Future forest health concerns for Nevada

Photo: Nevada Division of Forestry

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Outline
What is shaping change in Nevada forests?
What will Nevada forests contain in 2114?
Current and future concerns???

- Climate Change
- Drought
- Fire
- Lack of resources to care for land; politics
Nevada Bioregions

Sierra Nevada
Intermountain Desert
Mojave Desert

Photos: Nevada mojave (flickr.com); Intermountain region (fs.fed.us)
Threats

Drought. Water diversion.
Fire.
Recreation over-use. Off-road vehicles. Tourism. Recreational shooting areas.
Grazing.
Oil and gas drilling. Mining.
Poor vegetation management.
Air pollution.
Lack of care for species valued by tribes.

Photos: Los Padres Forest Watch, Popular Mechanics
Threatened and Endangered Species

40+ federally-listed threatened & endangered species

Southwestern willow flycatcher
Yuma clapper rail
Numerous fishes (pupfish, chub, trout, springfish, etc.)
Gray wolf
Sierra Nevada bighorn sheep
Numerous plants (milk-vetch, buckwheat, etc.)
Desert tortoise

Photos: Southwestern willow flycatcher (nrcs.usda.gov); gray wolf (fws.gov); steamboat buckwheat (dcnr.nv.gov); Devil’s hole pupfish (nas.er.usgs.gov)
Climate & Climate Change

2014 is warmest year in 120 years of recordkeeping.

By 2100, average temperatures in Nevada are predicted to increase 3-4°F (spring/fall) and 5-6°F (summer/winter).

Changes in precipitation, including 16 fewer days in the snow season since 1950, mean limited water supplies.
U.S. Drought Monitor
West

October 14, 2014
(Released Thursday, Oct. 16, 2014)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

<table>
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<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
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<tbody>
<tr>
<td>Current</td>
<td>31.95</td>
<td>68.05</td>
<td>55.56</td>
<td>35.07</td>
<td>19.75</td>
<td>8.90</td>
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<td>Last Week</td>
<td>31.51</td>
<td>68.49</td>
<td>55.52</td>
<td>35.65</td>
<td>19.95</td>
<td>8.90</td>
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<tr>
<td>3 Months Ago</td>
<td>31.51</td>
<td>68.49</td>
<td>60.35</td>
<td>46.65</td>
<td>23.56</td>
<td>6.02</td>
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<td>Start of Calendar Year</td>
<td>22.20</td>
<td>77.80</td>
<td>51.44</td>
<td>31.11</td>
<td>7.75</td>
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<tr>
<td>Start of Water Year</td>
<td>31.48</td>
<td>68.52</td>
<td>55.57</td>
<td>35.65</td>
<td>19.95</td>
<td>8.90</td>
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<tr>
<td>One Year Ago</td>
<td>27.53</td>
<td>72.47</td>
<td>56.15</td>
<td>32.44</td>
<td>5.34</td>
<td>0.63</td>
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</tbody>
</table>

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Mark Svoboda
National Drought Mitigation Center

http://droughtmonitor.unl.edu/
Locations of increased forest mortality due to drought & high temperatures

How will forests respond to climate change?

Warming will:

- decrease snowpack,
- cause earlier snowmelt,
- increase summer evapotranspiration,
- increase frequency and severity of droughts,
- increase risk of frost injury,
- change germination time,
- change time of bud set and bud break.

Global convergence in the vulnerability of forests to drought

Brendan Choat1, Steven Jansen2, Tim J. Brodribb3, Hervé Cochard4,5, Sylvain Delzon6, Radika Bhaskar7, Sandra J. Bucci8, Taylor S. Feild9, Sean M. Gleason10, Uwe G. Hacke11, Anna L. Jacobsen12, Frederic Lens13, Hafiz Maherali14, Jordi Martínez-Vilalta15,16, Stefan Mayr17, Maurizio Mencuccini18,19, Patrick J. Mitchell20, Andrea Nardini21, Jarmla Pittmann22, R. Brandon Pratt12, John S. Sperry23, Mark Westoby10, Ian J. Wright10 & Amy E. Zanne24,25

Temperature as a potent driver of regional forest drought stress and tree mortality

A. Park Williams1, Craig D. Allen2, Alison K. Macalady3,4, Daniel Griffin3,4, Connie A. Woodhouse3,4

The interdependence of mechanisms underlying climate-driven vegetation mortality

Nate G. McDowell1, David J. Beering2, David D. Breshears3, Rosie A. Fisher4, Kenneth F. Raffa5 and Mark Stitt6

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3 School of Natural Resources and the Environment, and Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ, USA

4 National Center for Atmospheric Research, Boulder, CO, USA

5 Department of Entomology, University of Wisconsin, Madison WI, USA

6 Max Planck Institute for Molecular Plant Physiology, Potsdam, Germany
Mountain pine beetle and forest carbon feedback to climate change

W. A. Kurz¹, C. C. Dymond¹, G. Stinson¹, G. J. Rampley¹, E. T. Neilson¹, A. L. Carroll¹, T. Ebata² & L. Safranyik¹

1. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, British Columbia, V8Z 1M5, Canada
2. British Columbia Ministry of Forests and Range, Victoria, British Columbia, V8W 9C2, Canada

Effects of biotic disturbances on forest carbon cycling in the United States and Canada

Manage water for forest health!

Mulch
Thinning and species selection
Soil conservation
Irrigation

Water for fish? Water for farms? Water for city people?
Or – water for the forest?


Photo credit: TNC
Acknowledgements

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Photo: Electric tree, Burning Man (flickr.com)