Climate Change Impact on Forest Resources

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Scenario Analysis Subgroup
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Sacramento

Acknowledgements

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Approach

Goal: Evaluate climate change impacts on the forest resources for a specific region in California's timberbelt

Case: Mixed conifer forest in El Dorado County

- 25% of statewide growing stock
- Value in 2004 -- $23.3 million
- Growth-climate relationships documented

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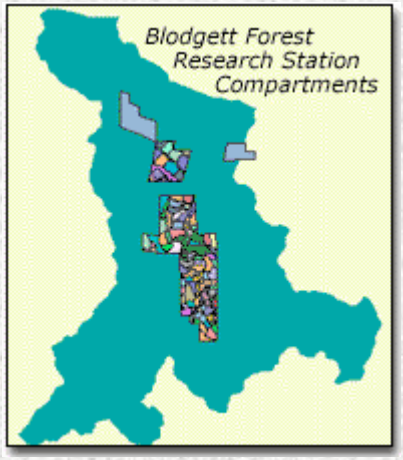
Three questions

- Impact on timber yield
- Impact on tree survival
- Impact on forest diseases and insects

Forest growth simulated and validated for stands in Blodgett Forest, El Dorado County



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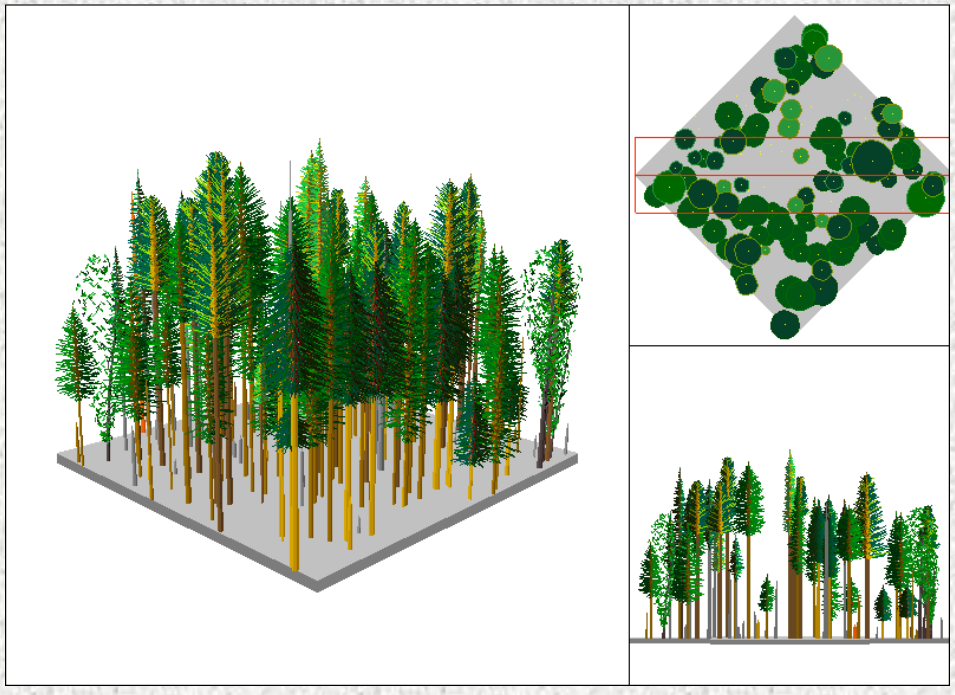
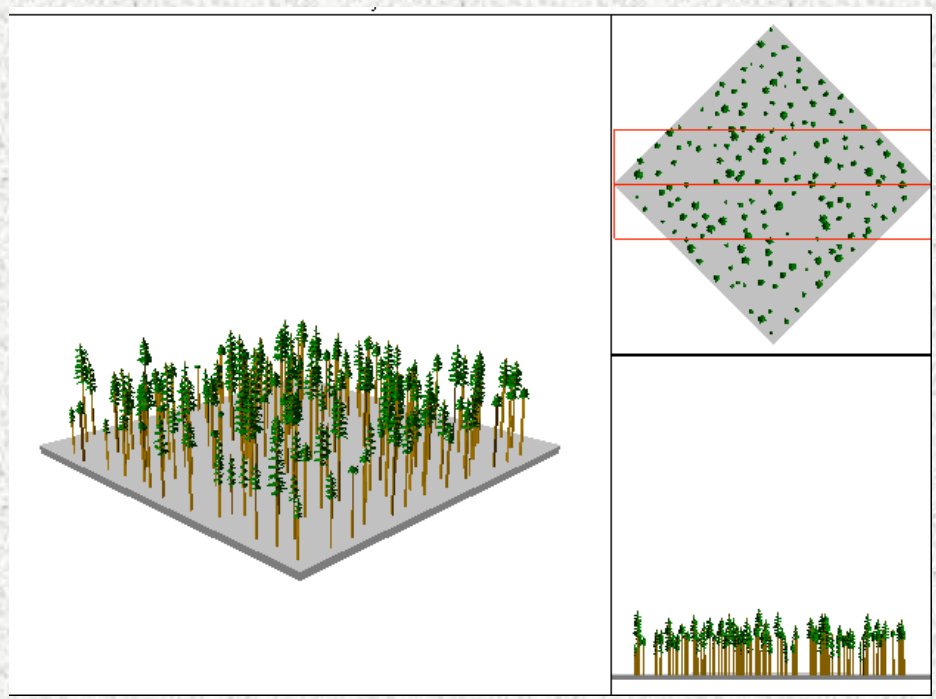
Management regimes

Mature (80 years old) mixed conifer forest



Pine plantation (20 years old)



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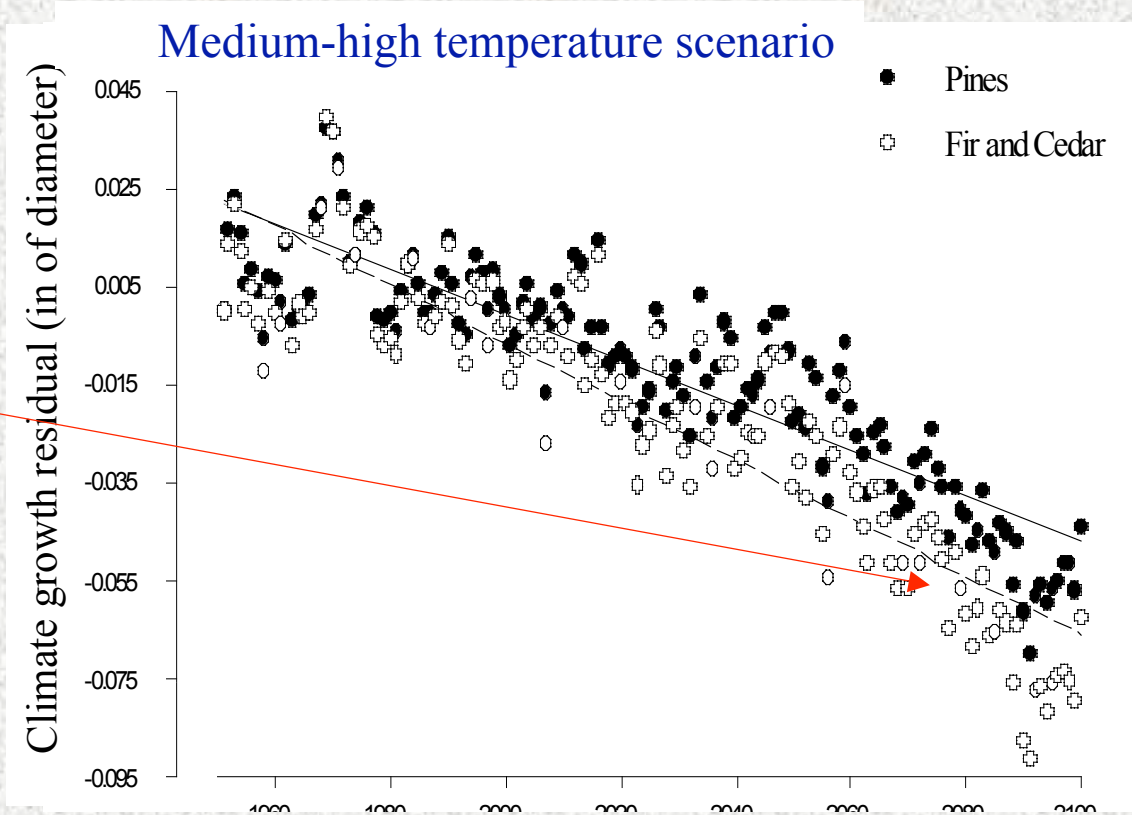
Climate impact on tree growth

Tree growth predictors:

summer temperature
winter rainfall

By 2100, impacts more severe for fir and cedar than for pines



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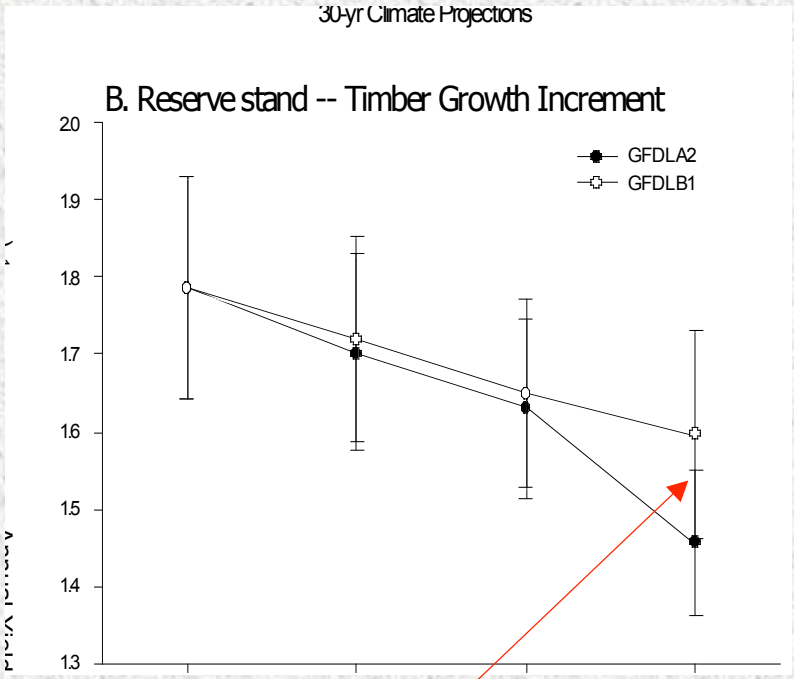
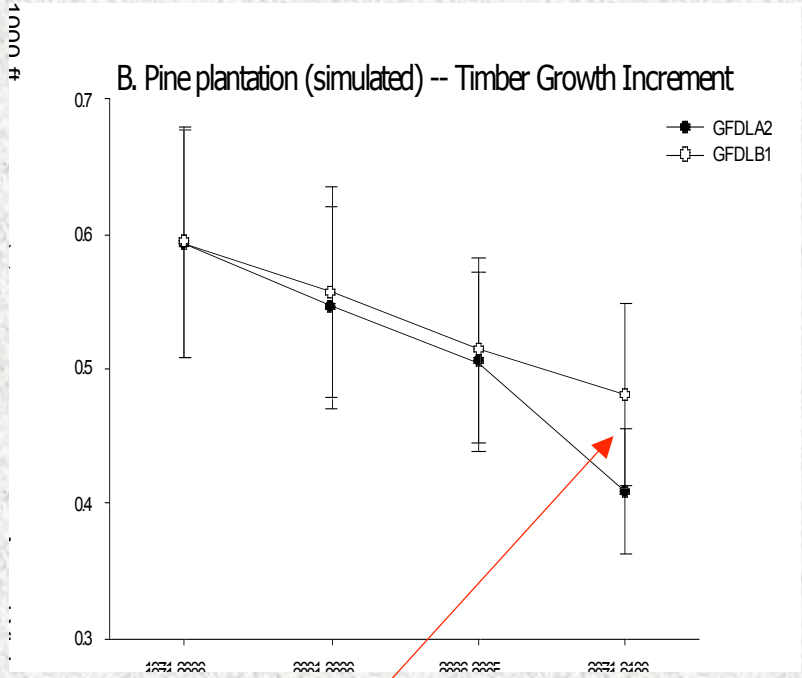
Timber yield





Medium-high temperature scenario
18% reduction in yield by 2100

Medium-high temperature scenario
30% reduction in yield by 2100

(Note: Current stumpage value: ~$325/MBF)

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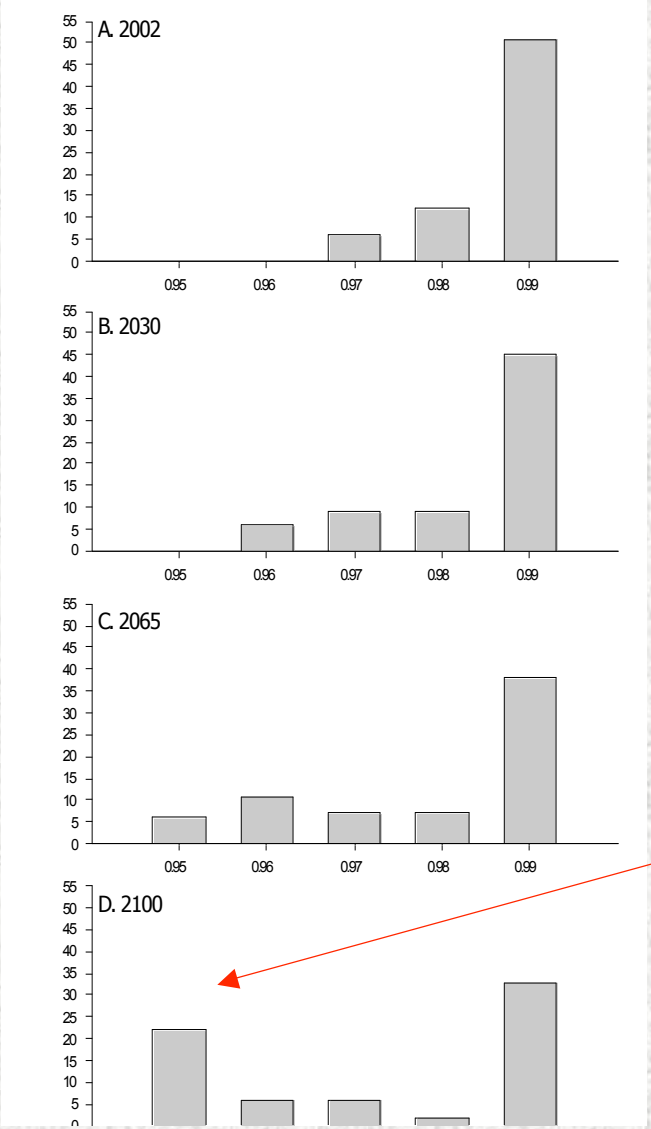
Tree survival (non-catastrophic)

Vulnerability profiles for white fir (*Abies concolor*)



Medium-high temperature, scenario (GFDL A2)

More than 20% of tree population at "high risk" by 2100 due to climate-related reduction in growth

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Diseases and insects

Pest organisms have the ability to adapt much faster than their host trees – expansion of non-native diseases and insects

New diseases and insects have potential to cause catastrophic losses (e.g., pitch canker in the El Dorado County)

Also increased host stress (i.e., reduced growth in trees) can increase the lethality of native organisms

Specific examples relevant to California's conifer forests include root diseases caused by *Armillaria* spp. and certain wood or twig boring insects (*Ips* spp).

Strategies for reducing impact

To alleviate forest health concerns:

- Maintain a mixture of species
- Maintain lower tree densities

To offset decreasing yields:

- Reduce capital costs of timber management
- Increase harvest
- Change species of crop tree