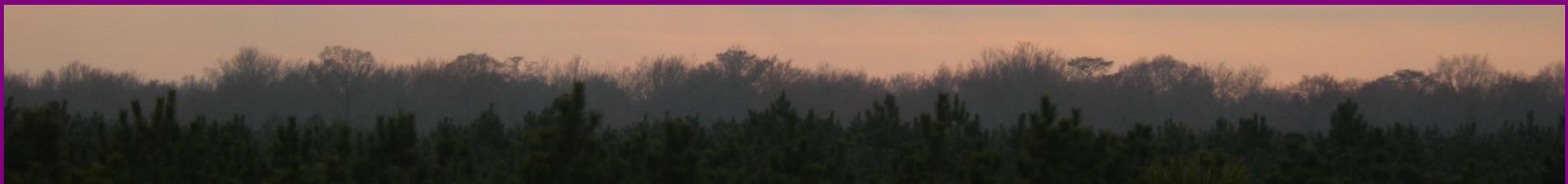




Template for Assessing Climate Change Impacts and Management Options

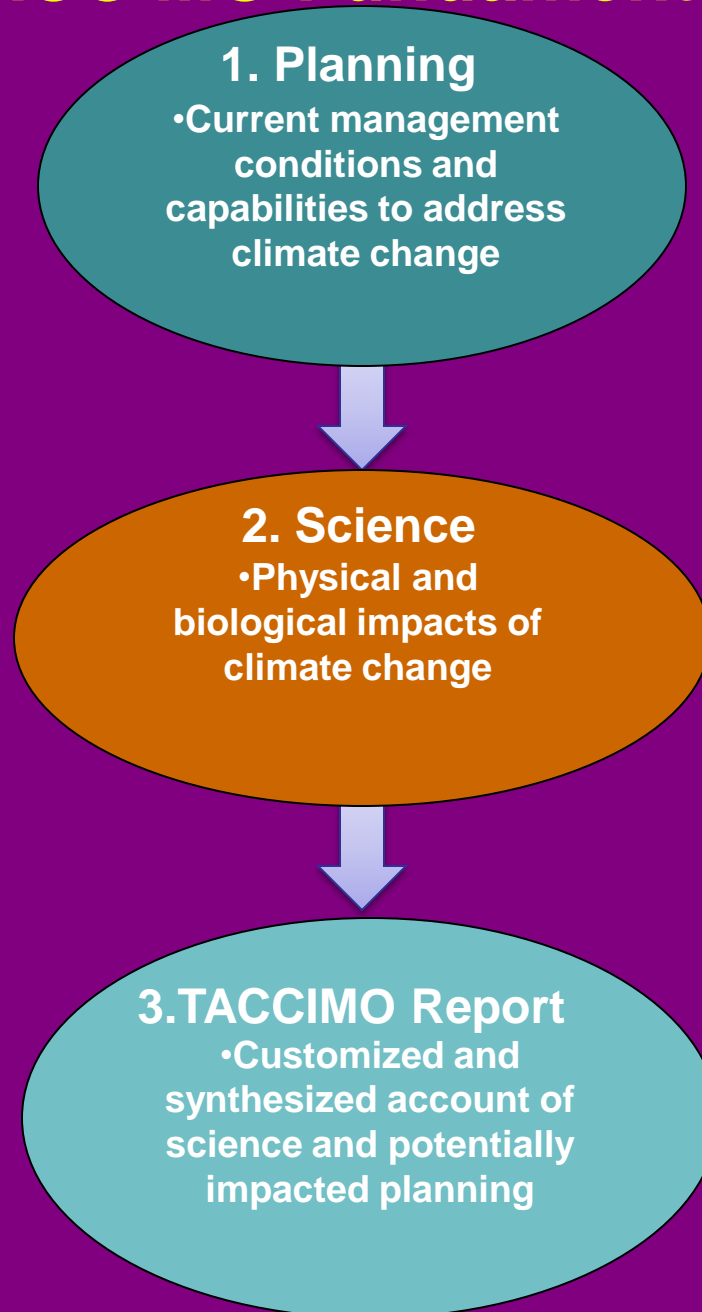
A USDA Forest Service Management Partnership
Southern Research Station :: Forest Planning :: Forest :: Cooperative Forestry



Development Team

- Chris Liggett and Steve McNulty PI's
- NFS R8
 - Dave Meriwether and Paul Arndt (co- NFS input leads, and lead application use)
- SRS EFETAC
 - Emrys Treasure (lead science and structure development)
 - Jen Moore Myers (lead geospatial development)
 - Rob Herring (lead programmer)

TACCIMO Fundamentals



TACCIMO Concept

Objective

- provide land owners, managers, and planners with the best and most current climate change science available
- facilitate the review of climate change forecasts, factors impacting ecosystems, and management options
- create an optional report to aid in planning and management analysis

Rationale

- address new information and research on climate change
- collaboratively bring current research together with current forecasts
- identifying information and data that are regionally specific

Product Development

- web-based information interface that is easily maintained through stable linkages to information sources, forecasts, and tools
- this information interface (TACCIMO) will be used to evaluate climate change factors impacting ecosystems, management options, and links to forest planning

TACCIMO Product Model

Projected Climate Change

- 4 Global Circulation Models
- 3 IPCC Scenarios
 - Temperature
 - Precipitation
- Interactive Tools

Climate Change Factors Impacting Ecosystems

- Direct Impacts
- Management Options
- Supporting Literature
- Geographic Location
- Interactions

Land and Resource Management Plans

- Desired Conditions
- Objectives
- Design Criteria
- Monitoring Questions

Input

Output

TACCIMO

Basic Template Report (State and Private)

- Exportable
- Customized
- Maps and Figures
- Factors Impacting Ecosystems

Planning Template Report (USFS Planners)

- Exportable
- Customized
 - Maps and Figures
 - Factors Impacting Ecosystems
 - Management Options
- Related Plan Components

Feedback Tracking

- Allow Users To:
 - Provide Feedback on Content and Function
 - Recommend New Sources
 - Update Plan Database

Current Situation Report (CSR)

- Readily Composed From "Planning Template Report"

TACCIMO Product Model

Land and Resource
Management Plans

Desired Conditions & Objectives

- Sourced from current NF Plans
- Attributes:
 - National Forest
 - Plan Area
 - Headings

Design Criteria

- Sourced from current NF Plans
- Attributes:
 - National Forest
 - Plan Area
 - Headings

Monitoring Questions

- Sourced from current NF Plans
- Attributes:
 - National Forest
 - Plan Area
 - Headings

Planning Optional

Linked

Linked

Direct Impacts Database

- Quotations from peer reviewed literature
- Emphasis on impacts to forests
- Attributes:
 - Supporting Literature
 - Geographic Location
 - Interactions
 - Headings

TA

Linked

MO

Linked

Management Options Database

- Quotations from peer reviewed literature
- Emphasis on management/abatement
- Attributes:
 - Supporting Literature
 - Geographic Location
 - Interactions
 - Headings

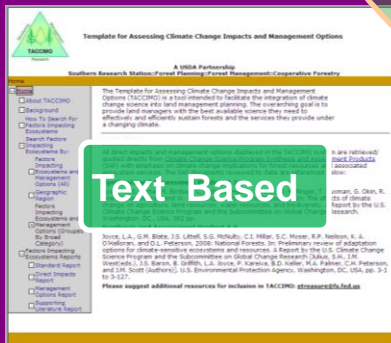
Projected Climate Change

- 4 Global Circulation Models
- 3 IPCC Scenarios
- Interactive Tools:
 - Carbon Calculator
 - Water Stress Model

Linked

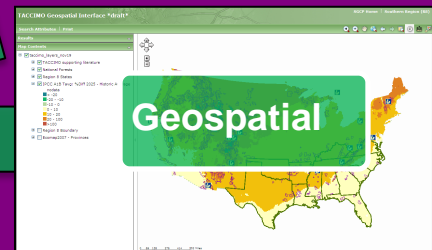
Output

Output



Text Based

Planning Template Report



Geospatial

Climate Change Factors
Impacting Ecosystems

User Interfaces

TACCIMO Product Model

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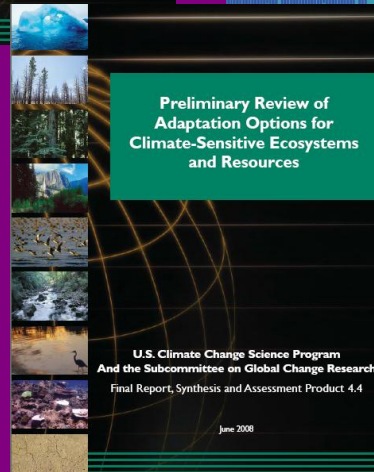
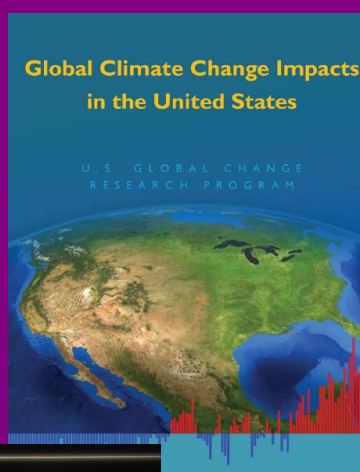
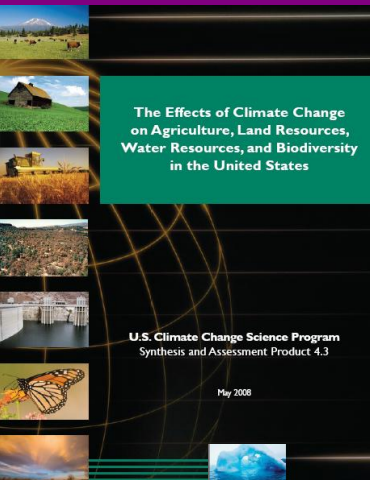
- Readily Composed From "Planning Template Report"

TACCIMO Development: Direct Impacts & Management Options

Input

Climate Change Factors Impacting Ecosystems

- Direct Impacts
- Management Options
- Supporting Literature
- Geographic Location
- Interactions



Template for Assessing Climate Change Impacts and Management Options

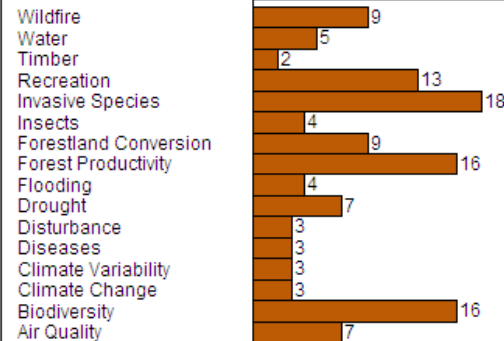
A USDA Partnership
Southern Research Station: Forest Planning: Forest Management: Cooperative Forestry

Home > Search Threats by: > Ecosystem Changes and Management Options (All)

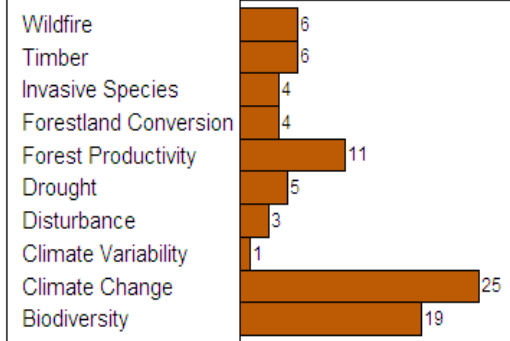
☐ Home
☐ About TACCIMO
☐ Background
☐ How To Search For Ecosystem Changes
☐ Search Threats By:
☐ Ecosystem Changes and Management Options (All)
☐ Geographic Region
☐ Ecosystem Changes and Management Options (Grouped By Broad Category)
☐ Ecosystem Change Reports
☐ Standard Report
☐ Direct Impacts Report
☐ Management Options Report
☐ Supporting Literature Report

Ecosystem Change	Description
Air Quality	Air pollution (ozone, sulfur dioxide, nitrogen oxides, and mercury) is a current major forest stressor. Climate change induced trends in temperature and precipitation may increase certain air pollutants.
Biodiversity	The influence of climate change on biodiversity will result in unique management challenges relating to migrating species, shifting ecosystems, and potential for extinction. Management options range from landscape planning to the selective genetic sourcing of planting and seedling material.
Climate Change	In addition to acting on current stressors, climate change will itself act as a unique factor challenging historical planning and management assumptions. Awareness of climate change as an independent force will help guide effective management strategies, practices, and tools.
Climate Variability	Climate variability, in the form of drought, flooding, and other types of disturbance, will likely increase under a changing climate. Ecosystem responses and interactions with current major stressors will be difficult to predict and will pose unique management challenges.
Diseases	Forest pathogens (diseases) are current major stressors that may expand beyond their historic ranges under climate change and interact with insects resulting in increased forest stress.
Disturbance	Disturbance and extreme events, such as a wind and ice storms, are current major stressors that may become more frequent or more intense under a changing climate. Disturbance may provide important opportunities for monitoring and implementation of management options.

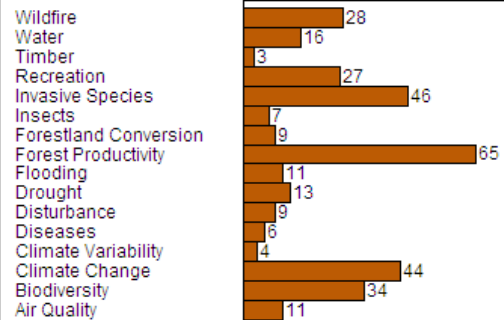
Direct Impacts



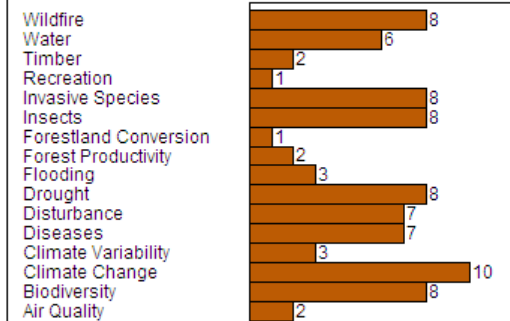
Management Options



Supporting Literature



Interactions



TACCIMO Product Model



TACCIMO Development: Forest Plans

Input

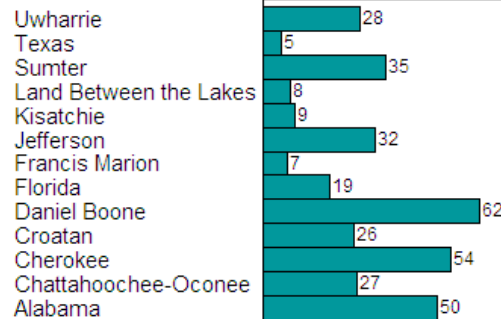
Land and Resource Management Plans

- Desired Conditions
- Objectives
- Design Criteria
- Monitoring Questions

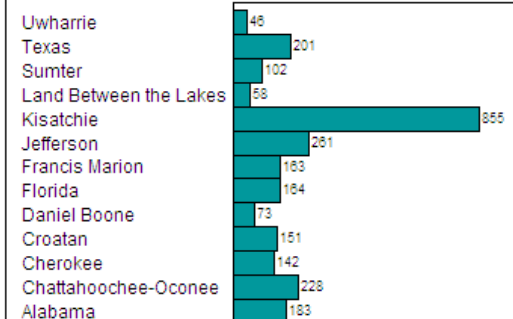


- Development In Progress
- El Yunque, Mississippi, Ozark-St. Francis, Nantahala-Pisgah, and Ouachita will also be included

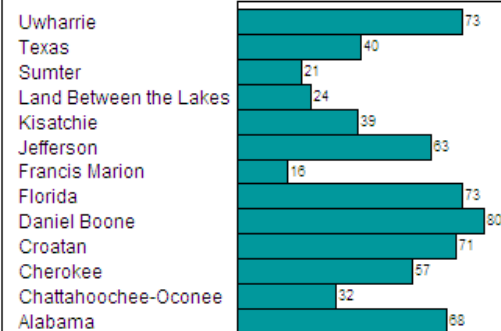
Desired Conditions



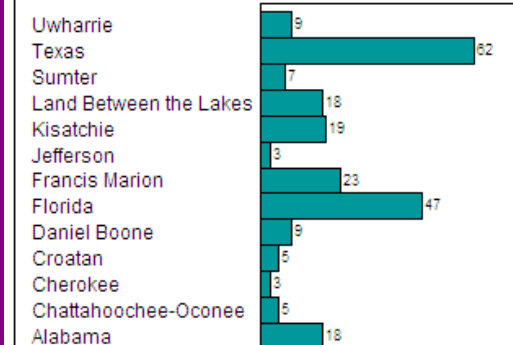
Design Criteria



Objectives



Monitoring Questions



LAND AND RESOURCE MANAGEMENT PLAN

United States Department of Agriculture
Forest Service
Southeast Region



LAND BETWEEN THE LAKES NATIONAL RECREATION AREA



Revised Land and Resource Management Plan Kisatchie National Forest



Croatan National Forest Land And Resource Management Plan



Revised Land and Resource Management Plan

United States Department of Agriculture
Forest Service
Southeast Region

National Forests in Alabama



Management Bulletin R8-MB 112A

National Forest Francis Marion

Revised Land and Resource Management Plan



United States Department of Agriculture
Forest Service
Southeast Region





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Input

Output

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Current Situation Report (CSR)

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TACCIMO Development: Geospatial Resource

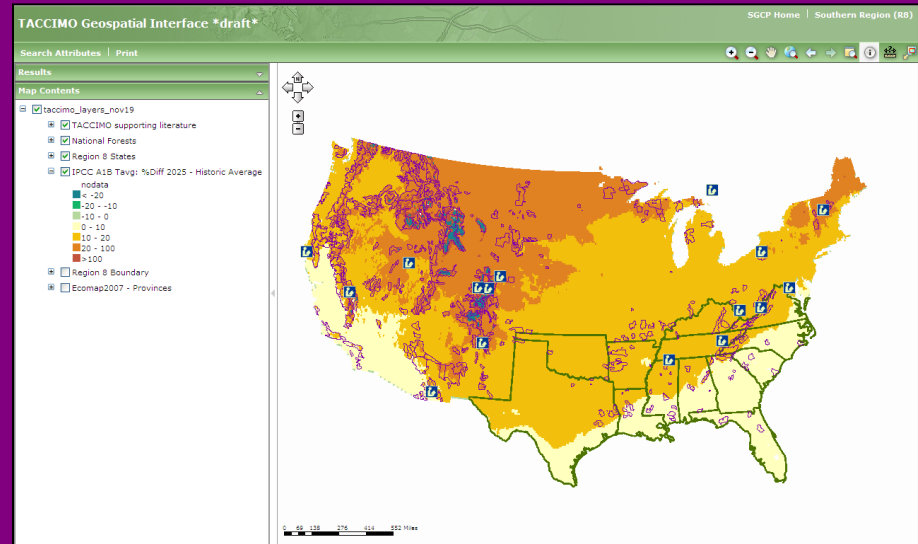
Projected Climate Change

- 4 Global Circulation Models
- 3 IPCC Scenarios
 - Temperature
 - Precipitation
- Interactive Tools

Input

- 🌐 Temperature and precipitation forecast data accessible in 1/8° resolution (~12km)
- 🌐 Water availability budgets, forest productivity, biodiversity, and other risk forecasts will be available.
- 🌐 Context layers (infrastructure, geography, etc.)

Modeling Group	GCM
Canadian Centre for Climate Modeling & Analysis	CGCM3.1
Hadley Centre for Climate Prediction and Research / Met Office	UKMO-HadCM3
National Center for Atmospheric Research	CCSM3
US Dept of Commerce / NOAA / Geophysical Fluid Dynamics Laboratory	GFDL-CM2.1



Scenario	Emissions Path	Description
SRES A2	"higher" emissions path	technological change and economic growth more fragmented, slower, higher population growth
SRES A1b	"middle" emissions path	technological change in the energy system is balanced across all fossil and non-fossil energy sources, where balanced is defined as not relying too heavily on one particular energy source
SRES B1	"lower" emissions path	rapid change in economic structures toward service and information, with emphasis on clean, sustainable technology. Reduced material intensity and improved social equity

TACCIMO Product Model



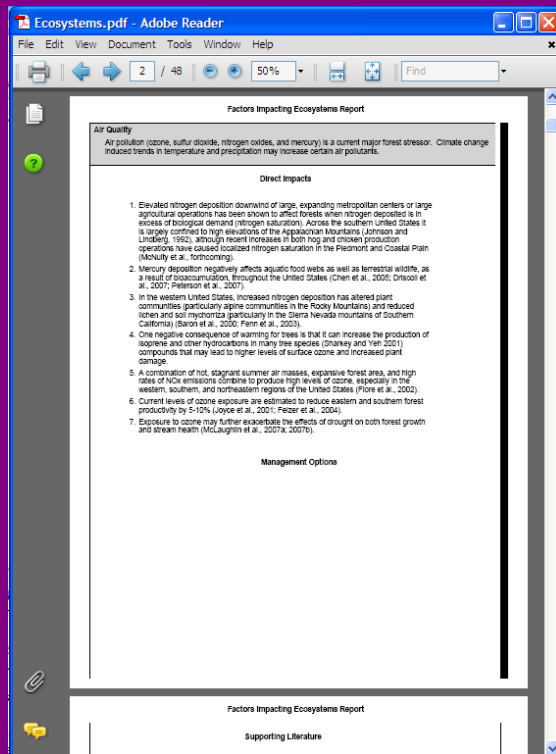
TACCIMO Development: Reports

Standard Report Generator

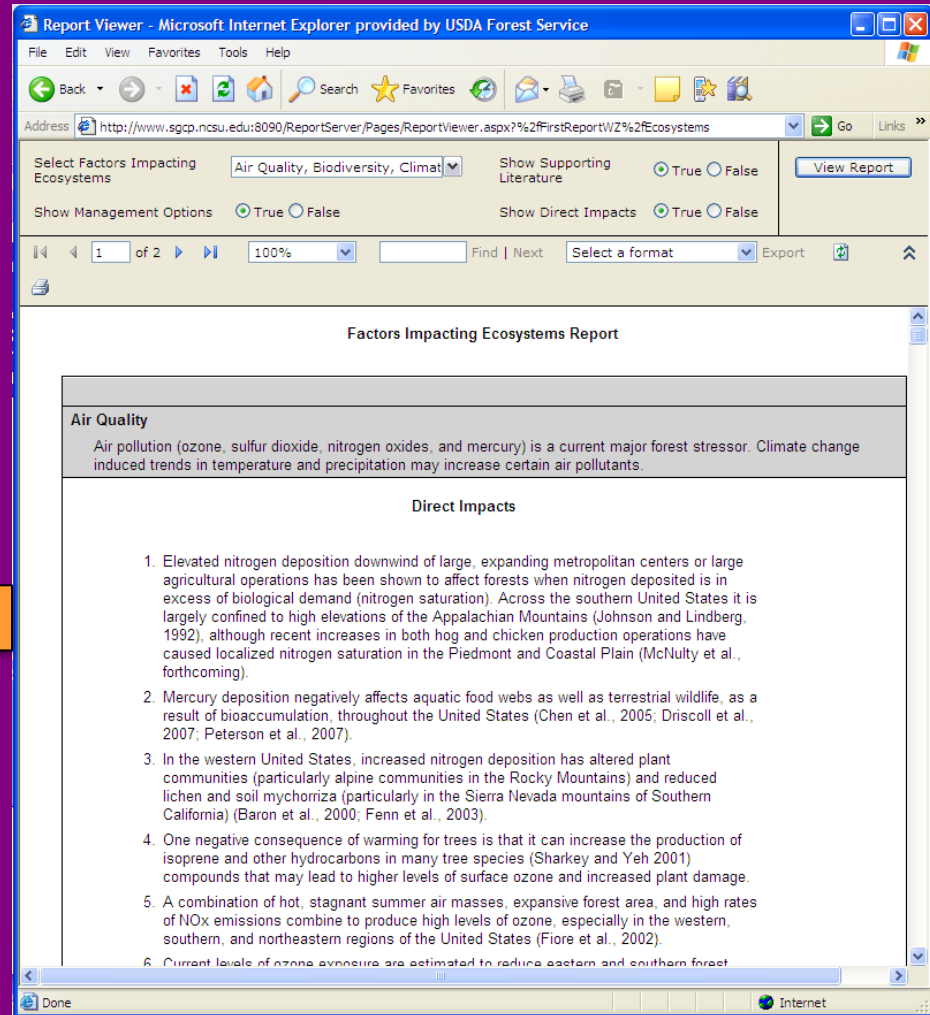
Planning Template Report (USFS Planners)

- Exportable
- Customized
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 - Related Plan Components

Output



Export



Numerous Formats Available for Export: PDF, Excel, CSV, etc.

TACCIMO Text Interface



Template for Assessing Climate Change Impacts and Management Options

A USDA Partnership

Southern Research Station::Forest Planning::Forest Management::Cooperative Forestry

Home

- ☐ Home
- ☐ About TACCIMO
- ☐ How To Search For:
- ☐ Factors Impacting Ecosystems
- ☐ Search By:
- ☐ Factors Impacting Ecosystems
- ☐ Geographic Region
- ☐ Reports
- ☐ Standard Report
- ☐ Direct Impacts Report
- ☐ Management Options Report
- ☐ Supporting Literature Report

Search

Report

The Template for Assessing Climate Change Impacts and Management Options (TACCIMO) is a tool intended to facilitate the integration of climate change science into land management planning. The overarching goal is to provide land managers with the best available science they need to effectively and efficiently sustain forests and the services they provide under a changing climate.

Contact Information

General Comments

Steve McNulty: (919) 515-9489

Functionality Comments

Emrys Treasure: (919) 515-9490

Technical Issues

Rob Herring: (919) 513-0588

Disclaimer:

All direct impacts and management options displayed in the TACCIMO system are retrieved/ quoted directly from [Climate Change Science Program Synthesis and Assessment Products](#) (SAP) with emphasis on climate change implications for forest resources and associated ecosystem services. The SAP documents reviewed to date are referenced below:

Synthesis and Assessment Product 4.3

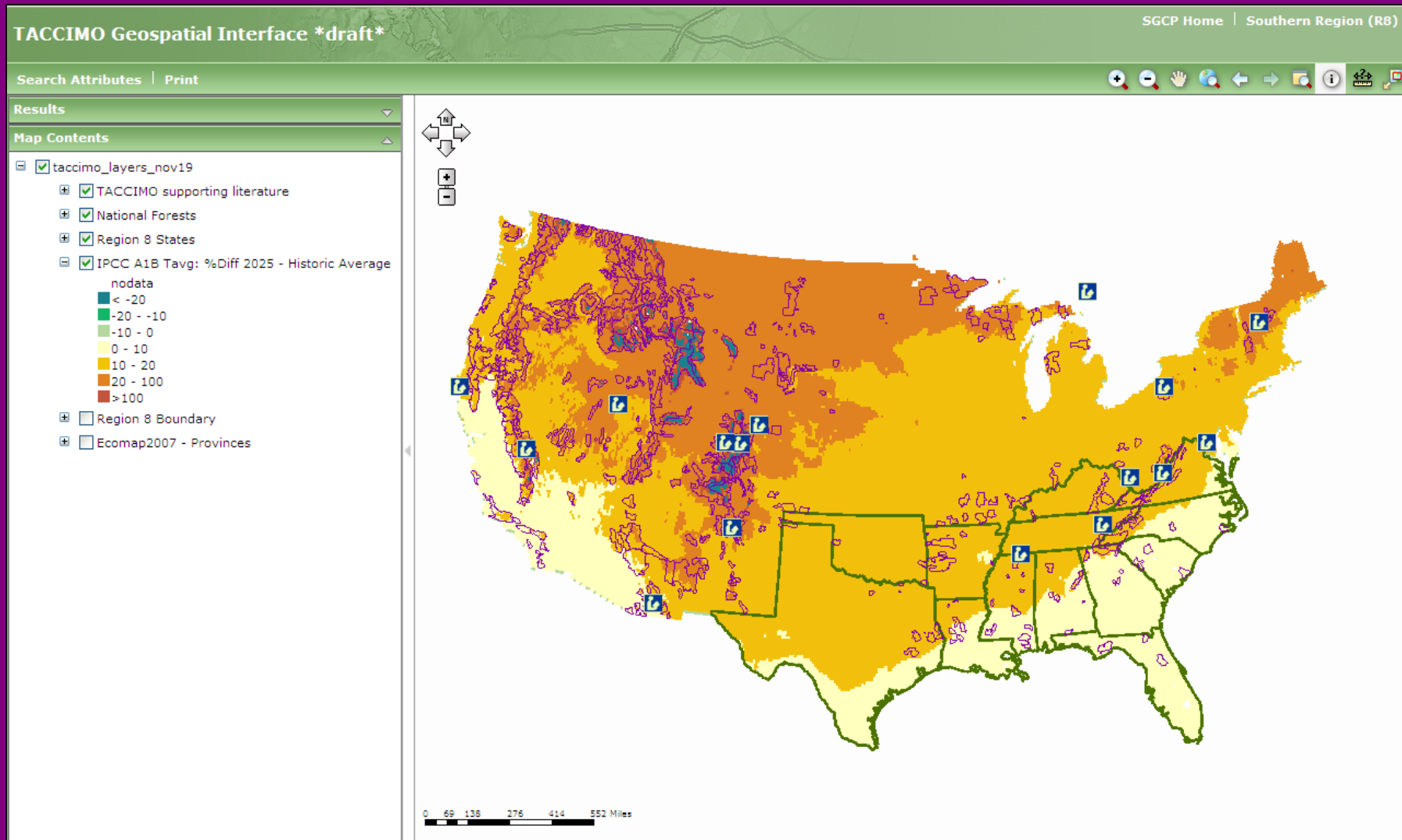
Ryan, M., S. Archer, R. Birdsey, C. Dahm, L. Heath, J. Hicke, D. Hollinger, T. Huxman, G. Okin, R. Oren, J. Randerson, and W. Schlesinger, 2008. Land Resources. In: The effects of climate change on agriculture, land resources, water resources, and biodiversity. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Washington, DC., USA, 362 pp.

Synthesis and Assessment Product 4.4

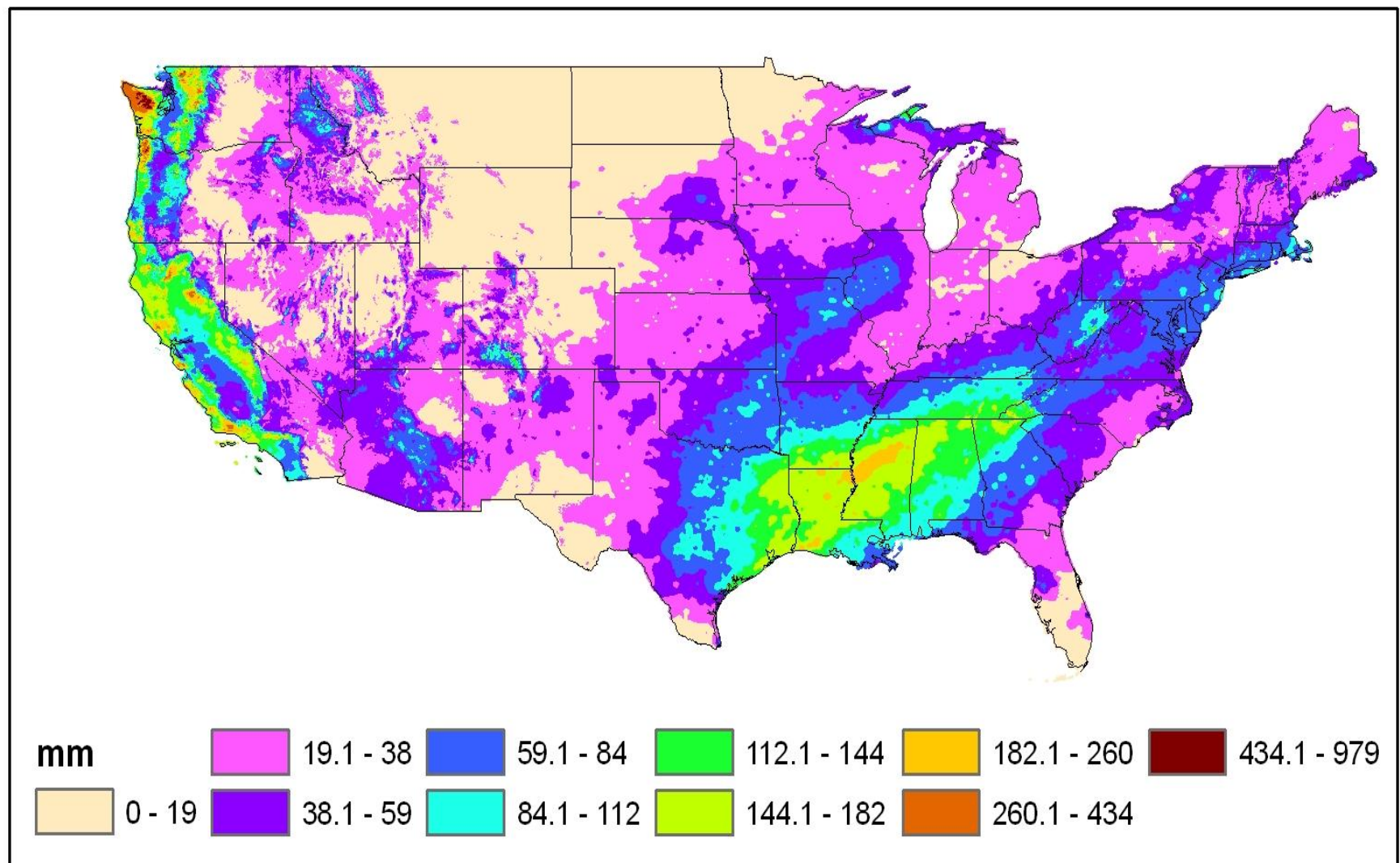
Joyce, L.A., G.M. Blate, J.S. Littell, S.G. McNulty, C.I. Millar, S.C. Moser, R.P. Neilson, K. A. O'Halloran, and D.L. Peterson, 2008: National Forests. In: Preliminary review of adaptation options for climate-sensitive ecosystems and resources. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [Julius, S.H., J.M. West(eds.), J.S. Baron, B. Griffith, L.A. Joyce, P. Kareiva, B.D. Keller, M.A. Palmer, C.H. Peterson, and J.M. Scott (Authors)]. U.S. Environmental Protection Agency, Washington, DC, USA, pp. 3-1 to 3-127.

Please suggest additional resources for inclusion in TACCIMO: etreasure@fs.fed.us

TACCIMO Geospatial Interface



PRISM: Precip 1/2001 as 4km Grid



Project Timeline

TACCIMO 1.0 released in July 2010 for Region 8

- Primarily text based with limited geospatial coverage

TACCIMO 2.0 scheduled for release in January 2010 for Region 9

- Extensive text based and geospatial coverage, limited model interface

TACCIMO 3.0 scheduled for release in June 2011 (pending funding)

- Extensive text based, geospatial coverage, and model interface