



Actions by the Oregon Department of Forestry and Oregon Forest Resources Institute in Response to Climate Change

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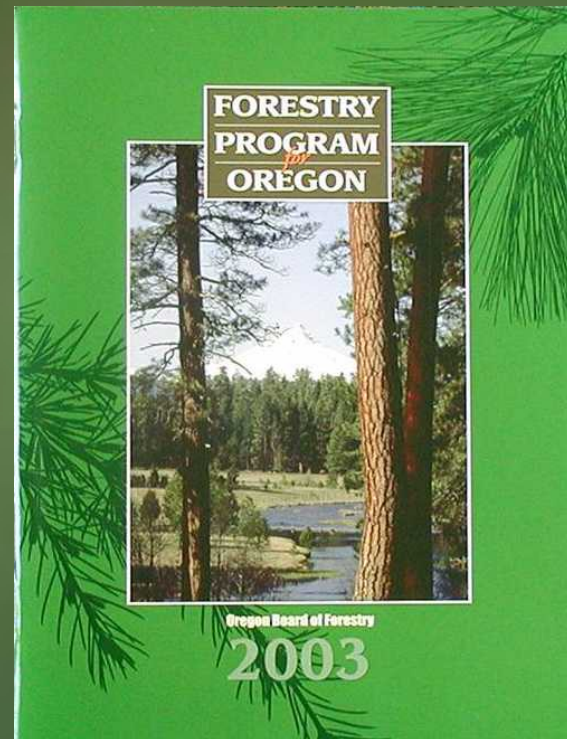


What we will cover

- ❑ Oregon Department of Forestry and Oregon Forest Resources Institute current actions and new opportunities relating to Oregon's forests and climate change

2003 *Forestry Program for Oregon* Elements

- **Mission**
- **Strategies**
- **Vision**
- **Values**
- **Issues**
- **Actions**
- **Indicators**



Sustainability is a Unifying Theme

Sustainable forest management means:

Forest resources are used, developed, and protected at a rate and in a manner that enables people to meet their current environmental, economic, and social needs, and also provides that future generations can meet their own needs (based on ORS 184.421)





Nature emphasis forests

– Parks, wilderness, wild areas *Mostly federal lands, some state, tribal and private*

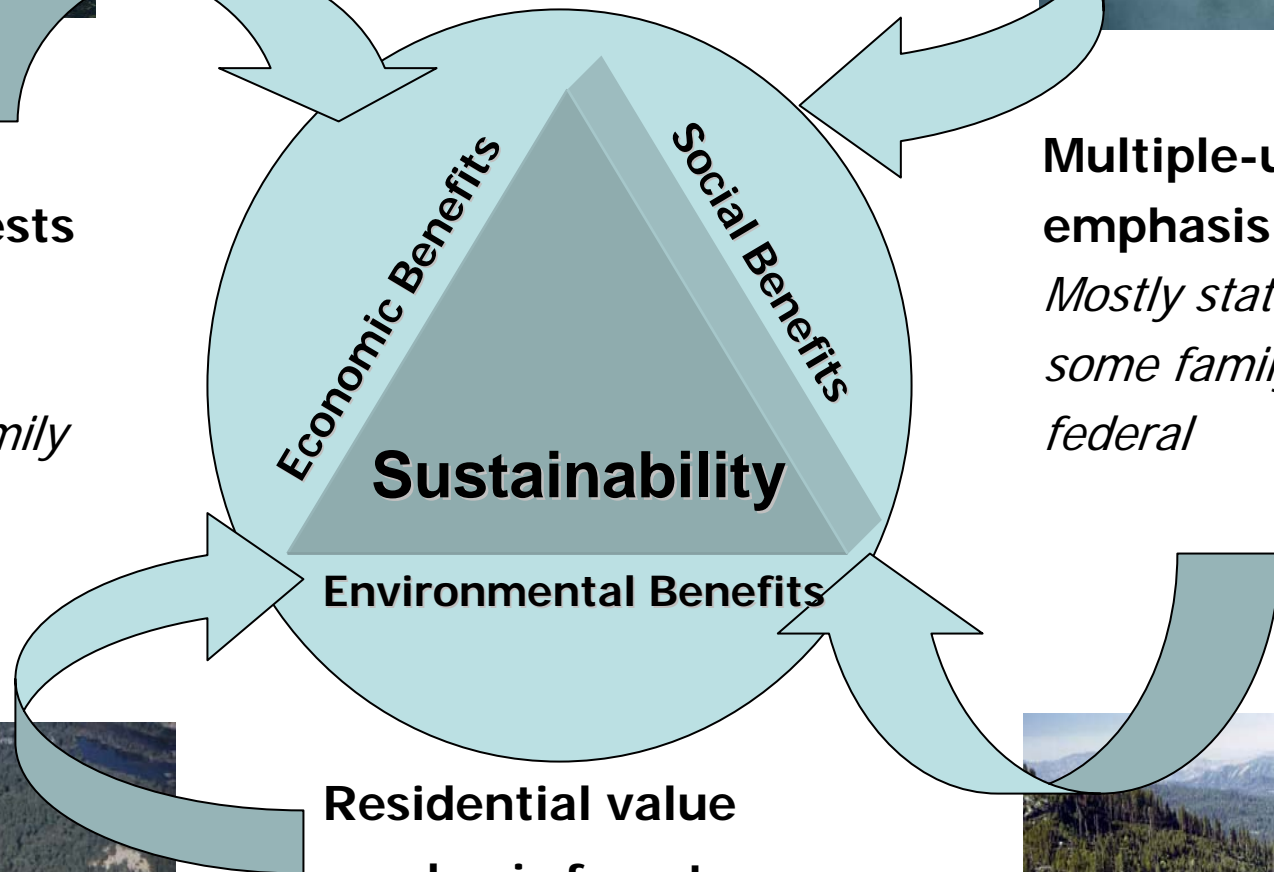


Production emphasis forests

Mostly forest industry, some state, tribal, family

Multiple-use emphasis forests

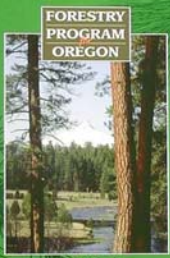
Mostly state, tribal, some family, some federal



Residential value emphasis forests

Forests where people live





Forestry Program for Oregon Strategies:

A: Promote a sound legal system, effective and adequately funded government, leading-edge research, and sound economic policies.

B: Ensure that Oregon's forests provide diverse social and economic outputs and benefits valued by the public in a fair, balanced, and efficient manner.

C: Maintain and enhance the productive capacity of Oregon's forests to improve the economic well-being of Oregon's communities.

D: Protect, maintain, and enhance the soil and water resources of Oregon's forests.

E: Contribute to the conservation of diverse native plant and animal populations and their habitats in Oregon's forests.

F: Protect, maintain, and enhance the health of Oregon's forest ecosystems, watersheds, and airsheds within a context of natural disturbance and active management.

G: Enhance carbon storage in Oregon's forests and forest products.



Key issues related to climate change and Oregon's forests

- **Maintaining the forest land base is key to many environmental, economic, social benefits and should be Oregon's primary contribution to moderating global climate change**
- Renewable wood should be a preferred building material, use of Oregon wood is an even better choice
- Private forest ownership is changing, continued viability is question
- Forest ecosystems dynamics are often not reflected in forest policies
- Mix of Oregon ownerships and management objectives a good thing
- Forest health, overstocking, fire risk on many federal eastside and SW Oregon forests
- Effects of future climate change and invasive species may dwarf current forest management debates

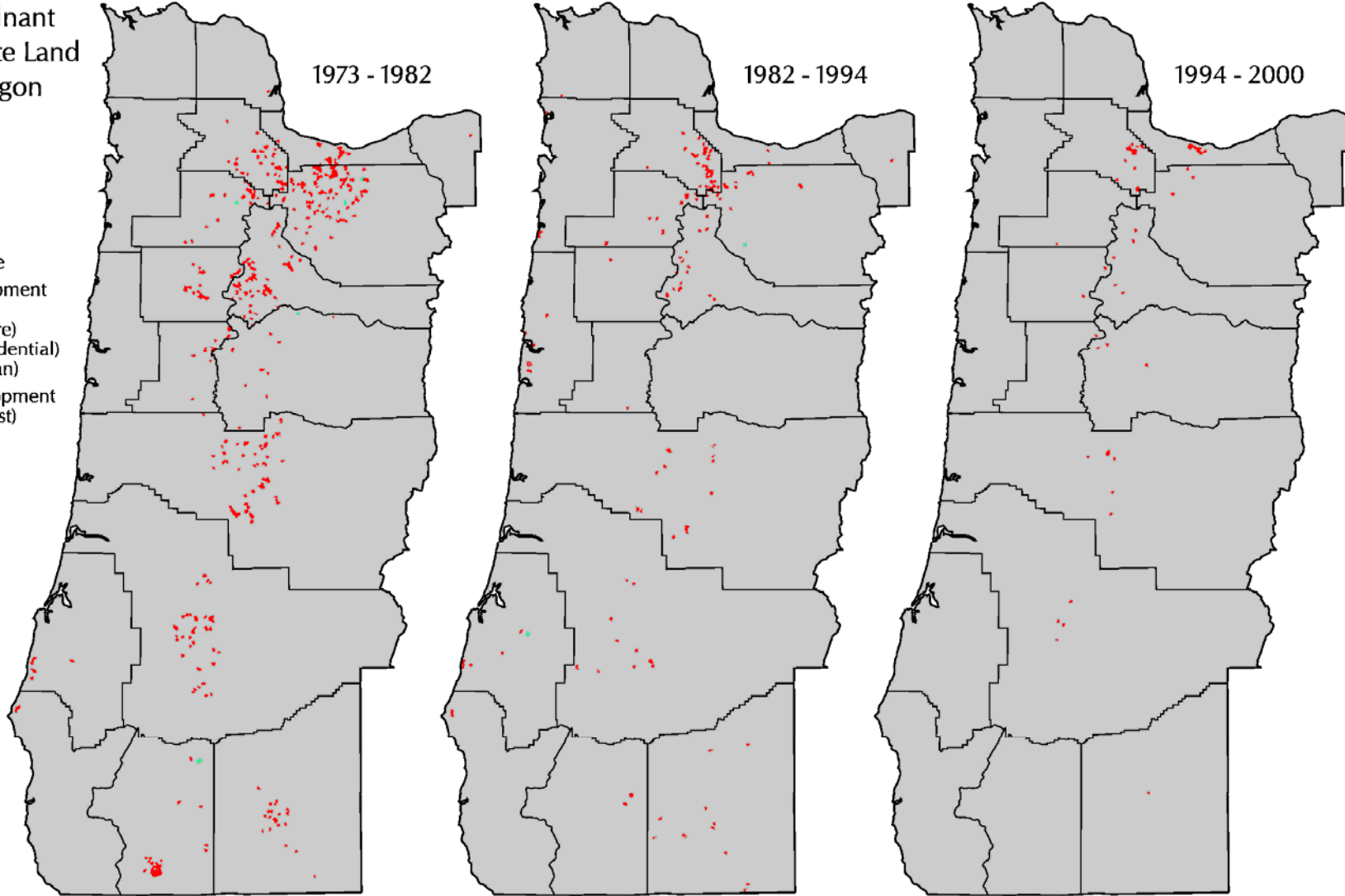
Change in Dominant Land Use on Private Land in Western Oregon

1973 - 1982

1982 - 1994

1994 - 2000

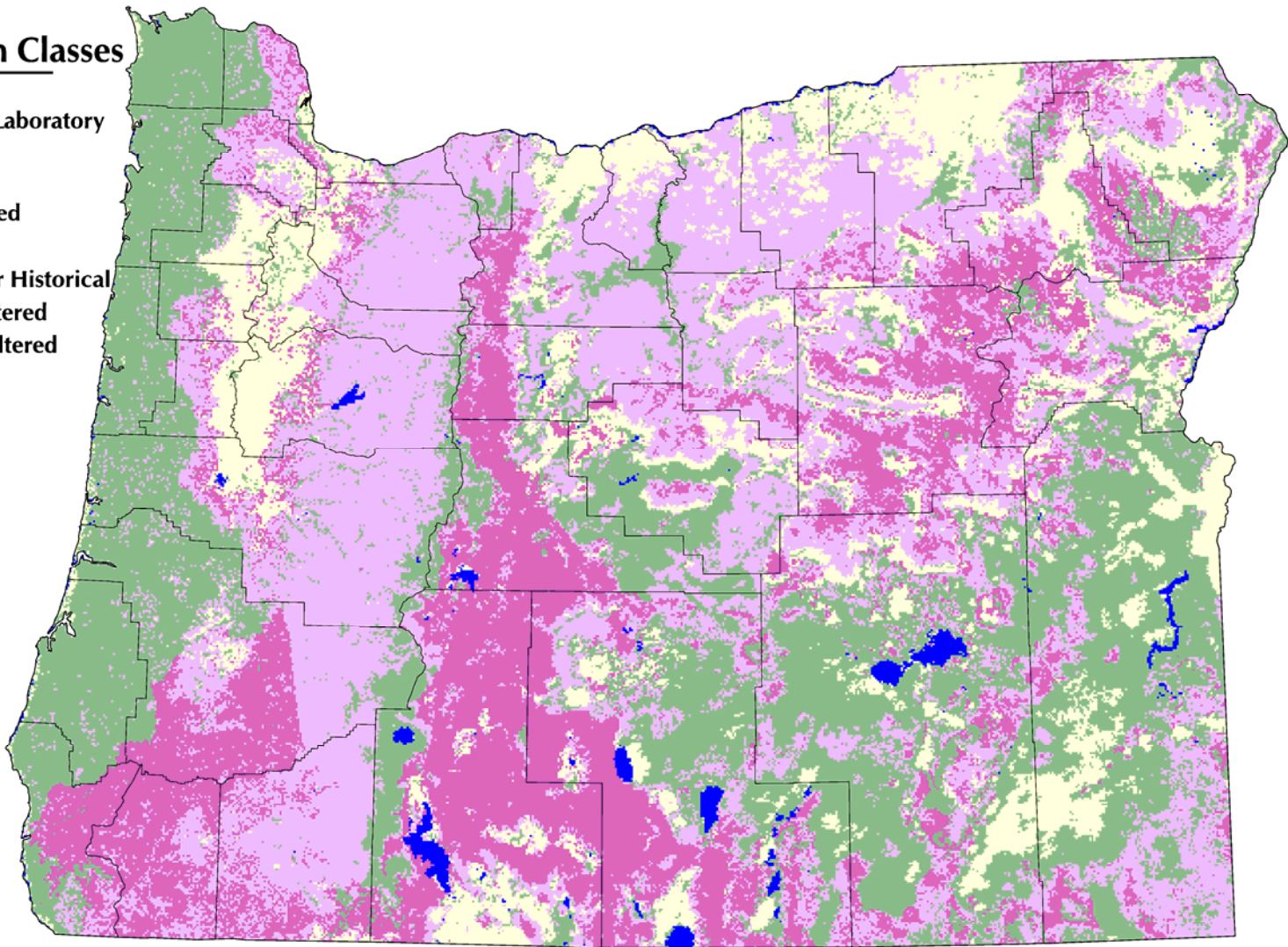
- No Change in Dominant Land Use
- Increase in Development (Forest to Mixed) (Forest to Agriculture) (Residential to Urban)
- Decrease in Development (Agriculture to Forest)



Current Fire Condition Classes

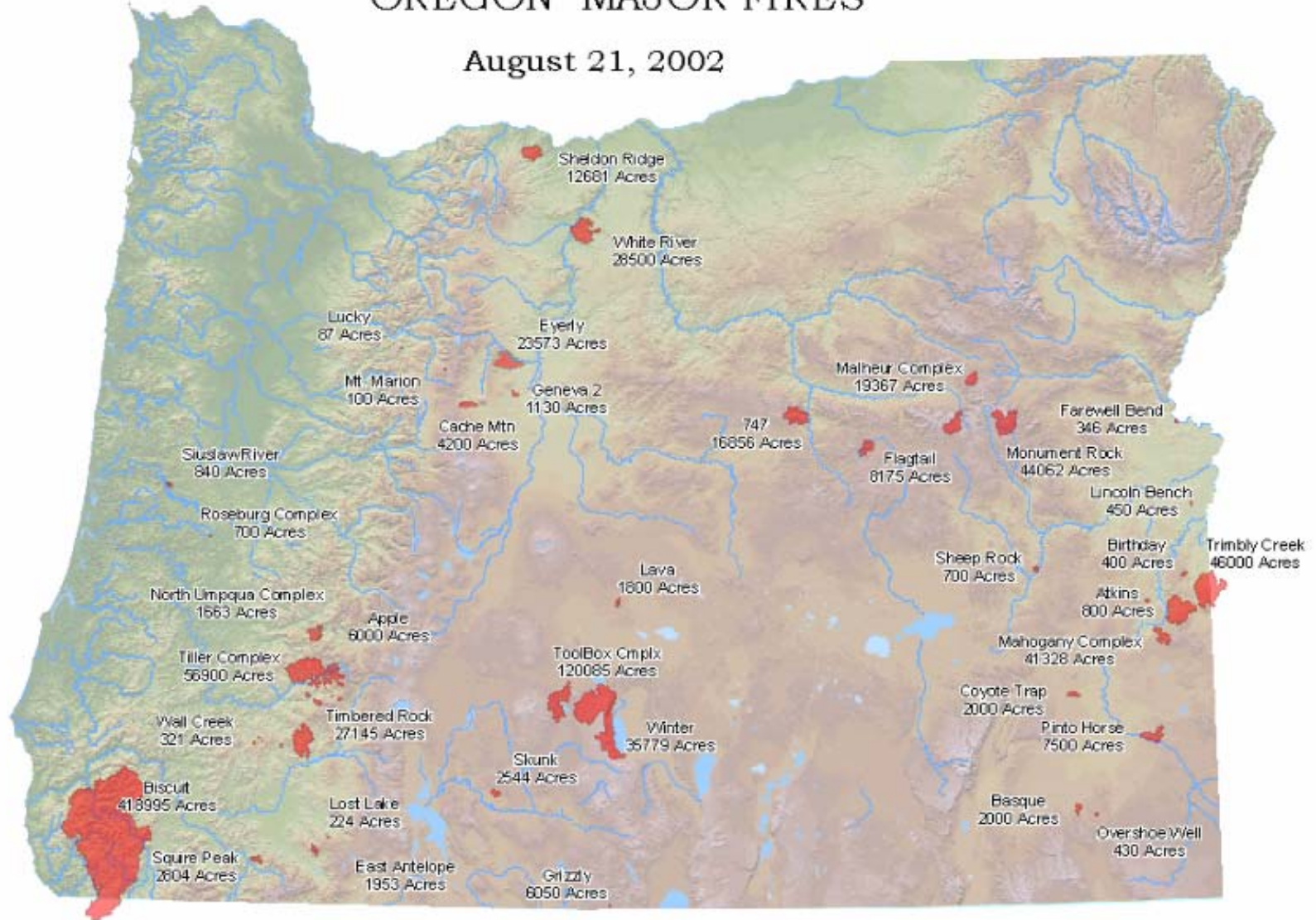
SOURCE: USFS Fire Sciences Laboratory

- Agriculture or Non-Vegetated
- Open Water
- Fire Regime Within or Near Historical
- Fire Regime Moderately Altered
- Fire Regime Significantly Altered



OREGON MAJOR FIRES

August 21, 2002





Global implications of Oregon timber harvest constraints

Where is global wood products demand satisfied if not by Oregon wood?

43% US Southern Forests

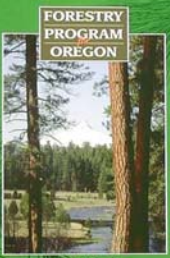
15% Asian Forests

10% Canadian Forests

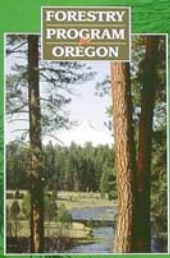
32% Non wood products (i.e. steel, plastic, concrete)

(Perez-Garcia, 2003)

Forestry Program for Oregon actions related to climate change



- **Encourage maintaining and increasing Oregon's forestland base and promoting urban forests**
- Develop tools to understand the dynamics of forest carbon pools
- Promote increased public and forest landowner understanding of the potential contributions of trees and forests in storing carbon
- Promote the development of forestry carbon-offset markets, and provide landowners information about the markets
- Promote the use and reuse of Oregon forest resources
- Develop local markets for wood products from Oregon forests
- Encourage greater consumer awareness of the environmental advantages of using renewable and recyclable Oregon forest products



2003

Forestry Program for Oregon actions related to climate change (cont.)

- Promote active forest fuels and vegetation management
- Promote forest landscape conditions that are resilient to natural disturbances, including climate change
- Encourage long-term wood volume growth in Oregon that exceeds the rates of timber harvest and mortality
- Maintain a favorable investment climate for environmentally sensitive, socially responsible, and globally competitive forest-based businesses throughout Oregon
- Promote adaptive forest management



10 of 19 Oregon indicators of sustainable forest management related to climate change

Influences:

- Carbon stocks on forestlands and in forest products
- Area of non-federal forestland and development trends
- Forest ecosystem services contributions to society
- Forest products sector vitality
- Timber harvest trends compared to planned and projected harvest levels and the potential to grow timber
- Forest fuel conditions and trends related to wildfire risks

Effects:

- Composition, diversity, and structure of forest vegetation
- Forest plant and animal species at risk
- Tree mortality from insects, diseases, and other damaging agents
- Invasive species trends on forestlands



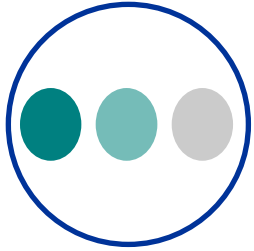
Key opportunities

- The *Forestry Program for Oregon* provides a foundation for planning for healthy, sustainable forests
- Environmental, economic, and social benefits from our forests are interdependent; we must sustain all three to sustain any one benefit
- Oregon indicators of sustainable forest management can be tools for policy feedback, public education and dialogue, and for prioritizing future monitoring and assessment work
- Maintaining the forest land base critical
- More unified Oregon vision needed for federal forest management (57 percent of Oregon's forests)
- Promote greater use and reuse of Oregon wood products



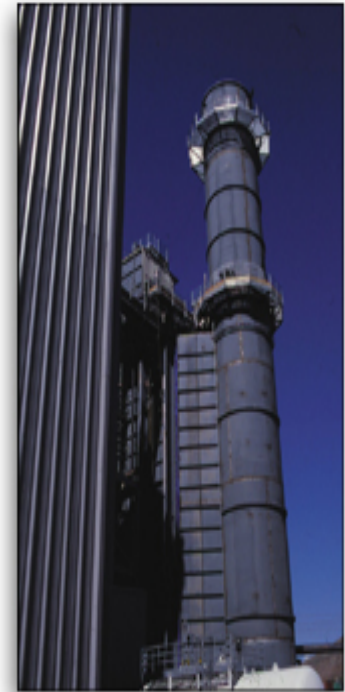
Key opportunities (cont.)

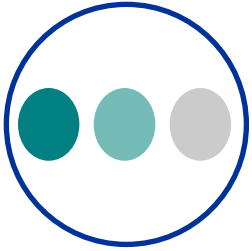
- Need a clear State of Oregon forest products cluster economic development strategy and the institutional capacity to implement it
- Active management needed to restore forest health
- Forest biomass utilization -- tremendous potential with multiple environmental/economic/social benefits
- Need to make Oregon natural resource decisions in a global context--what appears sustainable at a state scale may be unsustainable when viewed from a global perspective
- Develop accurate carbon accounting for forest management and wildfire
- Promote forestry carbon offset-markets
- Improvements to the Oregon Forest Resource Trust



Forest Resource Trust

- 1995 Implemented with \$3.5 MM lottery dollars
 - ◉ Carbon offsets transferred to Board of Forestry
 - ◉ Created new forest on 40% of existing projects
 - ◉ State budget crisis removed 70% of funding
- 1999 Received \$1.5 MM carbon offsets funds from the Klamath CoGeneration Project
- 2005 Revitalization plan requested by the Energy Facility Siting Council and the Department of Energy because of limited results





House Bill 2200

Forestry Carbon Offsets

Authorizes State Forester to Aggregate Carbon Offsets

- Unclaimed in Forest Resource Trust
- State-owned Forestlands
- **Non-Federal Landowners (voluntary program)**

Allows Board of Forestry to Set Voluntary Standard

- Eligible Practices
- Principles of Carbon Accounting



Oregon Board of Forestry

www.oregonforestry.org



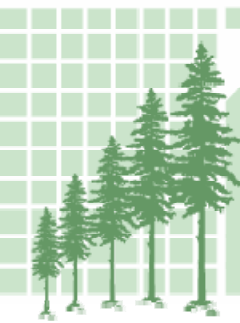
**OREGON FOREST
RESOURCES INSTITUTE**





Study of Biomass Energy and Biofuels from Oregon Forests

- ❖ Funded by OFRI
- ❖ Conducted by Mason, Bruce, & Girard; Pacific Energy Systems; OSU Colleges of Forestry and Agricultural Science; and Dr. Jim Bowyer
- ❖ Assisted by a working group made up of a cross section of state, federal, private and NGO stakeholders
- ❖ Study completed in June 2006
- ❖ Publication and distribution of report in August 2006
- ❖ Conference to follow in January 2007



OFRI Study: Biomass Energy and Biofuels from Oregon Forests

- ❖ Review existing research
- ❖ Conduct interviews with Oregon biomass stakeholders
- ❖ Assess potential for production of electric energy and biofuels from wood biomass in Oregon
- ❖ Review and summarize efforts underway in Oregon
- ❖ Assess constraints and challenges to woody biomass
- ❖ Develop recommendations on how Oregon can overcome the barriers



Key Study Findings

- Study analyzed potential biomass supply from fuel reduction treatments across 20 eastern and southern Oregon counties
- An estimated **4.25 million acres** (about 15% of Oregon's forestland) have the potential to provide forest biomass by thinning of forest stands to reduce risk of uncharacteristic fire
- Opportunities exist in Klamath/Lake, Jackson/Josephine/Douglas, Grant/Union/Wallowa/Baker & Crook/Deschutes/Jefferson/Wasco Counties
- Eligible area includes public and private timberland with moderate to high fire risk which is outside of designated roadless areas, Wilderness areas, parks and other forestlands where harvesting is excluded. Federal lands make up 71% of potential acres
- Thinning these acres over 20 years could produce **1.0 million bone dry tons (BDT) per year** of woody biomass not including merchantable sawtimber
- Sweet spot of 600,000 BDT/yr at lower harvest costs / current **market rates**
- Governor's staff and electric utilities have asked us to identify areas where fuel supply, transportation infrastructure and transmission infrastructure come together

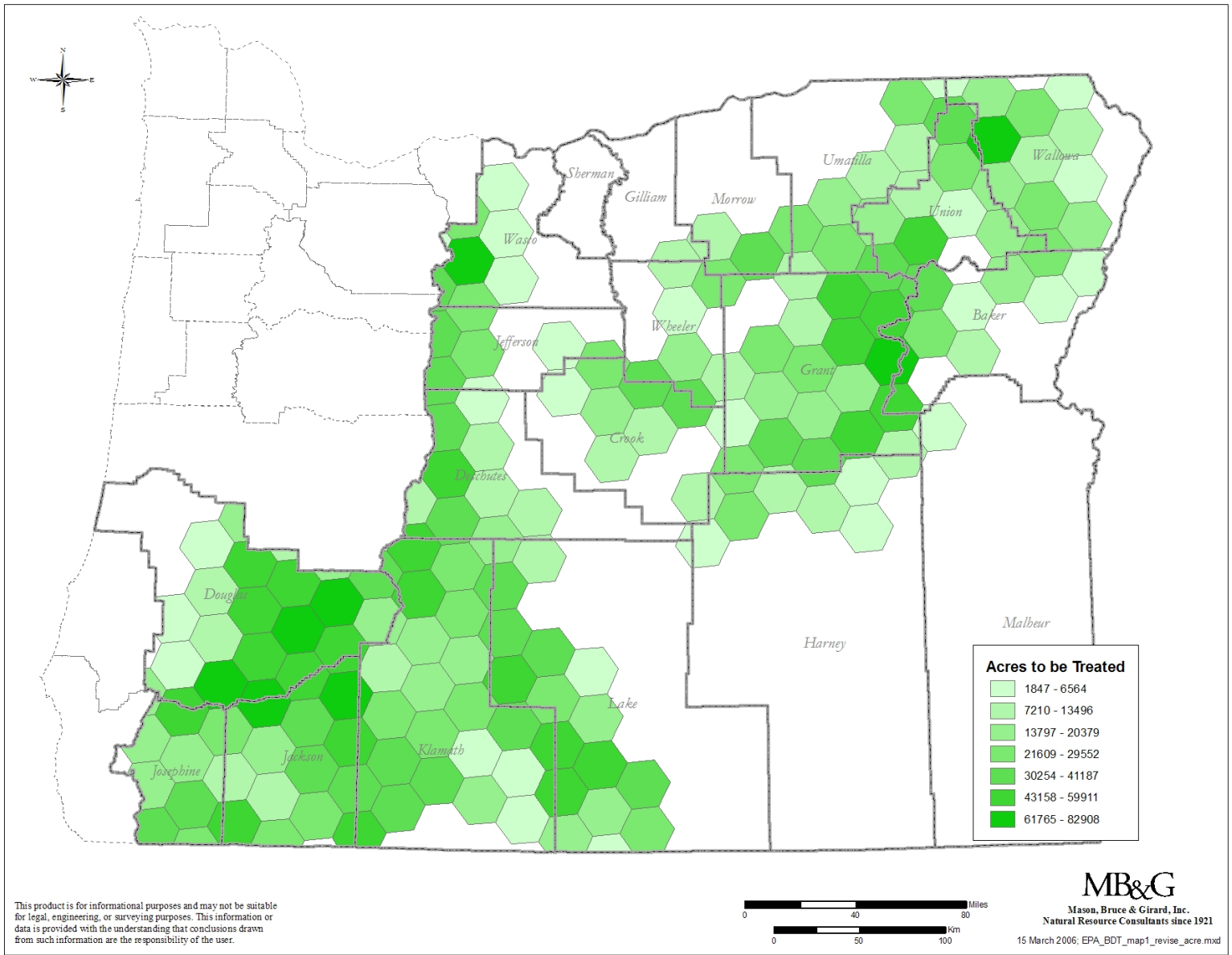


Figure 2-2 – Acres eligible for fuel reduction thinning treatment by 160,000 acre EMAP hexagon.

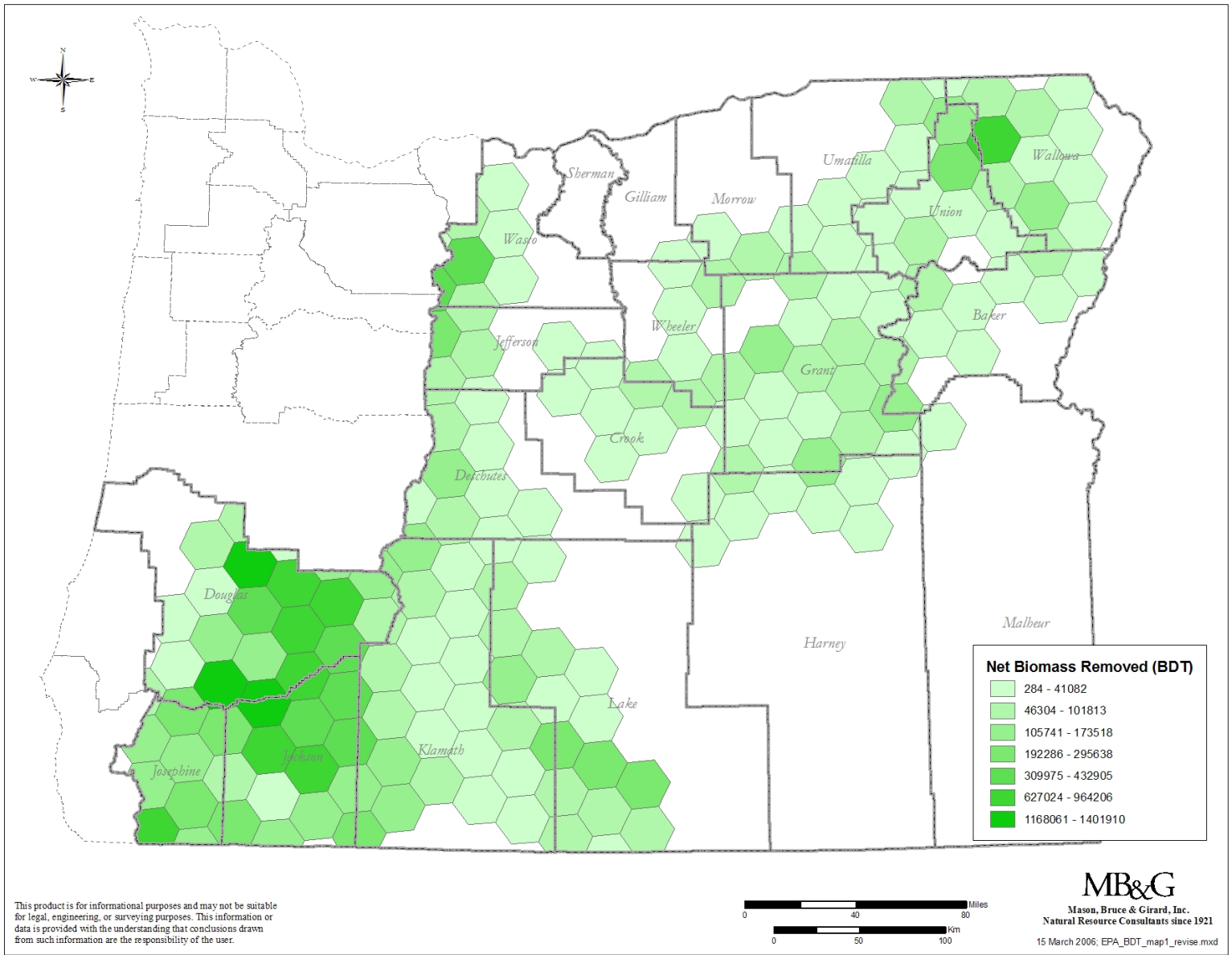


Figure 2-4 – Net biomass removed during fuel reduction treatments by 160,000 acre EMAP hexagon.

Estimated biomass supply

- Biomass supply of approximately 20 million bone dry tons (BDT) would result from treatment of 4.25 million acres of eligible treatment area.
- About 71% of eligible forestland is publicly owned; nearly all is federal.
- Treatment over 20 years would yield 1 million BDT annually.
- Average delivered cost of \$59/BDT.

1 million BDT of woody biomass would be capable of producing...

- 150 MW of electricity at an average cost of 8.1¢ per kWh
(new capacity market rate for natural gas)
OR
- 63 million gallons of ethanol

600 thousand BDT of woody biomass would be capable of producing...

- 81 MW of electricity at of 6.5-7.5¢ per kWh
(existing capacity market rate)

Table 2-17 – Annual net biomass volume available and average cost per BDT at alternative marginal costs, assuming a 20-year harvest period.

Delivered Cost Less Than...	Volume Available BDT/Yr	Avg. Delivered Cost \$/BDT
\$ 40.00	140,092	\$ 35.08
\$ 60.00	588,684	\$ 45.89
\$ 80.00	859,158	\$ 53.07
\$ 100.00	964,021	\$ 56.94
\$ 120.00	1,011,595	\$ 59.36
\$ 140.00	1,031,645	\$ 60.80
\$ 160.00	1,060,119	\$ 63.11
\$ 250.00	1,088,484	\$ 66.47

Other sources of woody biomass

- These sources together could provide another 1 million BDT of woody biomass annually:
 - Western juniper
 - Logging slash from conventional harvests
 - Hybrid poplar plantation slash



Best Bet – Near Term

- 0.6 million BDT/yr :: 81 MW @ \$45/BDT or 6.5¢/kWh
- Integrated stand management
- Combined Heat and Power (CHP)
- Areas where **Fuel Supply** (biomass) / **Transportation Access** / **Power Grid** overlap



Environmental Benefits

❖ Include:

- air quality improvement,
- reduction in greenhouse gases,
- soil and water conservation, and
- Protection and restoration of wildlife habitat and biodiversity

❖ Environmental benefits of biomass energy are estimated at 11.4¢/kWh

❖ The value of avoided forest overgrowth is estimated as 20.2¢/kWh

❖ The estimated net benefit of fuel reduction treatments is \$606 - \$1,402+ per acre

❖ These results suggest that the environmental benefits of forest biomass use for energy are well in excess of the market value of the electricity produced



Constraints & Challenges

- ❖ **Assured Access to Long-Term Biomass Supply**

 - (e.g. USFS Stewardship Contracts for 20 years)

- ❖ **Public Policies Supporting Biomass Energy Public acceptance**

 - (e.g. PUC prioritizes biomass / policy allows utilities to purchase power they don't own)

- ❖ **Energy Market Issues**

- ❖ **USFS/BLM Policies/Capabilities**

- ❖ **R&D Needs**

 - ❖ Emerging energy technology

 - ❖ Forest restoration/fuel treatment needs

 - ❖ Harvesting technology



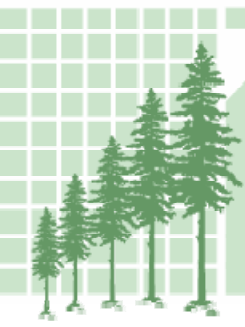
Conclusion



Biomass can help:

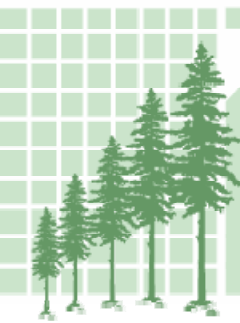
- ❖ solve forest health & habitat problems
- ❖ create economic prosperity in rural Oregon
- ❖ produce renewable energy

Collaboration and agreement between stakeholder groups on forest management and industrial development issues will be necessary to develop a biomass industry in Oregon



Forests, Carbon and Climate --

**Continual Change and Many
Possibilities**



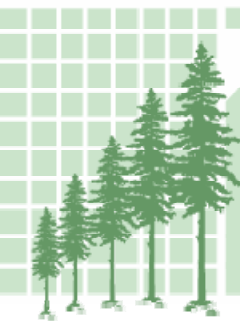
Why Should You Care about Forests, Carbon and Climate?

- People benefit greatly from forests -- watershed health, native species, wood products.
- Climate sets the stage for livability.
- Forests can make a big difference in reducing the rate of climate change.



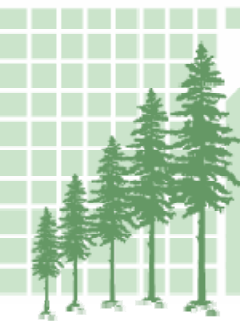
How have Forests Changed over Time and Space?

- Forests are dynamic and have changed both in location and species composition
- Through cooling and warming periods over the last several million years.
- Beginning around 8,000 years ago, humans initiated massive losses of forest.



Working with Half the Forest

- Human activities have likely resulted in the loss of 50% of Earth's forest cover.
- We face large challenges perpetuating the remaining 9.6 billion forest acres as forest.



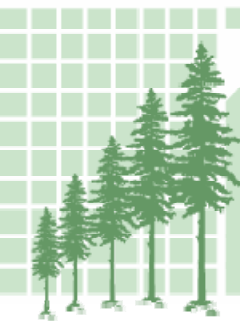
How have Carbon and Climate Changed over Time and Space?

- Huge variations of carbon over time have caused ice ages and warm periods.
- Current rate of increase may exceed levels from past 420,000 years.
- During the past 400 years of the industrial age, humans have transferred carbon
- From long-term stores in forests and fossil fuels into the atmospheric pool.



What does the Future Look Like Now?

- Climate oscillation and change are expected to continue, with forests responding in complex ways.
- Scientists pose ranges for temperature, precipitation, growing seasons, vegetation.



What can We do to Influence Future Climate through Forest Resource Management?

- Reducing uncharacteristically intense wildfires is the single largest thing we can do
- Land use strategies like afforestation and preventing loss of forest can increase forestlands.
- Forest management strategies offer options to store more carbon per acre.
- Forest product management strategies can capture more carbon in wood products, use woody biomass to create energy, and substitute wood for other materials.
- Forestland owners can profit from the sale of carbon credits.



The Future for Oregon

- Oregon is a forest-rich state, poised with opportunities for forests, forestry and forest product enterprises to profit from positive roles in maintaining a livable climate.



Forests, Carbon and Climate Change

Chapters: 2-6

- **Atmospheric Carbon Dioxide** – Mark Harmon, Department of Forest Science, Oregon State University
- **Climate Change at Multiple Scales** - Connie Millar, Pacific Southwest Research Station, US Forest Service and Ronald P. Neilson, Pacific Northwest Research Station, US Forest Service
- **Global Warming: A Skeptic's View** – George Taylor, Oregon Climate Service, Oregon State University
- **Forest Management Strategies for Carbon Storage** - Olga N. Krankina, Department of Forest Science, Oregon State University
- **Keeping Land in Forest** - Jeffrey D. Kline, Pacific Northwest Research Station, US Forest Service



Forests, Carbon and Climate Change

Chapters: 7-10

- **Using Wood Products to Reduce Global Warming** - Jim Wilson, emeritus, Wood Science & Engineering Department, Oregon State University
- **Emerging Markets for Carbon Stored by Northwest Forests** – Betina von Hagen, EcoTrust and Mike Burnett, The Climate Trust
- **Carbon Accounting: Determining Carbon Offsets from Forest Projects** – Jim Cathcart, Oregon Department of Forestry and Matt Delaney, Delaney Forestry Services
- **Governor’s Global Warming Initiative** – Gail Achterman, Institute of Natural Resources, Oregon State University