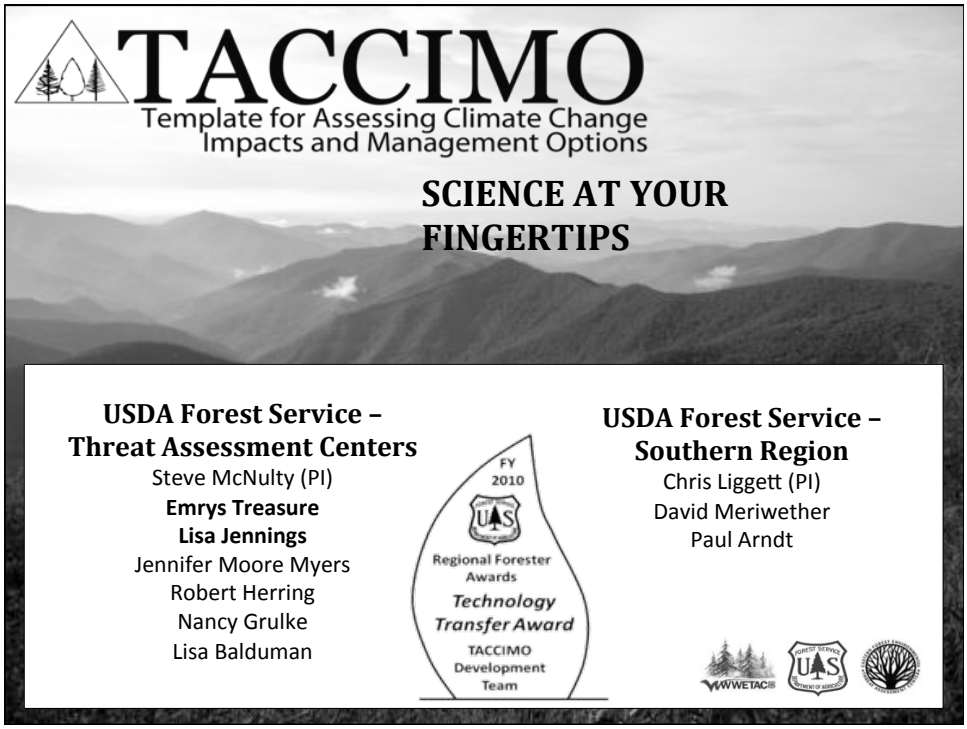

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

Webinar Goals & Objectives

- This webinar will:
  - Explore TACCIMO, a science tool that helps natural resource professionals understand and communicate about climate change
- This webinar will not:
  - Discuss whether climate change is "real" or not

  A recent study[1] showed 97-98% of climate scientists believe in anthropogenic climate change.
  - Discuss potential carbon markets or greenhouse gas mitigation techniques (other than general carbon management in forests)

  These topics are out of the scope of this talk, but there are other resources to address these areas.

[1] Anderegg, W. R. L., Prall, J. W., Harold, J., and Schneider, S. H. (2010). Expert credibility in climate change. *Proceedings of the National Academy of Sciences*, 107(27), 12107-12109.

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Poll #1 – Multiple Choice

- **In your work, how important is reading scientific (peer-reviewed) papers to keep current on new and emerging issues?**
  A. Extremely Important
  B. Moderately Important
  C. Slightly Important
  D. Not Important
  E. I do not read these papers as part of my work

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Poll #2 – Multiple Choice

- **In the last 6 months, approximately how many scientific (peer-reviewed) articles about climate change and natural resource management have you read?**
  A. More than 20 (too many to count!)
  B. 10-20
  C. 5-10
  D. 1-5
  E. I do not read these papers as part of my work

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

TACCIMO is a web-based application integrating climate change science with management and planning options through search and reporting tools that connect land managers with peer-reviewed information they can trust.

Science: Geospatial | Science: Literature | USDA FS Forest Planning

Inputs

Outputs

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

EXPLORE	GENERATE A REPORT
LITERATURE EXPLORER: FACTORS	CLIMATE REPORT
LITERATURE EXPLORER: GEOGRAPHIC REGION	LITERATURE REPORT
FOREST PLAN EXPLORER	LITERATURE AND PLANNING REPORT
GIS VIEWER	PLANNING REPORT

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

Why TACCIMO?

- Federal guidance requires FS managers and planners to consider climate change.
- There is an ever-increasing volume of useful scientific knowledge about climate change and forest ecosystems.
- TACCIMO highlights elements from this wealth of information with attention to what natural resource managers need.
- TACCIMO's team of content developers and flexible framework allows new information to be added routinely and existing information to be reorganized.

Chris Madden, Inkline Press

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

What's available on the website?

- **2,800+** quotations describing effects of climate change
- **700+** adaptive management options
- **700+** peer-reviewed source papers
  - With citations to almost **3,000** supporting literature documents
- Content is organized into **16** resource area "Factors"
  - In **16** Geographic Regions and **58** Categories
- Associated with **36** National Forest plans
  - Over **12,000** desired conditions, objectives and design criteria
- Supported by geospatial projections from **3** General Circulation Models (GCMs) and PRISM historic data
  - With **87** supporting resource layers

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

What's available on the website?

TACCIMO includes resources for training and assistance:

- Quick-link buttons at the top of each page provide access to:
  - step-by-step help files
  - how-to videos
  - feedback forms
  - general site disclaimer

- These resources allow users to come to TACCIMO without any prior knowledge of the tool and produce the results needed to quickly and effectively address impacts of a changing climate on forest resources.
- TACCIMO's website also offers a comprehensive user guide, example case studies, and direct user support (phone, emails, etc.)

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How is TACCIMO Used?

- **National Forest Land and Management Plan (LMP) Revisions in the Southern (R8) and Pacific Southwest (R5) regions**
  - TACCIMO was used in recent George Washington National Forest LMP revision in the Mid-Atlantic Highlands.
  - TACCIMO is currently being used in support of the El Yunque National Forest LMP revision in Puerto Rico.
  - TACCIMO content is being developed for use in the upcoming Southern Sierra National Forests LMP revision in California.

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How is TACCIMO Used?

- **NEPA analysis and responding to public comments**
  - NEPA coordinators in the Southern region are using TACCIMO to respond to public comments regarding climate change and carbon sequestration
- **State and Private-Level Forest Management**
  - The North Carolina Forest Service worked with TACCIMO to craft climate change materials for private landowner stewardship plans.
- **Everyday use**
  - TACCIMO is used for every day climate change needs by federal, state, and private natural resource planners, managers, and others

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Template for Assessing Climate Change Impacts and Management Options

A Dynamic Literature Review Tool

- A Natural Resource Professional needs to preform a literature review of climate change science….

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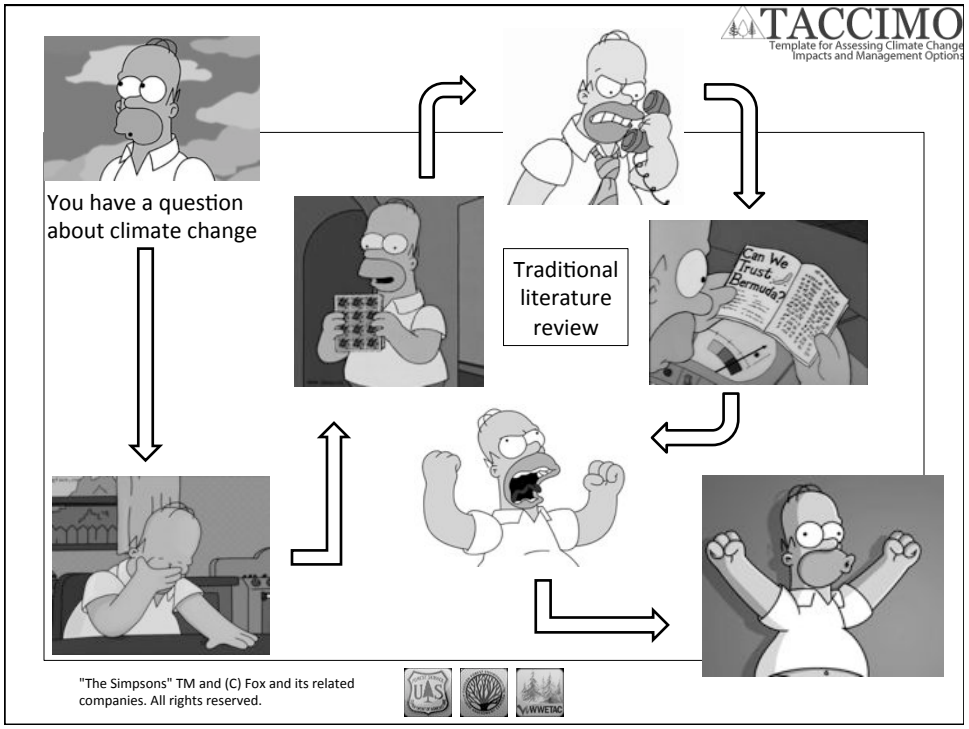
A Dynamic Literature Review Tool

- A Natural Resource Professional needs to preform a literature review of climate change science….


TACCIMO
Template for Assessing Climate Change Impacts and Management Options
You have a question about climate change
Traditional literature review
Can We Trust Bermuda?
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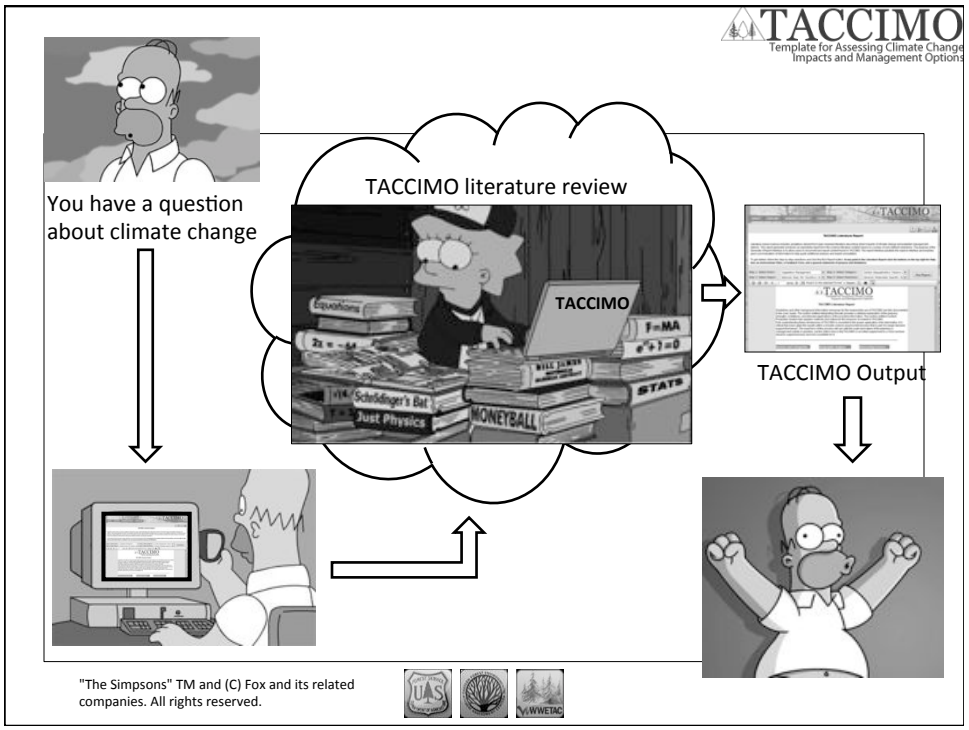
TACCIMO
Template for Assessing Climate Change Impacts and Management Options
You have a question about climate change
TACCIMO literature review
TACCIMO
Equations
F=MA
Schrödinger's Cat
Just Physics
MONEYBALL
STATS
TACCIMO Output
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Poll #3 – Multiple Choice

- **What is the "gold standard" of literature for inclusion in a scientific literature review?**
  A. Gray Literature
  B. Website/Blog Posts
  C. Peer-reviewed Literature
  D. White Literature
  E. Green Literature

- **Questions for clarification about the tool?**

An applied case study…

USING TACCIMO AS A LITERATURE REVIEW TOOL

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

A Dynamic Literature Review Tool

- A Natural Resource Professional needs to preform a literature review of climate change science….

- The professional is interested in the impact of climate change on **plethodontid salamanders**, to include in a review of salamander ecology in **George Washington National Forest**.

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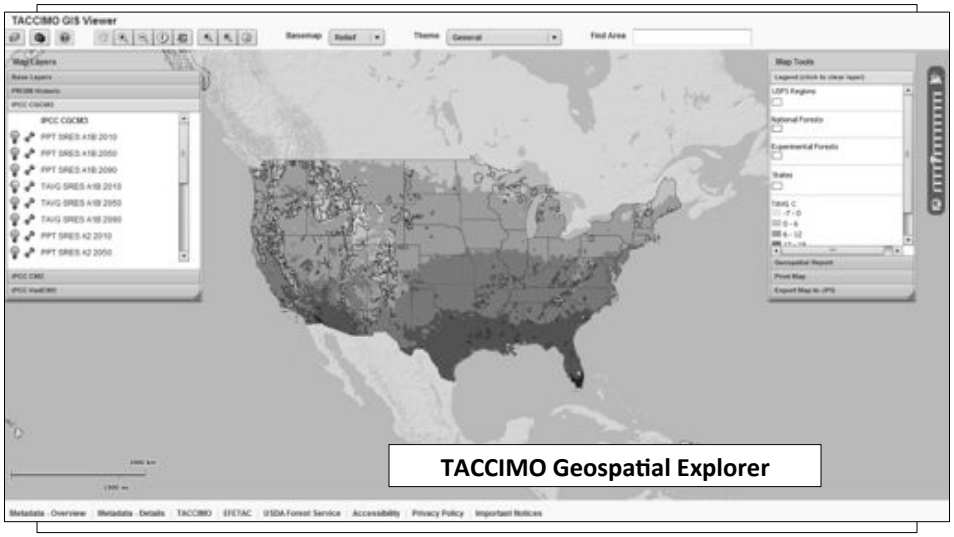
Describing the bounds of future climate



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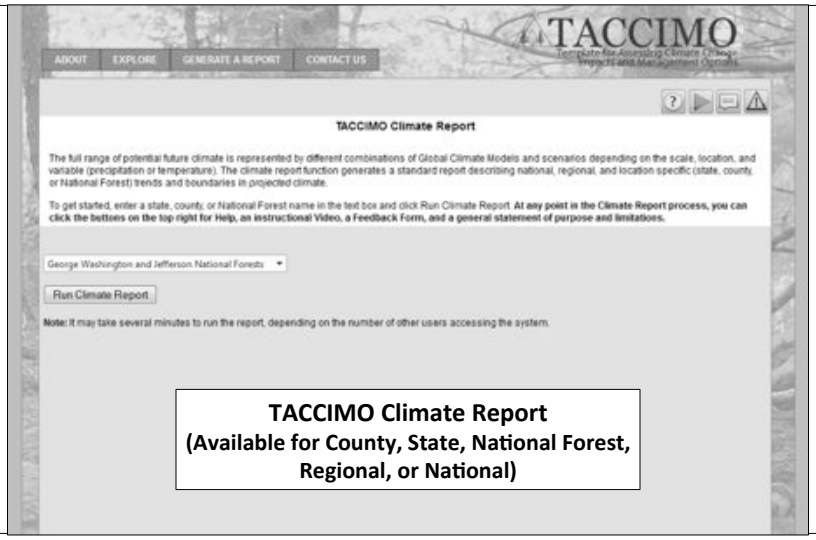
Describing the bounds of future climate

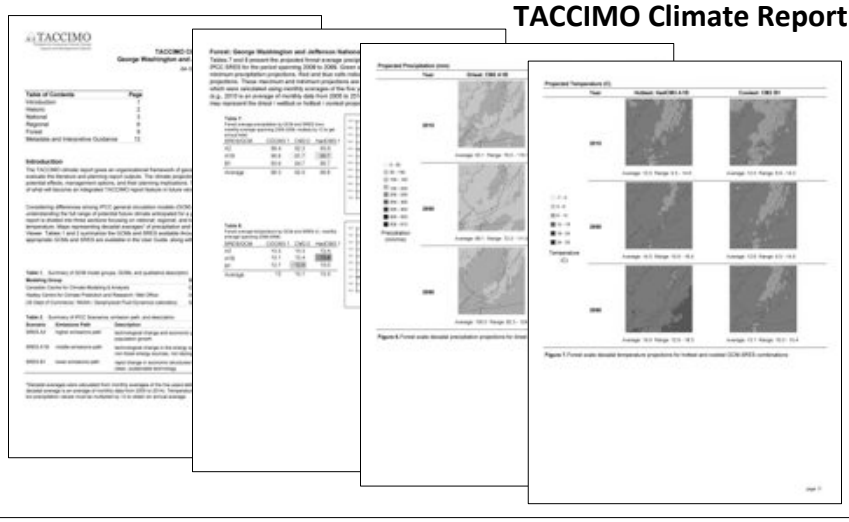


TACCIMO Climate Report
(Available for County, State, National Forest, Regional, or National)

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

Describing the bounds of future climate

TACCIMO Climate Report



TACCIMO
Template for Assessing Climate Change Impacts and Management Options

Describing the bounds of future climate

Using TACCIMO results, summary statements can be crafted:

- "Based on data from TACCIMO, the predicted changes in precipitation and temperature are shown in the following tables:"

Table A3.2 Predicted Changes in Precipitation on the GWNF

Precipitation, annual average from 2009-2099 (in)			
Emissions Path	Commerce Model	Canadian Model	Hadley Model
Middle Emissions	46.3	43.9	47.7
Higher Emissions	47.0	43.9	44.7
Lower Emissions	44.4	44.8	45.8
Average of all emission options	45.9	44.2	46.1
Historical Average (PRISM 1970-2000)	43.5	43.5	43.5

Table A3.3 Predicted Changes in Temperature on the GWNF

Average temperature (°F, Monthly Average spanning 2009 – 2099)			
Emissions Path	Commerce Model	Canadian Model	Hadley Model
Middle Emissions	56.3	56.8	57.7
Higher Emissions	56.8	57.0	57.2
Lower Emissions	55.2	55.2	56.1
Average of all emission options	56.1	56.5	57.0
Historical Average (PRISM 1970-2000)	52.5	52.5	52.5

- "All of the models predict an increase in precipitation ranging from less than a half inch to more than four inches per year. All of the models also predict an increase in temperature ranging from 2.7°F to 5.2°F (Meehl et al. 2007)."

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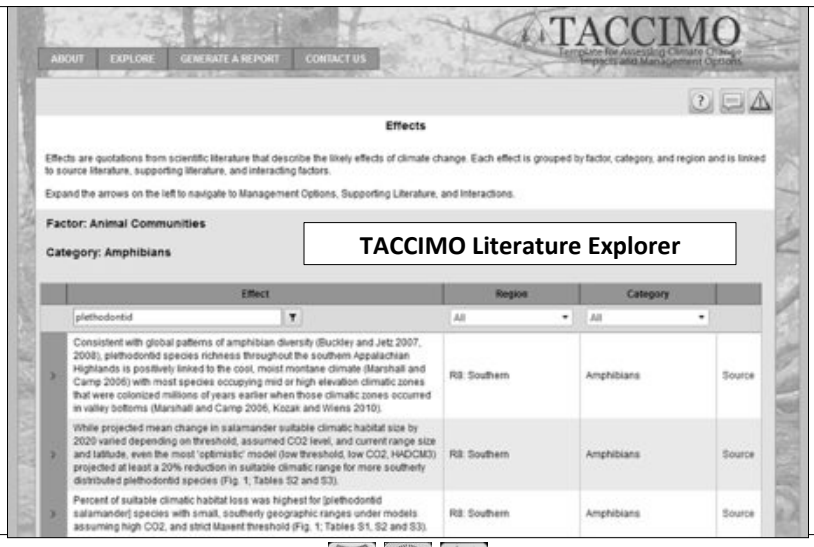
Investigating Effects of Climate Change



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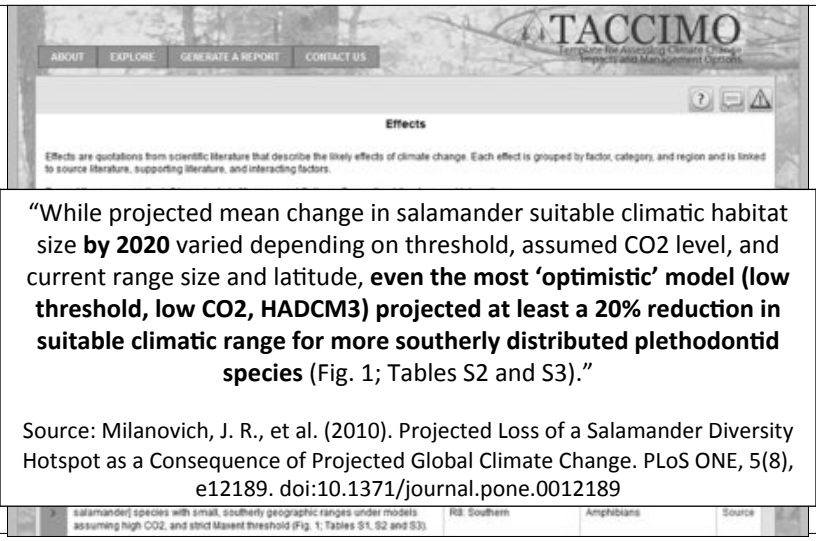
Investigating Effects of Climate Change



"While projected mean change in salamander suitable climatic habitat size **by 2020** varied depending on threshold, assumed CO2 level, and current range size and latitude, **even the most 'optimistic' model (low threshold, low CO2, HADCM3) projected at least a 20% reduction in suitable climatic range for more southerly distributed plethodontid species** (Fig. 1; Tables S2 and S3)."

Source: Milanovich, J. R., et al. (2010). Projected Loss of a Salamander Diversity Hotspot as a Consequence of Projected Global Climate Change. PLoS ONE, 5(8), e12189. doi:10.1371/journal.pone.0012189

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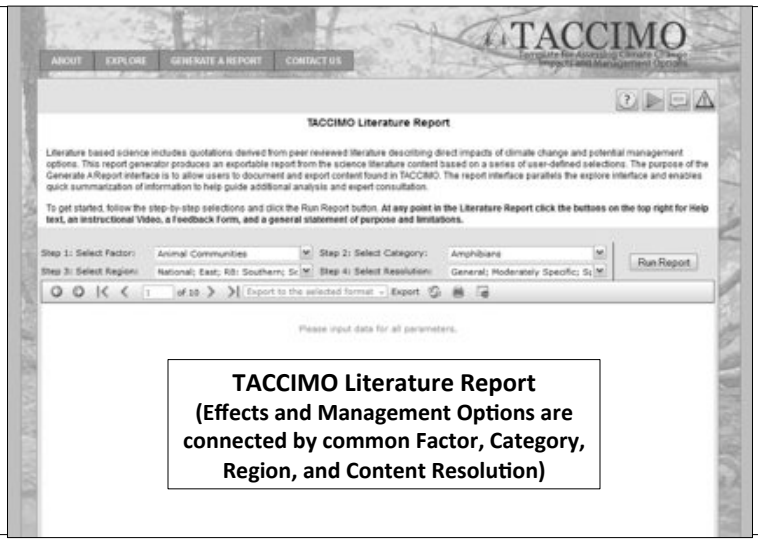
Template for Assessing Climate Change Impacts and Management Options

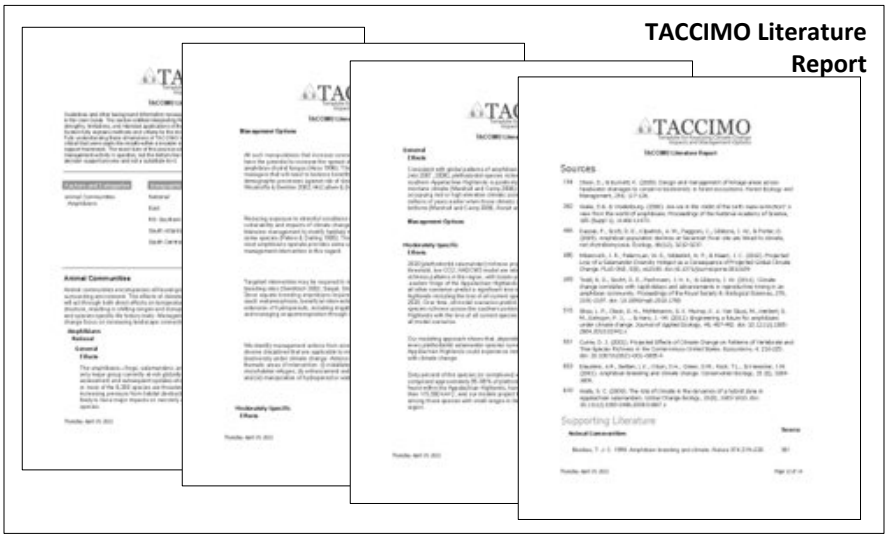
Investigating Effects of Climate Change



TACCIMO Literature Report
(Effects and Management Options are connected by common Factor, Category, Region, and Content Resolution)

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

Investigating Effects of Climate Change



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Investigating Effects of Climate Change

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

Investigating Effects of Climate Change

Using TACCIMO results, summary statements can be crafted:

- Quotations from Rodenhouse et al. (2009) identify negative impacts of temperature and decreasing soil moisture on plethodontid salamander species reproduction.
- Milanovich et al. (2010) predict significant declines in plethodontid salamander species habitat availability as soon as 2020 and almost total habitat loss by the end of the century, with significant losses in species with southerly, high elevation distributions.
- Identifying management options, quotations from Shoo et al. (2011) suggest supplementing naturally occurring shelters with logs and debris to provide temperature-maintaining refuges, restoring riparian vegetation to maintain soil moisture, and increasing connectivity between habitat patches.

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Looking at Management Plan Guidelines

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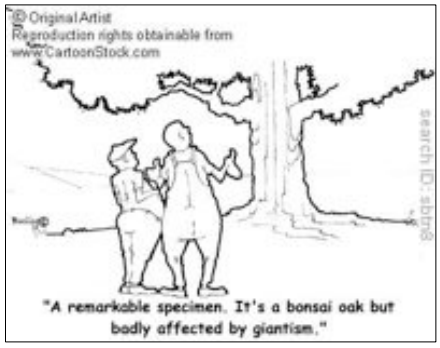
Poll #4 – Yes/No

- **Good forest and natural resource stewardship is generally good climate change stewardship.**
  - Yes (TRUE)
  - No (FALSE)



An applied case study…

USING TACCIMO TO INFORM FOREST MANAGEMENT

Emerging Forest Threats – NC:

Management Options For Healthy Forests

- Pamphlet created in collaboration with the NC Forest Service Forest Management Division
- Targeted at private forest landowners engaged in stewardship plans
- Summarized from over 300 peer-reviewed sources in TACCIMO
- Does not explicitly mention Climate Change
- Available to public in late summer

Emerging Forest Threats Pamphlet

Emerging Forest Threats for the Southeastern US

– Impacts to Forest Health, Wildfire, Timber, Water Quantity and Quality, Wetlands, Wildlife, Fish, Biological Diversity, Soils, & Recreation and Aesthetic Quality

Top Emerging Threats by North Carolina Region

- Mountains: High Elevation Forests
- Piedmont: Water Quantity
- Coastal Plain: Sea Level Rise

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Emerging Forest Threats Pamphlet

Forest Management Strategies to Address Emerging Threats in the Southeastern US

- Timber management activities provide forest managers and landowners with an opportunity to adapt their forests to multiple threats.
- Including "adaptation" as a landowner's management goal may provide multiple benefits and does not have to be costly.

Simple alterations can be made to forest management activities in the face of climate change

- Site Preparation, Fertilization, Planting, Thinning, Prescribed Fire, & Harvest

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Visit our Case Studies Page

- For more examples of TACCIMO uses, visit our case studies page:

http://www.taccimo.sgcp.ncsu.edu/casestudy

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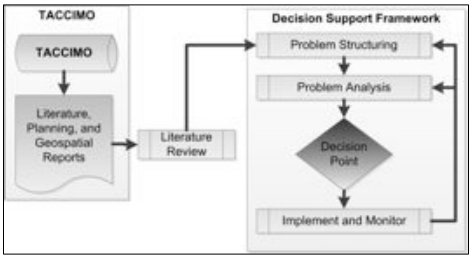
Remember:

- **TACCIMO IS:**
  - A literature review and decision support tool
  - A starting point in the decision making process
  - A large and growing repository of peer-reviewed climate change science for forest resources
- **TACCIMO is NOT:**
  - A decision making tool
  - A substitute for local and expert knowledge
  - An all-inclusive climate change resource for all regions



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Thank You!

Questions?

For further inquires contact :
emrys.treasure@fs.fed.us or Lisa_Jennings@ncsu.edu

Visit the TACCIMO Website today:
www.forestthreats.org/taccimotool



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