

# OVERVIEW OF SCENARIOS FOR CALIFORNIA'S 4TH CLIMATE CHANGE ASSESSMENT: IS THERE A ROLE FOR TAHOE STUDIES?

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November 13, 2014  
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# Today's Talk

- Goals & structure of the 4<sup>th</sup> Assessment
- Overview of underlying scenarios and selected/relevant proposed research for 4<sup>th</sup> Assessment
- Opportunities for collaboration and engagement

# California's Fourth Climate Change Assessment: Goals & Structure

## Goals

- Actionable science; users of information to be engaged throughout
- Focus on next ~30 years, without losing sight of end-century impacts

## Leadership

- Being led by California Natural Resources Agency (CNRA) in collaboration with Governor's Office of Planning and Research
- CNRA/OPR leading the non-energy studies (anticipate \$5 M total)
- CEC leading "energy sector studies" (different funding source)

## Timeframe

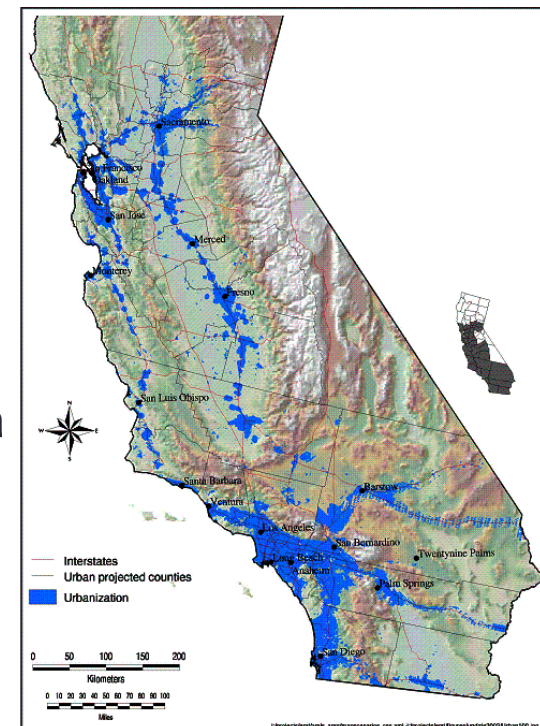
- CEC and CNRA expect to issue RFPs late 2014, early 2015
- 4<sup>th</sup> Assessment results expected to be released 2018

More information about California's prior climate assessments at:

[http://www.climatechange.ca.gov/climate\\_action\\_team/reports/climate\\_assessments.html](http://www.climatechange.ca.gov/climate_action_team/reports/climate_assessments.html)

# Primary scenario research supported by CEC

- **Climate, hydrology, and sea-level rise**
  - Use new LOCA downscaling technique (Scripps) to project daily T and precip at 3.5 mile resolution for RCP 8.5, 4.5 and [possibly] 2.6
  - Hydrological (VIC), relative humidity & wind fields
  - Develop a “long drought” scenario
  - Quasi-probabilistic climate forecasts
  - Build on prior work to develop quasi-probabilistic sea level rise scenarios for California
- **Socioeconomic and land use scenarios**
  - Develop urban, suburban, and ex-urban scenarios, recognizing dynamic general plans & interplay between climate risks and land use and enabling exploration of a variety of development paradigms
  - Coordination w/ USEPA (ICLUS), USGS
  - Cohere with Department of Finance projections



*Figure:* Estimated distribution of urban areas under a 92 million population scenario. J. Landis and M. Reilly, 2003.

*source:*

[http://www.energy.ca.gov/reports/500-03-058/2003-10-31\\_500-03-058CF\\_A03.PDF](http://www.energy.ca.gov/reports/500-03-058/2003-10-31_500-03-058CF_A03.PDF)

# Secondary scenarios related to wildfires

- **Wildfire scenarios (statistical approach)**
  - Support, e.g., analysis of timeframe during which various regions will transition to higher wildfire risk based on wildfire frequency & intensity
- **Vulnerability of forests to climate change and wildfire:**
  - Update projections for: shifts in major forest species, likelihood of type conversion, and wildfire regimes
- **Wind-driven events for So. California**
  - 4<sup>th</sup> Assessment studies may make use of research ongoing at UCI, UCLA to explore how changes in Santa Ana winds will affect wildfires



*Figure:* Rim fire, August 2013. Photo: Noah Berger, EPA.

*source:*

<http://www.theguardian.com/world/2013/aug/26/california-wildfire-rim-fire-crews-progress>

CEC support  
CNRA support  
External work

# Climate change, habitat, and wildfire: Research on vulnerability and adaptation

- **Energy infrastructure**
  - Expand prior work to include distribution system as well as proposed (in addition to existing) transmission corridors
- **Adaptation options for natural terrestrial ecosystems**
  - Identify management options based on projected shifts in forest tree and other vegetation species in response to climate change; may also consider changes due to fuel treatment
- **Impacts of wildfire on homeowners' insurance**
  - Regional study in high-risk area
  - Analyze range of potential losses from projected changes in wildfire risks; consider how insurance market may respond
- **Reducing wildfire-mediated health impacts**
  - Regional study in high-risk area
  - Leverage wildfire scenarios and regional transport models to explore impacts on public health as well as adaptation options

# Climate change, habitat, and wildfire: Critical reviews

- **Migration corridors and refugia: critical review**
  - Assess existing efforts to identify criteria for identifying migration corridors as well as a taxonomy for refugia, barriers to adaptation
  - If resources permit, modeling to identify potential corridors, refugia
- **Fuel treatment for forest resilience and climate mitigation: critical review**
  - Clarify what is known about fuel treatment effects on C cycling in CA
  - Improve estimates of forest management effects on carbon sequestration and avoided wildfire emissions
  - Identify what more need be known to support sound decision-making vis a vis forest resilience and carbon storage

# California's working lands: Research on forest vulnerability and adaptation

- Mapping forest carbon for sequestration & adaptation
  - Develop, evaluate innovative methods (e.g., airborne LiDAR + hyperspectral sensors) to improve forest carbon mapping in California
  - Need replicable, repeatable, accurate, cost-effective measurements
  - Ultimately, support appropriate management and GHG accounting

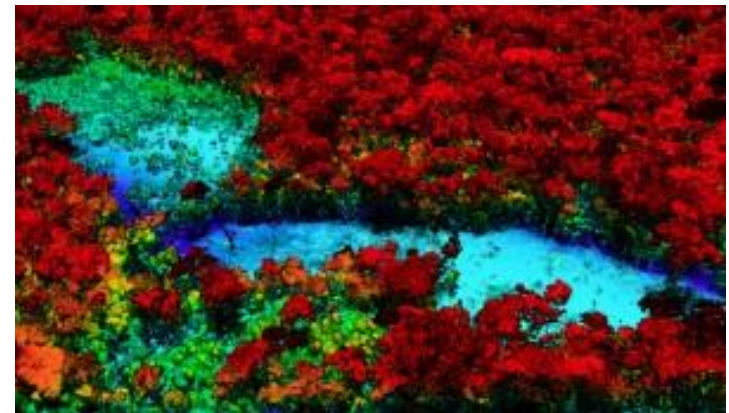


Figure: Mapping with airborne LiDAR plus an imaging spectrometer.

source: <http://blog.lidarnews.com/3d-forests>



# Forecasting to support climate-resilient decision-making

*Prior research demonstrates that state-of-the-art regional climate projections to support probabilistic seasonal and decadal forecasts can improve water management under current and future conditions*

- **Probabilistic climate forecasts for the energy system**
  - Will be used as a basis for decision-support tools to enhance climate resilience of natural gas and electricity sectors
- **Probabilistic climate forecasts for the public health sector**
  - Will be used as a basis for decision-support tools to enhance climate resilience of public health in California, e.g., development of short-term public health warnings tailored to local and regional conditions in California

CEC support  
CNRA support

## Other non-energy research includes:

- Climate change and emergency management in California
  - Systematic assessment of the condition and climate vulnerability of state-owned essential infrastructure critical to response and recovery operations
- Several studies on Water Security and Long Droughts
  - Adaptation options for California's water system: improving models of human-hydrological interaction for climate adaptation
  - Adaptation options for local "self-sufficient" utilities
  - Lessons from the current drought: Adapting to increased water stress
- Funding and Implementing Adaptation Measures in California
  - Investigation of Practical Opportunities to Fund Adaptation
  - Overcoming Barriers to Adaptation: A Case Study

*For a full description of CNRA's proposed research portfolio, see:*  
<http://resources.ca.gov/climate/fourth/>

# Energy-related research

- Socioeconomic and urban projections for the energy sector
- Climate, hydrological, and sea-level rise scenarios to support energy sector planning and management (*ongoing research*)
- Wildfires and the transmission and distribution system
- Sea-level rise and electricity infrastructure
- Long-term scenarios for the energy sector
- Improved characterization of the urban heat islands
- Regional adaptation studies for the natural gas sector
- Electricity sector strategies to foster resilience
- Related studies supported by the CEC, including:
  - Delta levee subsidence, sea level rise, and the energy infrastructure
  - Cal-Adapt: Visualizing climate-related risks for the energy sector

*As presented by CEC at public workshops, August 25, 26, and 29. Full presentations at:*  
[http://www.energy.ca.gov/research/epic/documents/2014-08-25-26-29\\_presentations/?rtn=08292014](http://www.energy.ca.gov/research/epic/documents/2014-08-25-26-29_presentations/?rtn=08292014)

# External Projects:

## Is there a role for Tahoe science?

- There are more research needs than research funds
- State seeks to complement the core portfolio of planned research with externally funded studies
  - Alignment of ongoing and/or planned work to contribute to the 4<sup>th</sup> Assessment would involve, e.g., use of common scenarios, peer-review, participation in quarterly meetings of research teams
- **Upcoming workshop to explore possible collaborations**
  - Sacramento, Monday, December 1
  - Details forthcoming

... Many opportunities to work together!



# Staying engaged

- Sign up for the Natural Resources Agency climate list-serv:  
[https://listserv.state.ca.gov/wa.exe?SUBED1=CNRA\\_Climate&A=1](https://listserv.state.ca.gov/wa.exe?SUBED1=CNRA_Climate&A=1)
- Draft portfolio of non-energy sector proposed research available (*or coming soon*): <http://resources.ca.gov/climate/fourth/>
- Energy sector workshop presentations are available here:  
[http://www.energy.ca.gov/research/epic/documents/2014-08-25-26-29\\_presentations/?rtn=08292014](http://www.energy.ca.gov/research/epic/documents/2014-08-25-26-29_presentations/?rtn=08292014)
- When energy-sector RFPs are released, they will be distributed through research list-servs:  
<http://www.energy.ca.gov/listservers/>

The image shows a screenshot of a web page titled "RESEARCH & DEVELOPMENT LISTS". The page contains a list of four research programs, each with an unchecked checkbox:

- epic - Electric Program Investment Charge (EPIC) Program
- research (Energy RD&D / PIER program)
- pierbuilding (PIER Pgm. - Residential & Commercial Bldgs. Program Area)
- naturalgas (Natural Gas Research Program)  
Note: uses main natural gas list

Two red arrows point from text labels to the checkboxes. One arrow points from "Electricity sector research" to the "research (Energy RD&D / PIER program)" checkbox. The other arrow points from "Energy-related natural gas research" to the "naturalgas (Natural Gas Research Program)" checkbox. The "research (Energy RD&D / PIER program)" checkbox is also circled in red.

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