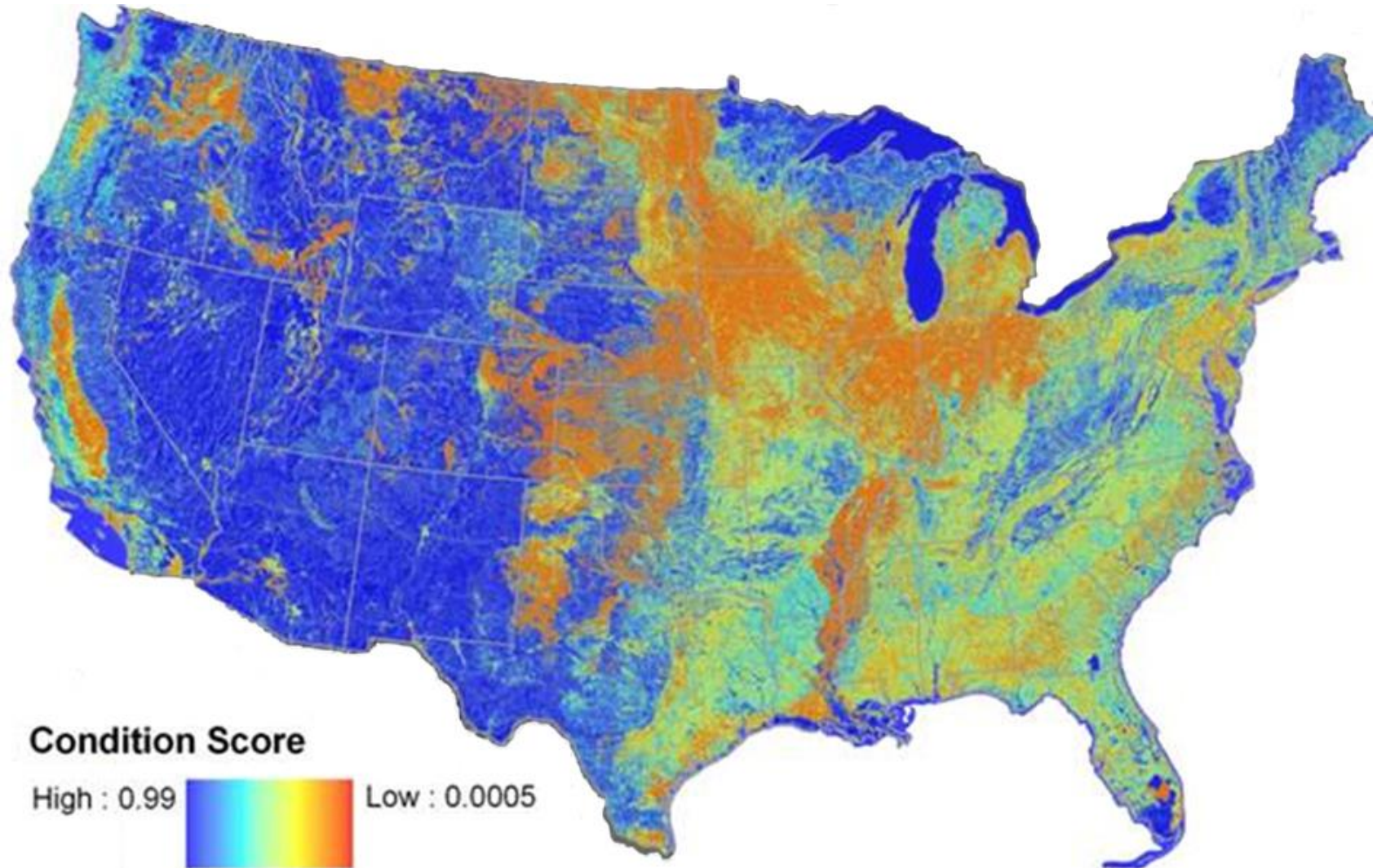
Landscape Permeability Nationwide



Theobald et al. 2012. Conservation Letters.

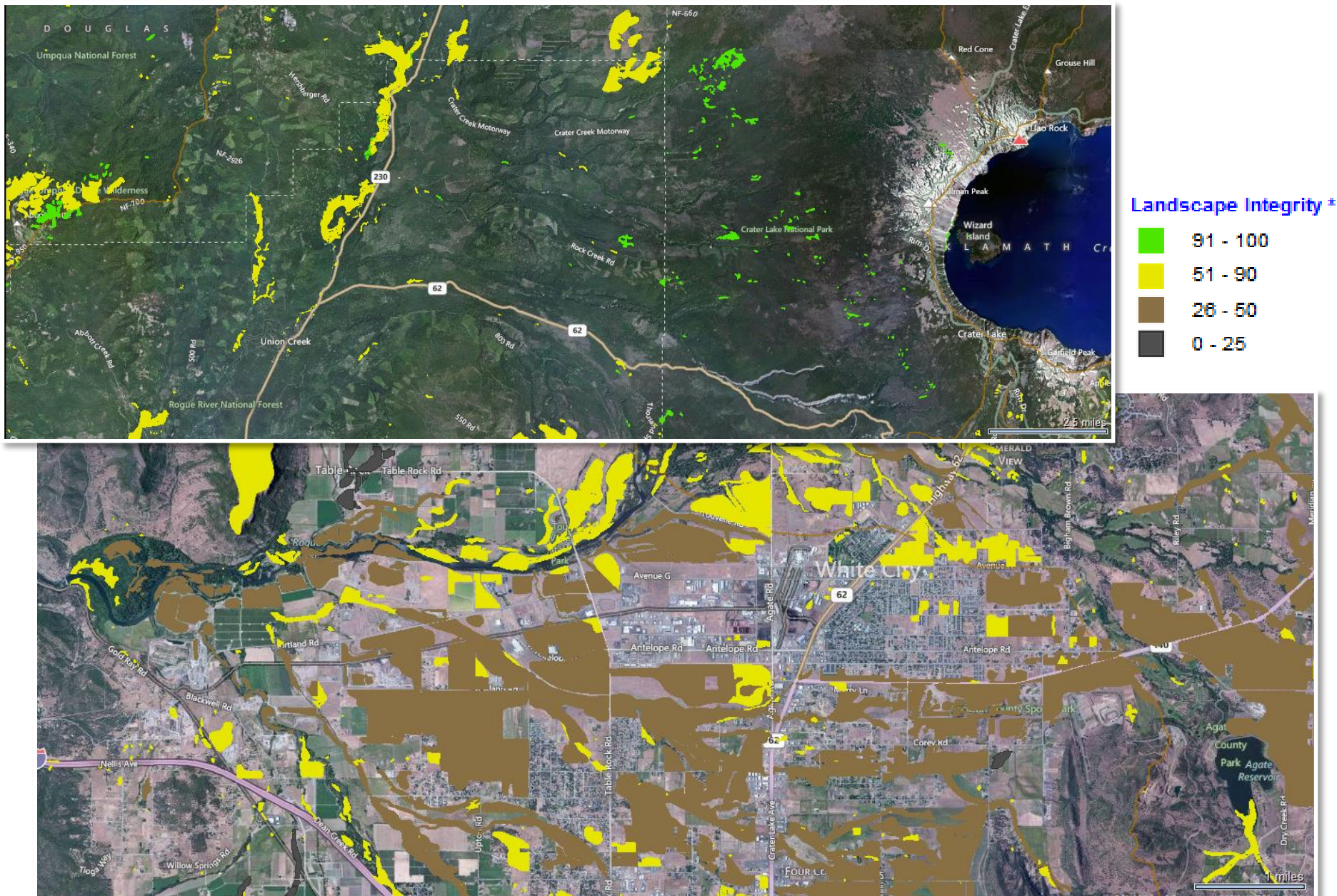
Landscape Context:

Connectivity, surrounding land use, patch size, and stressors



Comer, P. J. & J. Hak. 2014. Landscape Condition in the Conterminous United States. Spatial Model Summary. NatureServe, Boulder, CO.

Wetlands Landscape Integrity at Finer Scales



Ecological Integrity Measures

(by area)

Ecological measures

Land management
status

Bridge to people

Landscape
features

Habitat
characteristics

Representative
species

At-risk species

Nature's
benefits

Size

Fragmentation

Landscape,
stream
connectivity and
permeability

Landscape
context

Type and
importance

Condition and
vulnerability
(riparian or forest
structure, water
chemistry, cover)

Biotic composition
(native, invasive,
noxious)

Key processes
(fire, hydrology, flood,
nutrients)

Forest structure

Size of trees

Snags

Down wood

Tree cover

Gradient Nearest Neighbor Structure Maps



LEMM A



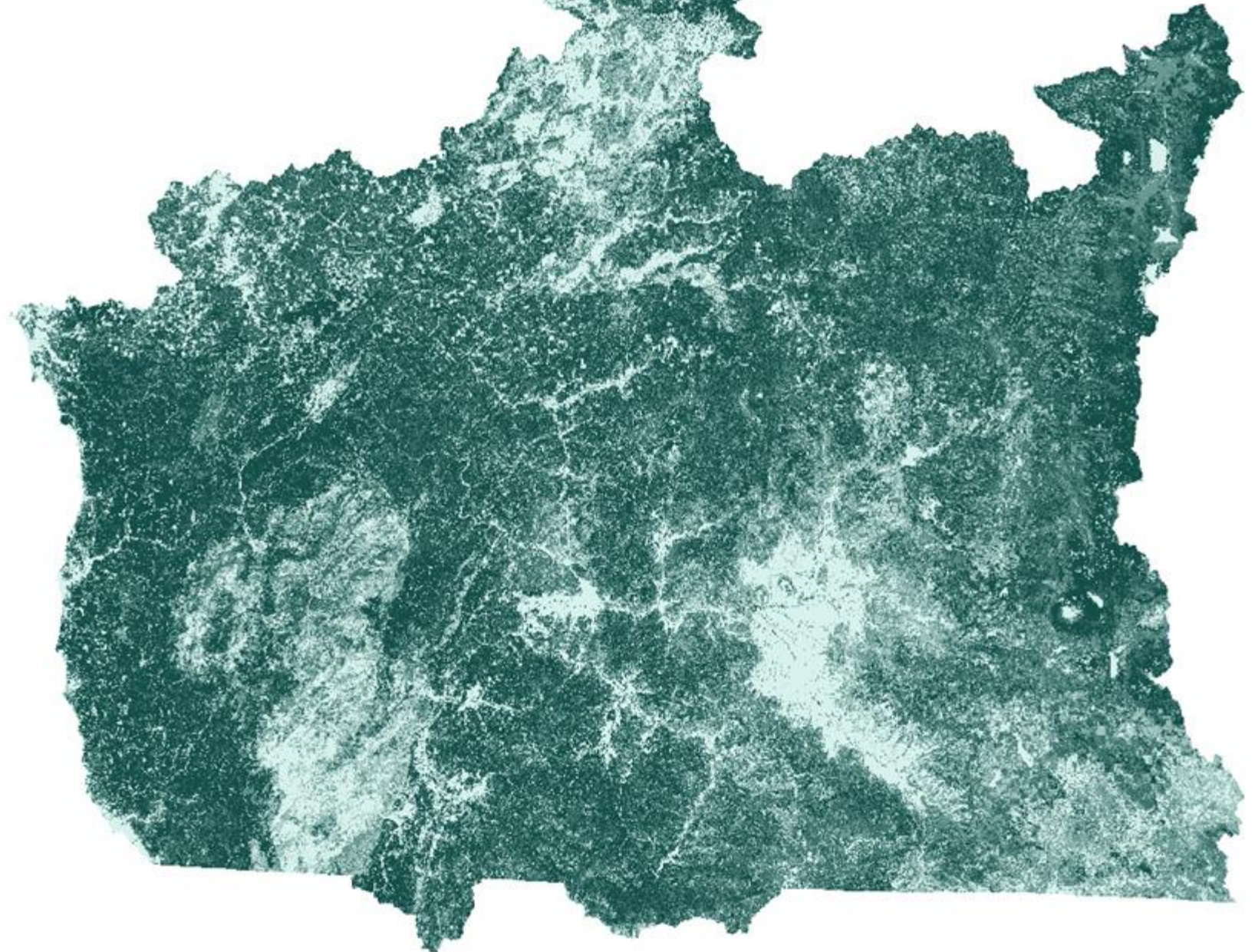
Landscape Ecology, Modeling,
Mapping & Analysis

- Research Projects
- Methods
- Download Maps and Data
- Publications and Reports
- About Us

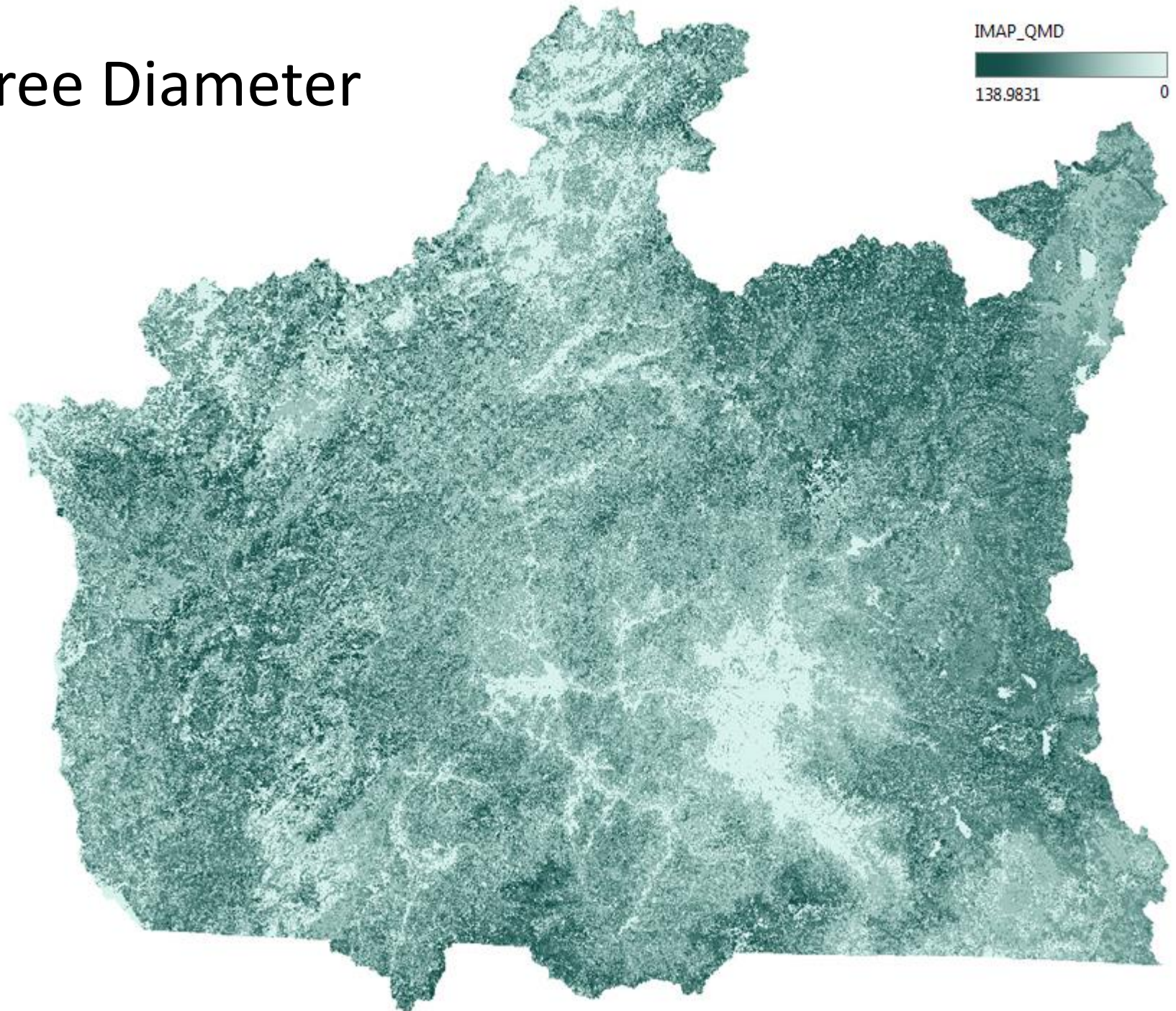
A collaborative research group of the
USFS Pacific Northwest Research Station
and Oregon State University



Forest Canopy Cover



Tree Diameter



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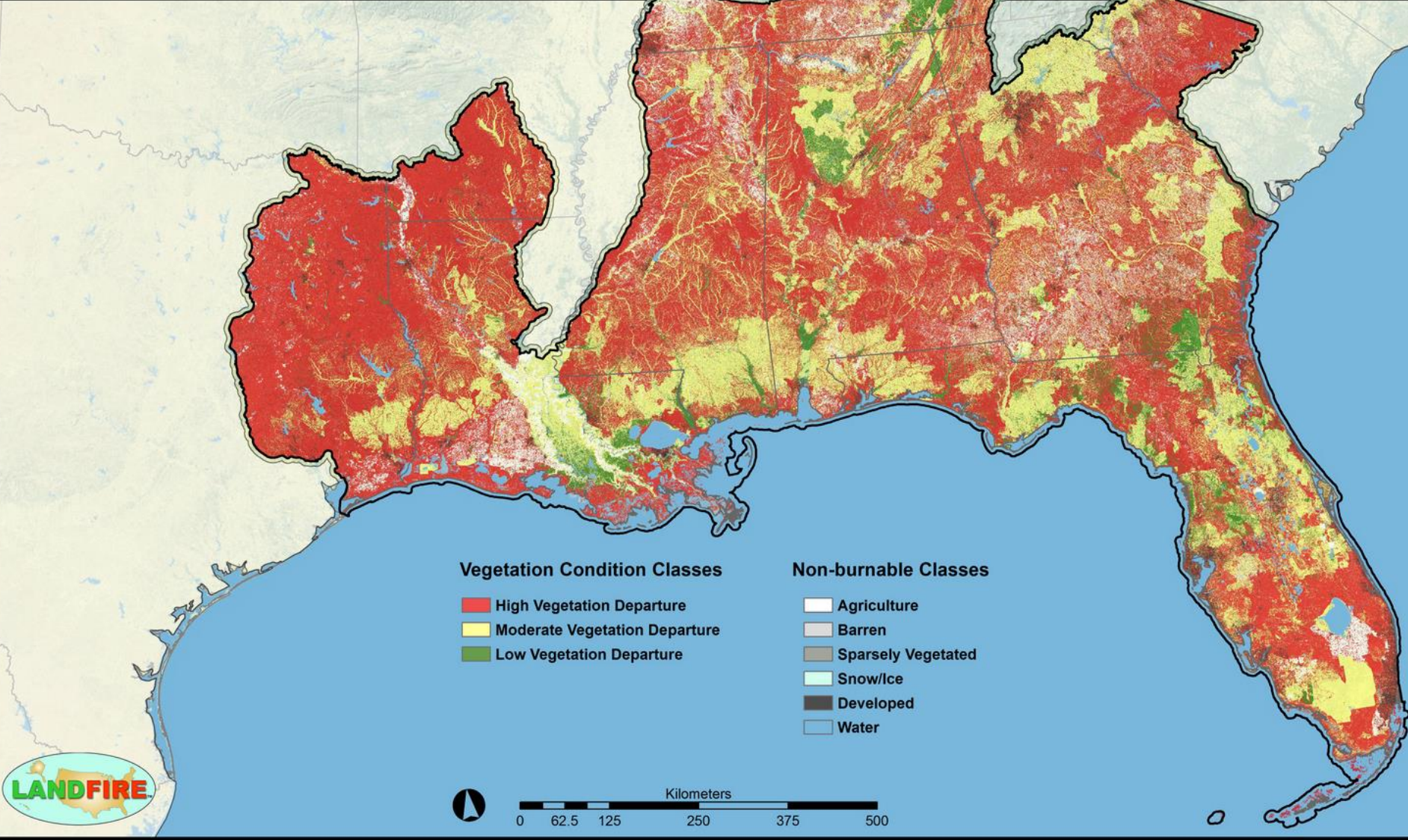
Fire

% Stand replacement
fires

Fire Risk

Vegetation departure

LANDFIRE 2008 Refresh Updates: Vegetation Condition Classes for the Southeast



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Unique native
species

Vertebrates
species status

Vascular plant
species status

Large
concentrations
(migrations, flyway
stopovers)

Keystone species

Animal distribution
presence or absence

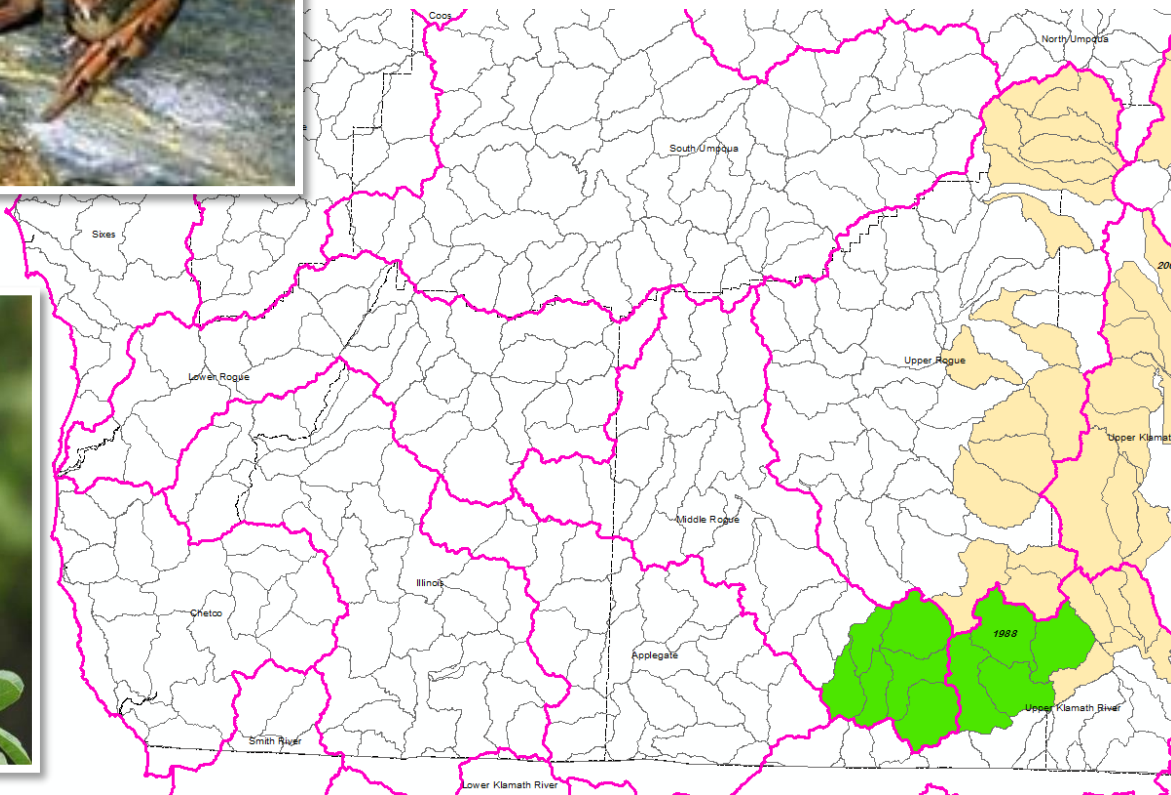
Amount of good
habitat

Plant distribution
presence or absence

Amount of good
habitat

Presence or Absence

Oregon Spotted Frog (*Rana pretiosa*)

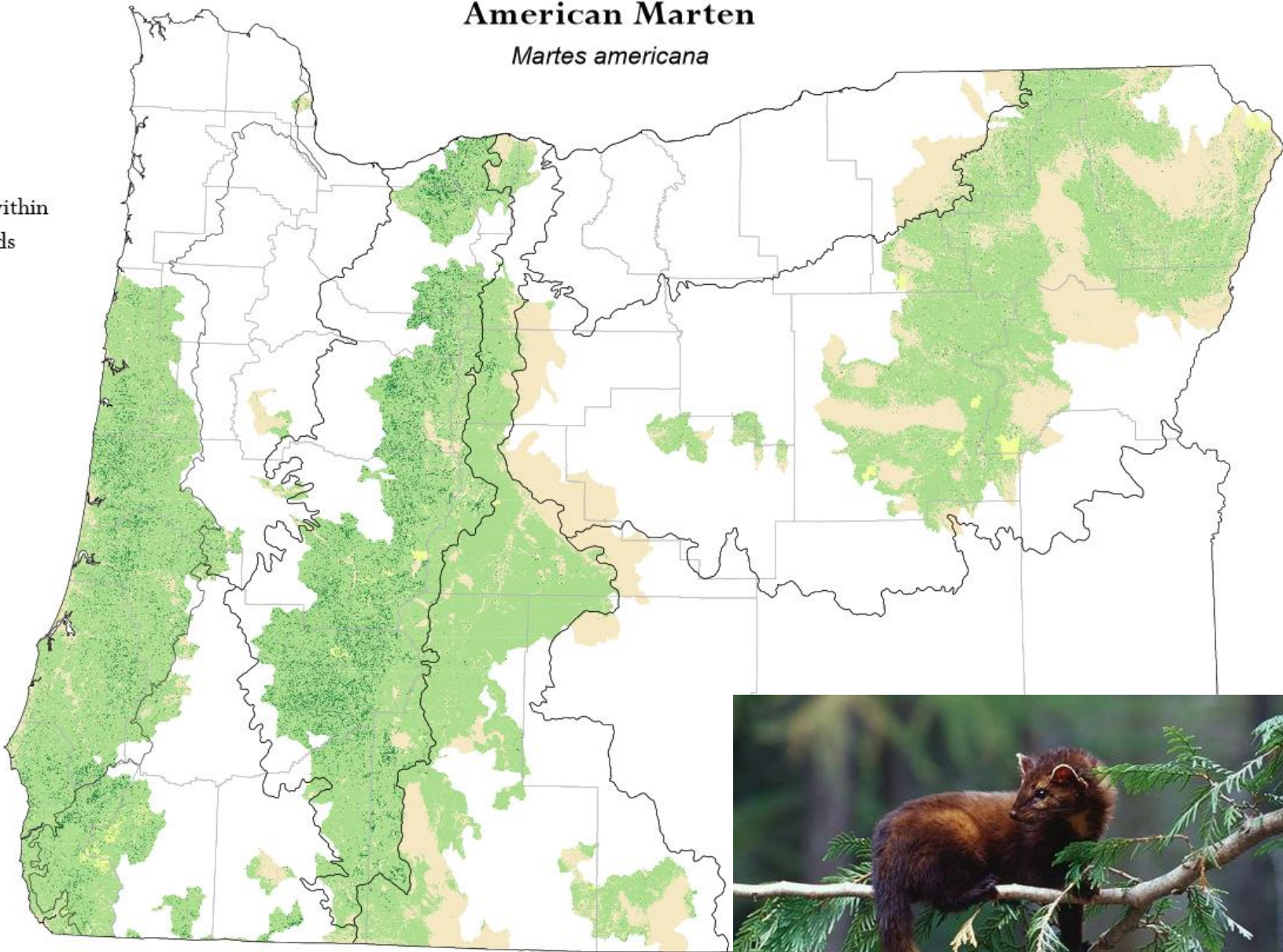


American Marten

Martes americana

Predicted habitat within
occupied watersheds

- None
 - Poor
 - Fair
 - Good
- Ecoregional
boundaries
- County
boundaries



0 50 100 Miles
0 80 160 Kilometers



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Relative rarity

Population size
and vulnerability

Support systems
(pollinators,
prey, etc.)

Type and
intensity of
threats

Population size

Annual variance in
population size

Adjacent threats

Threat immanence

Habitat quality

Why Do We Need This?

How Do We Use This Information?

- Inform state-and-transition models used to evaluate alternatives in various plans,
- Develop information needed to evaluate impacts of climate change,
- Help identify restoration priorities,
- To measure biodiversity related ecosystem services and to evaluate change over time.

How Does It Get Done?

- Assign agency staff to integration efforts
- Create a climate where success requires interaction
- Offer incentives for cross-jurisdictional management



Prioritize integration, enhancement of critical baseline data

- Human footprint (roads, power lines),
- Aquatic features (rivers, streams),
- Species (observational data, focal, invasive),
- Soils,
- Vegetation plots across agencies.

Allocate funding for data integration



Establish consistent protocols and standards for data collection, integration and analysis



Support citizen science programs

- Funding
- Tech support – repository for data – photo points
- Training





Questions?
Comments?

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