

Climate Change Tree Atlas

The Forest Service's online resource to help land managers chose the right tree for the right site under different climate change scenarios

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Where to Start?

<http://www.fs.fed.us/nrs/atlas/>

USDA United States Department of Agriculture
Forest Service

Northern Research Station

Forest Service Home | About the Agency | Contact the National Office

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Climate Change Atlas

Explore the Climate Change Tree Atlas

Explore the potential habitat shifts for 134 tree species

Search for Trees & Birds:

Enter a common or scientific name

[List of Trees](#) | [List of Birds](#)

About the Climate Change Atlas

The Climate Change Atlas documents the current and possible future distribution of **134 tree species** and **147 bird species** in the Eastern United States and gives detailed information on environmental characteristics defining these distributions. Please be sure to read the **warnings, cautions and questions**. You can also **browse and view the previous version of the Tree Atlas**.

Featured Research

Central Appalachians forest ecosystem vulnerability assessment and synthesis: a report from the Central Appalachians Climate Change Response Framework project

Combined Species Outputs

Potential Changes by Region, State, Forest Type or National Forest and Parks

Climate Change Atlas Resources

Hands-on Guide to Atlas (pdf)

Videos

- Quick Start Guide
- An Introduction to the Climate Change Atlas: How does it work?
- An Overview of the Climate Change Atlas Components
- Exploring Current Species Information
- Modeled Future Habitats
- Combined Species Outputs

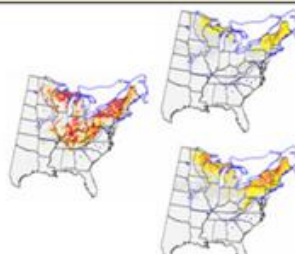
Short instructional videos and guide for the use, background, and functions of the Climate Change Atlas



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Climate Change Atlases

- [Tree Atlas](#)
- [Bird Atlas](#)
- [Combined Species Outputs](#)
- [Summary of Predictors](#)

Learn About the Models

- [DISTRIB](#)
- [SHIFT](#)
- [ModFacs](#)

Products

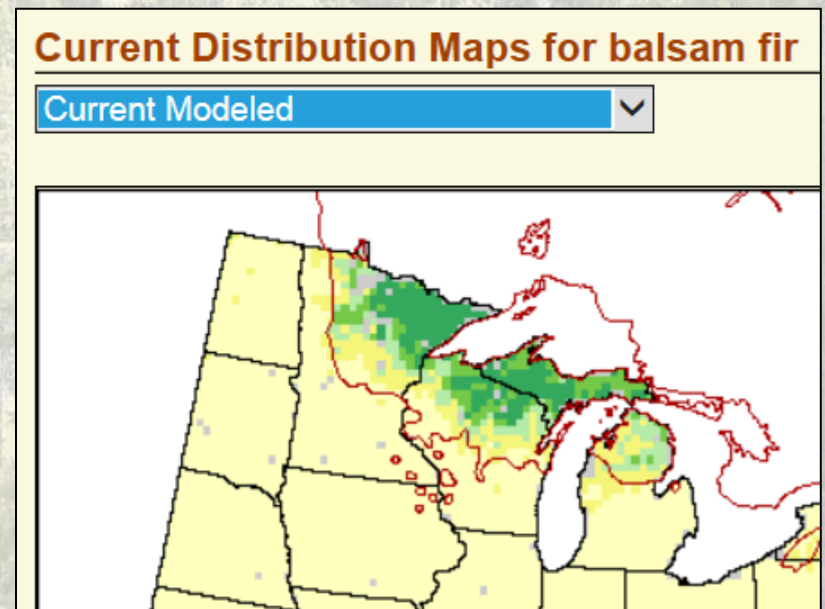
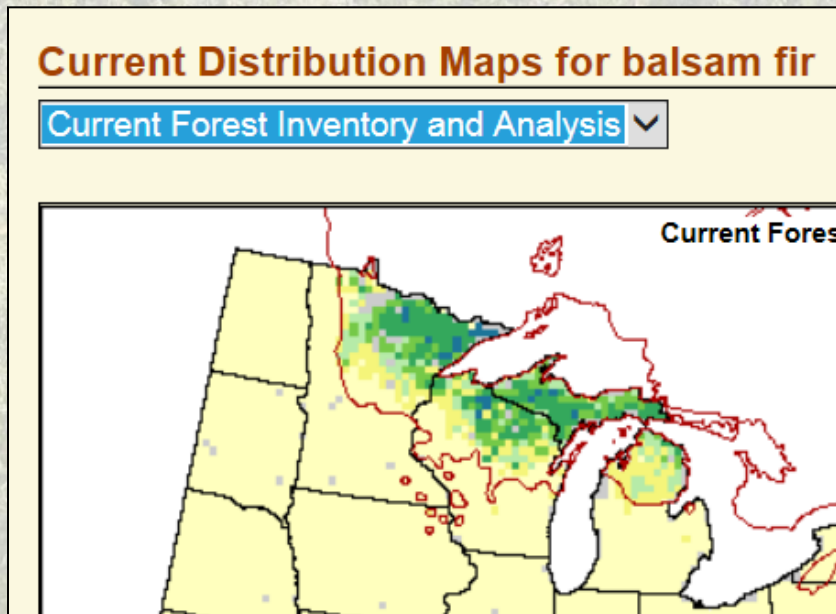
- [Publications](#)
- [Regional Assessments](#)
- [National Climate Assessment](#)

Get Help

- [Quick Start Guide](#)
- [Tutorial Videos](#)
- [How to Cite the Atlas](#)
- [Contact Us](#)

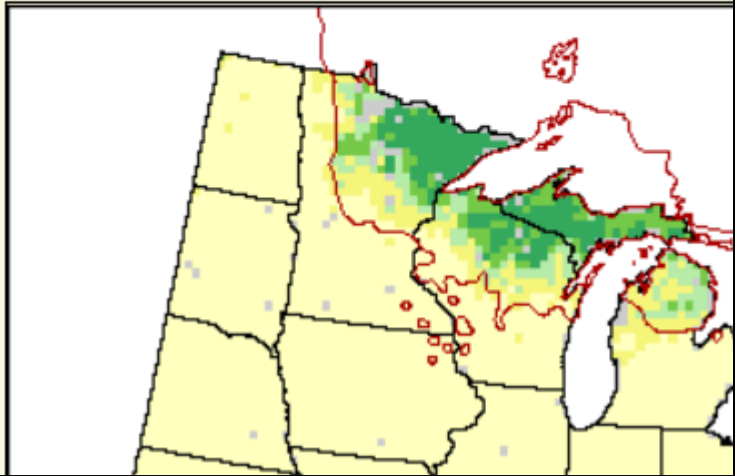
Species distribution models developed using

- Soils
- Elevation
- Land Use
- ~~Climate~~ **Future Climate Data**
- Existing Forest Service FIA data



Current Distribution Maps for balsam fir

Current Modeled



balsam fir (*Abies balsamea*)

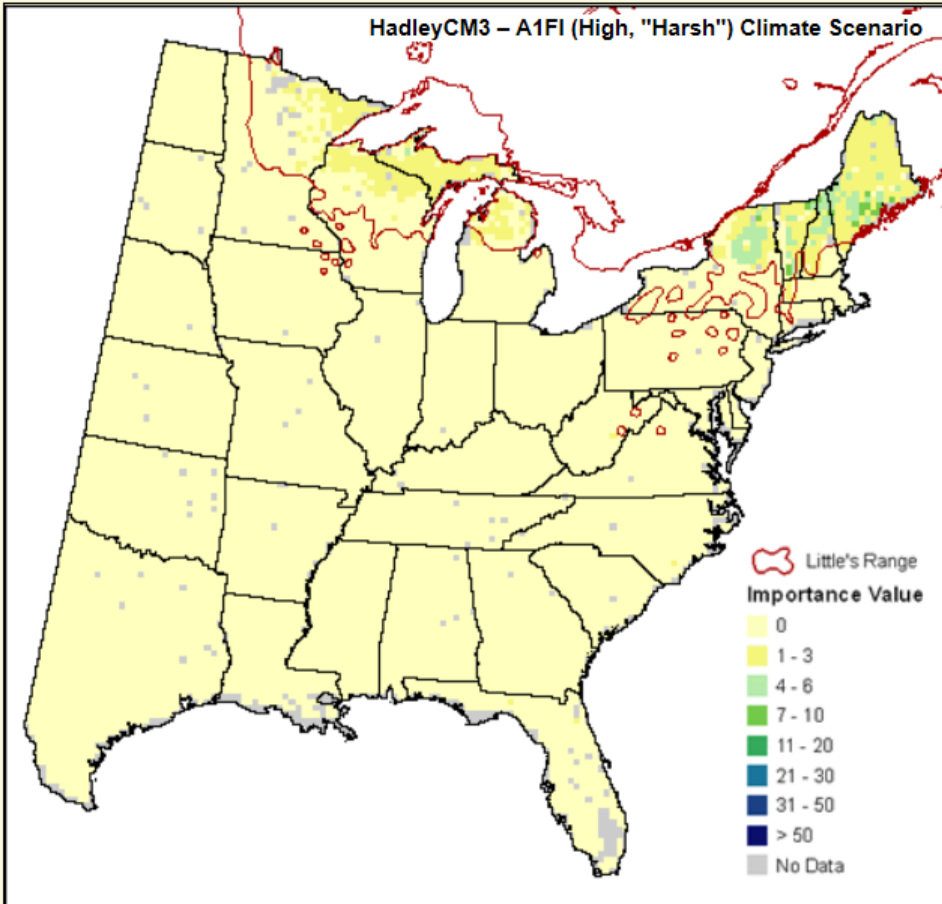
Current Distribution Projected Future Habitat ● Predictor Maps

Climate Change Scenario Maps ●

Help »

HadleyCM3 – A1FI (High, "Harsh")

Compare Scenarios

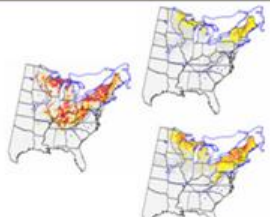


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Explore the potential habitat shifts for 134 tree species



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Climate Change Atlas Resources

Featured Research

Combined Species Outputs

Tree Species in the Climate Change Tree Atlas

Central Appalachia vulnerability assessment report from the Climate Change Atlas

Notice:

This is an updated version of the Climate Change Tree Atlas. You can also [browse the previous Tree Atlas](#).

Show 25 entries

Search:

Species Number	Model Reliability	Common Name	Scientific Name
951	2 - Medium	American basswood	Tilia americana
531	3 - High	American beech	Fagus grandifolia
421	2 - Medium	American chestnut	Castanea dentata
972	2 - Medium	American elm	Ulmus americana
591	3 - High	American holly	Ilex opaca
391	2 - Medium	American hornbeam: musclewood	Carpinus caroliniana
935	2 - Medium	American mountain-ash	Sorbus americana
43	1 - Low	Atlantic white-cedar	Chamaecyparis thyoides
221	2 - Medium	bald cypress	Taxodium distichum
12	3 - High	balsam fir	Abies balsamea
741	3 - High	balsam poplar	Populus balsamifera
816	1 - Low	bear oak: scrub oak	Quercus ilicifolia
654	1 - Low	bigleaf magnolia	Magnolia macrophylla
743	3 - High	bigtooth aspen	Populus grandidentata
402	1 - Low	bitternut hickory	Carya cordiformis

Eastern White Pine Distribution and Future Suitable Habitat

eastern white pine (*Pinus strobus*)

Current Distribution

Projected Future Habitat ●

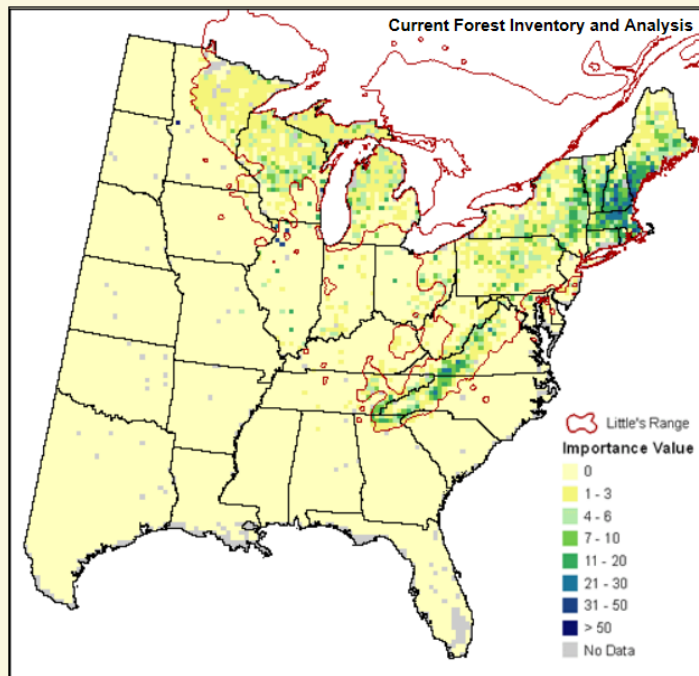
Predictor Maps

Current Distribution Maps for eastern white pine

Help »

Current Forest Inventory and Analysis ▼

Compare Two Species



eastern white pine (*Pinus strobus*)

Current Distribution

Projected Future Habitat ●

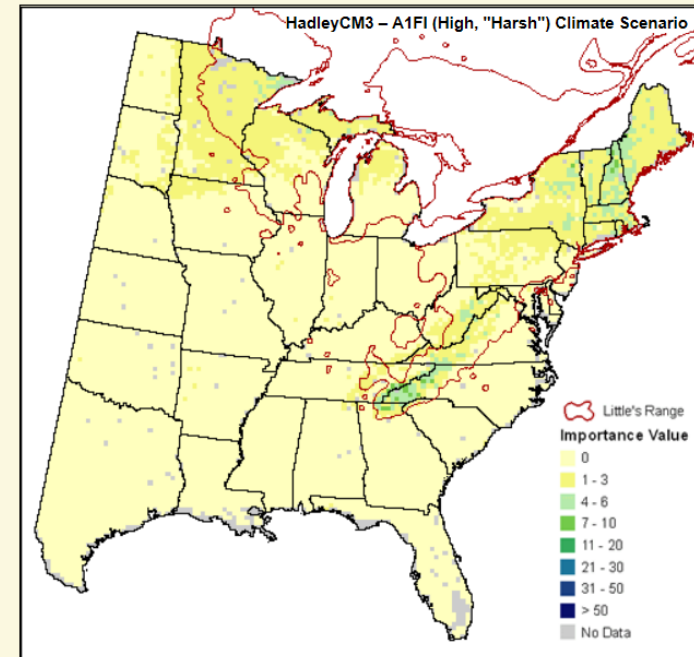
Predictor Maps

Climate Change Scenario Maps ●

Help »

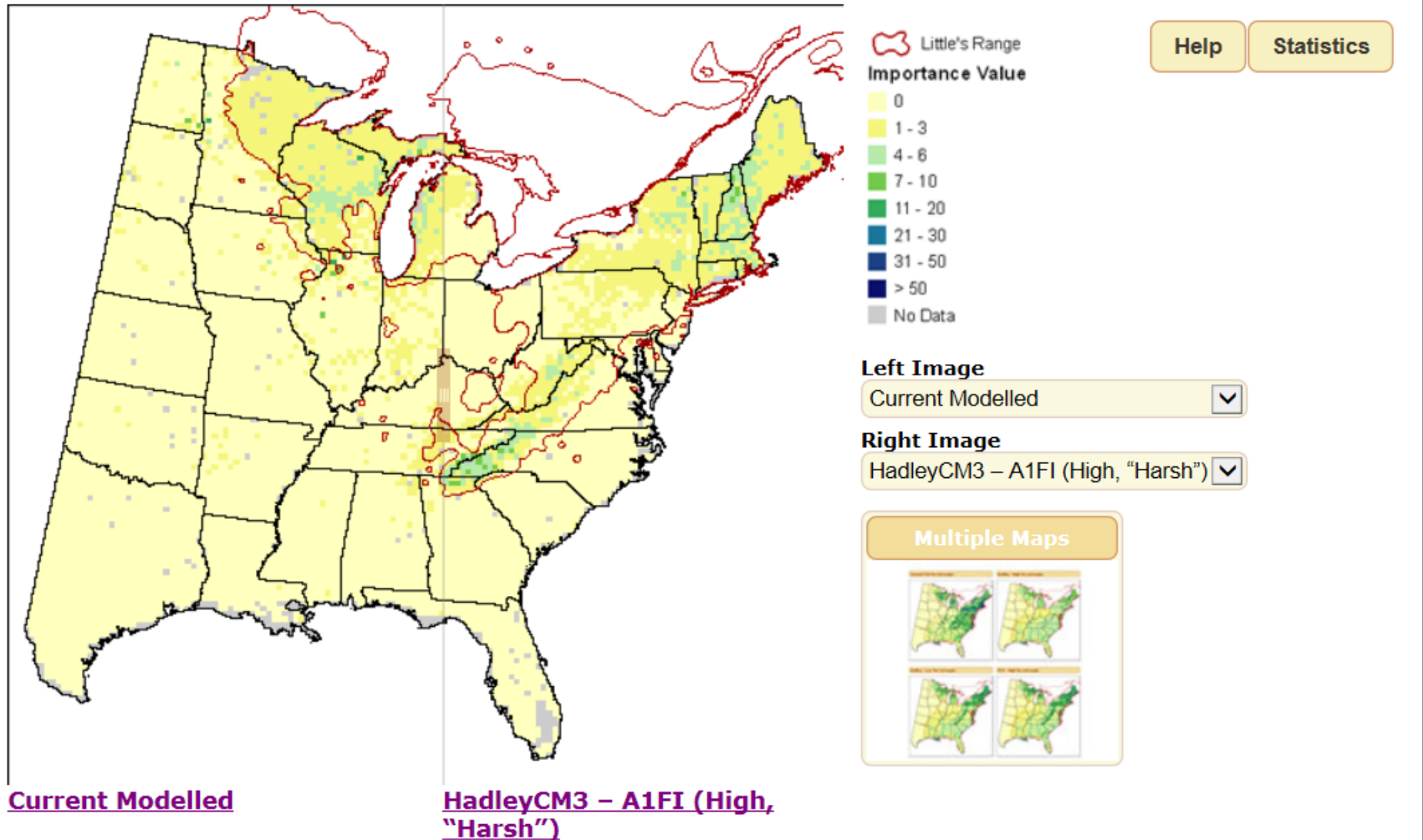
HadleyCM3 – A1FI (High, "Harsh") ▼

Compare Scenarios



Compare Scenarios

Current Modelled versus HadleyCM3 – A1FI (High, “Harsh”) for eastern white pine Model Reliability: High ●



Summary of Predictors

USDA United States Department of Agriculture
Forest Service

Northern Research Station

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Explore the potential habitat shifts for 134 tree species

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Combined Species Outputs

Potential Changes by Region, State, Forest Type or National Forest and Parks

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Enter a common or scientific name

[List of Trees](#) | [List of Bi](#)

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red maple (*Acer rubrum*)

[Current Distribution](#) [Projected Future Habitat](#) [Predictor Maps](#)

[Help »](#)

Ranked Maps of the Predictors Used in the Model

Mean May-September precipitation (mm) (1) [Compare Predictors](#)

Mean May-September precipitation (mm)

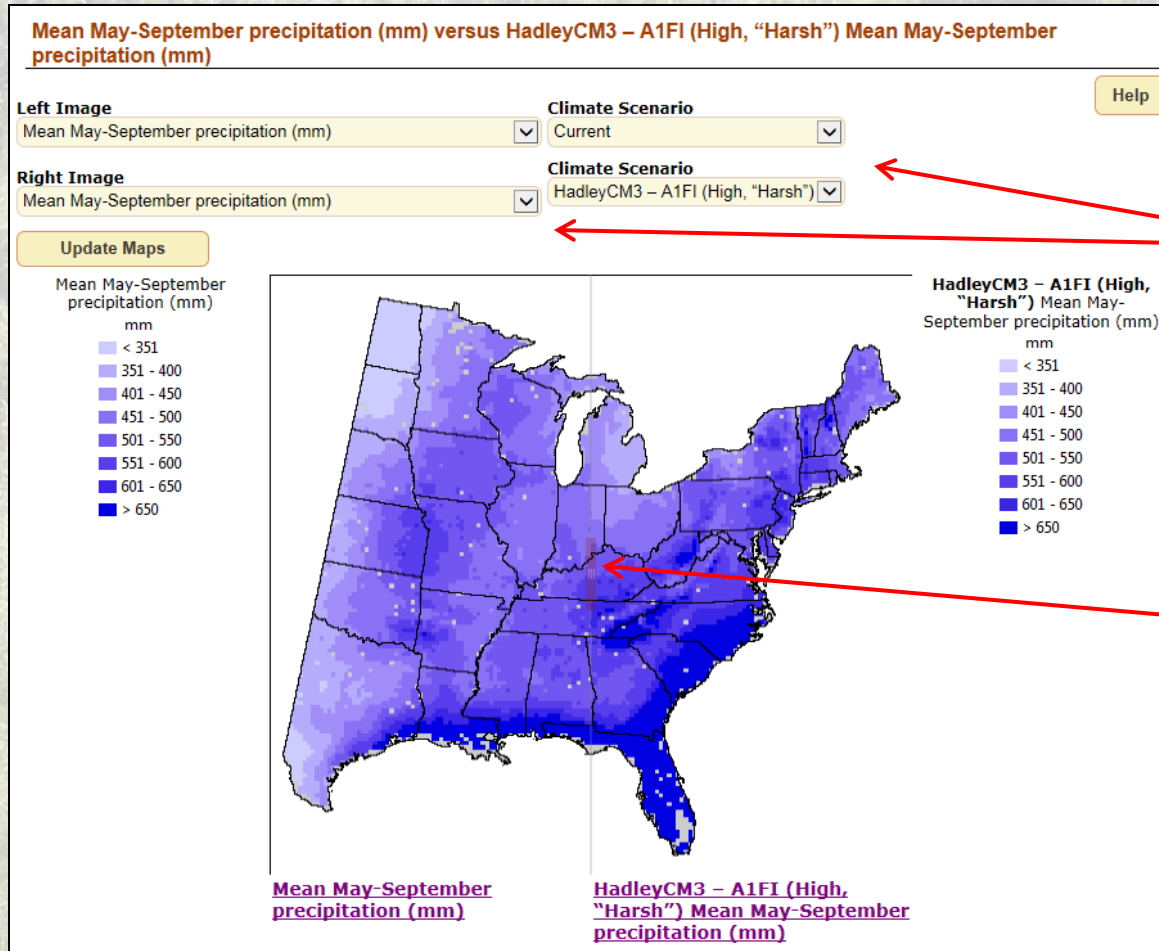
mm

- < 351
- 351 - 400
- 401 - 450
- 451 - 500
- 501 - 550
- 551 - 600
- 601 - 650
- > 650

Potential Changes in Abundance and Range (Future)

GCM SCENARIO	% Area Occ	Ave IV	Sum IV	Future/Current IV
Actual FIA	54.4	8.8	46,646	NA

Compare Predictors



Use the drop-down menus to change the climate variables and the climate scenarios

Slide bar in the middle to compare predictors and scenarios

Species Winners and Losers

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Climate Change Atlas

All Species Output

Current Distribution

Current Forest Types

Current Species Abundance by State

Current Species Abundance by Region

Current Mean center of Distribution (lat/long)

Modelled-Future Habitats

Potential Changes by Forest Types

Potential Changes by Region

Potential Species Winners and Losers by State

Potential Species Winners and Losers in National Forests/Grasslands

Potential Species Winners and Losers in National Parks

Potential Species Winners and Losers in Ecoregions

Future Mean Center of Distribution (lat/long)

Potential Changes of Mean Center Distribution (polar graphs)

Species Winners and Losers

Species Winners and Losers by State

The links below allow you to explore products that itemize mean changes in importance values for four GCM scenarios and also look at winners and losers of species within eastern US states.

Alabama(AL); Arkansas(AR); Connecticut(CT); Delaware(DE); Florida(FL); Georgia(GA); Iowa(IA); Illinois(IL); Indiana(IN); Kansas(KS); Kentucky(KY); Louisiana(LA); Massachusetts(MA); Maryland(MD); Maine(ME); Michigan(MI); Minnesota(MN); Missouri(MO); Mississippi(MS); North Carolina(NC); North Dakota(ND); Nebraska(NE); New Hampshire(NH); New Jersey(NJ); New York(NY); Ohio(OH); Oklahoma(OK); Pennsylvania(PA); Rhode Island(RI); South Carolina(SC); South Dakota(SD); Tennessee(TN); Texas(TX); Virginia(VA); Vermont(VT); Wisconsin(WI); West Virginia(WV).

Modeled Current-
Current Importance Values

"mean" IV Change from Current Modelled for: Michigan

Table of Winners & Losers: [MI mean fz winlose.csv](#)

NOTE: Table is sortable (ascending & descending) by clicking on the column names

Show entries

Spp#	SppCN	SppSN	ClimIndx	ModRel	ModCur	HadHiDif	PcmLoDif	Gcm3AvgHiDif	Gcm3AvgLoDif	IVchangeMap
12	balsam fir	Abies balsamea	3.5	1	3.47	-3.09	-2.48	-3.09	-2.96	RFmod_6pp_12.png
43	Atlantic white-cedar	Chamaecyparis thyoides	1	3	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_43.png
68	eastern redcedar	Juniperus virginiana	4	2	0.05	4.06	0.74	4.18	2.08	RFmod_6pp_68.png
71	tamarack (native)	Larix laricina	2.5	1	0.84	-0.53	-0.47	-0.53	-0.47	RFmod_6pp_71.png
94	white spruce	Picea glauca	3.5	2	0.82	-0.69	-0.63	-0.69	-0.53	RFmod_6pp_94.png
95	black spruce	Picea mariana	4	1	1.47	-1.43	-1.28	-1.44	-1.42	RFmod_6pp_95.png
97	red spruce	Picea rubens	4	1	0.11	-0.05	-0.04	-0.05	-0.06	RFmod_6pp_97.png
105	jack pine	Pinus banksiana	3	1	2.44	-1.87	-1.39	-1.91	-1.62	RFmod_6pp_105.png
107	sand pine	Pinus clausa	0	2	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_107.png
110	shortleaf pine	Pinus echinata	3.5	1	0.00	0.04	0.00	0.00	0.00	RFmod_6pp_110.png
111	slash pine	Pinus elliottii	2	1	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_111.png
115	spruce pine	Pinus glabra	0	2	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_115.png
121	longleaf pine	Pinus palustris	2.5	1	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_121.png
122	Table Mountain pine	Pinus pungens	1.5	2	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_122.png

Species Winners and Losers

Four Climate Change Scenarios show average importance value relative to the modeled current

"mean" IV Change from Current Modelled for: Michigan

Table of Winners & Losers: [MI_mean_fz_winlose.csv](#)

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107	sand pine	Pinus clausa	0	2	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_107.png
110	shortleaf pine	Pinus echinata	3.5	1	0.00	0.04	0.00	0.00	0.00	RFmod_6pp_110.png
111	slash pine	Pinus elliottii	2	1	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_111.png
115	spruce pine	Pinus glabra	0	2	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_115.png
121	longleaf pine	Pinus palustris	2.5	1	0.00	0.00	0.00	0.00	0.00	RFmod_6pp_121.png
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Species Winners and Losers

IVchangeMap loads maps to compare climate scenarios for species

"mean" IV Change from Current Modelled for: Michigan

Table of Winners & Losers: [MI_mean_fz_winlose.csv](#)

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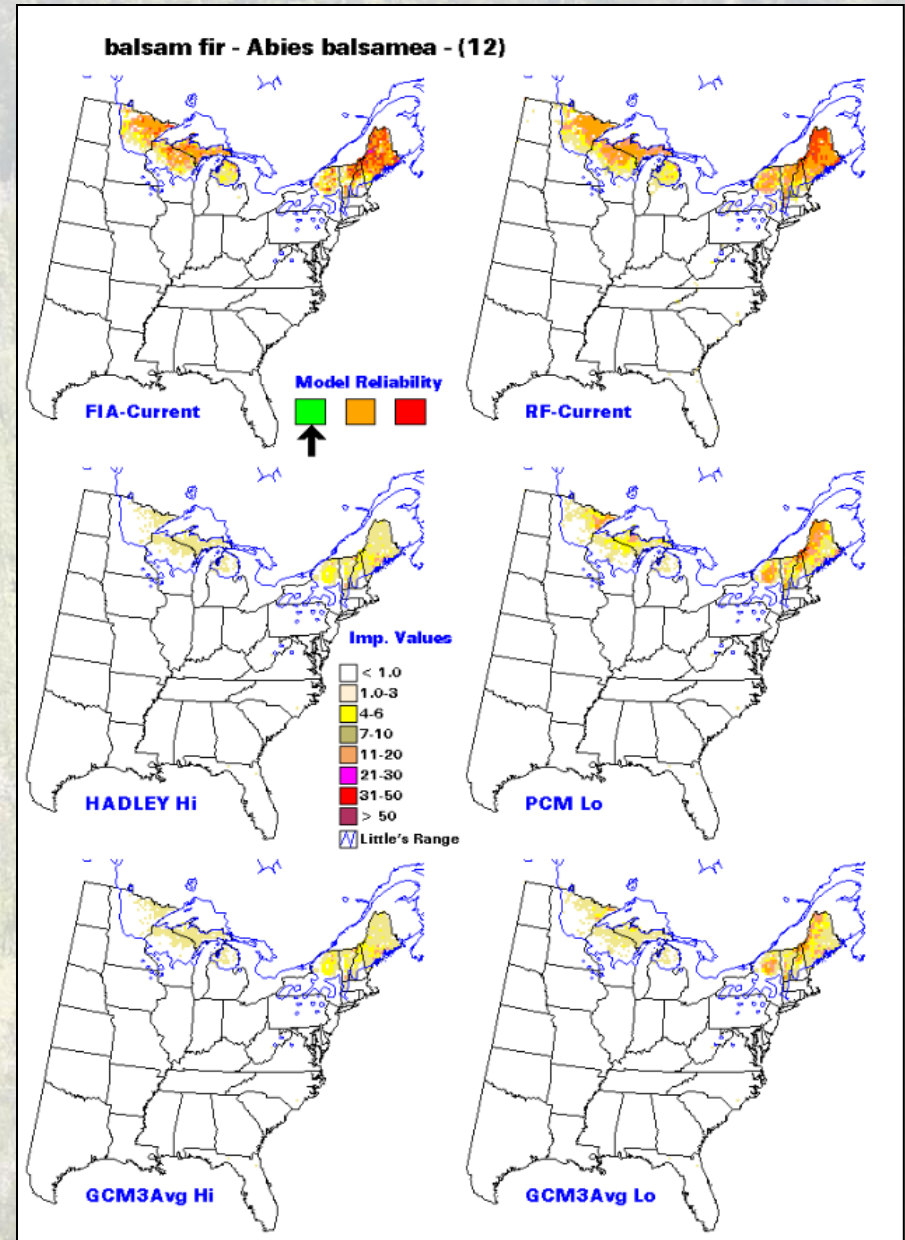


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IVchangeMap

- Two maps of current distributions
 - FIA data
 - Modeled
- Extremes of Climate Scenarios
 - Hadley High (most change)
 - PCM Low (least change)
- Averages of Scenarios
 - Average high emissions
 - Average low emissions



Habitat Changes by Species

**Northern Research Station**

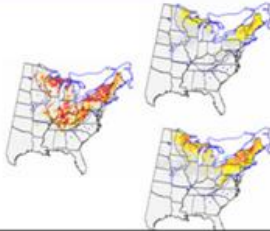
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Potential Changes by Region, State, Forest Type or National Forest and Parks

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- Tree Atlas
- Bird Atlas
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- Summary of Predictors

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red maple (*Acer rubrum*)

Current Distribution

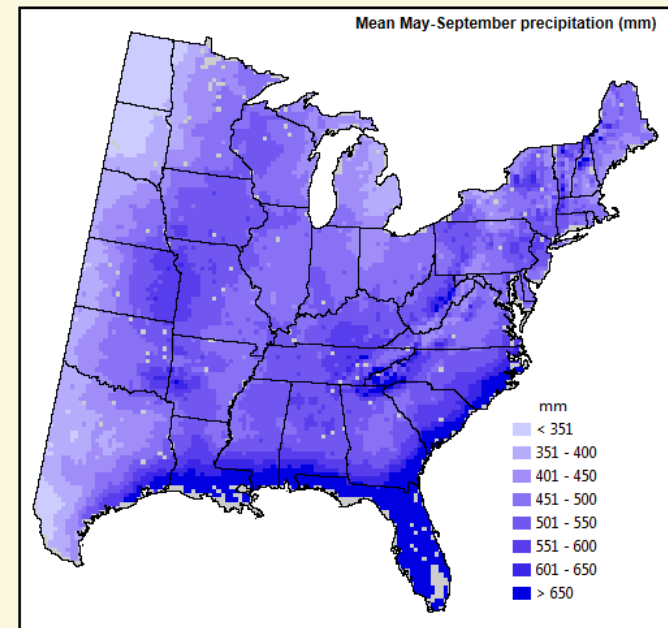
Projected Future Habitat

Predictor Maps

Ranked Maps of the Predictors Used in the Model

Mean May-September precipitation (mm) (1)

Compare Predictors



Potential Changes in Abundance and Range (Future)

GCM SCENARIO	% Area Occ	Ave IV	Sum IV	Future/Current IV
Actual FIA	54.4	8.8	46,646	NA

Habitat Changes by Species

red maple (*Acer rubrum*)

Current Distribution

Projected Future Habitat ●

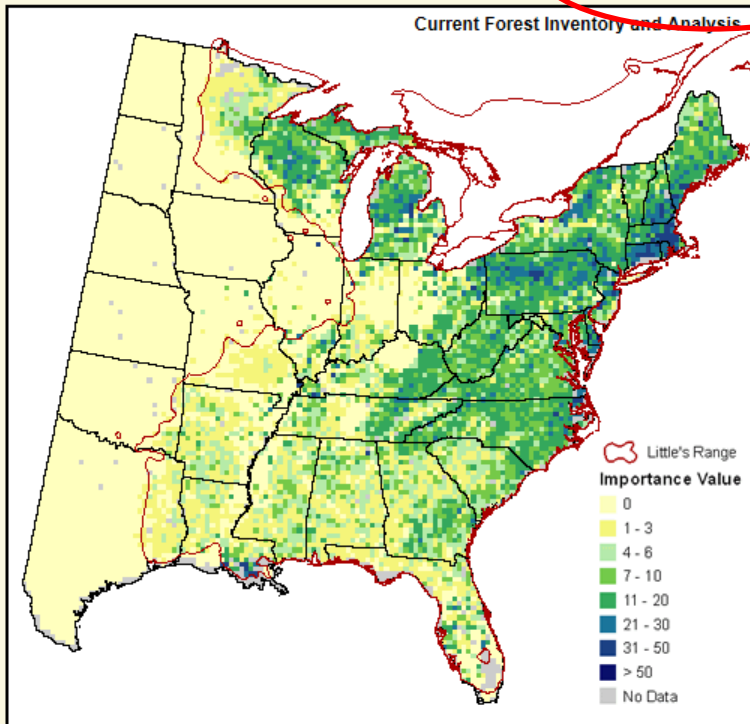
Predictor Maps

Current Distribution Maps for red maple

Help »

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Compare Two Species

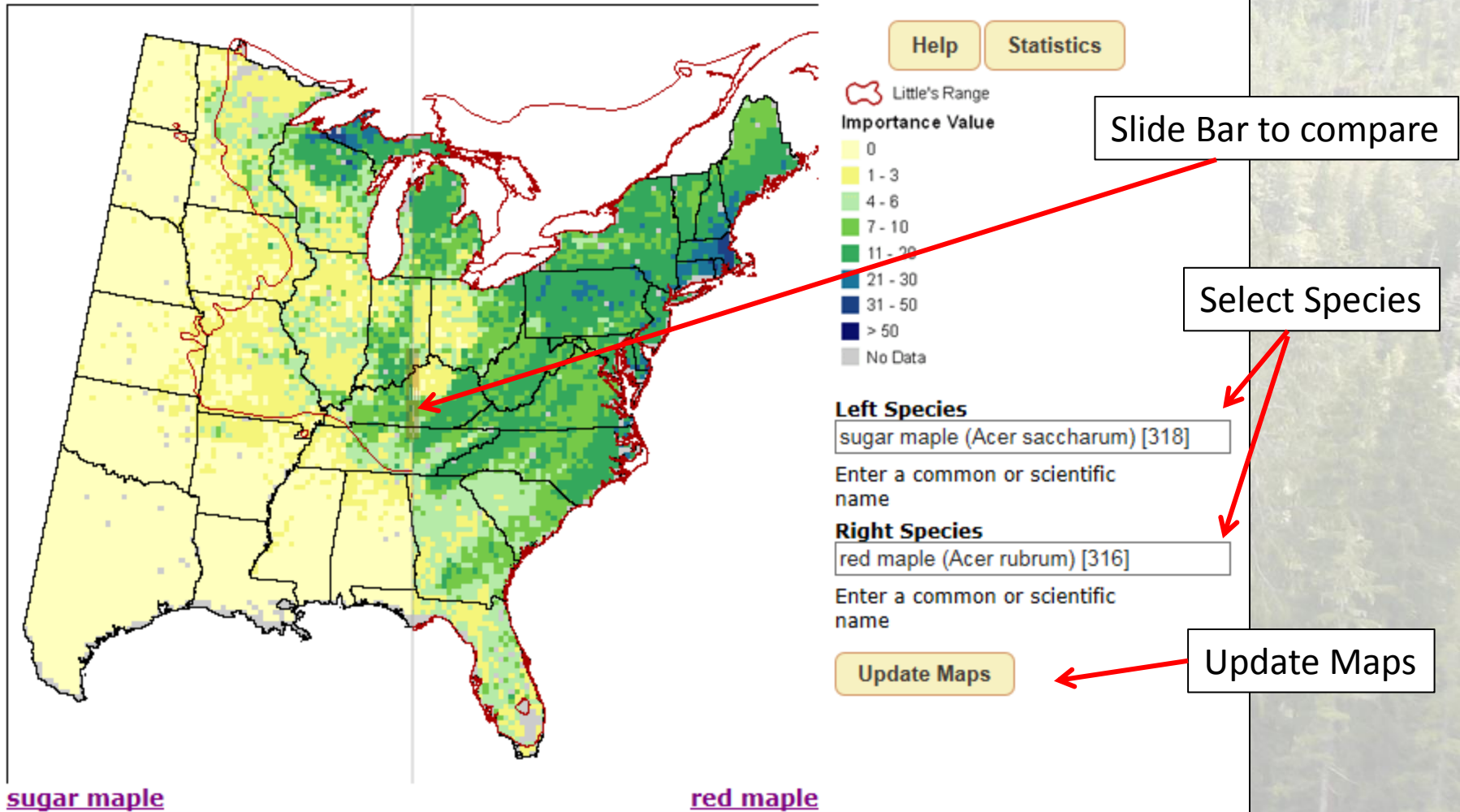


Potential Changes in Abundance and Range (Future)

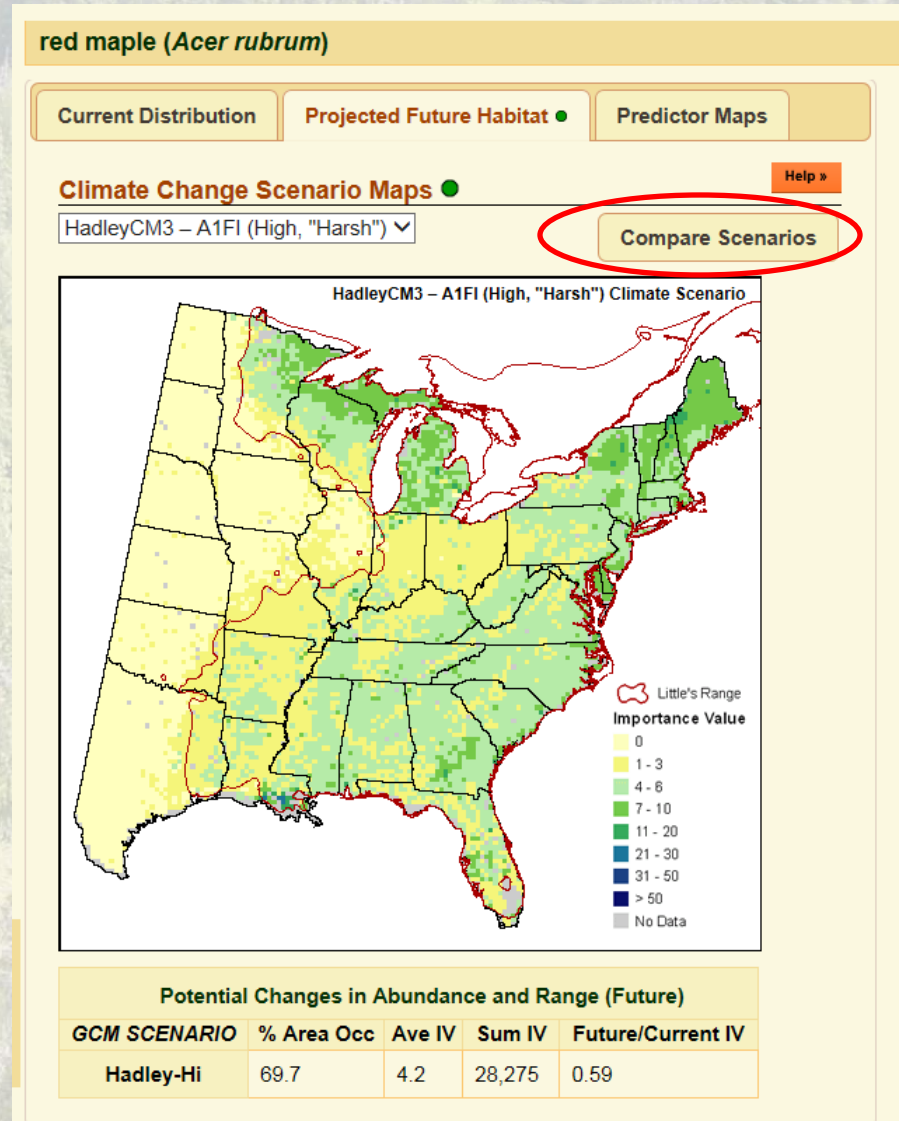
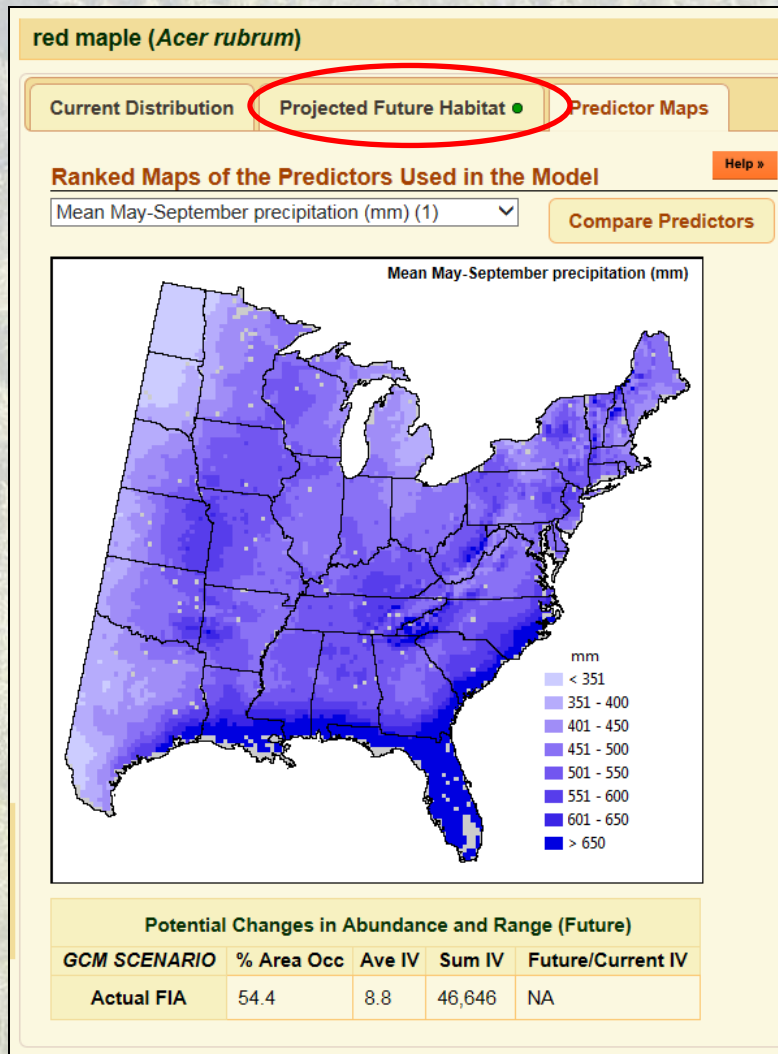
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Habitat Changes by Species

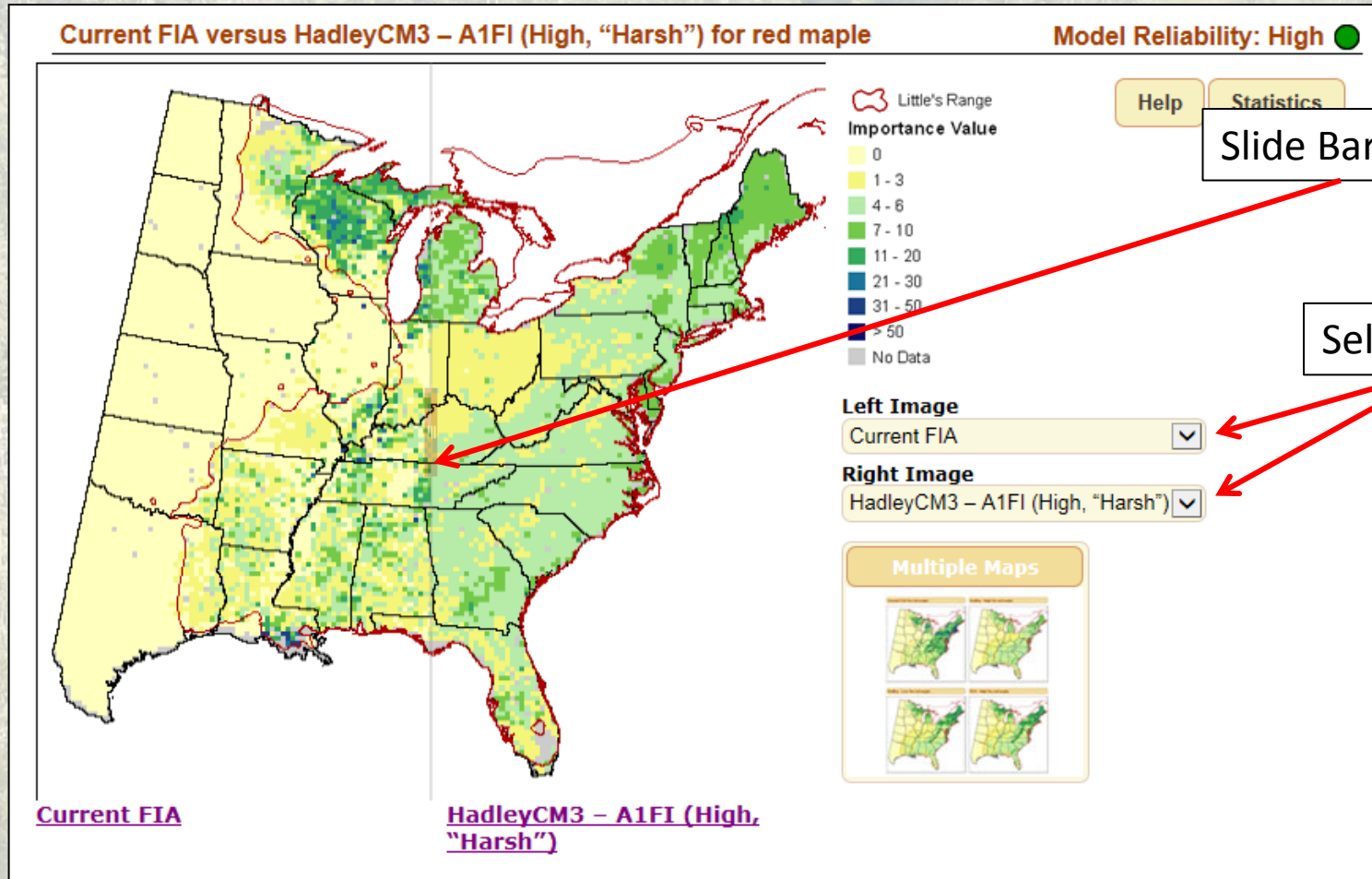
Current Modeled Distribution for sugar maple versus red maple



Compare Climate Scenarios



Compare Climate Scenarios



An aerial photograph of a vast, dense forest. The majority of the image is composed of tall, thin evergreen trees, likely spruce or fir, which appear as a textured green canopy. In the center of the image, there is a distinct, irregularly shaped clearing or meadow. This central area is lighter in color, appearing as a pale green or yellowish-green, and contains fewer trees, suggesting a more open, grassy or shrubby environment. The clearing is surrounded by the dense forest on all sides, creating a focal point for the viewer. The overall lighting is even, suggesting a bright but slightly hazy day, which softens the edges of the trees and the clearing.

Questions?