

ENVIROATLAS USE CASE

Screening New Market Opportunities for Sustainably Managed State, Private and Tribal Working Forests

NOVEMBER 2018



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Forest Trends' Ecosystem Marketplace
United States Forest Service

This use case was developed in partnership with the United States Forest Service (USFS), the United States Environmental Protection Agency (EPA) EnviroAtlas team, and the United States Department of Agriculture (USDA) Office of Environmental Markets. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of USFS, EPA, or USEPA.



Stimulating Partnerships for New Revenue Generation Opportunities from Sustainably Managed State, Private and Tribal Working Forest Lands

Sustainably managed working forests provide not just wood and fiber, but a range of other benefits: clean water, wildlife habitat, carbon storage, flood protection, recreational and cultural values, and more. Scaling up investments in sustainable forest management can generate financial returns for good stewardship of these multiple conservation values.

The United States Forest Service (USFS) is working to increase and unlock funding for forest stewardship, restoration, and protection by collaborating with the conservation finance sector. USFS seeks to leverage shared investments to increase the resilience of our nation's forests – both public and private.

A better understanding where of opportunities exist to generate revenues from the multiple conservation values of sustainable forest management will help USFS and its partners design and target technical assistance to managers of working forests.



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Stimulating Partnerships for New Revenue Generation Opportunities from Sustainably Managed State, Private and Tribal Working Forest Lands

USFS partnered with the Environmental Protection Agency's EnviroAtlas team and the nonprofit Forest Trends to develop a beta version of a screening tool to identify key opportunities for catalyzing shared investments in sustainably managed working forests. This screening tool can also help USFS and its partners identify where shared public-private investments may be possible, thereby increasing the pace and scope of restoration and conservation.

This use case provides details of our research approach and summary results.

Building on the screening tool developed here, USFS and its partners will refine our approach in consultation with stakeholders, and explore more in-depth analysis identifying priority areas to target for new public and private investments.

Project goals:

1. Identify landscapes with potential to generate revenue from the multiple conservation values associated with sustainable working forestlands
2. Support project developers in evaluating where multiple-benefits investment strategies are possible
3. Support states in developing and implementing technical assistance for landowners seeking to access conservation investments
4. Evaluate where cross-boundary shared investments spanning public and private forest lands are possible

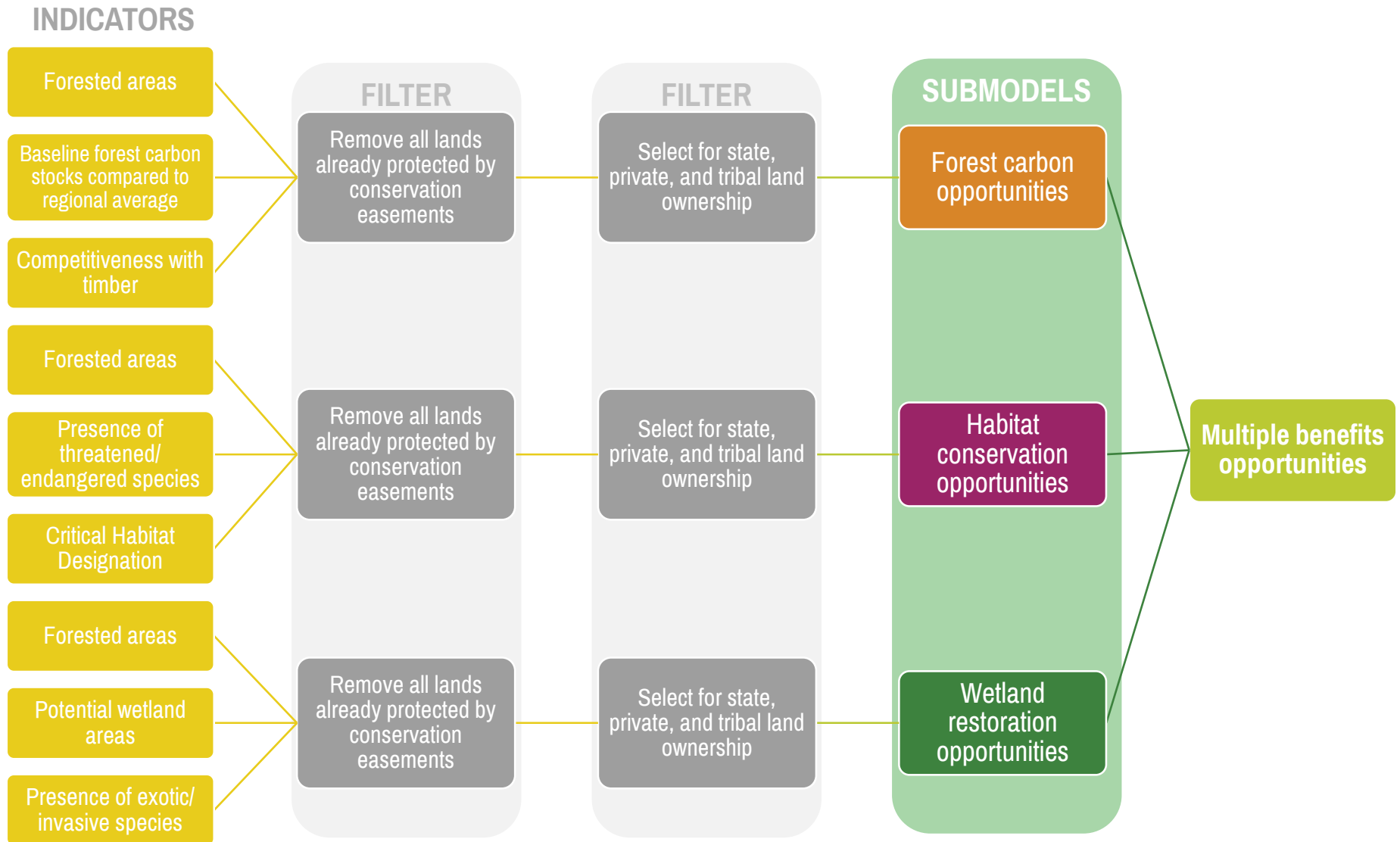
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Methodology

- A suitability analysis was developed for three categories (“submodels”) of conservation investment opportunities: forest carbon, habitat conservation, and wetland restoration.
- Indicators for each submodel were selected through consultation with stakeholders active in the conservation investments under consideration, as well as in consultation with EPA EnviroAtlas staff. Our primary criteria for indicator choice were: a) Is this indicator typically used by project developers or investors in their own due diligence process when selecting a project site for conservation investment? and b) Is a credible, national-scale, and publicly available spatial dataset available?
- Submodel results were filtered to exclude non-forested lands and lands already protected by conservation easements, since under many environmental markets’ rules, the presence of an easement may affect eligibility for developing new environmental offsets or credits. Submodel results were also filtered to exclude federally owned lands, in order to focus on opportunities on state, private, and tribal lands.
- We present results for both “all-lands” opportunities, and specifically for non-federal lands.
- A graphic showing our analytical workflow is presented on the next slide.

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Our Analytical Workflow



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HABITAT CONSERVATION BY THE NUMBERS

Active markets

National compliance driver
(Endangered Species Act §7,10)

Annual value

\$354 million

Annual trading volume

11,142 credits

Land area under management

3,337 acres

DATA YEAR: 2016

SOURCE: EM, USACE

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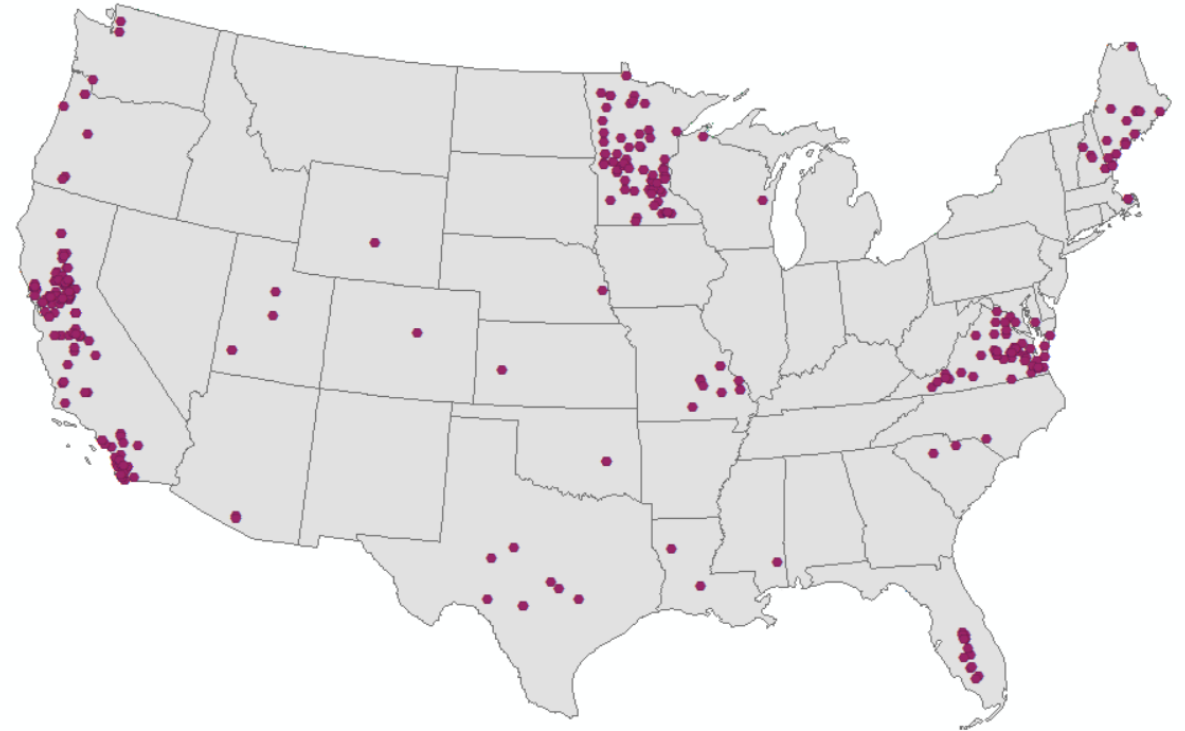
Habitat Conservation Investments: An Introduction

In the United States, there are two main frameworks for generating environmental "credits" by protecting an imperiled species or habitat.

Conservation banks are permanently protected sites that usually sell credits directly to buyers and are often run as a commercial operation.

A newer model are **Habitat Exchanges and similar habitat crediting systems**, which are platforms that allow multiple landowners to sell habitat or species credits to multiple buyers.

Buyers of conservation credits are often real estate developers, the energy industry, and transportation agencies, whose activities have resulted in negative environmental impacts in other locations. By purchasing a credit, they can mitigate for that impact to satisfy regulatory requirements.



Location of Conservation Banks and Habitat Crediting Projects in the United States. Source: EnviroAtlas.

ENVIROATLAS USE CASE

WETLAND RESTORATION BY THE NUMBERS

Active markets

National compliance driver
(Clean Water Act §404)

Annual value

\$3.5 billion

Annual trading volume

262,483 credits

Land area under management

13,149 acres

DATA YEAR: 2016

SOURCE: EM, USACE

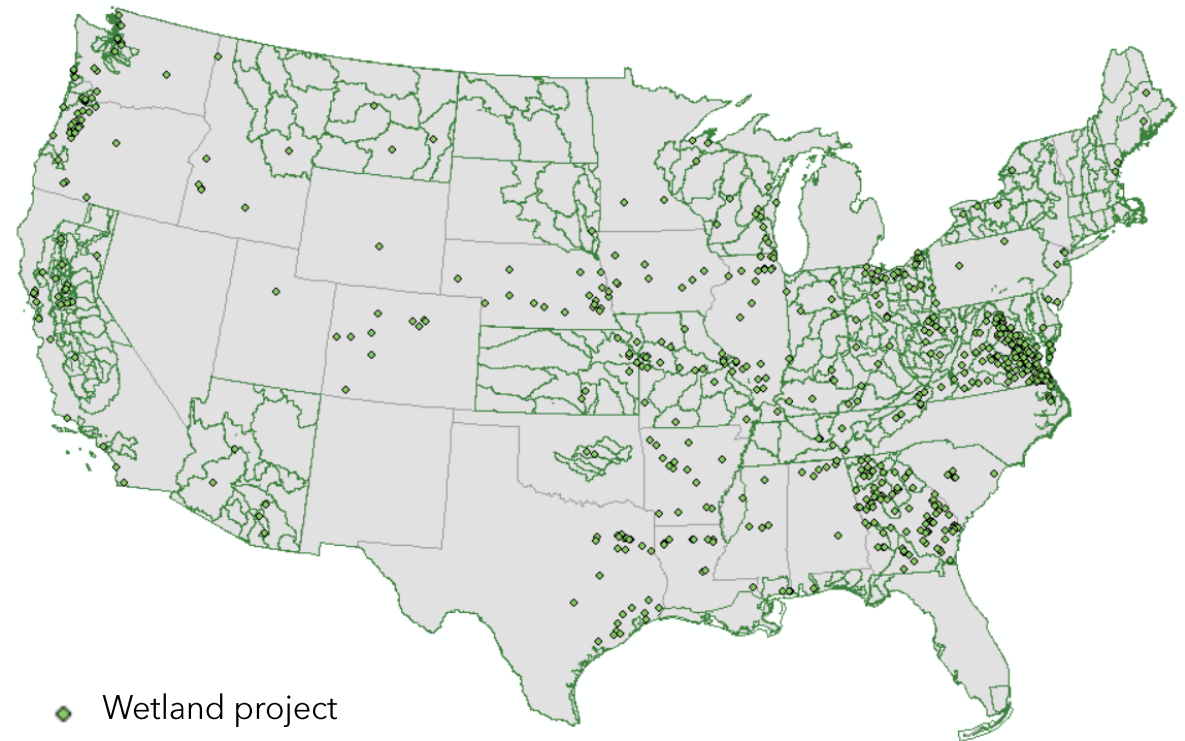
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Wetland Restoration and Conservation Investments: An Introduction

Landowners may also have revenue generation opportunities through wetland restoration projects that generate mitigation credits. As with conservation credits, developers whose activities negatively impact aquatic resources can buy mitigation credits to satisfy regulatory obligations under the Clean Water Act.

Landowners can either develop a **mitigation bank** on their property - often working with a commercial mitigation bank developer who takes charge of design, implementation, and long-term

management - or by partnering with an **In-Lieu-Fee program**, which will similarly take primary responsibility from the landowner for restoration and long-term stewardship.



- ◆ Wetland project
- In-Lieu Fee Program boundary

Location of Wetland Bank Projects and In-Lieu Fee Program Boundaries in the United States. Source: EnviroAtlas.

Mapping Forest Carbon Opportunities

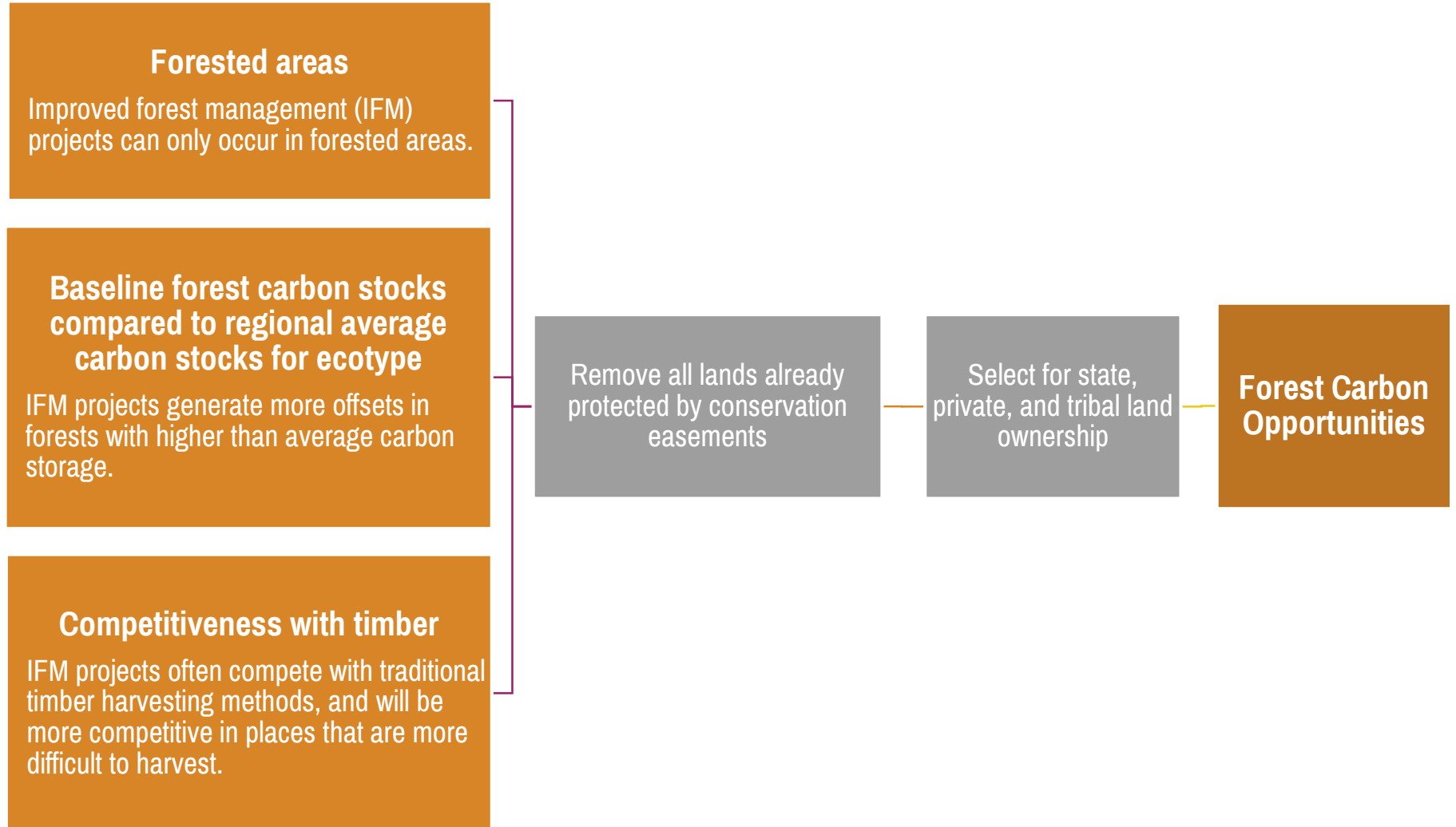
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This chart shows the indicators used to develop an overall score for potential forest carbon opportunities through improved forest management on state, private, and tribal forested lands.

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Analysis of Forest Carbon Opportunities: Analytical Framework

INDICATORS



ENVIROATLAS USE CASE

This table shows the data source, unit, and scoring approach for each indicator of forest carbon supply potential.

Analysis of Forest Carbon Opportunities: Indicators, Data Sources, and Scoring Method

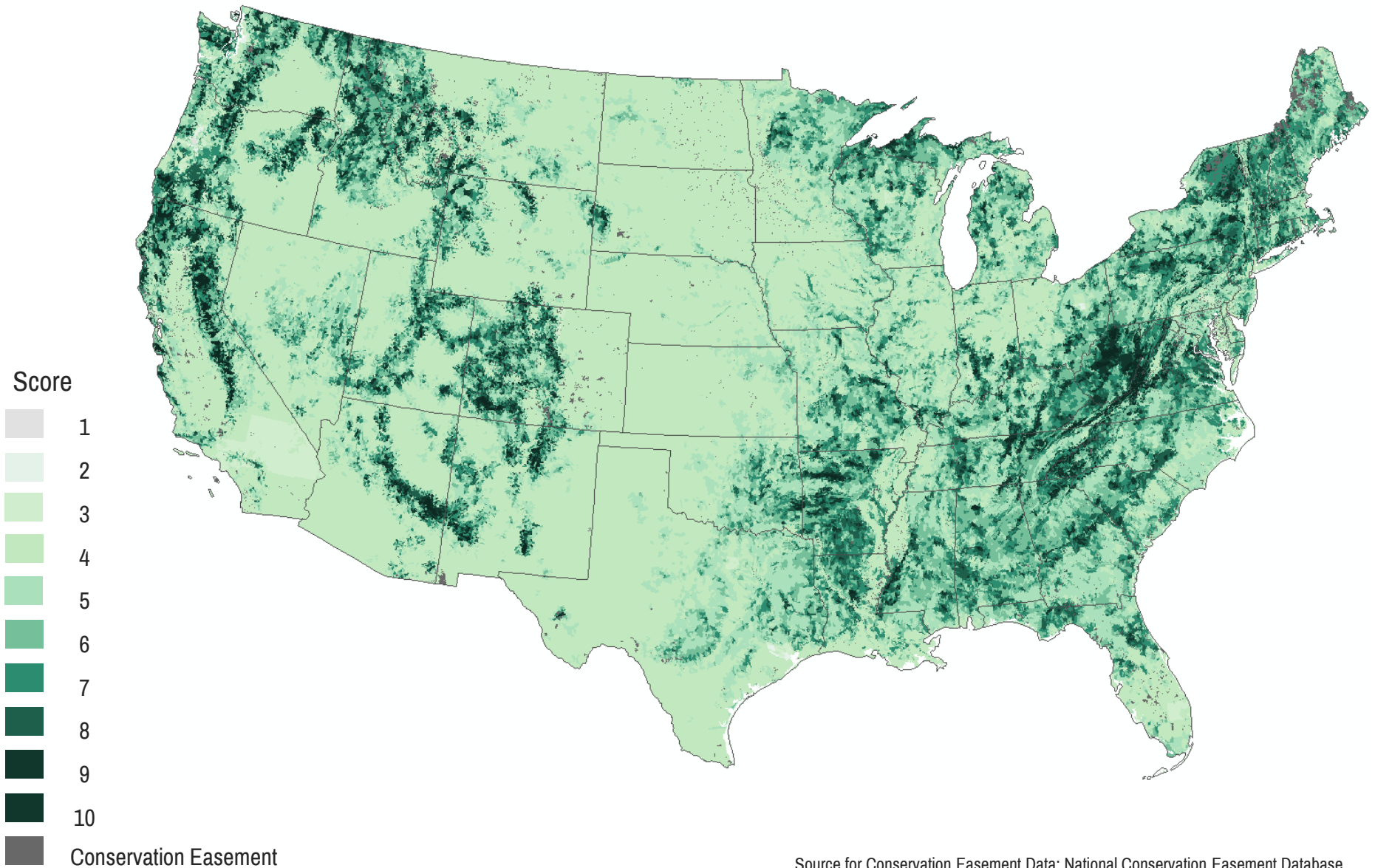
Indicator	Forested areas	Baseline forest carbon stocks compared to regional average carbon stocks for that ecotype	Competitiveness with timber
Source(s)	EnviroAtlas	Above and below-ground biomass EPA Ecosystems Research (Ecoregions)	US Census Bureau 2012 Economic Census
Unit	% forested area per HUC 12	% difference between average biomass in HUC 12 and average biomass in level IV ecoregion	Number of sawmills per county
Scoring method	Natural breaks	Natural breaks, only >0%	Natural breaks
Scores			
1 (low opportunity)	< 5.08 %	< 0	20-21
2	5.09 - 14.45%	0.01 - 1.39%	16-19
3	14.46 – 25.00%	1.40 - 3.08%	14-15
4	25.01 - 35.94%	3.09 - 4.78%	12-13
5	35.95 - 46.48%	4.79 - 7.04%	10-11
6	46.49 - 56.25%	7.05 - 9.58%	8-9
7	56.26 - 65.63%	9.58 - 12.98%	6-7
8	65.64 – 75.00%	12.99 - 16.93%	4-5
9	75.01 - 84.77%	16.94 - 22.30%	1-3
10 (high opportunity)	84.78 – 100%	> 22.30%	0

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Results: This map displays locations (in green) with high scores for forest carbon supply potential on all forested lands in the United States.

Results: Forest Carbon Opportunities, All Forested Lands



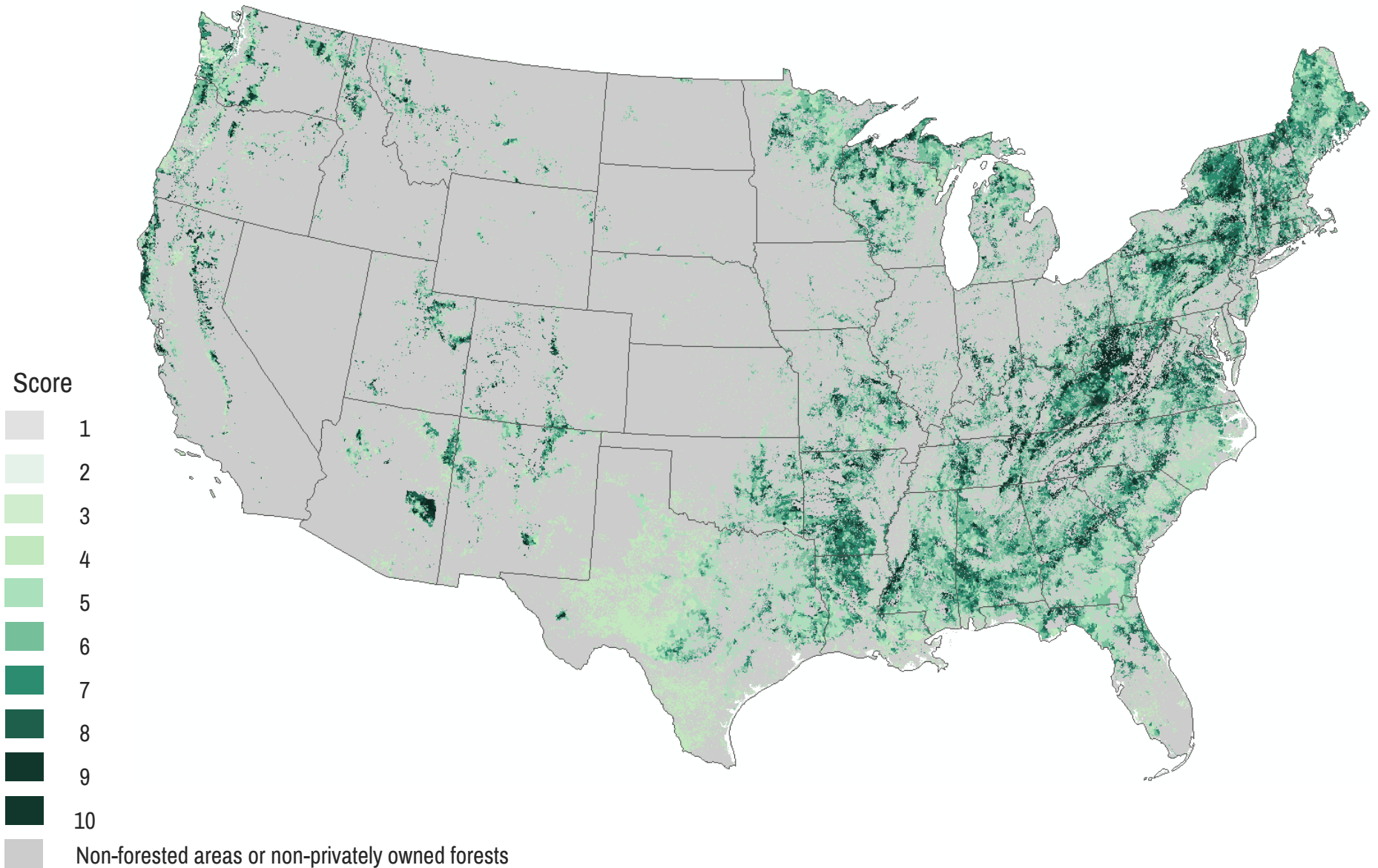
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ENVIROATLAS USE CASE

Results: This map displays locations (in green) with high scores for forest carbon supply potential on forested state, private, and tribal lands.

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Results: Forest Carbon Opportunities on State, Private, and Tribal Lands



Mapping Habitat Conservation Opportunities

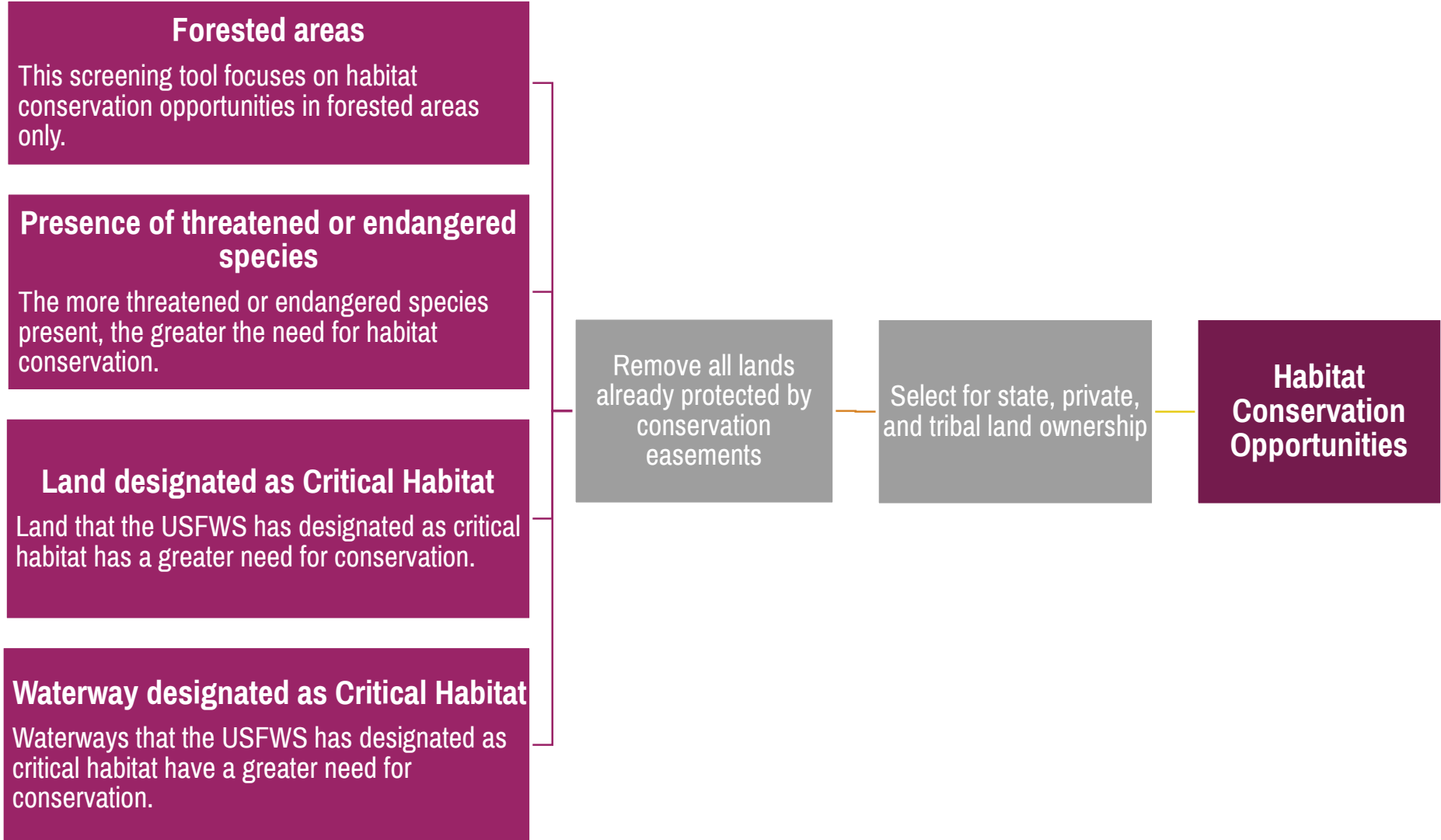
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This chart shows the indicators used to develop an overall score for potential habitat conservation opportunities on state, private, and tribal forested lands.

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Analysis of Habitat Conservation Opportunities: Analytical Framework

INDICATORS



ENVIROATLAS USE CASE

This table shows the data source, unit, and scoring approach for each indicator of habitat conservation potential.

Analysis of Habitat Conservation Opportunities: Indicators, Data Sources, and Scoring Method

Indicator	Forested areas	Presence of threatened or endangered species	Lands designated as Critical Habitat	Waterways designated as Critical Habitat
<i>Source</i>	EnviroAtlas	EnviroAtlas	USFWS Critical Habitat for Threatened & Endangered Species	USFWS Critical Habitat for Threatened & Endangered Species
<i>Unit</i>	% forested area per HUC-12	# of species per HUC-12	% of HUC-12 that is designated as critical habitat	# of designated kilometers per HUC-12
<i>Scoring method</i>	Natural breaks		Natural breaks	Natural breaks
Scores				
<i>1 (low opportunity)</i>	< 5.08 %	0	< 2.4%	< 2.95
<i>2</i>	5.09 - 14.45%	1	2.4 - 8.3%	8.54
<i>3</i>	14.46 – 25.00%	2	8.3 - 16.0%	13.71
<i>4</i>	25.01 - 35.94%	3	16.0 - 24.8%	18.95
<i>5</i>	35.95 - 46.48%	4	24.8 - 35.4%	24.93
<i>6</i>	46.49 - 56.25%	5	35.4 - 47.0%	32.33
<i>7</i>	56.26 - 65.63%	6	47.0 - 59.8%	42.09
<i>8</i>	65.64 – 75.00%	7	59.8 - 74.8%	57.32
<i>9</i>	75.01 - 84.77%	8-9	74.8 - 90.8%	93.93
<i>10 (high opportunity)</i>	84.78 – 100%	>9	> 90.8%	> 93.93

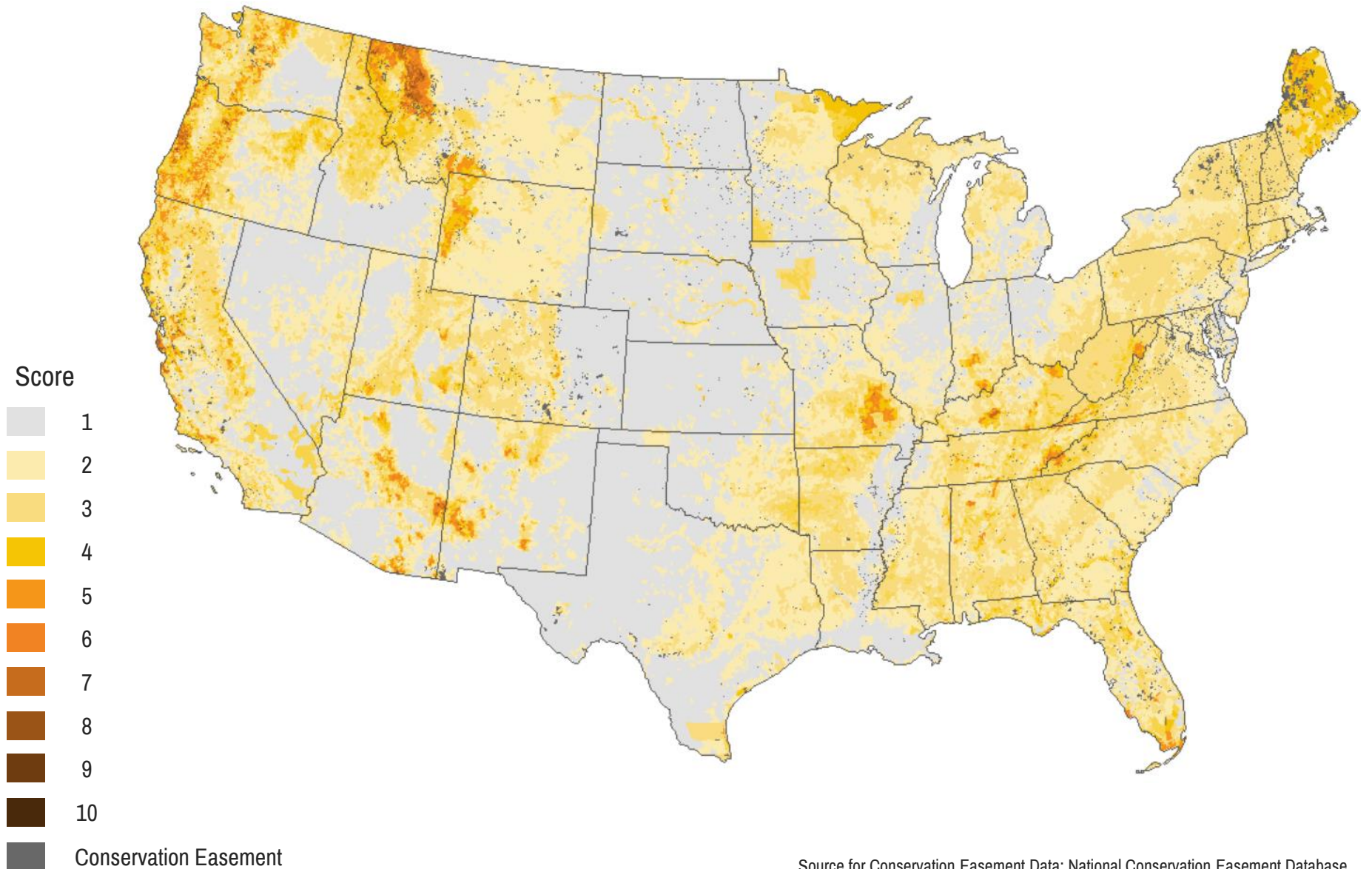
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Results: This map displays locations (in orange) with high scores for habitat conservation potential on all lands in the United States.

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Results: Habitat Conservation Opportunities on All Forested Lands



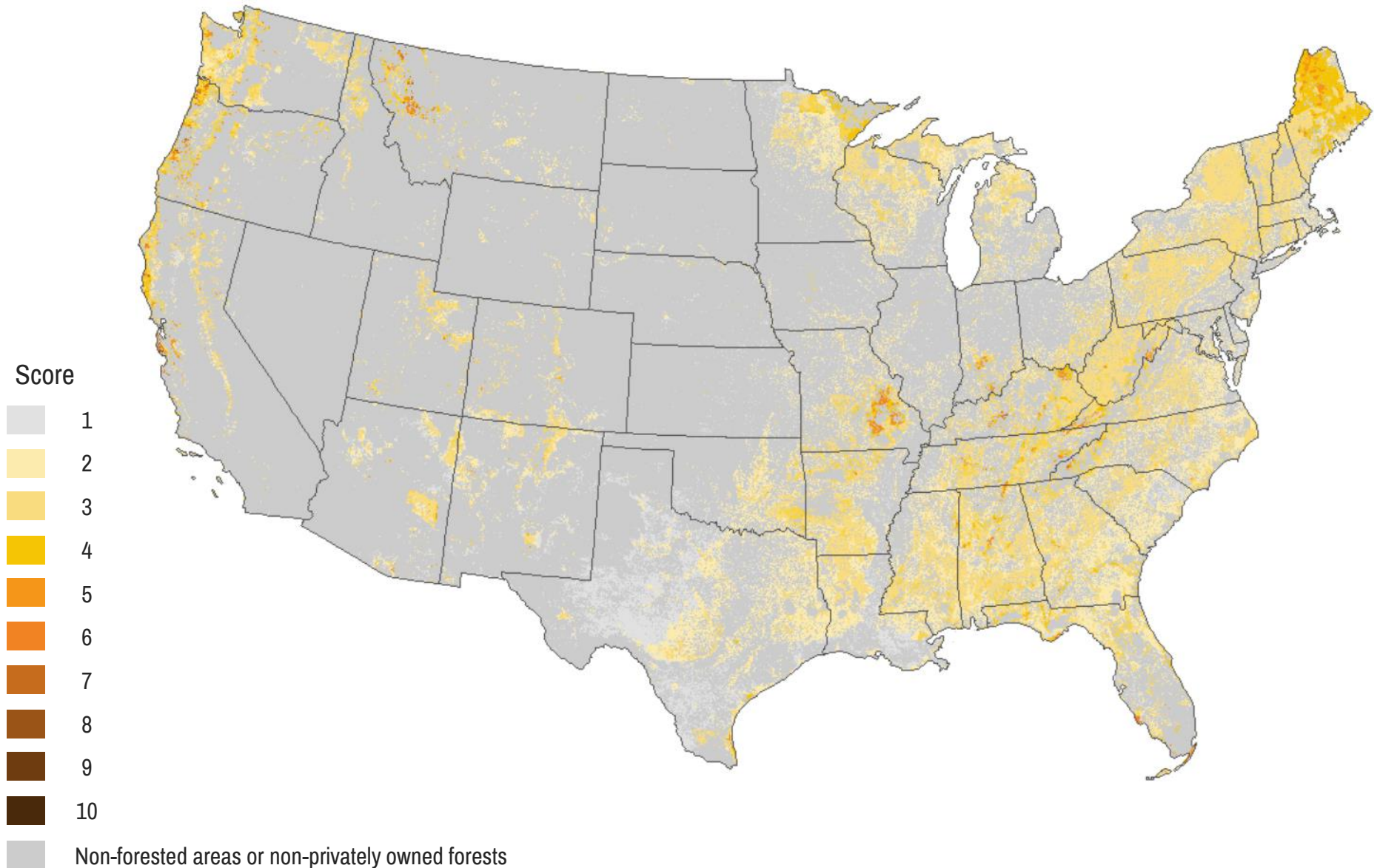
Source for Conservation Easement Data: National Conservation Easement Database.
Downloaded April 2018, <https://www.conservationaleasement.us/>

ENVIROATLAS USE CASE

Results: This map displays locations (in orange) with high scores for habitat conservation potential on all non-federal lands in the United States.

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Results: Habitat Conservation Opportunities on State, Private, and Tribal Forested Lands



Mapping Wetland Restoration Opportunities

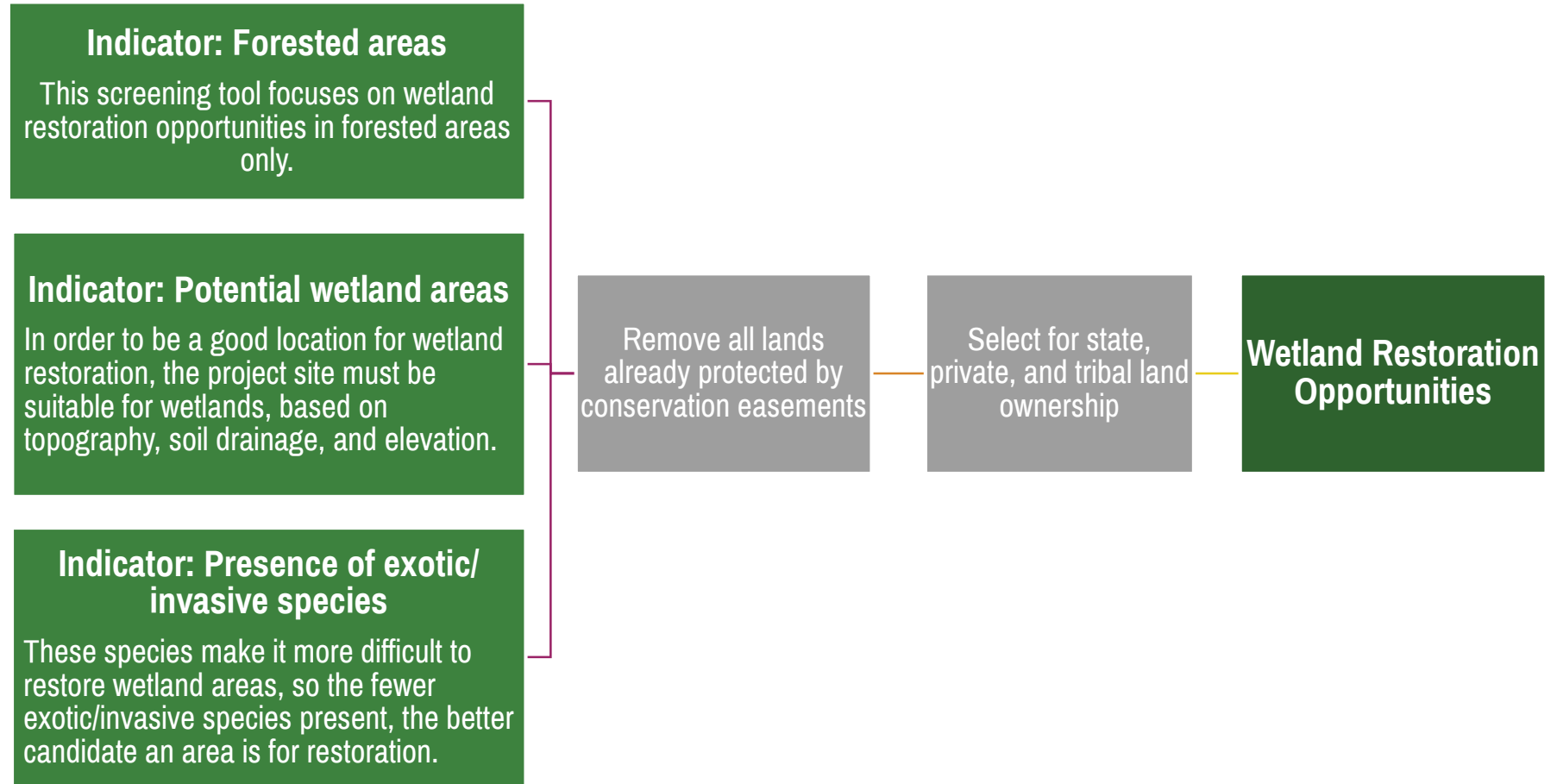
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This chart shows the indicators used to develop an overall score for potential wetland restoration opportunities on state, private, and tribal forested lands.

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Analysis of Wetland Restoration Opportunities: Analytical Framework

INDICATORS



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This table shows the data source, unit, and scoring approach for each indicator of wetland restoration potential.

Analysis of Wetland Restoration Opportunities: Indicators, Data Sources, and Scoring Method

Indicator	Potential wetland areas	Forested areas	Presence of exotics/invasives
<i>Source</i>	EnviroAtlas	EnviroAtlas	USGS Nonindigenous Aquatic Species Database
<i>Unit</i>	Level of potential	% forests per HUC-12	# of introductions and/or observations of nonindigenous aquatic fishes, mammals, reptiles, amphibians, invertebrates, and plants since 2010 per HUC-12
<i>Scoring method</i>	-	Natural breaks	Natural breaks
<i>Scores</i>			
<i>1 (low opportunity)</i>	No evident potential	< 5.08 %	>664
<i>2</i>	-	5.09 - 14.45%	287-663
<i>3</i>	-	14.46 – 25.00%	177-286
<i>4</i>	Low potential	25.01 - 35.94%	120-176
<i>5</i>	-	35.95 - 46.48%	75-119
<i>6</i>	-	46.49 - 56.25%	450-74
<i>7</i>	Moderate potential	56.26 - 65.63%	28-49
<i>8</i>	-	65.64 – 75.00%	12-27
<i>9</i>	-	75.01 - 84.77%	1-11
<i>10 (high opportunity)</i>	High potential	84.78 – 100%	0

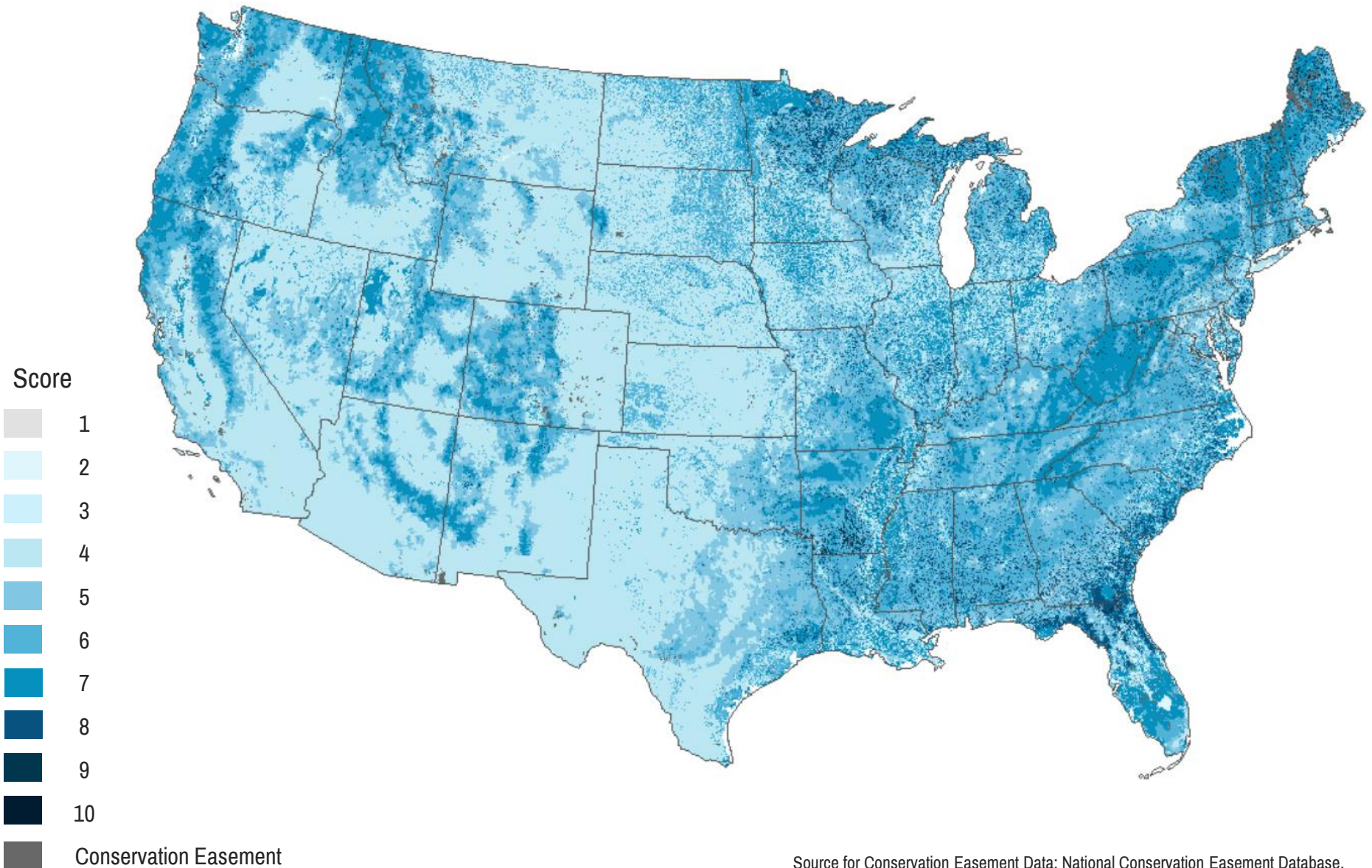
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Results: This map displays locations (in blue) with high scores for wetland restoration potential on all lands in the United States.

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Results: Wetland Restoration Opportunities on All Forested Lands

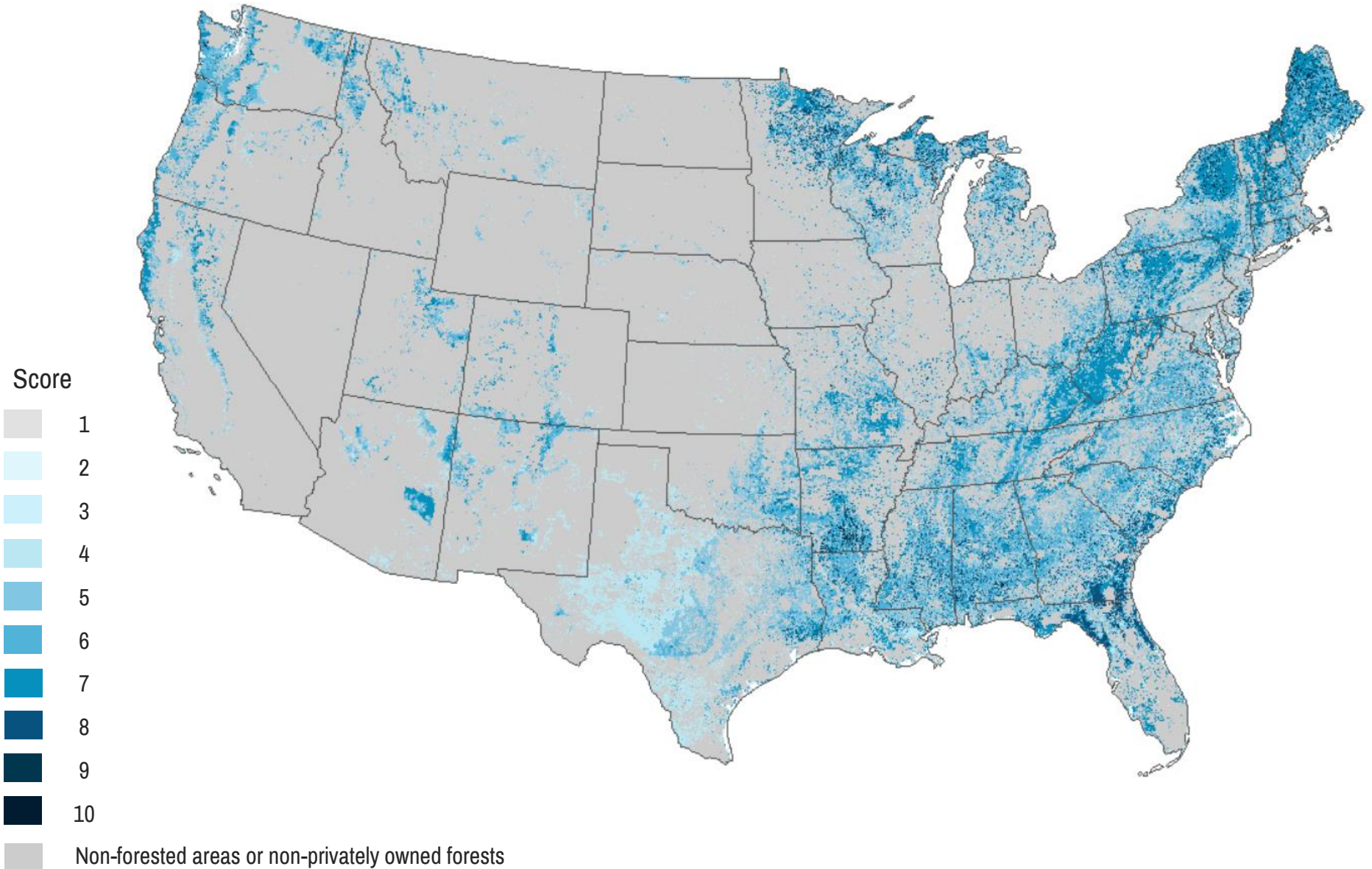


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Results: This map displays locations (in blue) with high scores for wetland restoration potential on all forested, non-federal lands in the United States.

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Results: Wetland Restoration Opportunities on State, Private, and Tribal Forested Lands



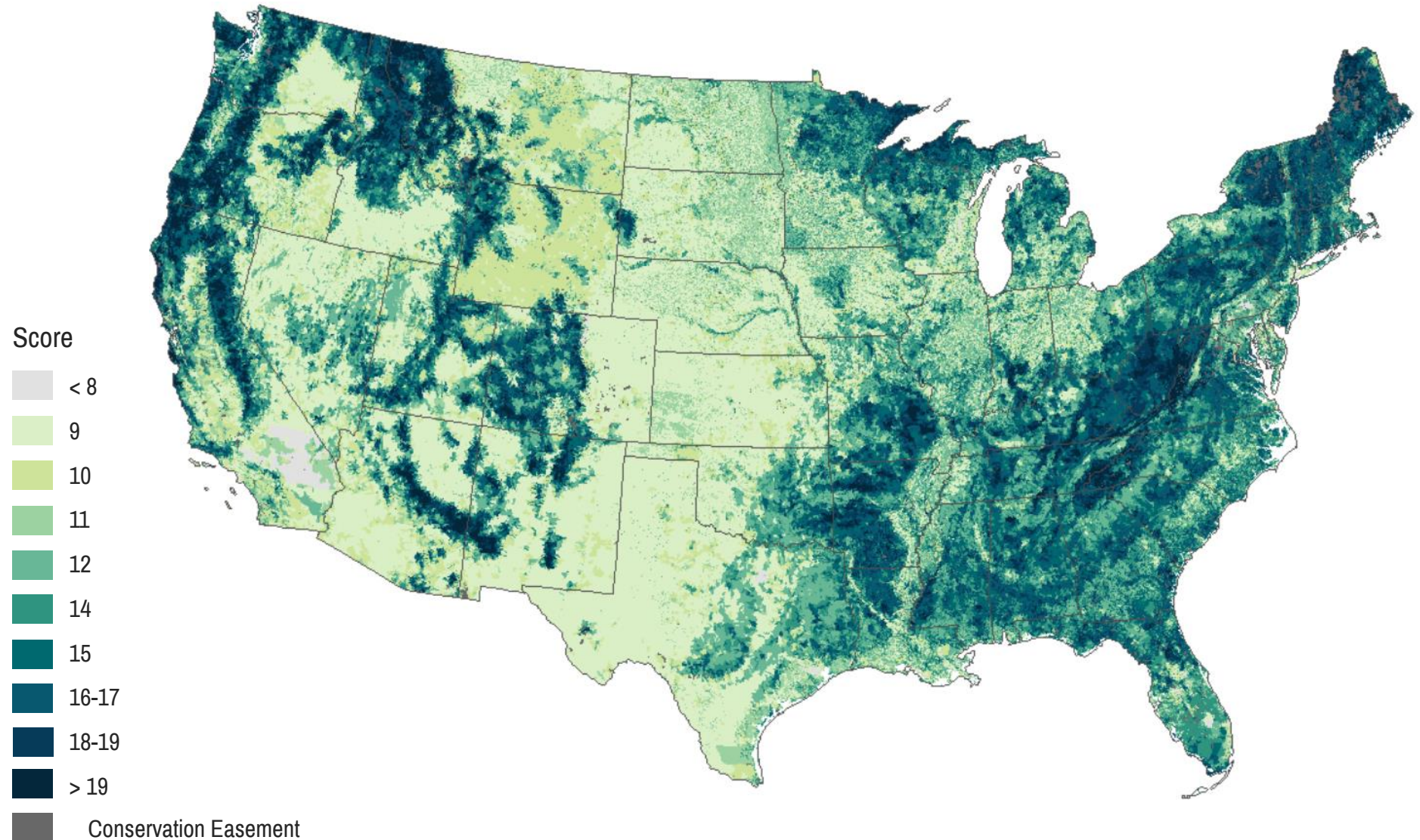
Catalyzing Shared Investments

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Many forests might generate revenue from multiple conservation values, either through “bundled” conservation investments (such as paying for habitat conservation *and* carbon sequestration), or “stacked” investments, with each targeting a distinct conservation outcome. This map shows areas that received high cumulative scores for forest carbon, habitat conservation, *and* wetland restoration opportunities.

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Multiple Benefits Opportunities on All Forested Lands

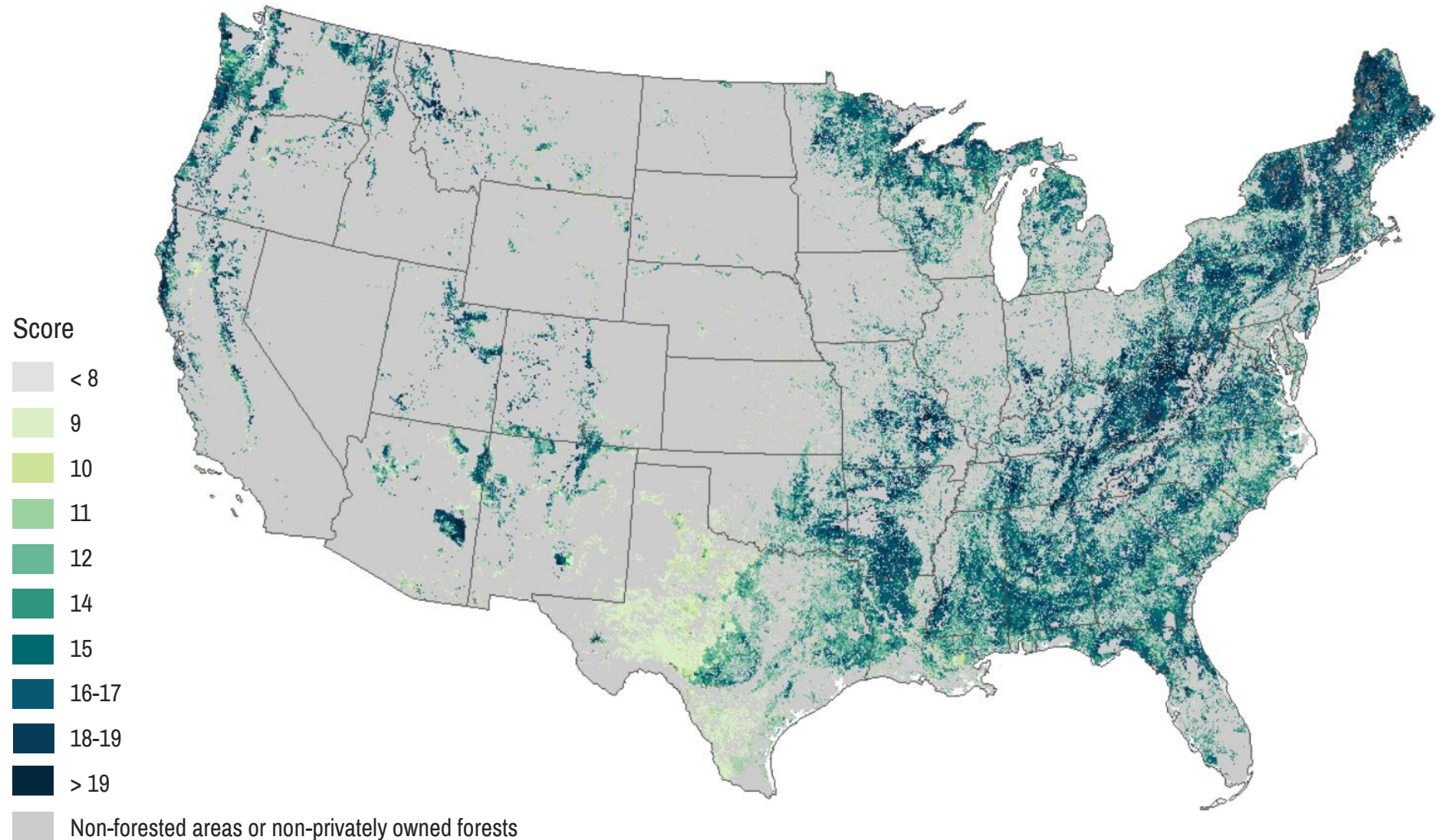


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Many forests could generate revenue from multiple conservation values, through “bundled” conservation investments (such as paying for habitat conservation *and* carbon sequestration), or “stacked” investments, with each targeting a distinct conservation outcome. This map shows state, private, and tribal forested lands that received high cumulative scores for forest carbon, habitat conservation, *and* wetland restoration opportunities.

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Multiple Benefits Opportunities on State, Private, and Tribal Forested Lands

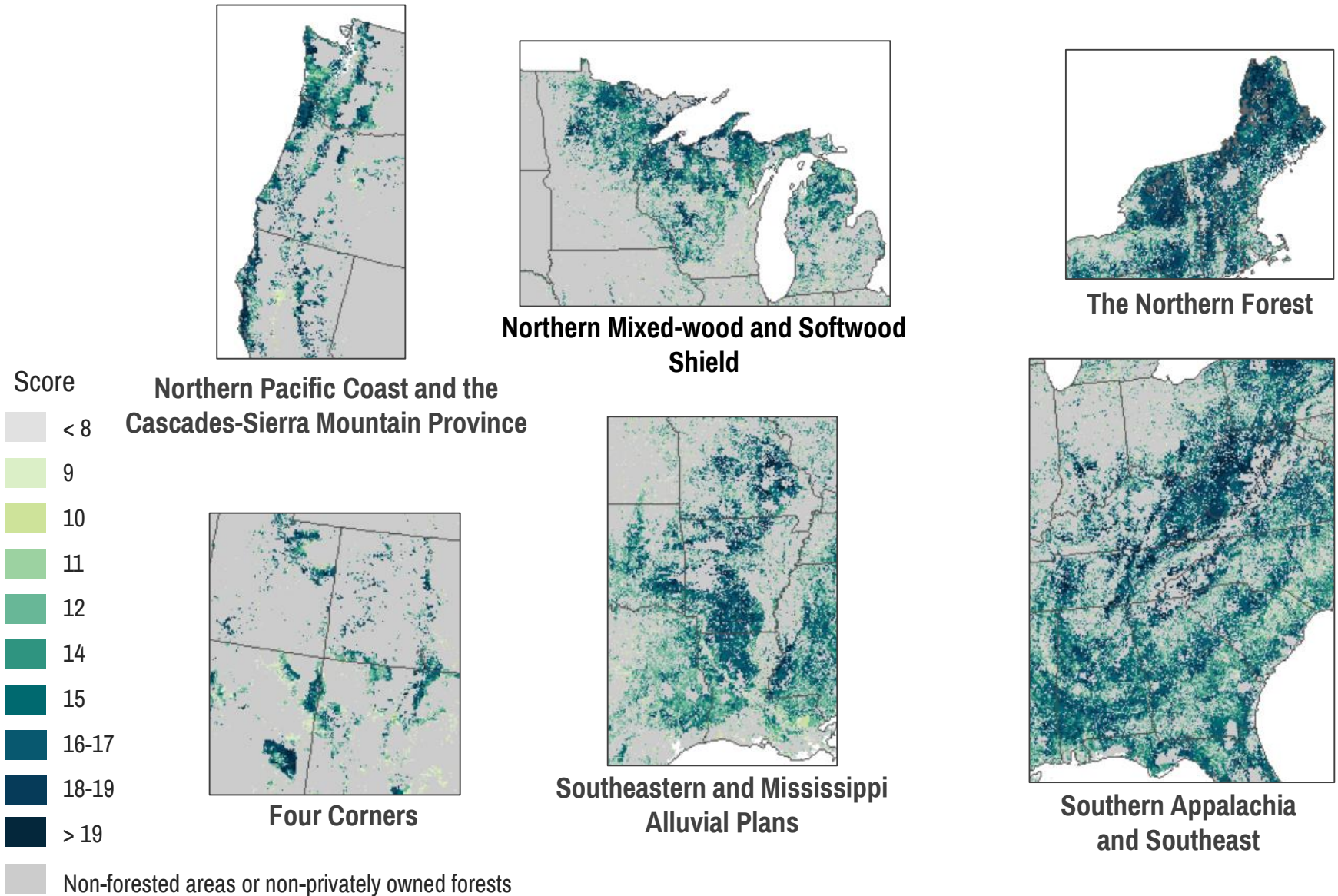


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Here, we zoom in on regions with significant state, private, and tribal forested land area with high cumulative scores for multiple benefits for forest carbon, habitat conservation, and wetland restoration opportunities.

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Multiple Benefits Opportunities on State, Private, and Tribal Forested Lands: High-Potential Regions

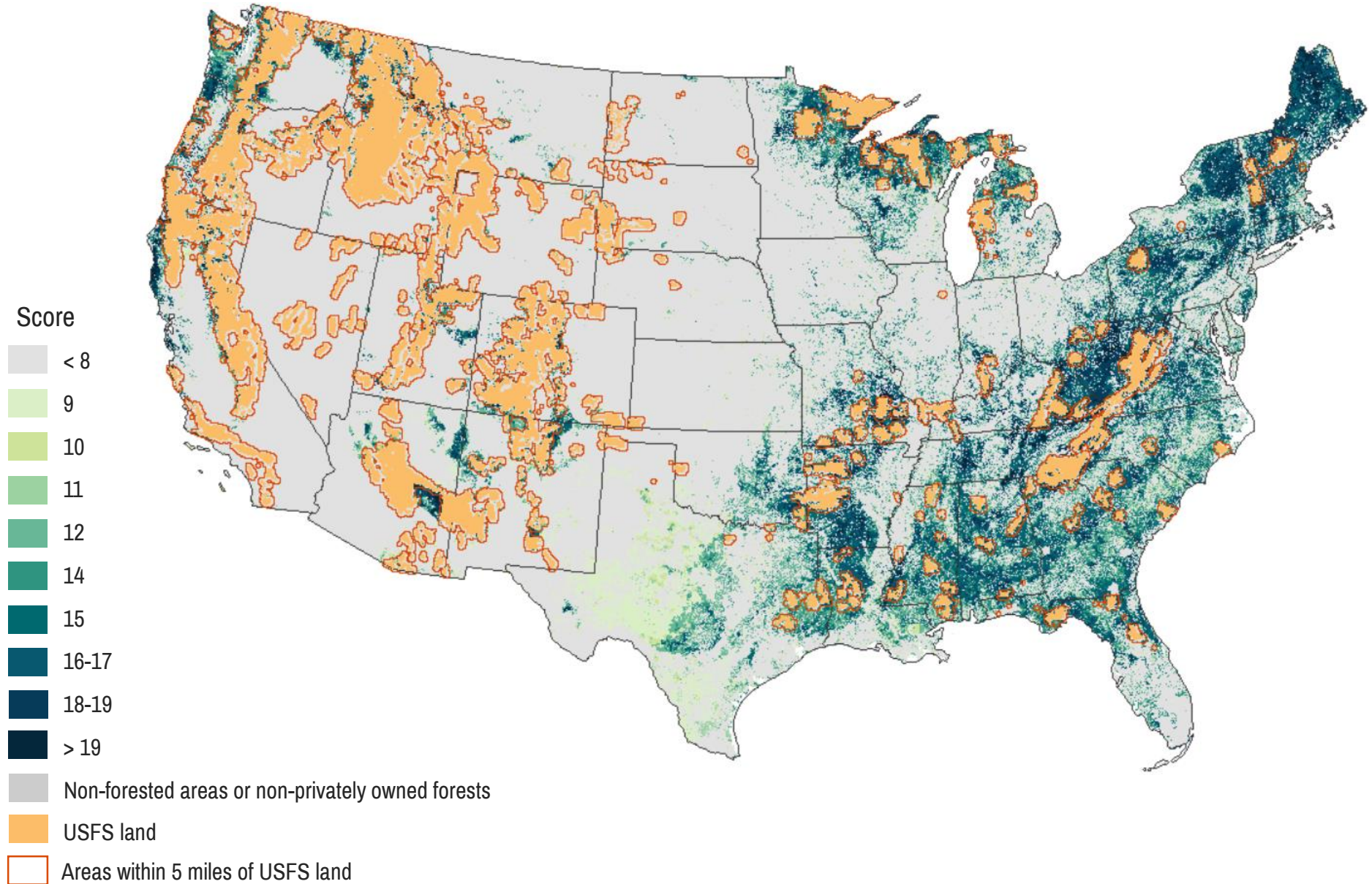


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This project also seeks to identify opportunities for cross-boundary investments. This map shows where opportunities for multiple benefits investments on state, private, and tribal forested lands occur within a 5-mile radius of USFS administrative boundaries. Our model indicates as much as 1.3M acres of state, private, or tribal forested land within 5 miles of the National Forest System are high-opportunity areas (scoring >15 points).

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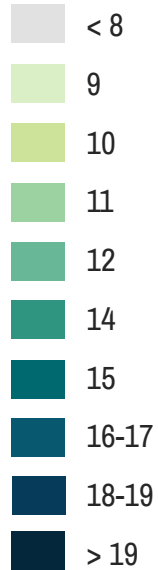
Cross-Boundary Shared Investments: USFS Administrative Boundaries and Multiple Benefits Opportunities on State, Private, and Tribal Forested Lands



Opportunities for Cross-Boundary Shared Investments: Northern Pacific Coast, Cascades-Sierra Mountain Province, and Northern Rockies

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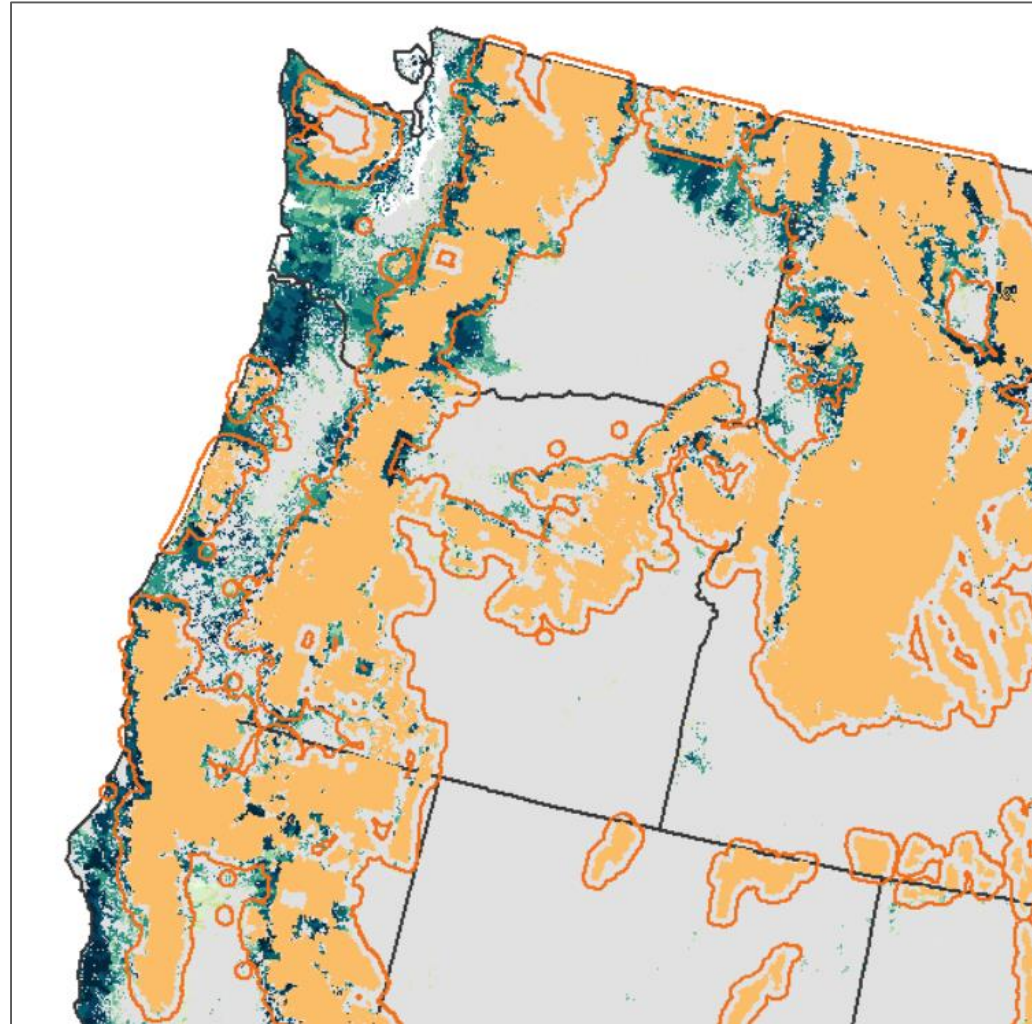
Score



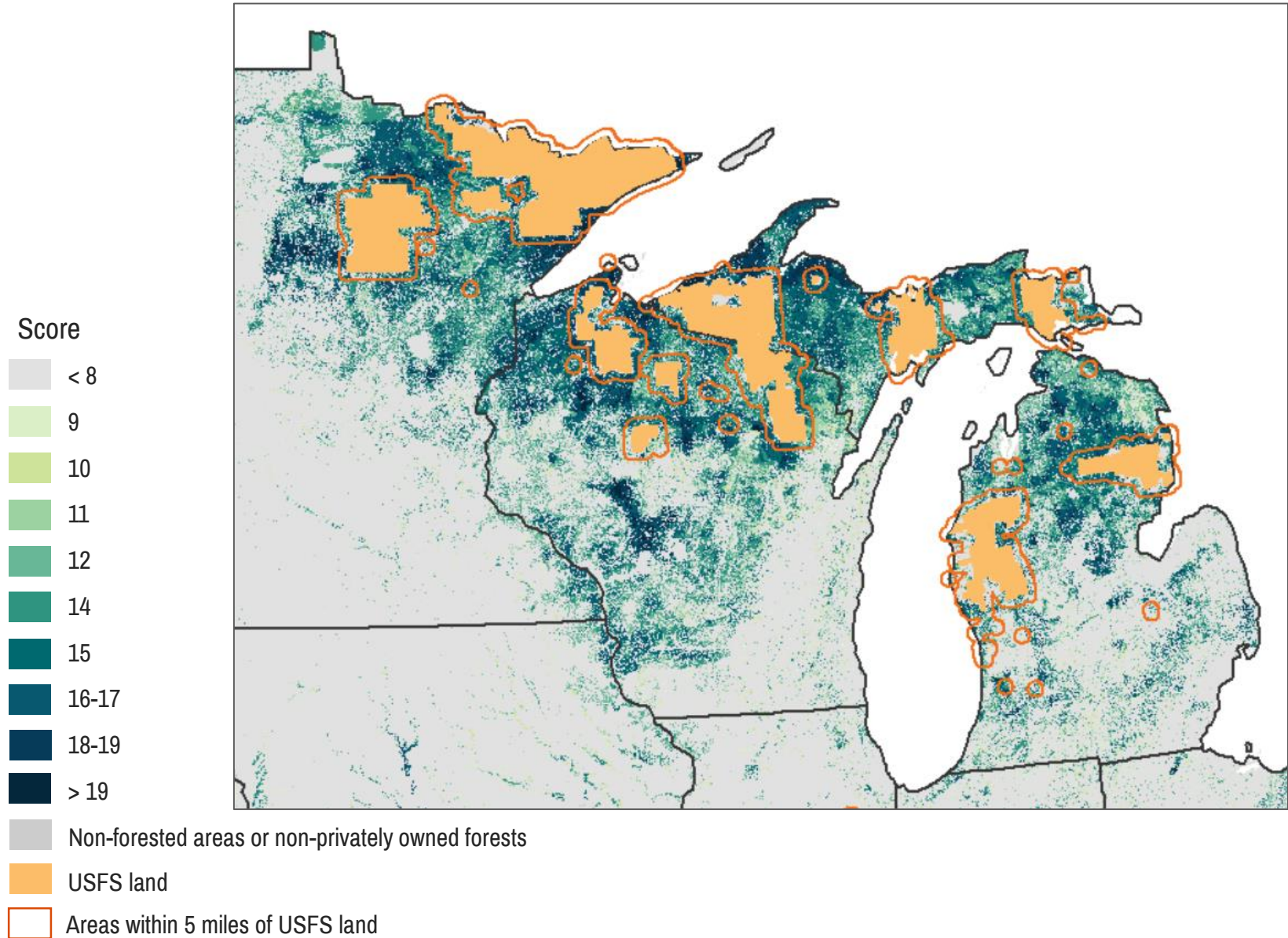
Non-forested areas or non-privately owned forests

USFS land

Areas within 5 miles of USFS land



Opportunities for Cross-Boundary Shared Investments: Northern Mixed-Wood and Softwood Shield

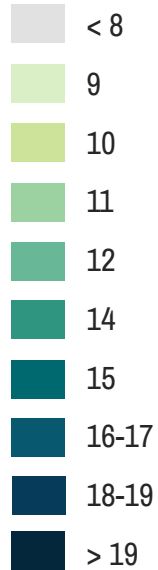


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Opportunities for Cross-Boundary Shared Investments: The Northern Forest

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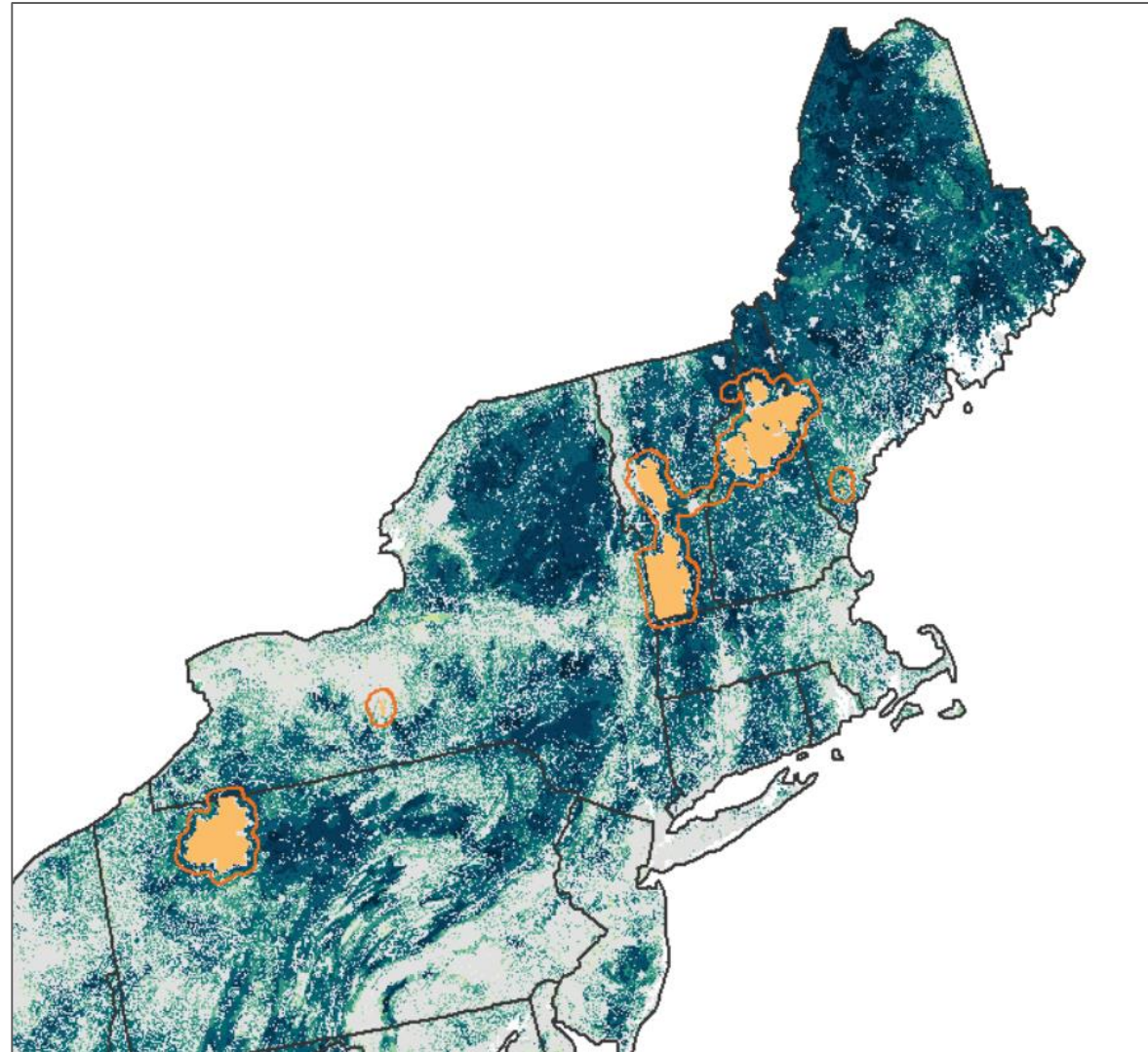
Score



Non-forested areas or non-privately owned forests

USFS land

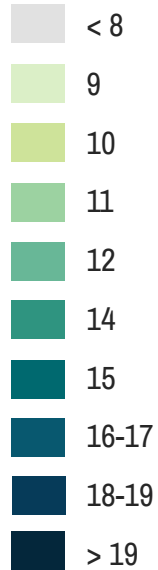
Areas within 5 miles of USFS land



Opportunities for Cross-Boundary Shared Investments:

Southern Appalachia and Southeast Forests

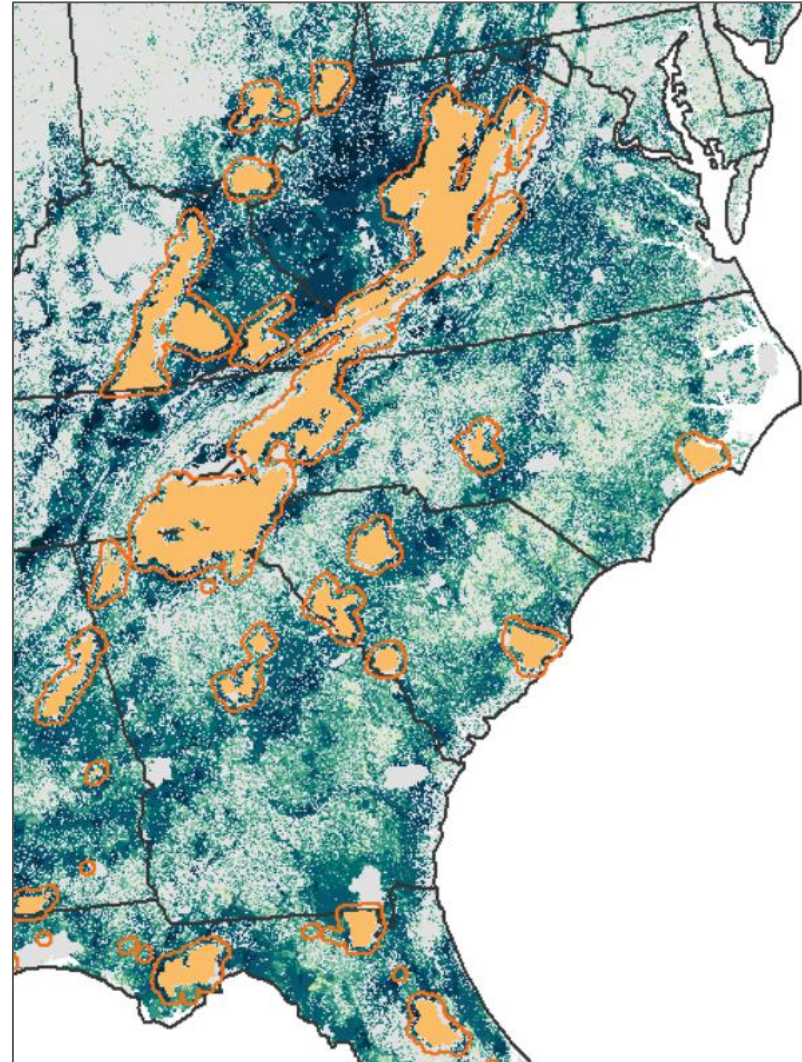
Score



Non-forested areas or non-privately owned forests

USFS land

Areas within 5 miles of USFS land

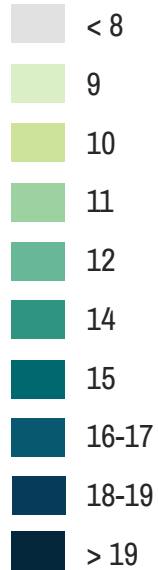


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Opportunities for Cross-Boundary Shared Investments: Southeastern and Mississippi Alluvial Plans

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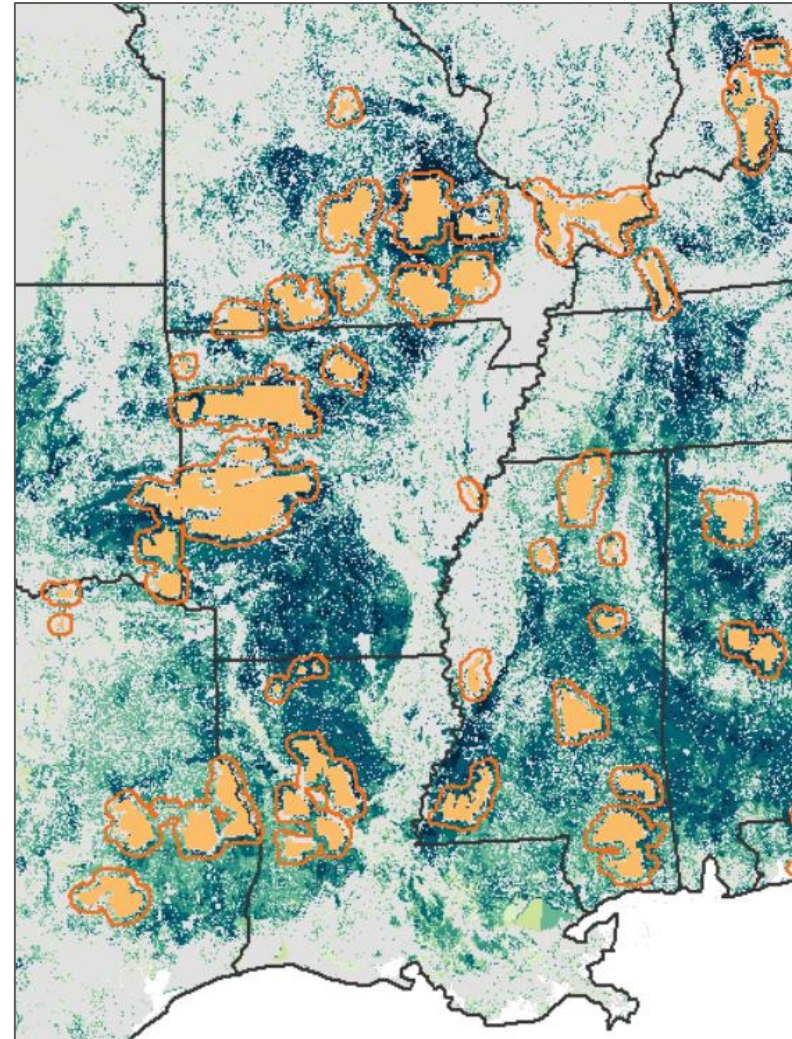
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Non-forested areas or non-privately owned forests

USFS land

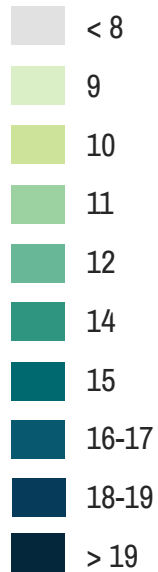
Areas within 5 miles of USFS land



Opportunities for Cross-Boundary Shared Investments:

Four Corners

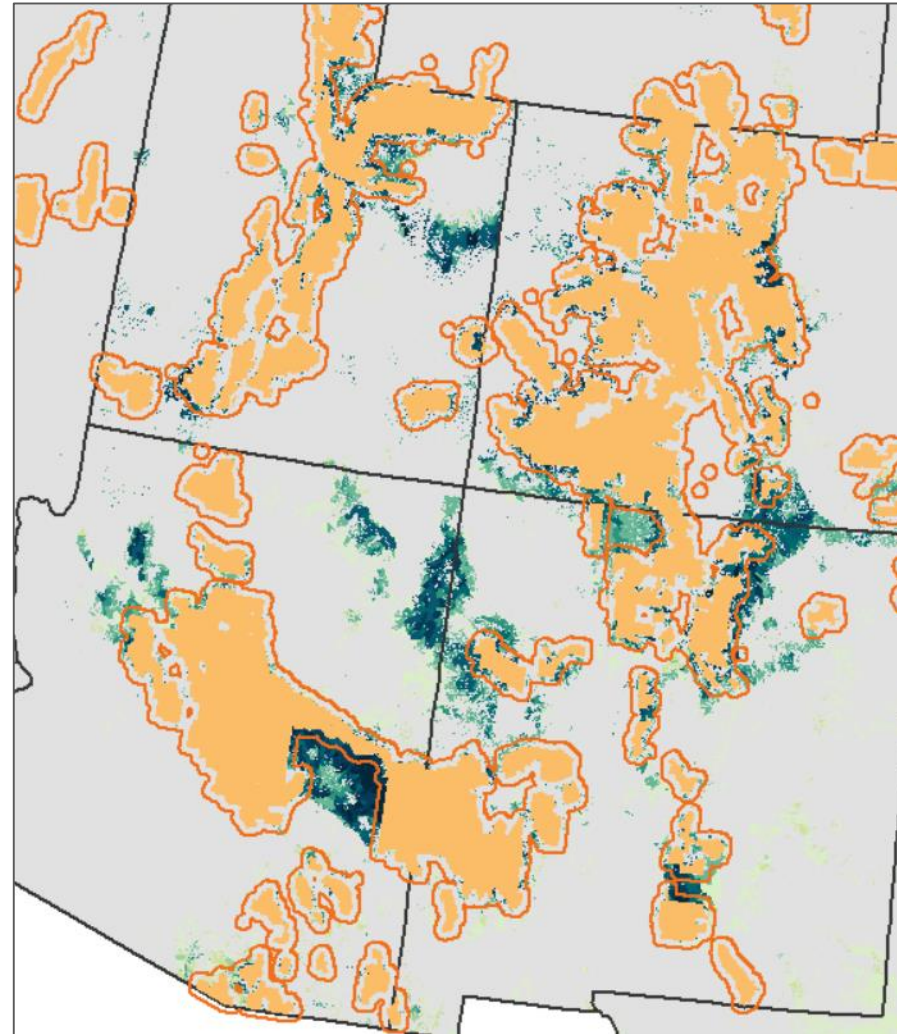
Score



Non-forested areas or non-privately owned forests

USFS land

Areas within 5 miles of USFS land



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Proposed next steps

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How USFS Can Catalyze Shared Investments in Working Forests

This mapping exercise is intended as a screening tool to understand the overall scale of opportunity and identify some promising regions. Before investments are made on the ground, additional due diligence will also be needed to look at opportunity indicators in greater depth and resolution. We are aware of a number of factors that project developers routinely consider for which geospatial data are unavailable at a national scale, but which should be considered at the local or regional level. In the future we hope to offer new data, tools, and guidance that can help to address some of these current limitations.

Proposed next steps include:

1. Evaluation of our findings with a stakeholder advisory group to “ground-truth” results and consider how to refine or build on this screening exercise.
2. Development of an interactive web-based mapping tool/widget to assist users in identifying and evaluating opportunities for specific parcels. The tool might include additional conservation investment opportunities, such as source water protection, water quality trading, and emerging small-diameter timber products. The proposed tool would also include data on local and regional market demand drivers and potentially an index of resources for landowners interested in developing new projects.
3. Develop partnerships supporting additional analysis of specific local and regional market opportunities, evaluation of USFS opportunities for targeting technical assistance to landowners pursuing conservation investments, and pilot testing of innovative investment models. Analysis could also look specifically at investment models most appropriate for specific forest landownership types, property sizes, and capacity for implementation and investor engagement.

Interested in learning more?

- Explore these findings in an [interactive online map](#).
- Join us for a [Town Hall session](#), "Creating New Opportunities for Shared Investments in Working Forest Lands," at the [ACES 2018 conference](#) in Washington, DC on Thursday, December 6th 2018 at 12:45 pm.
- Check out [EnviroAtlas](#) to view 300+ layers on scientific, demographic, and market indicators for ecosystem services, including many of the datasets used to develop this use case.
- [View additional use cases](#) evaluating ecosystem market opportunities in the United States.

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