Science – Management Partnerships at the Landscape Scale: Learning From and Partnering With the USDA Forest Service

March 28, 2012

National Landscape Conservation Cooperative Workshop

Science – Management Partnerships at the Landscape Scale: Learning From and Partnering With the USDA Forest Service

12:45 The Basics: Monica Tomosy

Research and Development, Washington Office

12:50 Land Management: Greg Kujawa

Climate Change Advisor's Office, Washington Office

1:00 Science: Steve McNulty

Southern Research Station, Raleigh, NC

1:10 Collaboration: Bill Gould

International Institute of Tropical Forestry, San Juan, PR

1:20 Closing Remarks - Monica

1:25 Discussion

1:45 End

Basics: Organization of the USDA Forest Service: 4 "Mission Areas" (Deputy Chiefs)

US Department of Agriculture -
Undersecretary of "Natural Resources and the Environment": Harris Sherman
Chief of Forest Service: Tom Tidwell

Forest Service Deputy Chiefs:

- Research & Development – Jim Reaves
- State & Private Cooperative Forestry – Jim Hubbard
- National Forest System – Leslie Weldon
- International Programs – Val Mezainis

Field and Regional Organization of USFS

- National Forest System: 9 Regional Offices… 174 National Forests/Grasslands; Supervisors Offices…Ranger Districts (193M acres)
- Research/Development: Nearly 100 Labs, Institutes, and Research Units…80 Experimental Forest and Range Units…6 Research Stations (Regional Administration)
- State/Private: within 8 Regional Offices, plus the Northeast S/P Office (influence 200M acres)

Basis for USFS Collaboration with DOI on landscape science and management:

• Forest Service implements Secretary Vilsack's All-Lands philosophy and Landscape-scale Conservation (LSC) approach through various mechanisms.

•DOI and the USFS both embrace a landscape-scale approach to conservation in the face of a changing climate to provide conservation science that will support natural resource managers facing new and challenging decisions.

•Both also embrace the philosophy that landscape scale approaches need to consider all lands and multiple users, uses, management objectives, and partners.

•Risk of inefficiencies and missed opportunities otherwise.

What is LSC About?

- **Managing land** at the level of watersheds, eco-regions, or broad geographic areas….
- **Framing problems and solutions** at the landscape scale to provide for a comprehensive approach to multiple issues and as a basis for coordinating goals and actions of Forest Service units and programs with other landowners and land managers….
- **Providing flexibility** to see problems and risks at various scales and address them at the most appropriate, effective level.
- LSC requires **integration of existing stove-piped strategies** into a single overarching framework and a common toolbox and language.
- **Common ground** for those with a foot in both LSC and LCCs.
- **LCCs provide communication and resource leveraging mechanisms** among leaders of any landscape scale efforts.

What is the formal relationship of USFS with LCCs?

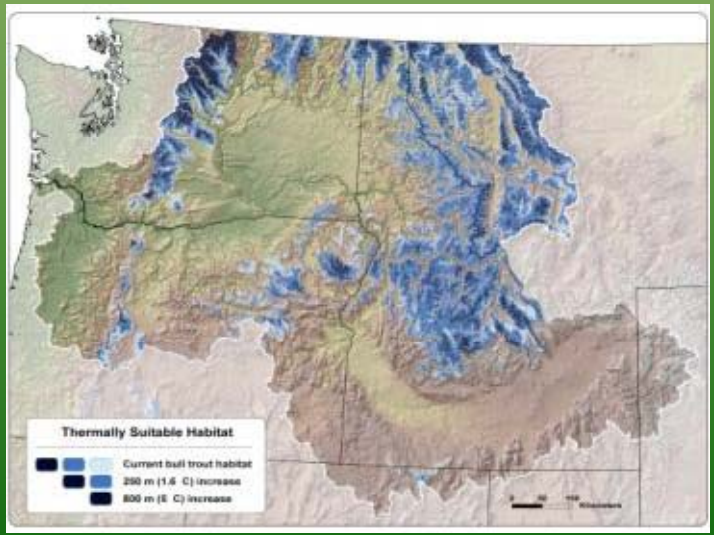
- USFS reps on 21 Steering Committees
- USFS reps on most Science Sub-Committees
- Each Station and each Regional Office has LCC and CSC Points of Contact LCCs in each regional area
- Communication and Coordination between USFWS W.O. LCC leaders and USFS W.O. Liaison LCCs

What is the formal relationship of USFS with CSCs?

- NCCWSC and W.O. R/D coordination between Liaison to the USGS National Climate Change and Wildlife Science Center and NCCWSC Partnership/Policy Coordinator.
- CSCs: Communication and Coordination takes place between USFS Research Station Managers and CSC Directors. USFS has positions on Stakeholder Advisory Committees, comment on Science Plans.
- Collaborative aquatic ecology projects in NW and SE.

Contribution of USFS to LCCs

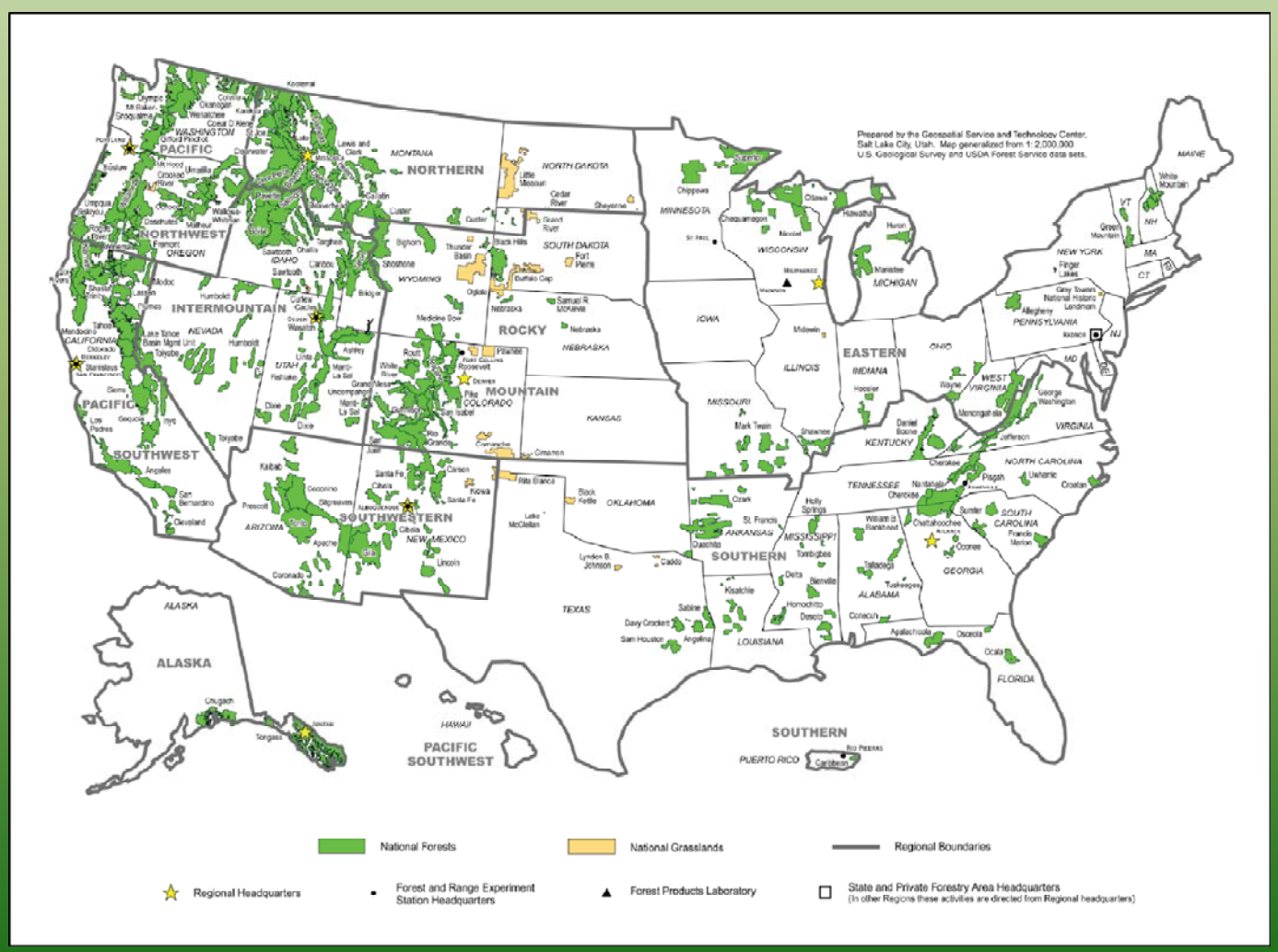
- USFS employees that have scientific background and experience in analysis of complex ecosystems and their management will be able to help improve ecosystem management efforts at scales extending beyond FS boundaries.
- Inclusion of USFS expertise to LCCs would benefit large-scale complex ecosystem management.



Forest Service Land Management – Landscape Scale Conservation - Greg Kujawa

- Does the FS view land management from a perspective beyond national forest boundaries? Yes, and we're getting better.
- How?
  - Through management of public lands…
    - National Forest System policies and programs: Planning Rule, Climate Change Scorecard, Collaborative Forest Landscape Restoration Program.
  - Support to private forest lands…
    - State and Private Forestry: Forest Legacy Program, Forest Stewardship Programs
  - Improving delivery of natural resource information
    - Inventory, Monitoring and Assessment Strategy.

Forest Service Land Management Units

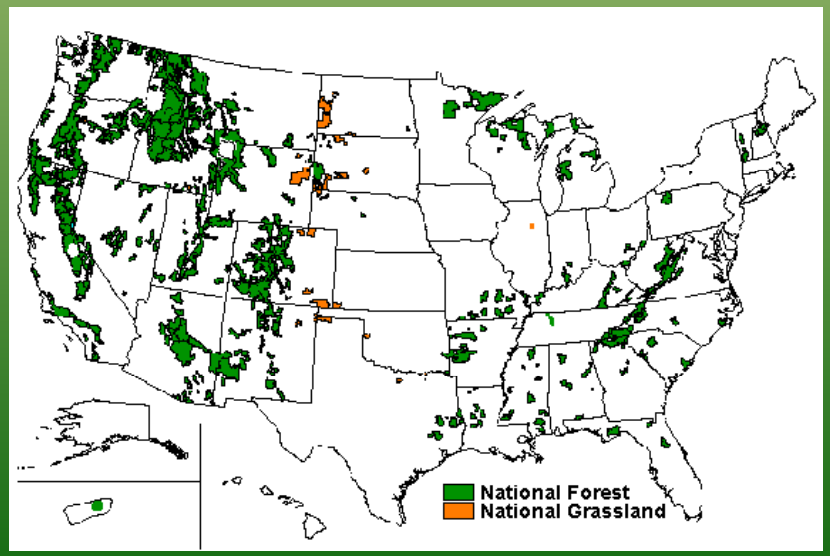


Forest Service Land Management – Landscape Scale Conservation

- How is the FS employing an adaptive management approach?
  - National Level: New Planning Rule establishes an **iterative planning process** for each land management plan (LMP).
  - Individual LMPs guide integrated resource management and allow National Forest System lands to **adapt to changing conditions, including climate change**.
  - Inventory, Monitoring and Assessment Strategy **supports adaptive management** by improving delivery of priority information to decision makers.

NFS – New Planning Rule

- Each unit of the 193-million acre National Forest System requires a land management plan.
- New Planning Rule provides the process or framework to guide development, amendment and revision of those land management plans.
- This framework provides a more efficient and <u>adaptive process</u> for land management planning, allowing the Forest Service to respond to changing conditions.



NFS – New Planning Rule

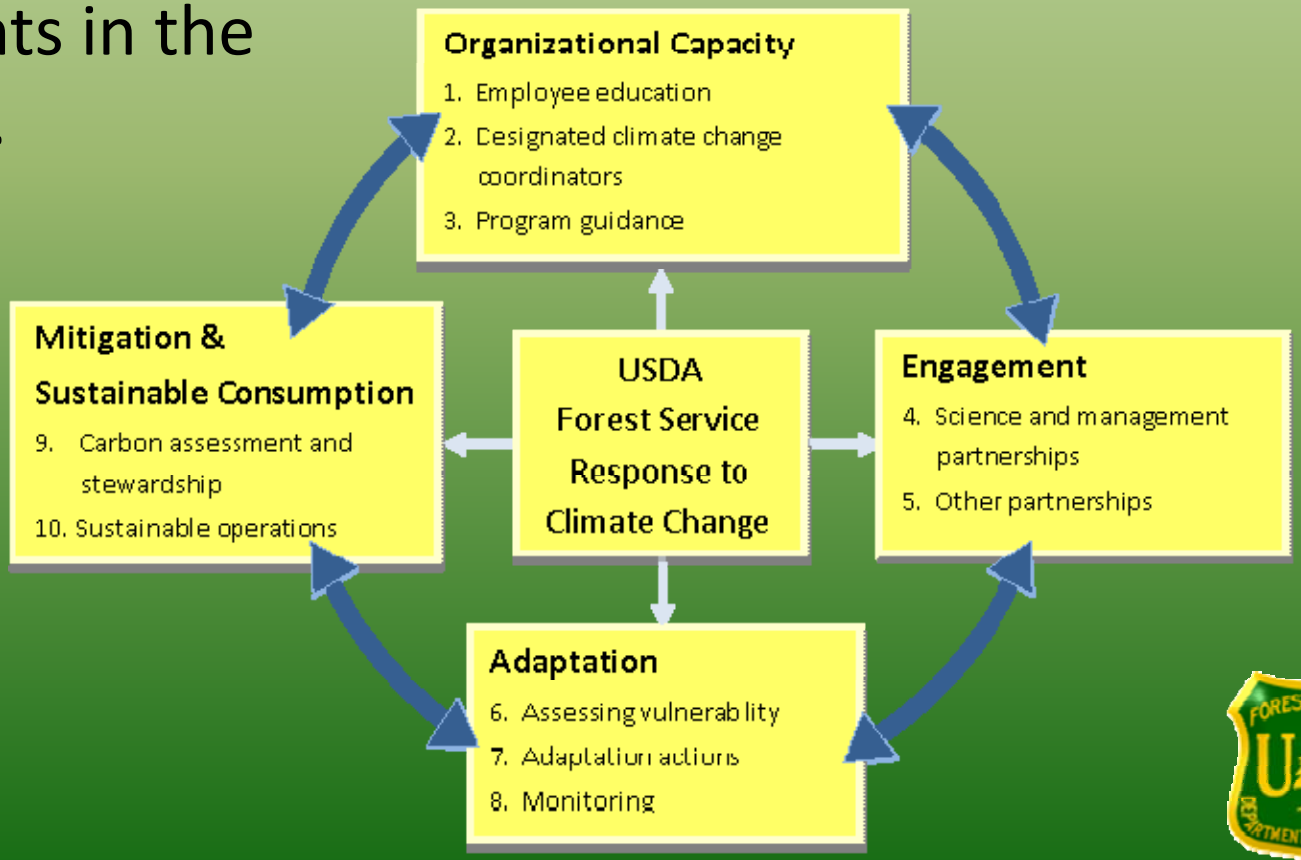
- Requires use of best available scientific information to inform decisions.
- Considers landscape condition and future vs. just the "Forest footprint".
- Emphasizes collaboration and strengthens the role of public involvement and dialogue throughout the planning process.
- Planning Rule preferred alternative was developed through the most collaborative rulemaking effort in Agency history.
- A final decision was signed by the NRE Undersecretary of Agriculture last week.

FS Response to Climate Change

- Leadership commitment at all levels: National, Regional, and Reporting Unit (national forest/grassland)
- Organizational adaptability
- Rapid science-to-action cycle
- Management systems for multiple stressors/values
- Landscape scale coalitions
- **<u>Balanced performance-based approach: Climate Change Scorecard</u>**

Climate Change Scorecard

- Helps implement the National Roadmap for Responding to Climate Change.
- 10 elements in the Scorecard.



NFS Collaborative Forest Landscape Restoration Program (CFLRP)

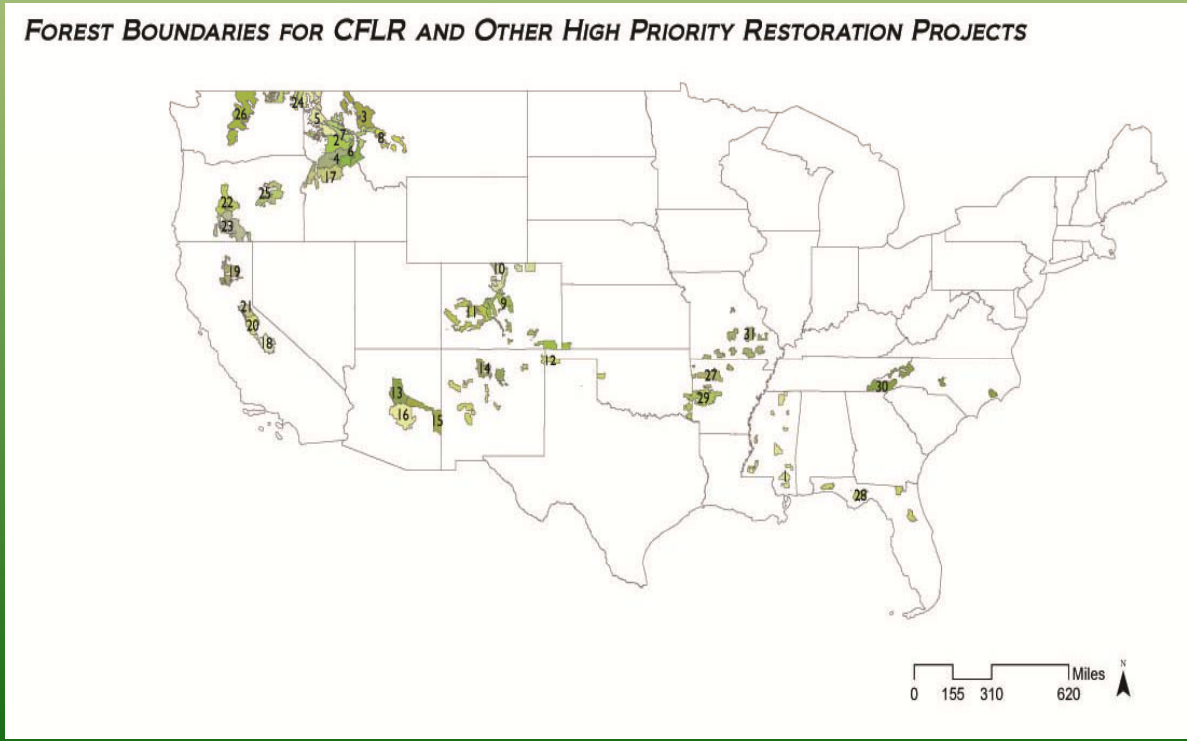
- Purpose of the CFLR Program
  - Encourage collaborative, science-based ecosystem restoration of priority forest landscapes.
- Scope of projects
  - Reduce risk of uncharacteristic wildfire;
  - Improve fish and wildlife habitat, including for TES species;
  - Maintain, improve water quality and watershed function;
  - Treat invasive species;
  - Maintain, decommission, and rehabilitate roads and trails;
  - Use woody biomass and small-diameter trees produced from projects implementing the strategy.

CFLRP - Collaboration Requirements

- Projects are to be developed and implemented through a collaborative process that:
  - Includes multiple interested persons representing diverse interests; and
  - Is transparent and nonexclusive; or
  - Meets the requirements for a resource advisory committee.

CFLRP - Current Projects

- 20 CFLR projects have been funded to-date. In addition, the Secretary has identified 3 other high priority restoration projects to be funded outside of CFLR.



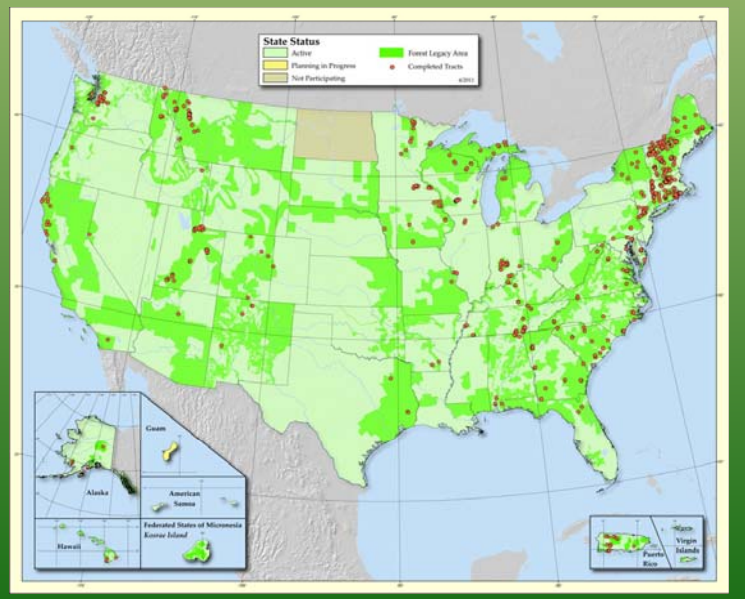
CFLRP – Selected Accomplishments in FY2011

- 38 miles of stream habitat restored or enhanced
- 167,263 acres of terrestrial habitat enhanced
- 20,561 acres of forest vegetation improved
- 77,133 acres of wildland-urban interface (WUI) high-priority hazardous fuels treated.

S&PF - Forest Legacy Program

- Protects Private Forest Lands From Conversion to Non-Forest Uses
  - Federal program in partnership with States,
  - Supports State efforts to protect environmentally sensitive forest lands and carry out their forest conservation plans.

- Is entirely voluntary.
  - Most conservation easements restrict development, require sustainable forestry practices, and protect other values.



S&PF - Forest Stewardship Program

- Helps private forest landowners develop plans for sustainable management of their forest.
  - Stewardship Plans lay out strategies for achieving unique landowner objectives and sustaining forest health and vigor.
  - Actively managed forests provide ecosystem services such as timber, wildlife habitat, watershed protection, recreational opportunities and many other benefits for landowners and society.

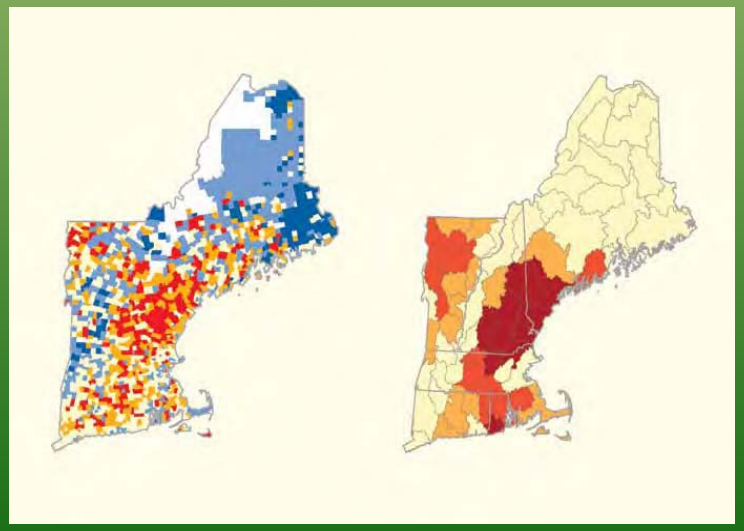
S&PF - Forest Stewardship Program

- Since its establishment in 1991, the FSP has produced more than 340,000 multi-resource management plans encompassing more than 31 million acres of nonindustrial private forest land.
- Program delivery is focused on Priority Forest Resource Areas as defined by the states in their State Forest Action Plans.

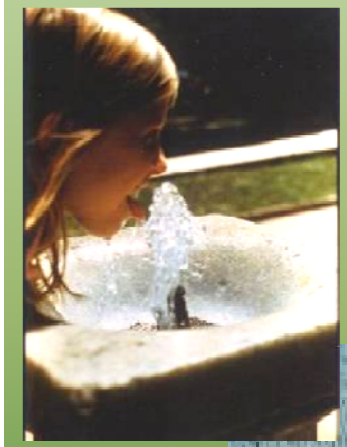
Open Space Conservation Strategy

- Cooperating across landscapes to sustain working and natural landscapes.
- USFS efforts complement FWS's Strategic Habitat Conservation approach, FHWA's Eco-Logical Initiative, and DoD's Sustainable Ranges Initiative.
- Four Objectives….

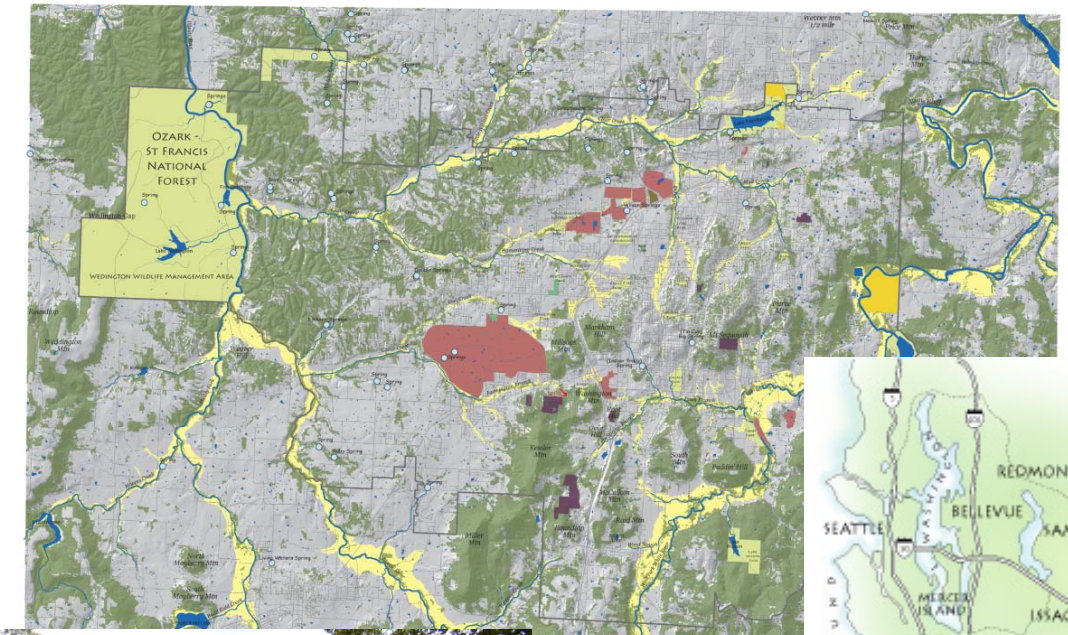
Convene partners to identify and protect priority open space



Promote national policies and markets to help private land owners conserve open space



Provide resources and tools to help communities expand and connect open spaces



Participate in community growth planning to reduce ecological impacts and wildfire risks

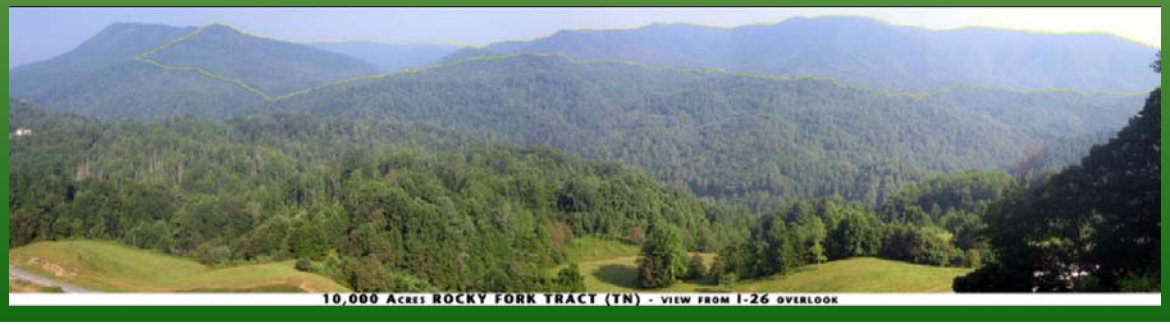
Priority lands to be conserved	Land adjustments and land acquisitions	Zoning issues
Subdivision and housing development	Urban growth	Transportation
Fire control	Utility locations, river setbacks	School locations

IM&A Strategy

- Goal 1: Ensure that all IM&A activities are comprehensive and inclusive.
- Goal 2: Support effective decision-making by providing credible information.
- Goal 3: Ensure that IM&A activities are responsive and adaptive to change.

Forest Service Science for Landscape-Scale Conservation – Steve McNulty

- LSC means recognizing and blending scientific findings, managerial experience, and systematic monitoring to anticipate and respond to changing risks and opportunities. KN1
- And, utilizing a decision framework within which scientific questions will be developed and answers applied via risk management.
- Scientists across the country offer nationally applicable approaches to LSC.



Slide 30

KN1 I think this slide can go nothing here that isn't in slide 32
Keith N, 3/21/2012

Forest Service Science for All Land Managers

- The Questions are land management driven.
- The Science is delivered to managers.
- Development, training, use of decision science; decision support tools, techniques for risk management, adaptive management.
- Broad diversity of expertise (species, ecosystems, social science, complexity of management challenges)
- Highly productive: 500 scientists, 3000 peer reviewed pubs last year.

USFS R&D Research Conservation Relevance

- Specialization: (examples)

- Center for Forest Mycology,
- Starkey Project (rangeland, ungulates)
- Grassland, Shrubland, Desert Program (sage grouse habitat)

- Interdisciplinary: (examples)

- Center for Research on Ecosystem Change
- Eastern and Western Threat Assessment Centers
- National Agroforestry Center

- 900 University Partners: co-located, co-appointments using easy contract/grant processes

USFS Science - Flagships

- Experimental Forests and Ranges (EFRs)

Replicated stand-scale manipulations over long time scales (going by to 1934), driven by management questions.

Nationally 82 EFRs in 32 Ecosystem types

- Forest Inventory and Analysis (FIA)

The Nation's forest inventory

Continually incorporating new data relevant to conservation and management

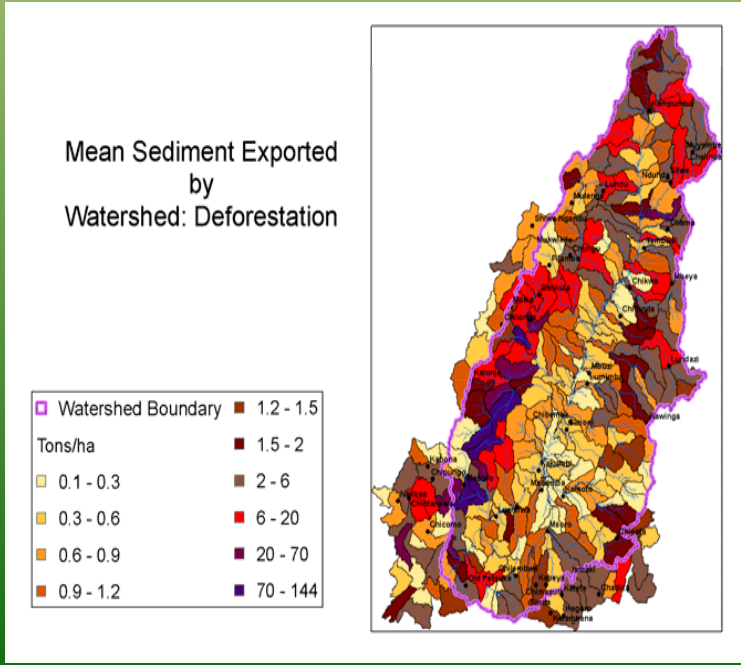
- Data from these and other long-term studies:

Empirically document change at the landscape level

Provide critical parameter estimates and validation tests for models associated with climate and landscape change

USFS Science

- And yes, USFS conducts research in every U.S. ecosystem, even where there are no National Forests or Grasslands Units!…Including Hawaii and Alaska, even the Arctic.
- USFS International Programs Office supports research all over the world.



Key landscape conservation issues for science coordination (FS focus areas):

- Water flow and temperature regimes
- Ecosystem carbon sequestration
- Fire risk, frequency, magnitude
- Invasive species
- Habitat connectivity
- Complex interactions among these factors
- Values of, and impacts to society, particularly Native American and Urban communities.

Science for Landscape-Scale Conservation: USFS Approaches

- **Employing a Decision Framework:** Problem Structuring…Problem Analysis…Decision Point…Implementation and Monitoring…Adapt.
- **Thinking "Risk Management":** values at risk, relative vulnerabilities, balancing risk reduction across multiple risks and costs.
- **Climate Change Adaptation Guidebook:**

  1. Review - become aware of basic climate change science and integrate that understanding with knowledge of local resource conditions and issues,

  2. Rank - evaluate sensitivity of specific natural resources to climate change,

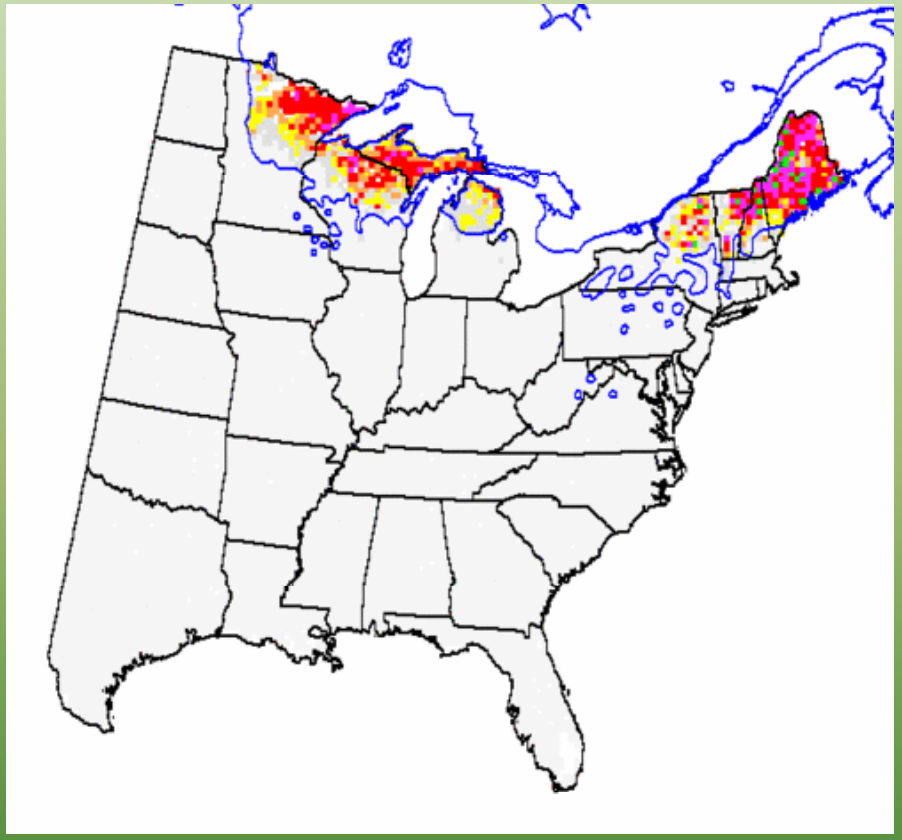
  3. Resolve develop and implement strategic and tactical options for adapting resources to climate change,

  4. Observe - monitor the effectiveness of adaptation options, learn, and adjust management as needed.
- Explicit learning by doing (**adaptive management**)
- **It's about Sustainability: Maintain and Restore for** future ecological function, vs. past structure and composition.

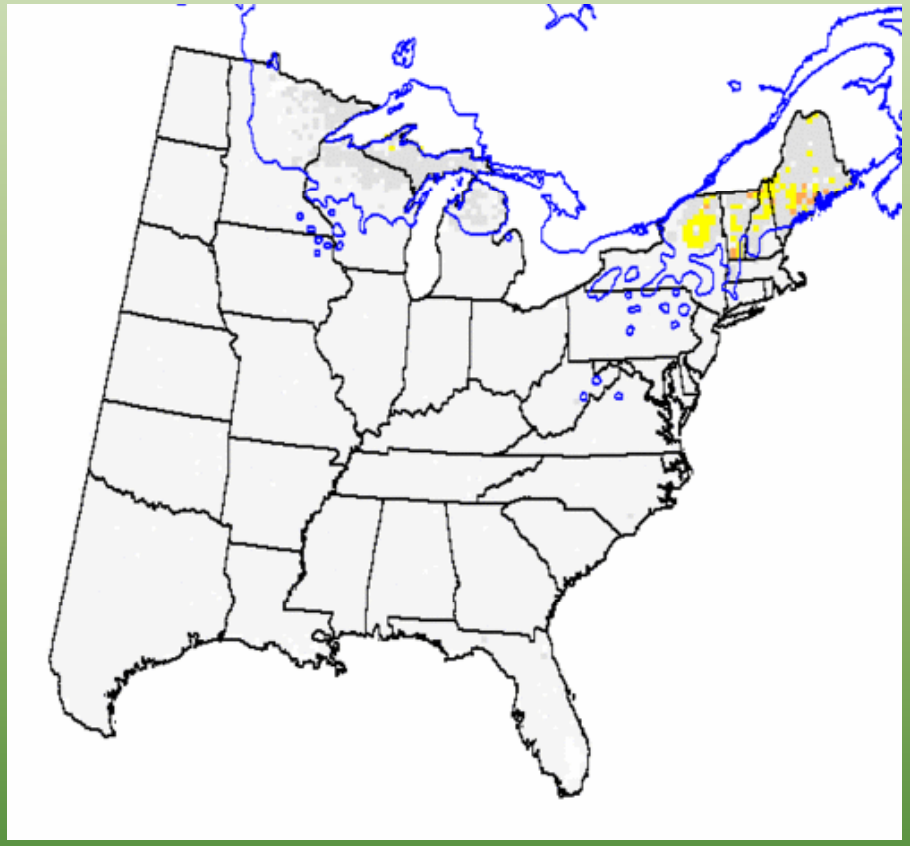
USFS Science at the Landscape Level

- Conduct long-term research at landscape scales that integrates forest ecology and management
- Multidisciplinary research work units and programs
- Some examples…

Iverson et al – Climate Change Atlas
- Predicted changes in tree species and forest type distribution



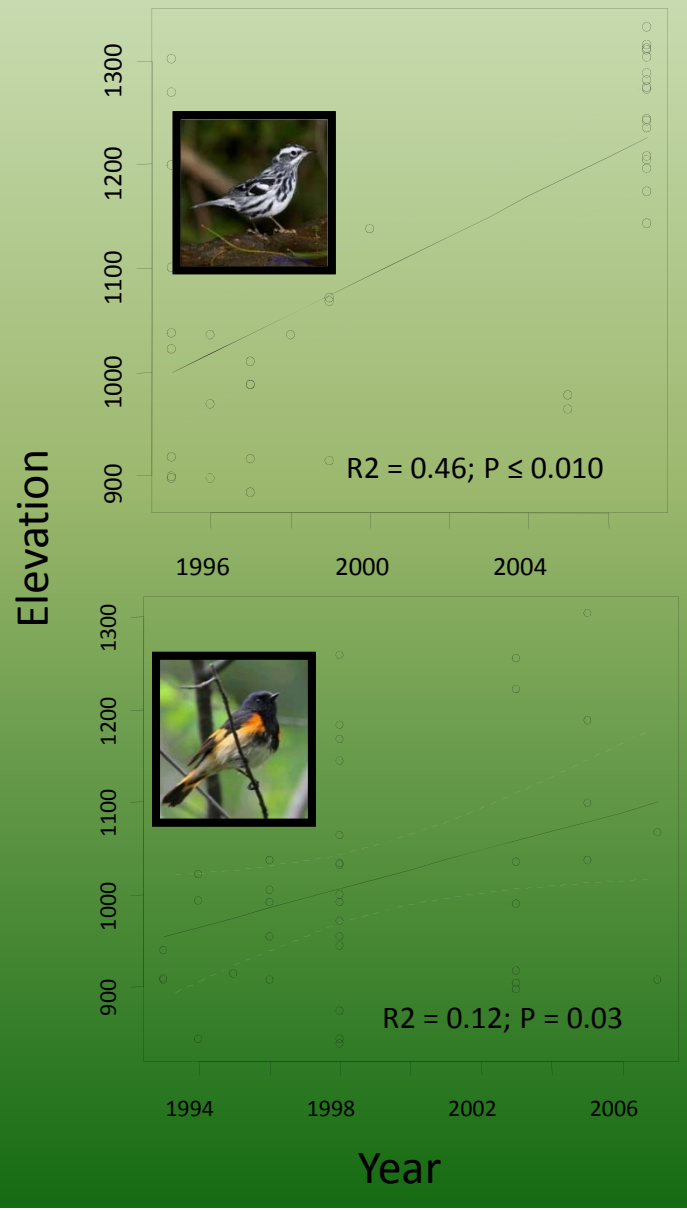
Current balsam fir distribution

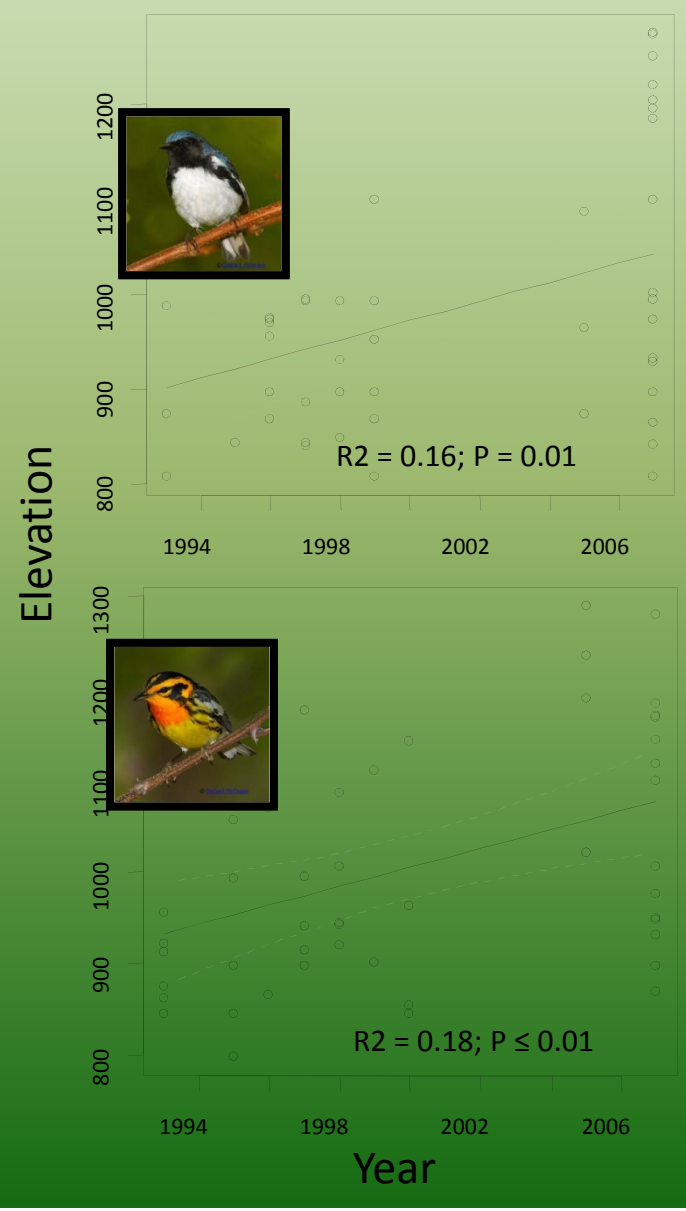


Predicted under Hadley high CC

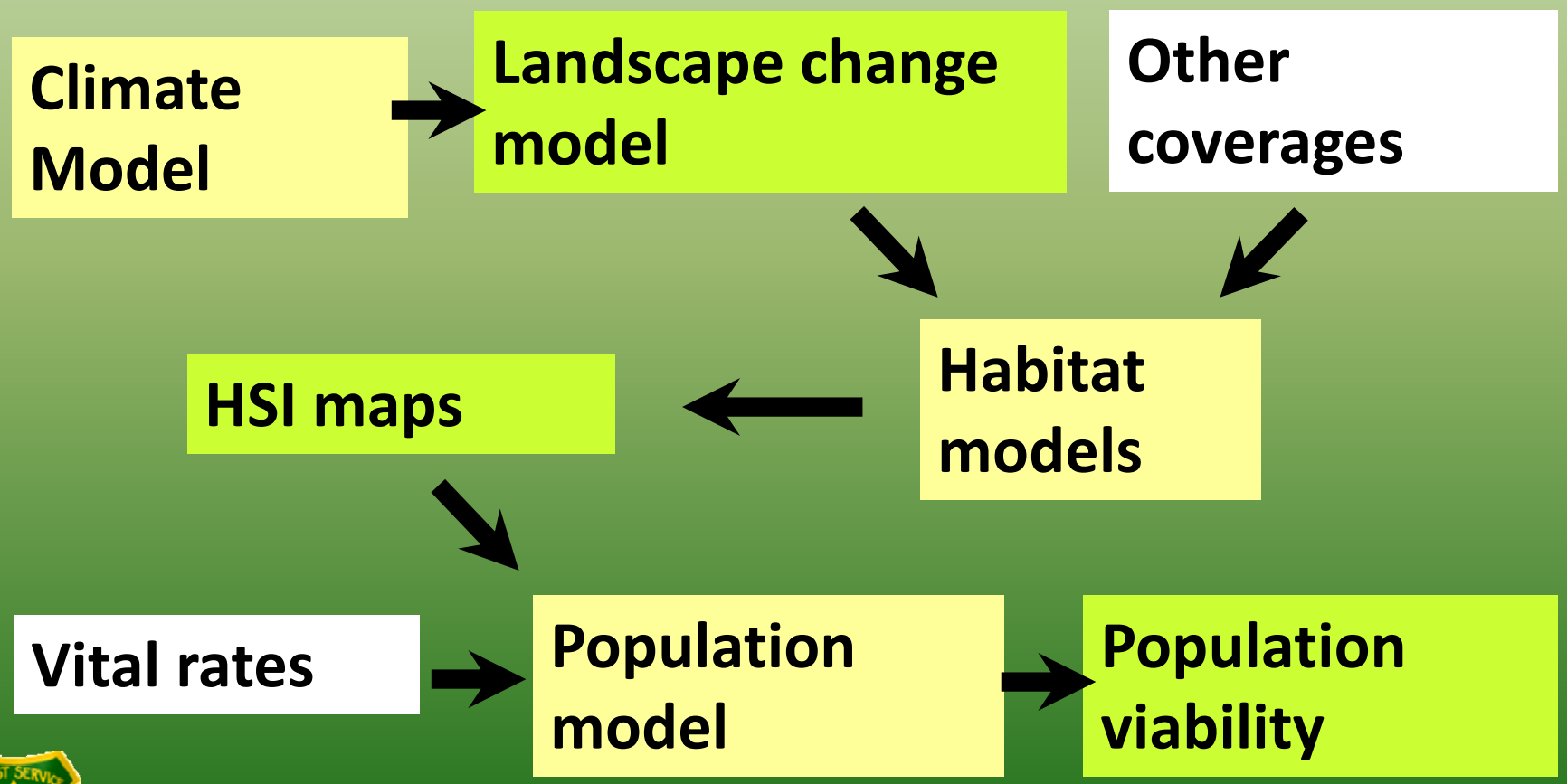
Spruce-fir forests - essentially gone from the NE/NC region
What will this mean?

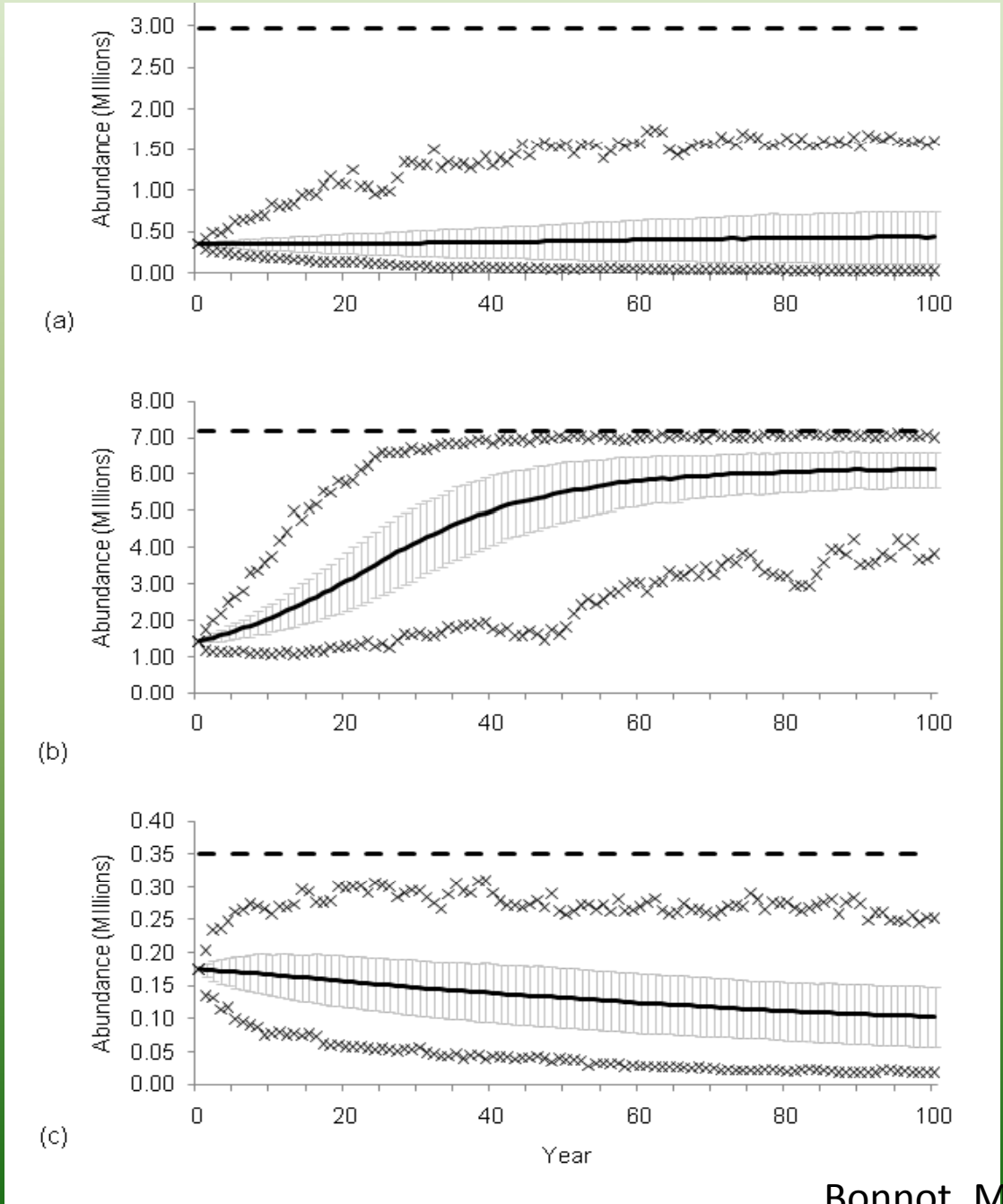
Lower elevation species shifting upwards





Linking climate and landscape change models with spatially explicit habitat and population models to understand impacts on fish and wildlife (Thompson, Millspaugh, NRS-UMO) - began in 2008

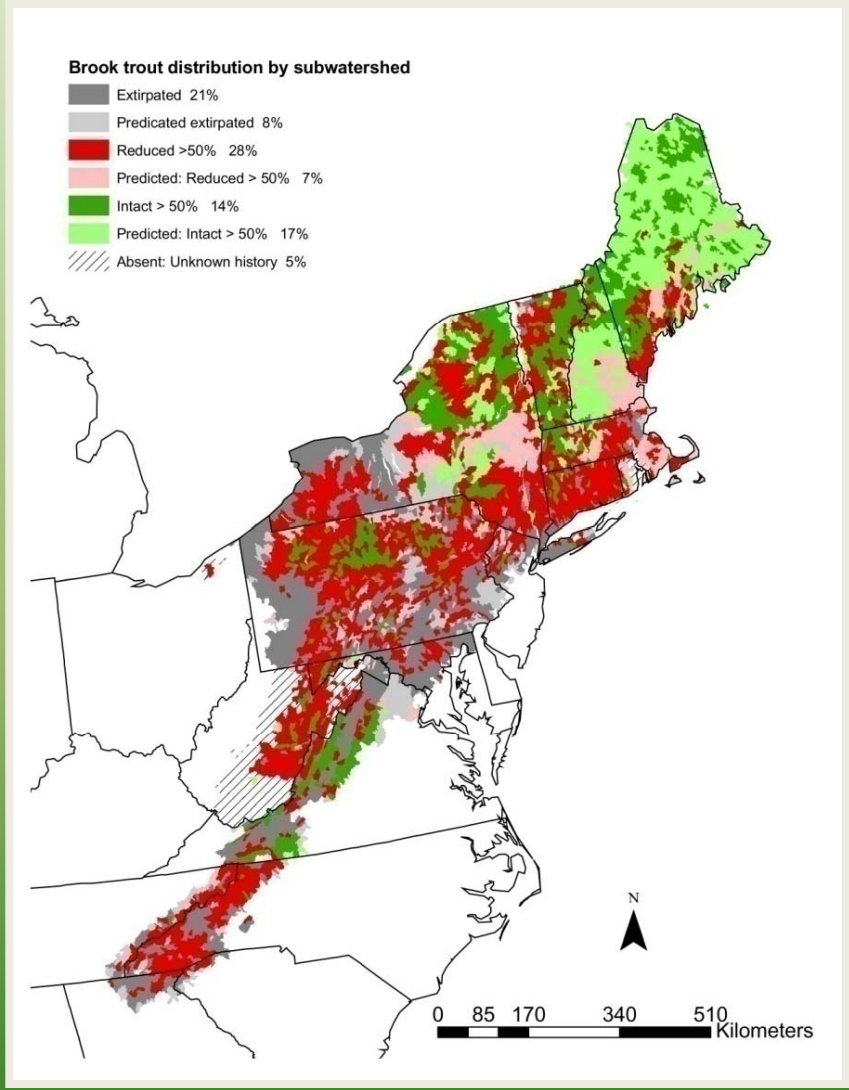




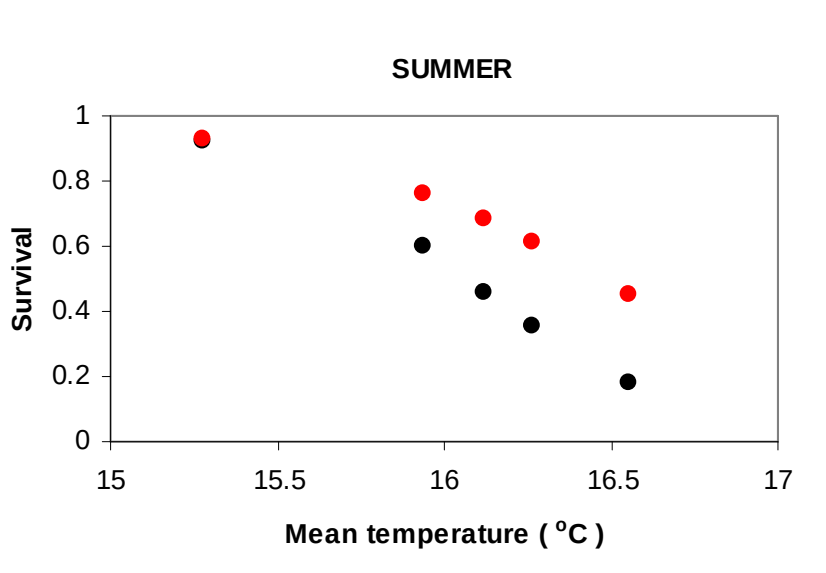
Bonnot, Millspaugh, & Thompson

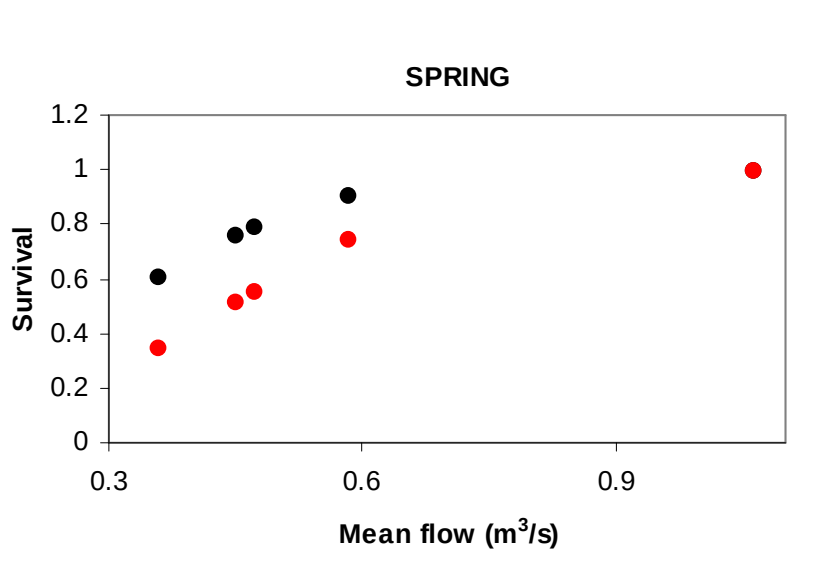
What will climate change mean for brook trout distribution, abundance, and resource quality? Which populations are likely to persist?

Brook trout still found throughout their historic range but have been extirpated from 90% of their historic catchments

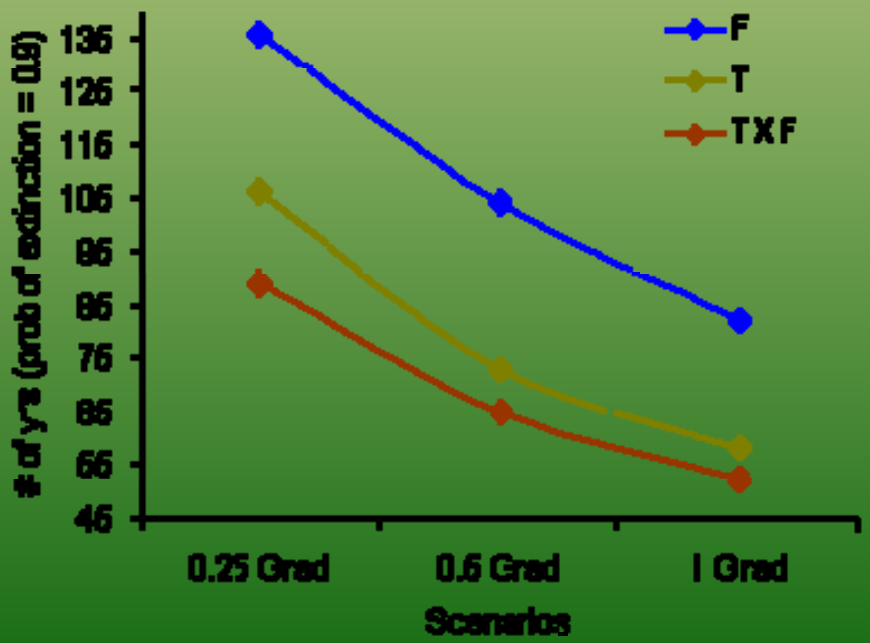


Hudy et al. 2009





Climate Change = Lower Flows + Higher Temps = lower survival+ lower fecundity (lower growth)

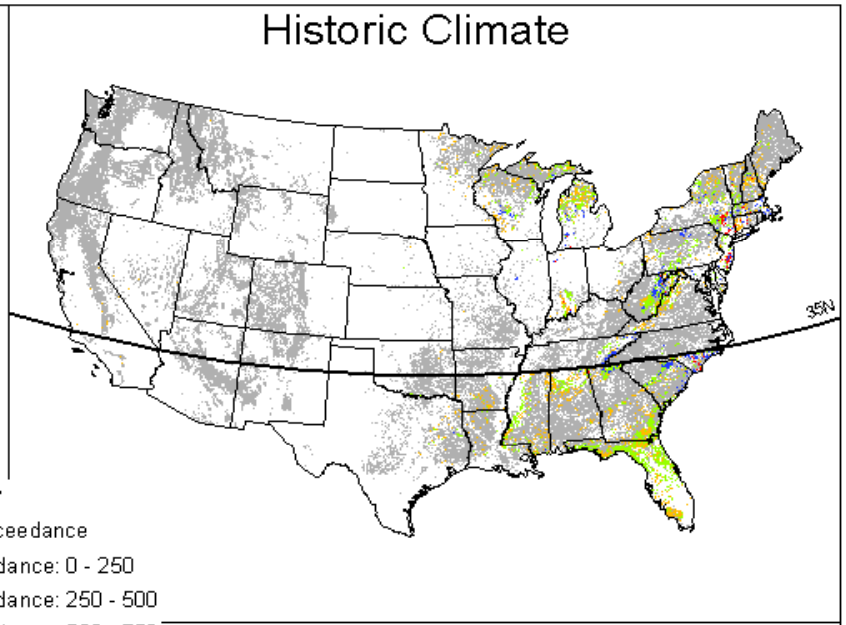


= 50 – 200x increased risk of extinction over baseline conditions

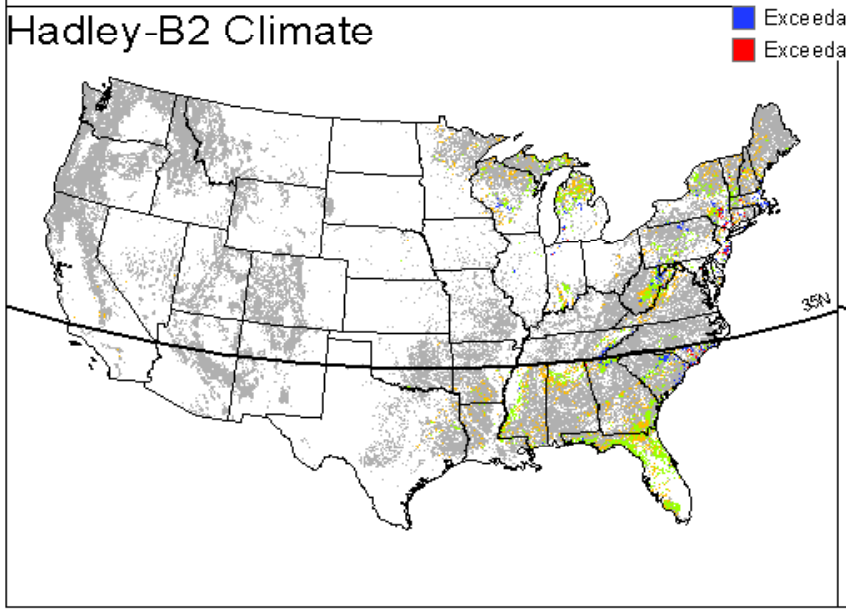
Impact of Climate Change on Acid Rain Impacted Forests

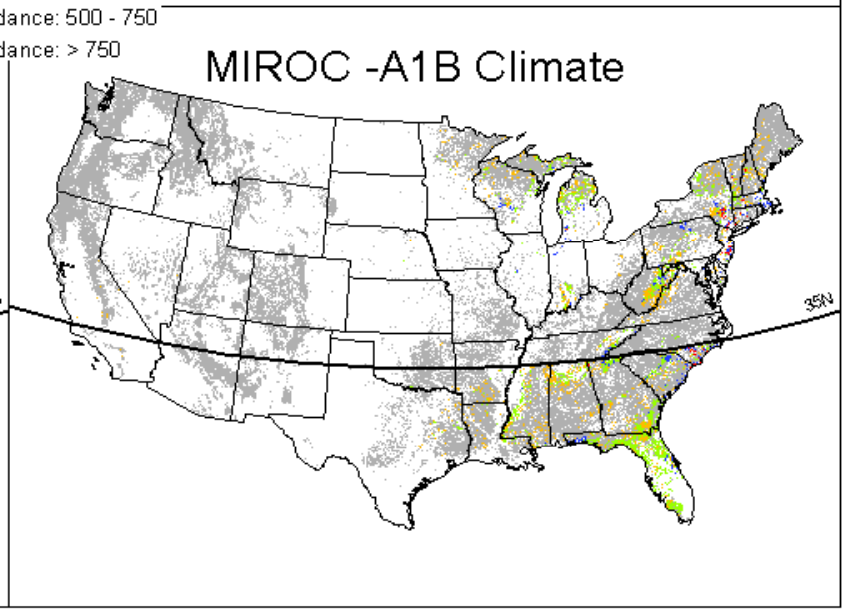
Exceedance of Critical Loads
on Forest Soils Scenario:
Runoff, Uptake, Temperature North of 35N

Scenario	No Exceedance	0 - 250	250 - 500	500 - 750	> 750	Total Exceeded in US
Historic	87.6%	5.4%	5.4%	1.3%	0.3%	12.4%
Hadley	88.1%	5.3%	5.3%	1.1%	0.3%	11.9%
Miroc	89.1%	4.9%	4.8%	1.0%	0.2%	10.9%



eq/ha/yr
- No Exceedance
- Exceedance: 0 - 250
- Exceedance: 250 - 500
- Exceedance: 500 - 750
- Exceedance: > 750





Decision Support Tools - Examples

- CRAFT: To examine resource management choices and trade-offs in a risk based framework (CRAFT – Comparative Risk Assessment Framework and Tools)
- TACCIMO: To support science-based decision making and planning (TACCIMO – Template for Assessing Climate Change Impacts and Management Options).
- Both of these products are being utilized at a national scale through the USFS R&D Western and Eastern Environmental Threats Centers (www.Forestthreats.org).

Science for Landscape Management

- WaSSI; used all over world to assess tradeoffs between carbon, water and biodiversity.
- Southern Research Station communication with USFWS SE Region, SE Climate Science Center: "Doggie Bag" series.
- Example: TACCIMO used in land management decisions for brook trout and beaver on the George Washington NF.

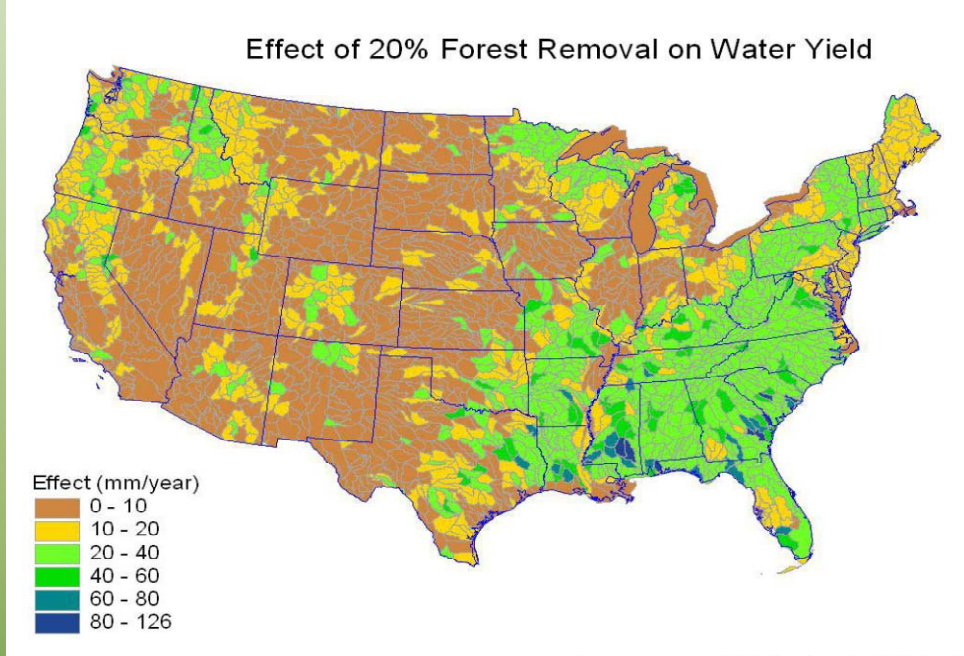
What does 'beyond forest boundaries' mean with regard to information and science needs that allow for better development of large scale management? How does it relate to different agencies using varying monitoring protocols?

- Substantial FS research on non-FS lands (particularly important in regions with limited federal ownership)
- Need for partnerships, communication, and standardization

Landscape-scale Conservation Science

- What areas of key landscape level research questions are currently being addressed by the USFS?
  - Wildland Fire
  - Invasive Species
  - Water, Air, and Soil
  - Wildlife and Fish
  - Recreation
  - Resource Use
  - Combinations of the above
  - Plus data and analyses at landscape scales
- Example: The tradeoffs between ecosystem carbon sequestration and water supply using the Water Supply Stress Index (WaSSI) water, carbon and biodiversity model.

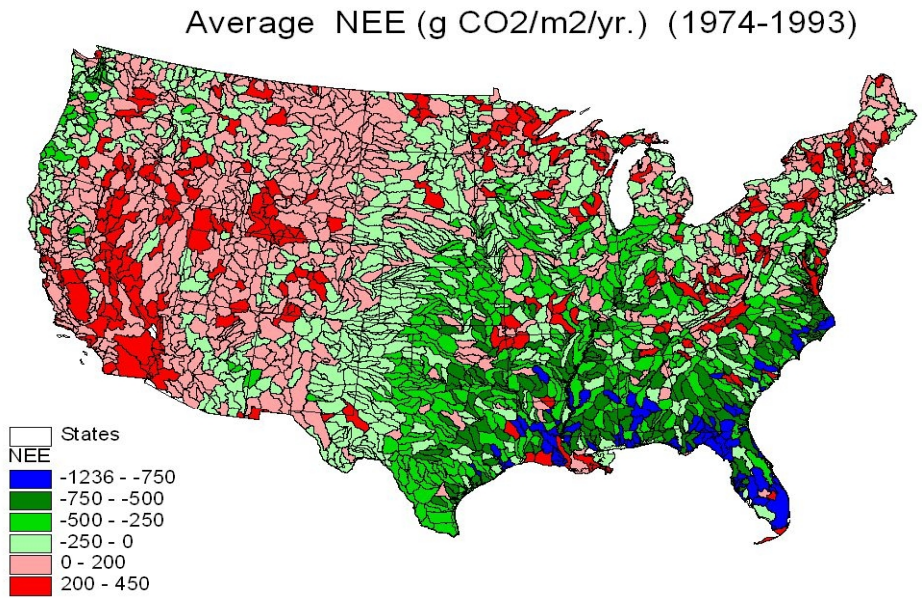
WaSSI-CB model



Welcome to the USDA Forest Service

We are entrusted with 193 million acres of forests and grasslands. It's a big task, but one that we take seriously. We are dedicated to restore and enhance landscapes, protect and enhance water resources, develop climate change resiliency and help create jobs that will sustain communities.

Chief Tom Tidwell



Forest Service Collaboration in Landscape-scale Conservation

William Gould, Research Ecologist, USDA Forest Service
International Institute of Tropical Forestry (IITF), Río Piedras, Puerto Rico
Coordinator, Caribbean Landscape Conservation Cooperative

Forest Service Collaboration in Landscape-scale Conservation - Topics

- All lands approach and Forest Service partnerships
- Research networks: collaboration and information management
- All lands approach in Puerto Rico
- Current and future directions: Forest Service collaboration in the Caribbean Landscape Conservation Cooperative

USDA *all lands* approach

"…Our nation's forestlands, both public and private, are environmental and economic assets that are in critical need of restoration and conservation…

…The threats facing our forests don't recognize property boundaries. So, in developing a shared vision around forests, we must also be willing to look across property boundaries. In other words, we must operate at a landscape-scale by taking an *all-lands approach*…."

Agriculture Secretary Tom Vilsack, first major speech, August 14, 2009.

Forest Service *landscape-scale* conservation

"…The mission of the Forest Service is to sustain the health, diversity, and productivity of the nation's forests, not just the national forests.

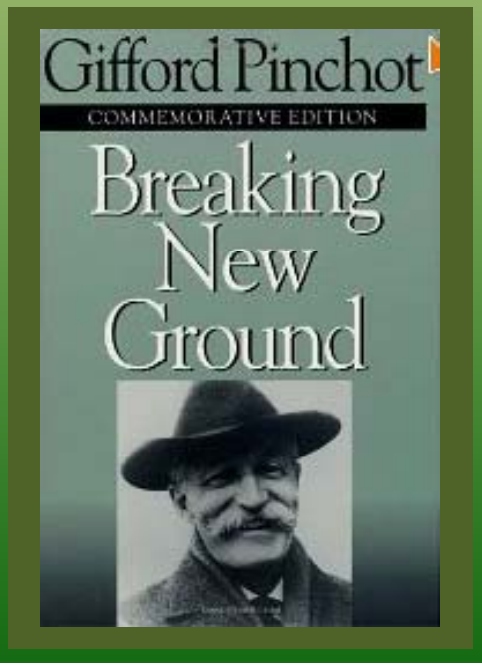
Working with partners, the Forest Service will take an all-lands approach that goes beyond the National Forest System….we will focus on landscape-scale conservation.

…the goal of forest restoration through an all-lands approach, through landscape-scale conservation, captures the spirit of *the greatest good*…."

Forest Service Chief Tom Tidwell, October 2009.

Forest Service *landscape-scale* conservation

"…Conservation is the foresighted utilization, preservation and/or renewal of forests, waters, lands and minerals, for the greatest good of the greatest number for the longest time…"



Gifford Pinchot, first Chief of the United States Forest Service (1905–1910) ."– *Breaking New Ground*

Forest Service Partnerships

The breadth and scope of conservation efforts in the United States exceed the capability of a single organization. The Forest Service recognizes the challenge and actively seeks to engage others in cooperative conservation. By working with partners, the Forest Service expands its capability to participate in conservation through stewardship, research, and intergovernmental coordination.

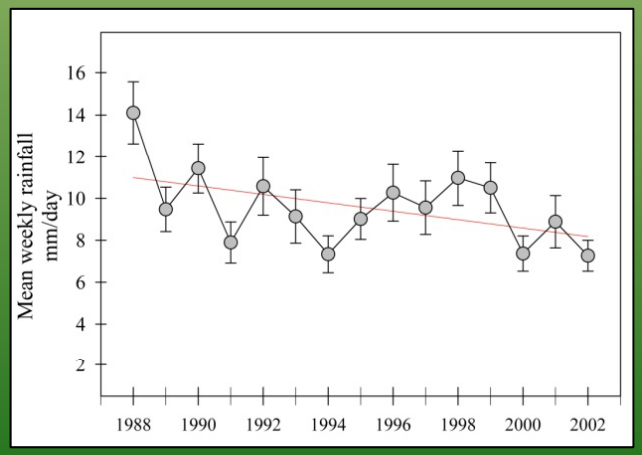
USDA Forest Service Strategic Plan: FY 2007–2012

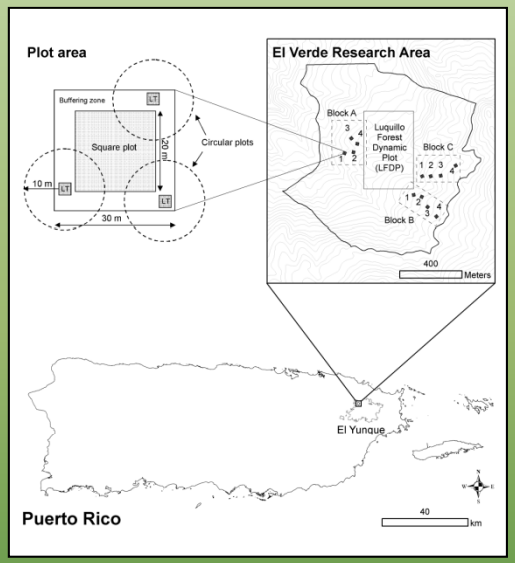
Collaborative research activities

Long term monitoring, experimental studies, modeling, mapping

National/International networks

LTER	FIA
ULTRA	LBA
NEON	GAP
LCZO	LCC
WEBB	EFR



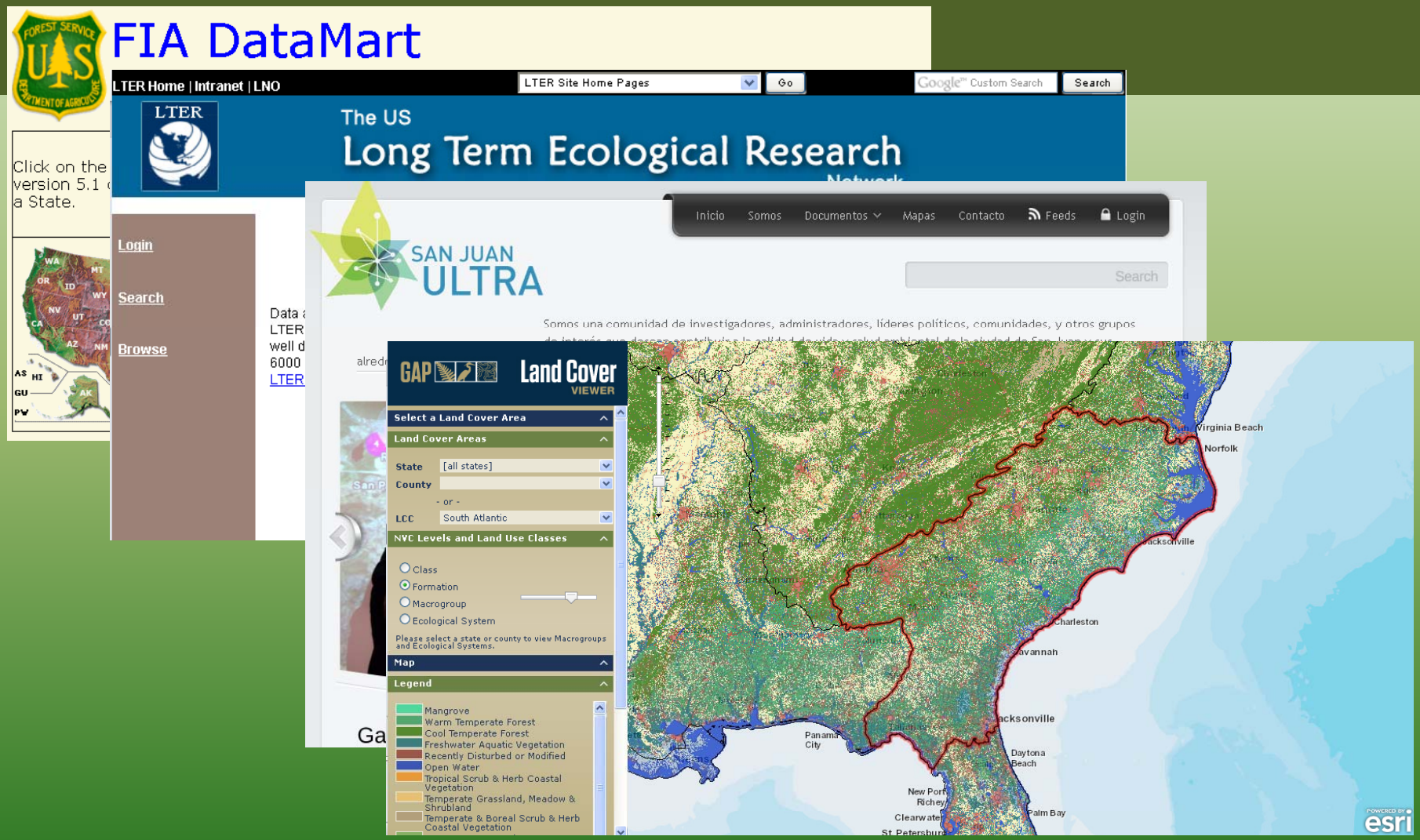


Luquillo Experimental Forest El Verde research area, (LTER) long term forest dynamics plot, Canopy trimming experiment

Heartsill Scalley, T., F.N. Scatena, C. Estrada, W.H. McDowell, and A.E. Lugo. 2007. Disturbance and long-term patterns of rainfall and throughfall nutrient fluxes in a subtropical forest in Puerto Rico. *Journal of Hydrology* 333:472-485.

Partnerships occurring at all levels: Among scientists, institutions, agencies

Lots of information generated



Usually not well-integrated within or among networks/programs/agencies

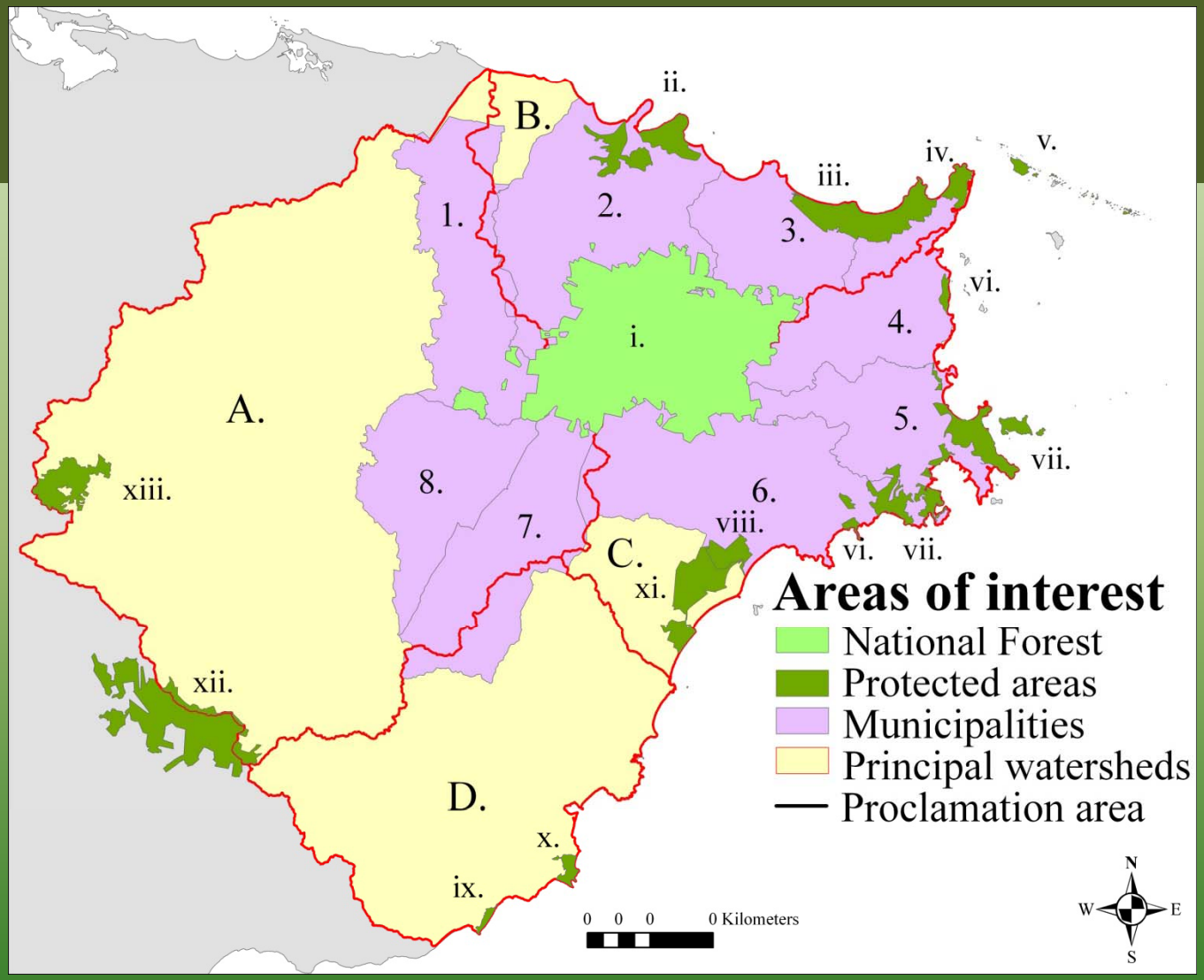
All lands approach in practice

All Lands Town Hall Meeting

Current state of the landscape and future nee

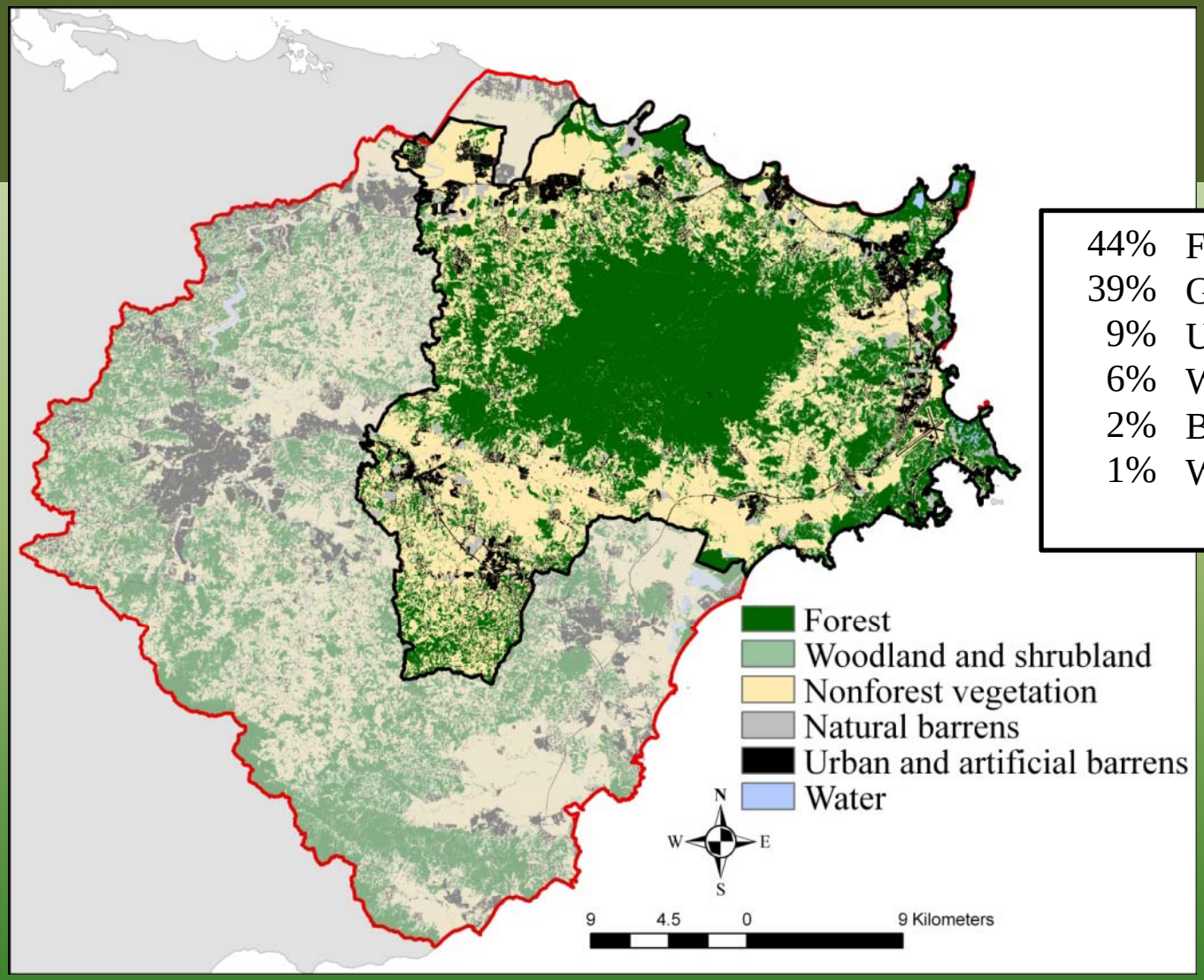
William Gould, USDA Forest Service Research Ecologist

Landscape of Northeastern Puerto Rico



Areas of interest for assessing conservation priorities in Northeastern Puerto Rico

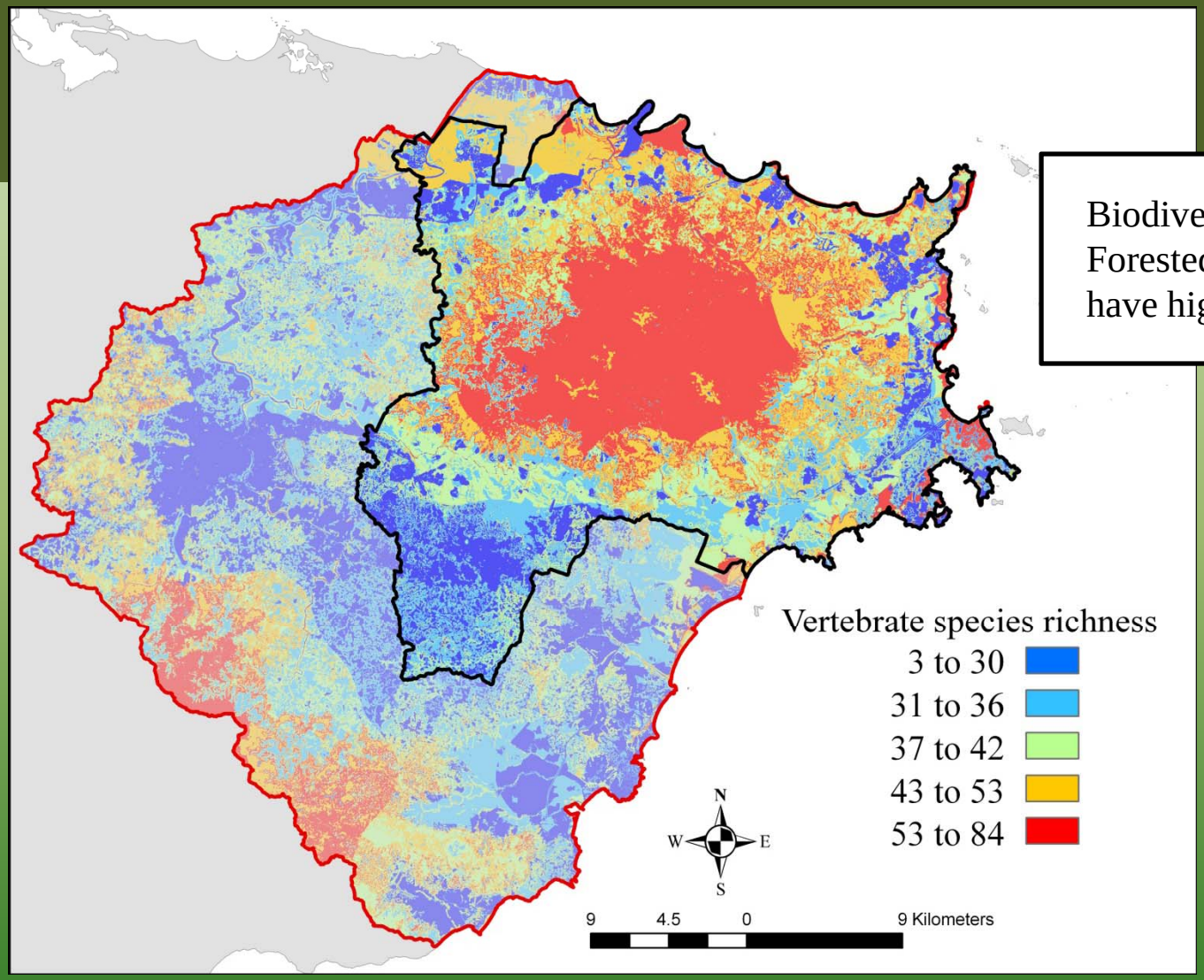
Landscape of Northeastern Puerto Rico



44%	Forest (3% mangrove)
39%	Grassland
9%	Urban
6%	Woodland/shrubland
2%	Barren
1%	Water

Land cover

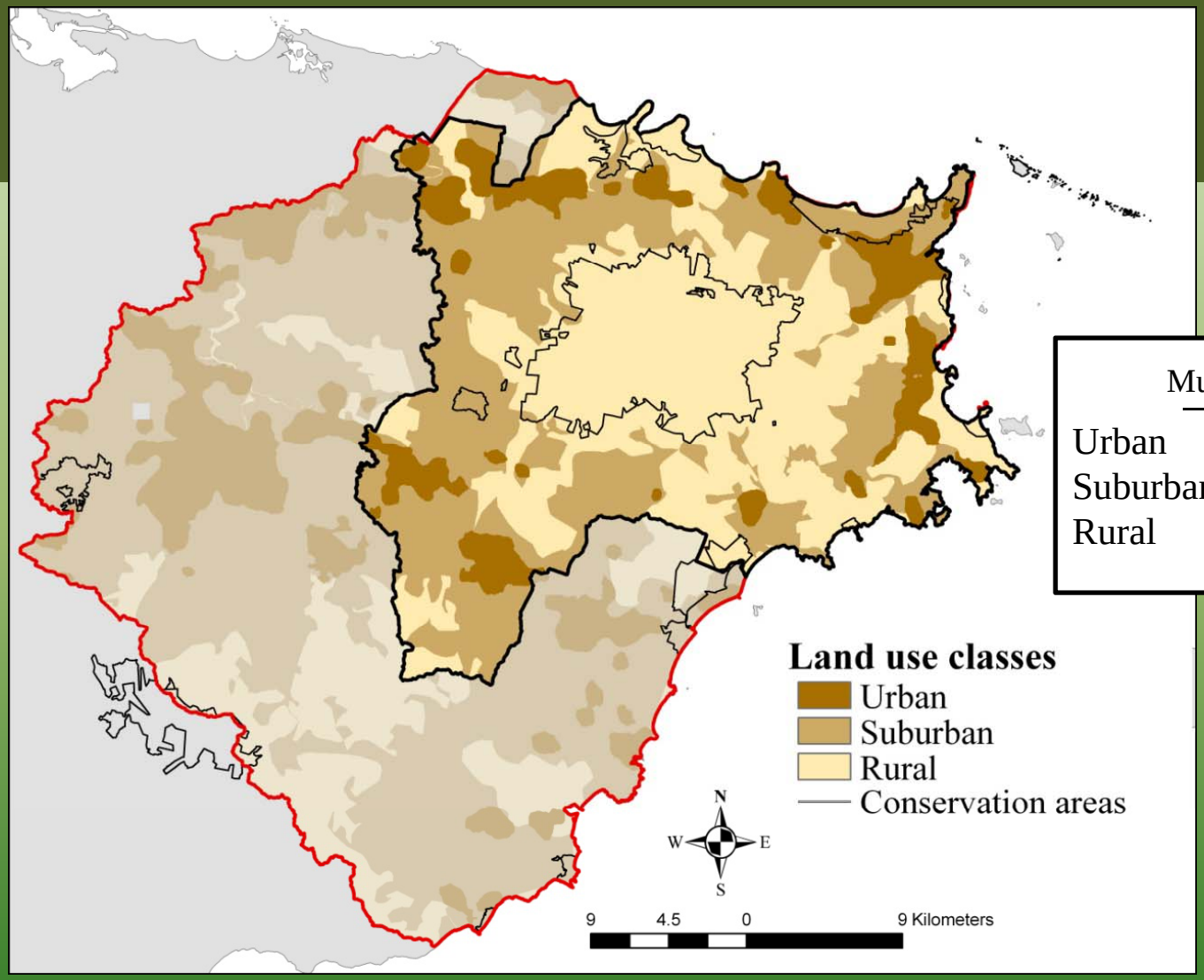
Landscape of Northeastern Puerto Rico



Biodiversity within habitats:
Forested montane habitats
have highest species richness

Vertebrate biodiversity patterns

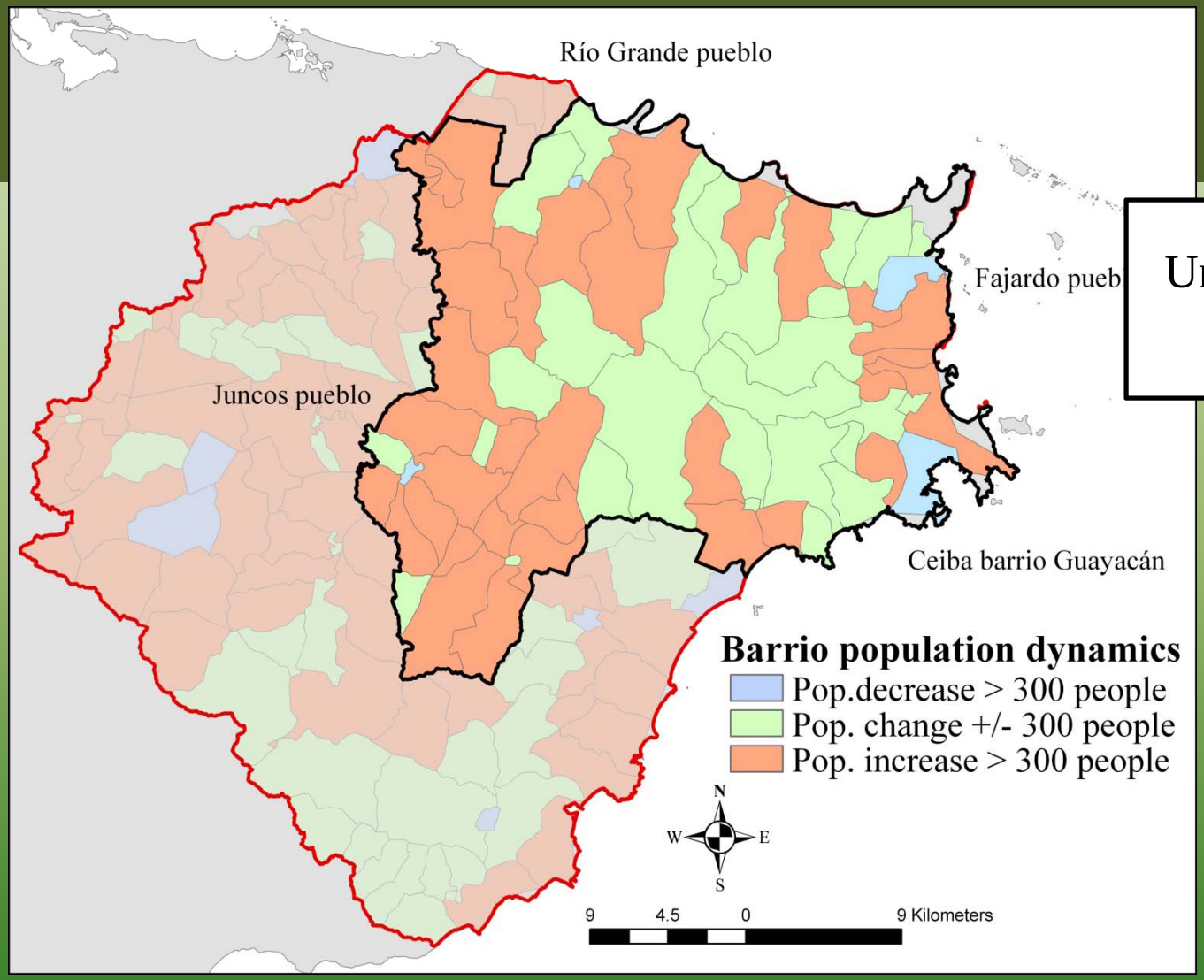
Landscape of Northeastern Puerto Rico



	Municipality	Watershed	PR
Urban	13%	16%	16%
Suburban	39%	50%	36%
Rural	49%	34%	48%

Urban-wildland interface

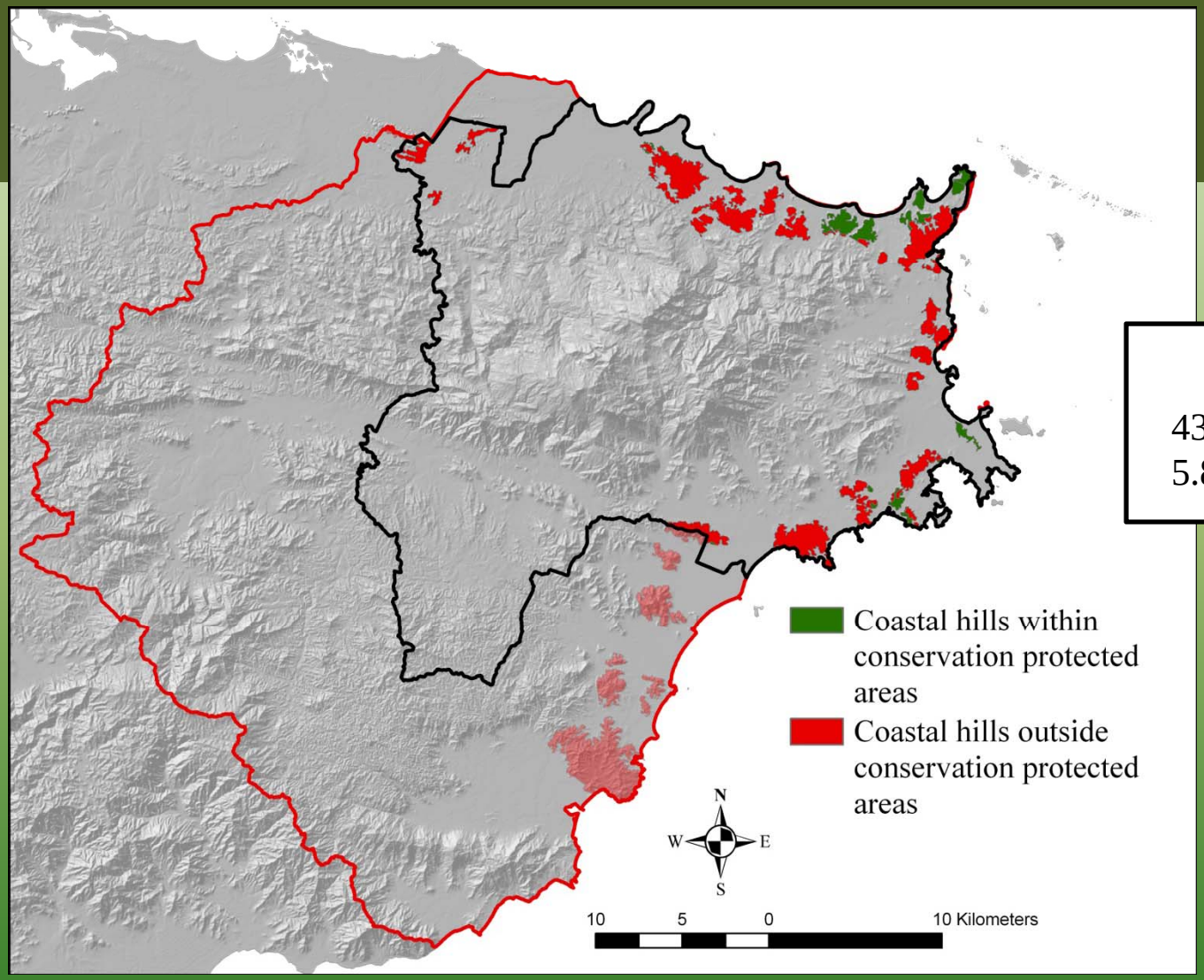
Landscape of Northeastern Puerto Rico



Urban centers losing population

Population dynamics

Landscape of Northeastern Puerto Rico

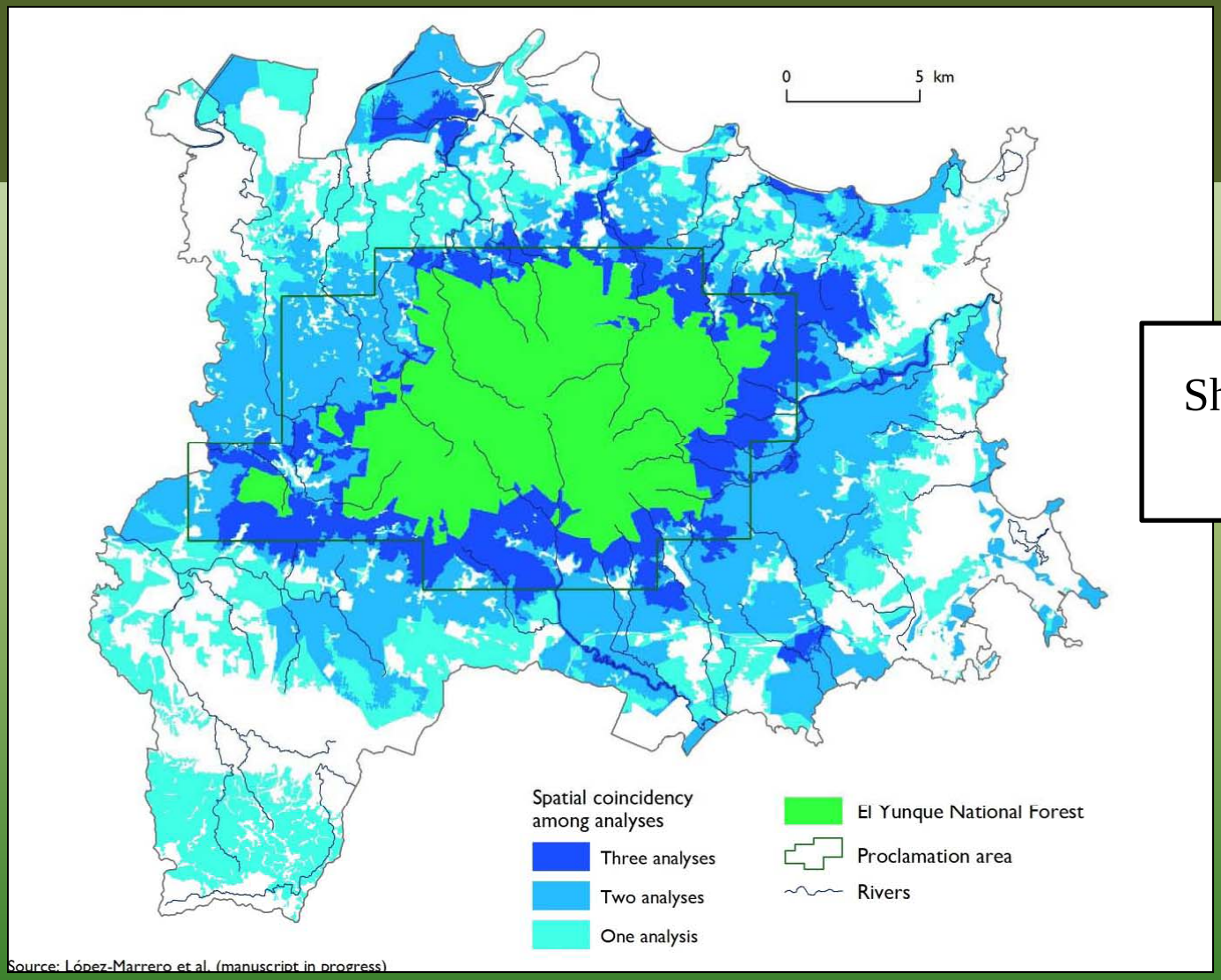


Coastal hills

4352 ha
5.8% of the municipalities

Vulnerable coastal hills

Landscape of Northeastern Puerto Rico



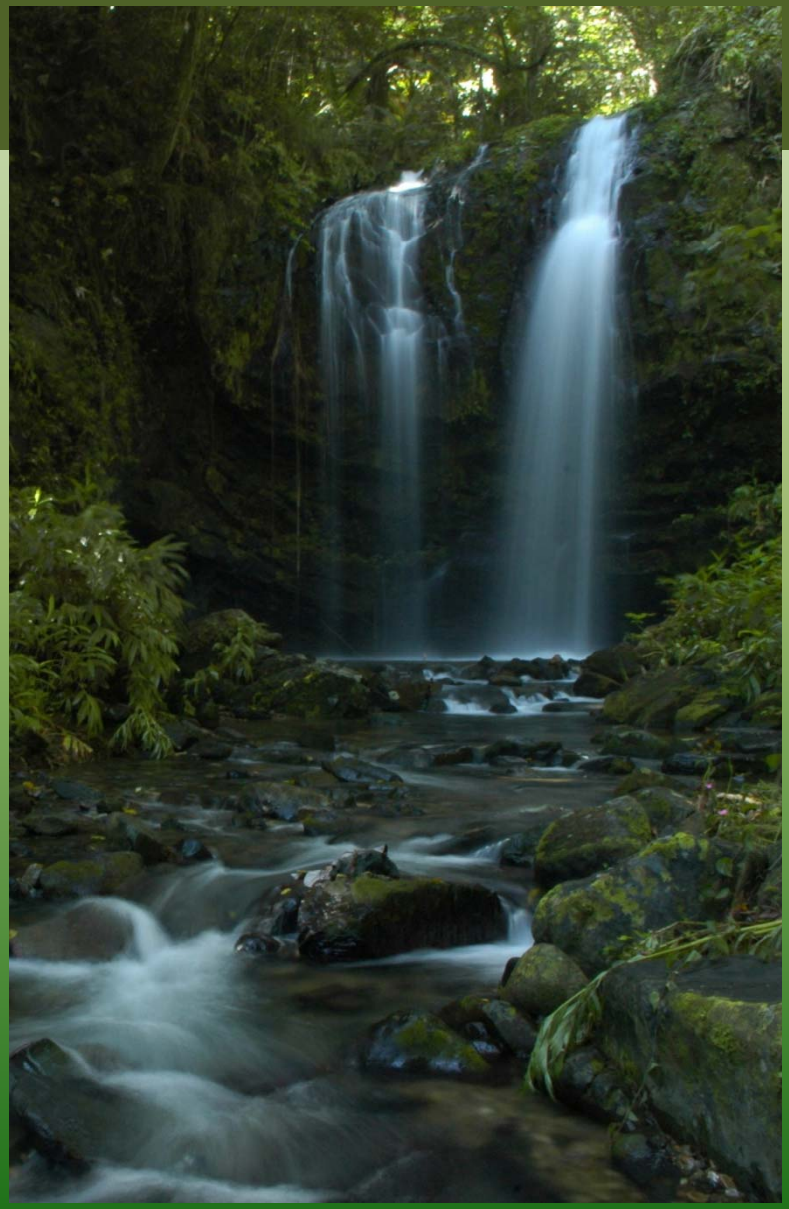
Source: López-Marrero et al. (manuscript in progress)

Shared conservation priorities

Areas important for the conservation and support of El Yunque National Forest functions and services.

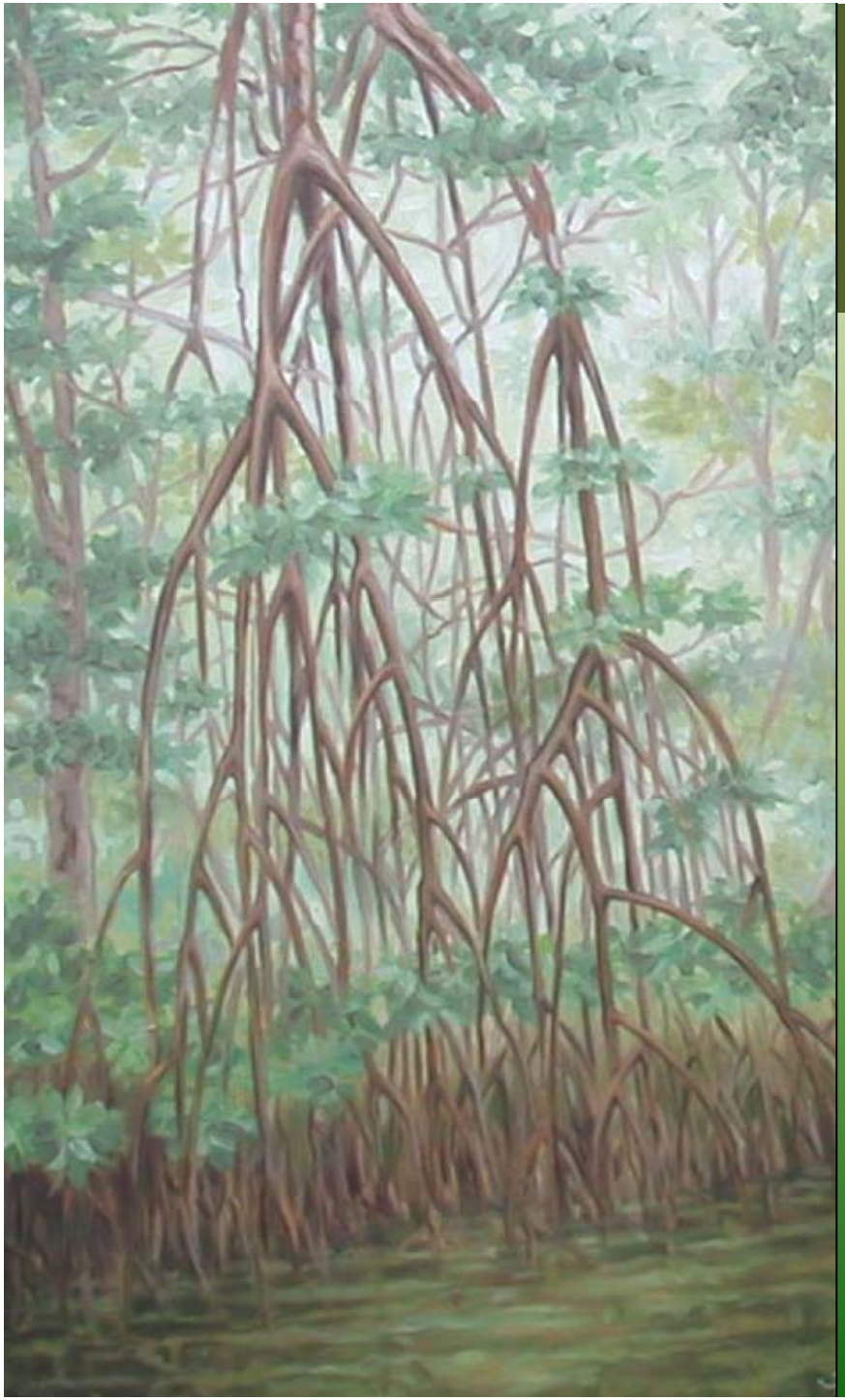
Lopez et al. in prep.

Beginnings of a collaborative *all-lands* approach



- Understanding differences in values
- Building common language
- Shared priorities
- Shared vision of future landscapes
- Common understanding of most vulnerable species/habitats/services
- Shared vision of adaptive management/using best science and best practices to achieve conservation goals

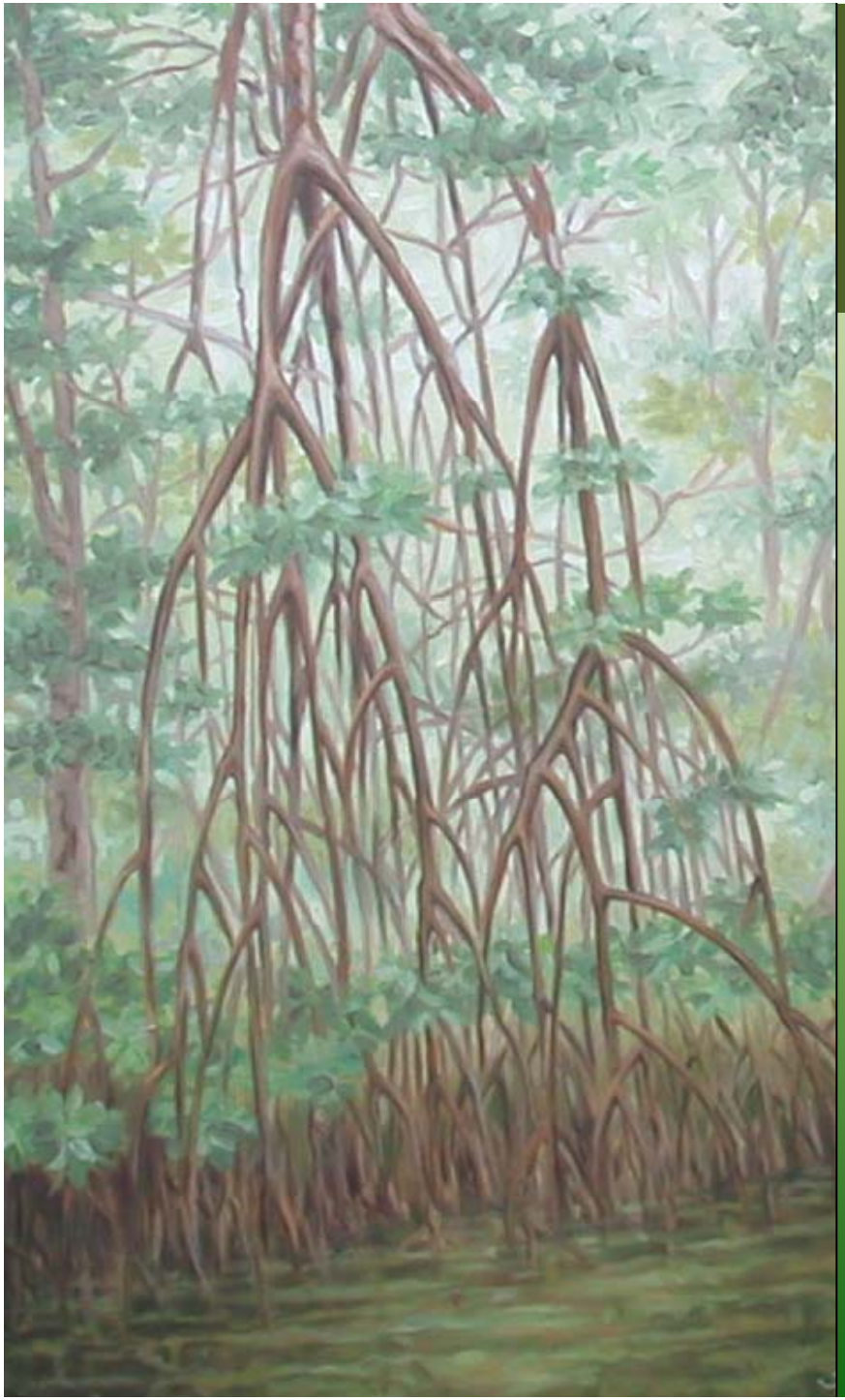
El Yunque National Forest will integrate the *all-lands* approach in the forest planning process.



Collaboration in the Caribbean Landscape Conservation Cooperative

Mission

Provide leadership, science, and technology to conserve, restore and sustain natural and cultural resources in the Caribbean in the face of climate and land use changes – to develop, provide and explain the best available information and conservation strategies to agencies, decision makers, organizations, researchers, and the general public.



Collaboration in the Caribbean Landscape Conservation Cooperative

Partners

Forest Service: IITF supporting the initiation and coordination of the CLCC, providing facilities, staff, research capacity

Fish and Wildlife Service: Instigating and supporting the initiation of the CLCC, funding staff and research capacity.

USGS: Supporting the initiation, providing expertise, funding climate science research.

NOAA: Supporting staff

Other agencies on steering committee: NRCS, NPS, PR DNER, USVI DPNR

Thoughts on USFS and LCC Collaboration

- LCCs and CSCs in early stages – opportunity for FS to collaborate at all levels.
- USDA and FS bring expertise in:
  Monitoring: forest ecosystem structure and services, climate, wildlife.
  USDA focus on working lands.
  Integrating research in land management.
  Research and management expertise in fire, invasive species, ecosystem function, carbon cycling and sequestration, remote sensing, and decision making.
- Need to create a mechanism at upper levels to facilitate the collaboration that is occurring at all levels.

In Summary - Monica

- USFS incorporates science into Forest Plans, thereby applying findings at landscape scales, monitoring outcomes and working directly with research.
- National Forests and Grasslands are landscape-scale places for climate science applications and learning; taking place across country.
- Do “climate change adaptation for everything”, not just wildlife or just water or…

Forest Service Science-Management Partnerships for Landscape-Scale Conservation

- Science-management partnerships are at the core of R/D support for land managers; handled in a variety of ways across the country.
- One example of management/science integration: **Climate Change Response Framework** (www.climateframework.org). The focal issue is climate change adaptation. Managers are invited to apply reality checks to model projections and predictions, identify constraints and opportunities in adaptation strategies, and engage in partnered implementation/demonstration projects on the ground.

Forest Service Science-Management Partnerships for Landscape-Scale Conservation

- Environmental change doesn't stop at ownership boundaries, so we work on a landscape basis. The analysis areas of USFS projects typically encompass National Forests, other federal, Tribal, state, county, private/industry, and trust lands.
- Often, scientists invite participation by all ownerships and management organizations, and therefore design our tools and approach to be generally useful.
- Often, USFS science is *not* focused on federal/public lands and not focused on forested ecosystems.

Highly Effective Model for Partners to Get Science Gaps Filled

- "Joint Fire Science Program" (JFSP)
- Interagency partnership from beginning to end (appropriations to projects)
- Goal is to accelerate the delivery of fire science findings
- Interagency management, priorities, funds, delivery of information.
- Key characteristics are:
  - Boundary spanning partnerships
  - End-user and science driven
  - Active engagement

JFSP – Cooperation and Results

Identify Research Questions

- Interagency Governing Board
- Executive and stakeholder meetings
- Roundtables, science plans
- Regional consortia

Conduct Studies

- Open, competitive process
- Peer review
- Federal research labs & universities

Exchange & Apply Results

- Science reports & manuscripts
- Syntheses & briefs
- Website (Firescience.gov)
- Social media
- Regional consortia

A Business Tool! Service First

An **idea to work together.**
An **authority to conduct joint projects.**
A **toolbox of resources.**

http://www.fs.fed.us/servicefirst/

What is Service First?

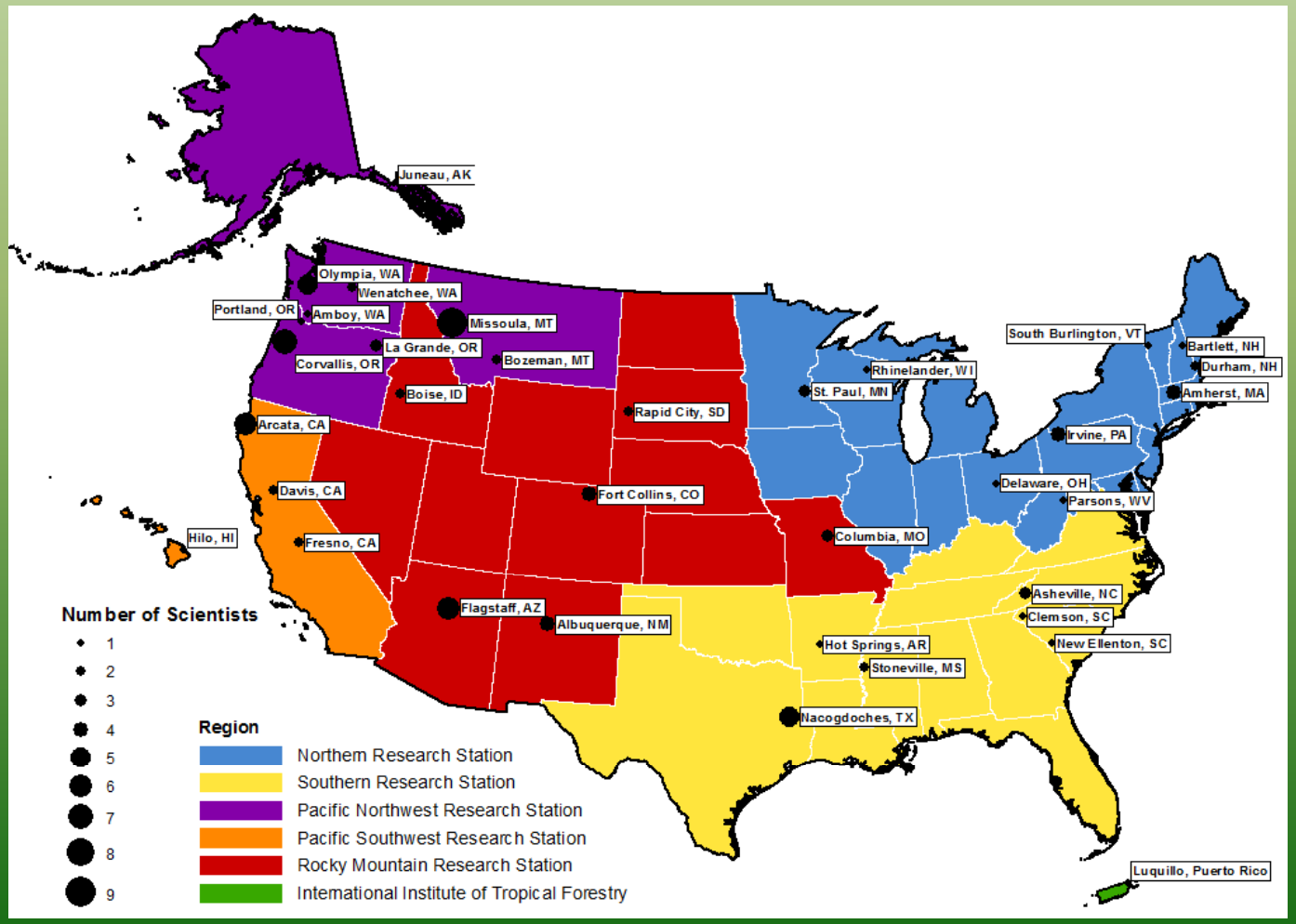
Service First is a permanent authority granted to the Bureau of Land Management, National Park Service, the US Fish and Wildlife Service, and the Forest Service to *"…conduct projects, planning, permitting, leasing, contracting and other activities, either jointly or on behalf of one another; [and] may co-locate in Federal offices and facilities…"*

What can be done under the Service First authority?

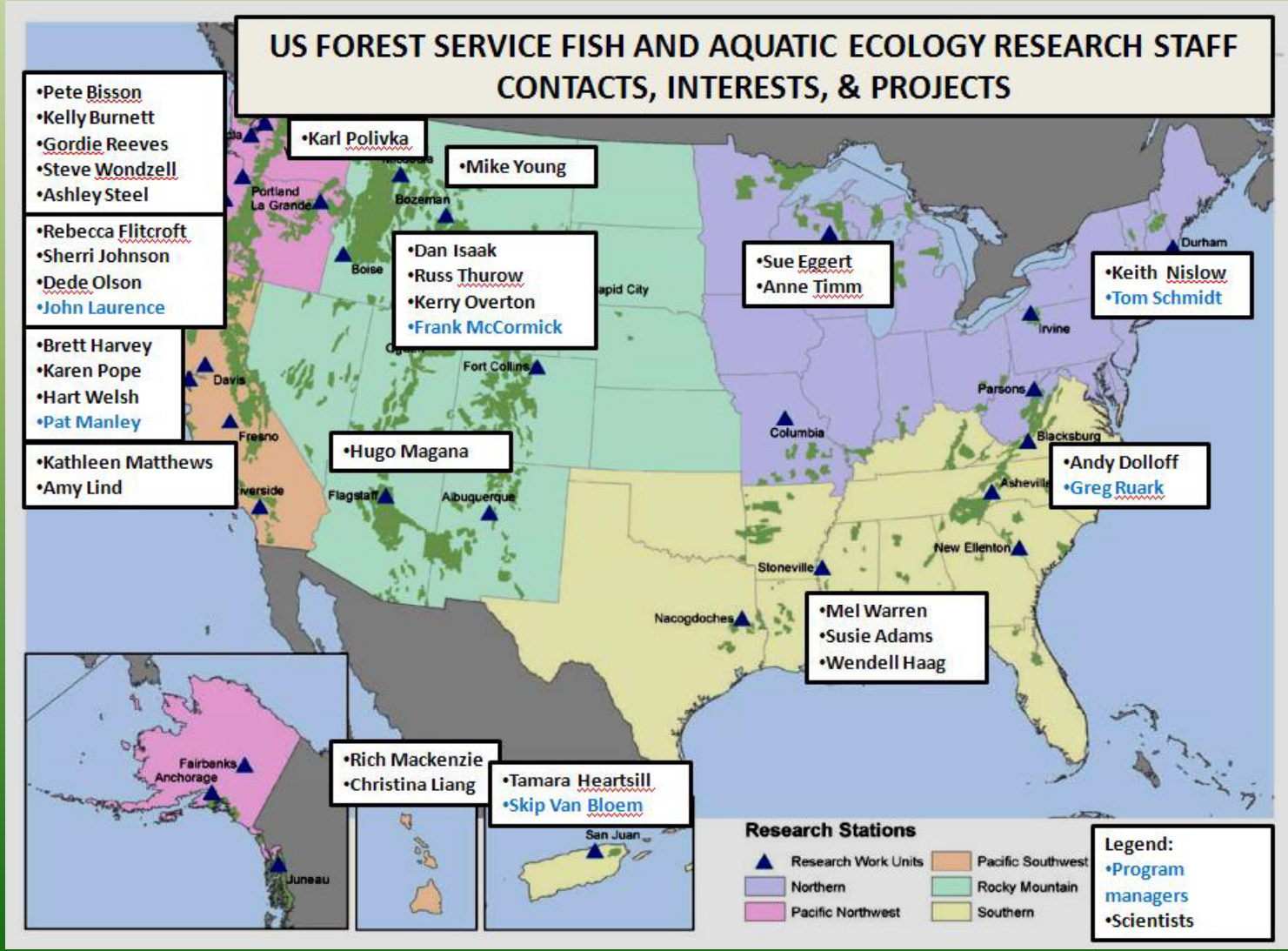
Service First has three broad goals:

1. Improve customer service;
2. Increase operational efficiency; *and*
3. Enhance land stewardship, resource protection, and conservation.

USDA Forest Service Wildlife and Terrestrial Ecology Research Staff *At-A-Glance*: *Contacts, Interests, and Current Projects (write nbuell@fs.fed.us)*



USDA Forest Service Fish and Aquatic Ecology Research Staff *At-a-Glance:* Contacts, Interests, and Current Projects *(write nbuell@fs.fed.us)*



USFS, LCCs, Science, and Management

- Landscape Conservation Cooperatives (LCCs) present an opportunity for land management and science agencies to:

  - Effectively share resources,
  - Develop valuable information and tools,
  - Avoid duplication,
  - Foster consistency, and
  - Provide easier and more meaningful access to a rapidly changing science base.

Connections and Conversations

- Check with the USFS employees in your networks to find out more.
- Have you reached out to the Regional Office and Research Station "LCC and CSC Points of Contact"?
- Do you converse with the USFS LCC Committee and Science Sub-Committee Representatives?
- Do you have the USFS Wildlife and Fish Scientists' Contact List?

Discussion – FS speakers and Audience

- How can we enhance FS - DOI interaction at the landscape scale?
- What are the main things that we need to do to move the needle?
- What are the first steps to make these happen?

FS Organizational Chart