

STATE OF SIERRA FORESTS

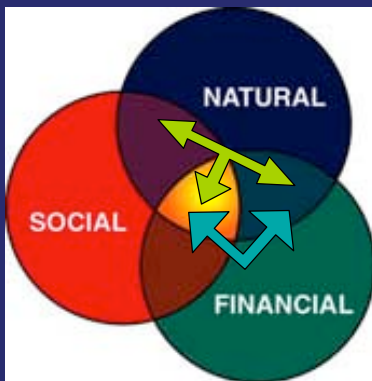
ECOSYSTEM SERVICES:
CHALLENGES AND
OPPORTUNITIES



Betony Jones - bjones@sbccouncil.org - 530/582-4800 ext.24

ECOSYSTEM SERVICES

· ECOSYSTEM SERVICES ARE "NATURAL CAPITAL"



TYPES OF ECOSYSTEM SERVICES

- PROVISIONING
 - Food
 - Fiber / Timber
 - Medicine
 - Water
 - Energy
- REGULATING
 - Climate regulation
 - Flood control
 - Waste decomposition & detoxification, Carbon sequestration
 - Nutrient cycling
- SUPPORTING
 - Air and water purification
 - Pollination
 - Seed dispersal
 - Pest & disease control
- CULTURAL
 - Intellectual, spiritual, & cultural inspiration
 - Recreation
 - Scientific discovery
- PRESERVING
 - Genetic & species diversity
 - Landscape connectivity



EXAMPLES OF ECOSYSTEM SERVICES

• NYC WATERSHED: Restoration of Catskill watershed cost \$1-1.5 billion compared to an estimate of \$6-8 billion to construct a water filtration plant plus annual operating costs of \$300 million

• YANGTZE RIVER WATERSHED IN CHINA: Maintaining forests in the watershed for hydroelectric power yielded 2.2 times the economic benefit than if the forests were harvested for timber



SIERRA ECOSYSTEM SERVICES

•PROVISIONING

- Water
- Timber
- Power

•REGULATING

- Carbon sequestration

•SUPPORTING

•CULTURAL

- Recreation

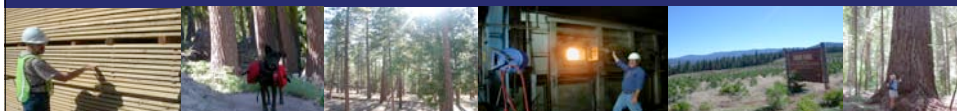
•PRESERVING

- Genetic & biological diversity
- Landscape connectivity



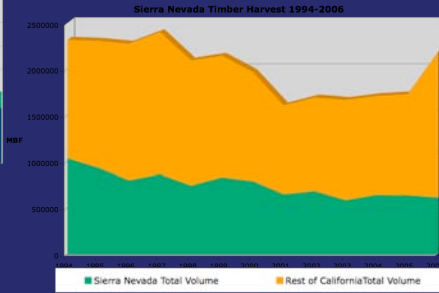
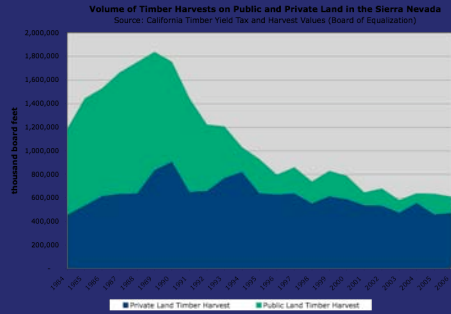
WATER

- The Sierra has 24 major watersheds
- Over 80% of the Sierra's water is exported out of the region
- Provides 65 % of California's water supply, generating \$1.3 billion a year in direct value plus revenue from downstream uses (\$32 billion agriculture industry)
- Sierra Nevada is responsible for over 50% of hydroelectric generation. There are 45 hydropower relicensing efforts scheduled to occur before 2015



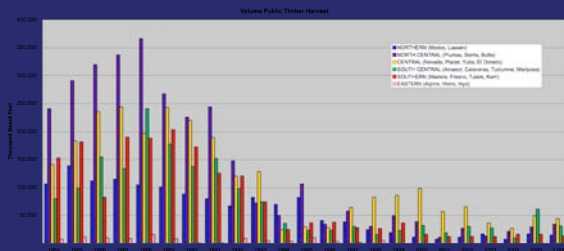
TIMBER PRODUCTION

•The Sierra supplies about 35-40% of California's timber supply

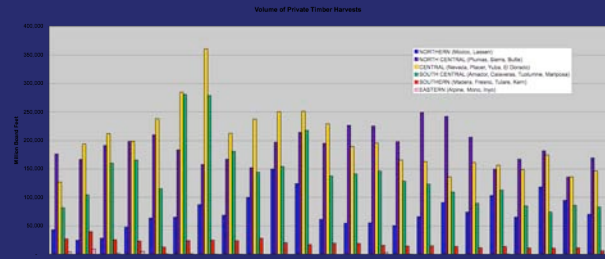


TIMBER PRODUCTION

public



private



TIMBER PRODUCTION

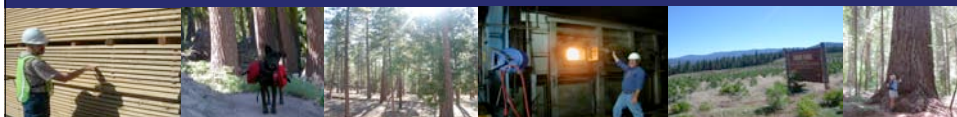
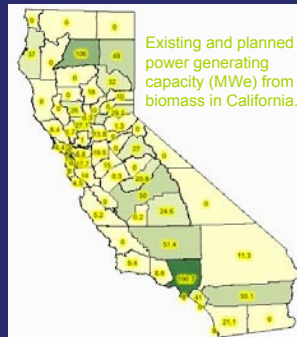


In 2000, Sierra counties received \$6.8 million in State Timber Yield Tax, \$8.5 million from USFS from in-lieu payments, and \$1.8 million in property taxes from California Timberland Production Zones (\$17.1 million)

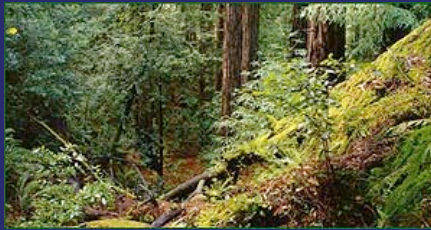


BIOMASS POWER

- 7 operating biomass plants in the Sierra plus 4 idle plants
- In California, there are 40 million acres of forest lands with an average standing tree biomass of 71 tons/acre. 88% of the trees are 10 in dbh or less
 - Slash = 8 million BDT/yr
 - Thinnings = 7.6 million BDT/yr
 - Sawmill residue = 6 million BDT/yr (1.3 million already used for power generation)
 - Shrub/chapparel = 5 million BDT/yr
 - **TOTAL: 26.6 BDT/yr**

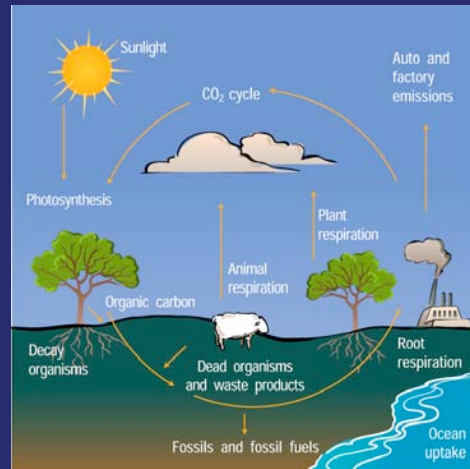
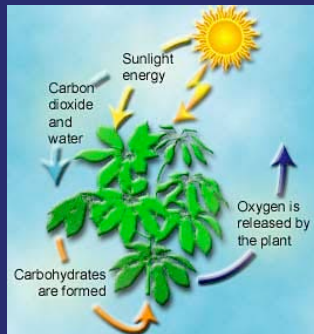
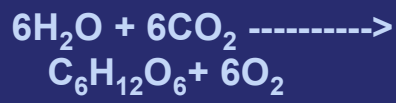


CARBON SEQUESTRATION



CARBON SEQUESTRATION

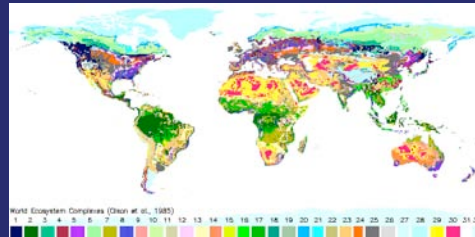
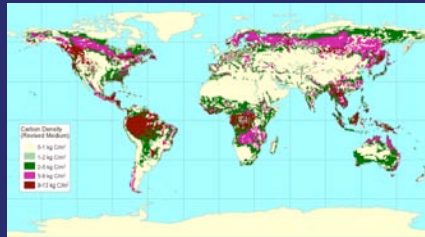
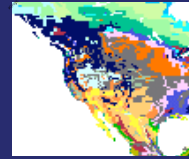
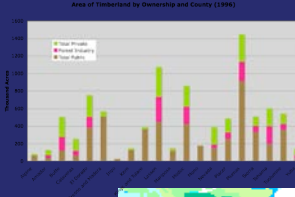
- Photosynthesis



CARBON SEQUESTRATION

The timberlands on the 11 Sierra Nevada National Forests alone store carbon equivalent to 365 million tons of CO₂, equaling \$1.3- 9.9 billion.

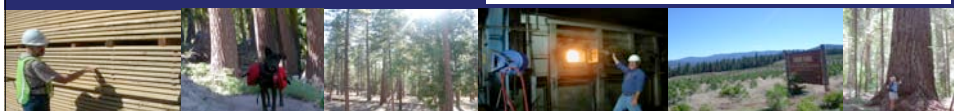
Plus they sequester another 8 million tons annually (\$28-217 million per year).



RECREATION

- CULTURAL
 - Recreation
 - Intellectual inspiration & scientific discovery

Sierra Nevada National Forests and Wilderness Areas



RECREATION

Sierra Nevada Public Lands Recreational Visitor Days: 50-60 million/yr,
2/3 of which take place on National Forest land (SNEP)

Inyo National Forest: 10 million RVDs

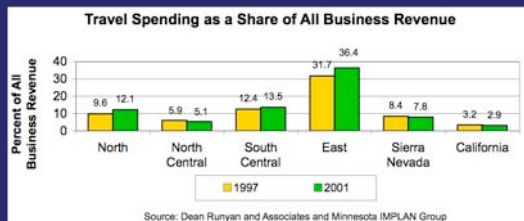
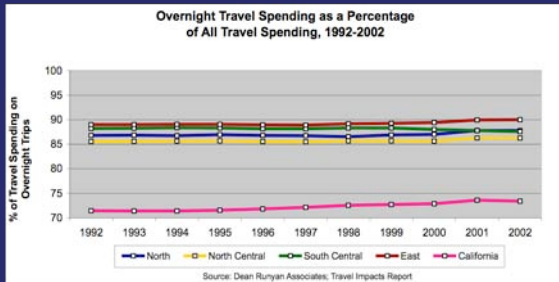
Lake Tahoe (public lands): 6-7 million RVDs

Yosemite NP: 3.4 million visits; \$288 million in visitor spending;
generates \$101.4 million and 7625 jobs in local economy

Lassen NP: 377,000 visits/yr; \$12 million in visitor spending; generates
\$4.2 million and 313 jobs in local economy



RECREATION



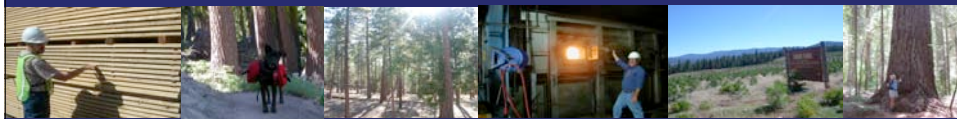
FIELD STATIONS

- CULTURAL
 - Recreation
 - Intellectual inspiration & scientific discovery



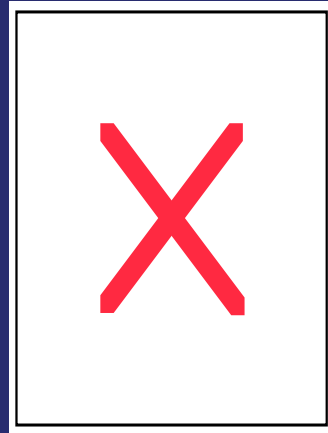
FIELD STATIONS

- | | |
|--|--|
| 1. Valentine Eastern Sierra Reserve (UC Santa Barbara) | 12. Chickering American River Reserve (UC Berkeley) |
| 2. Sequoia & Kings Canyon Field Station (USGS) | 13. Blodgett Experimental Forest (UC Berkeley) |
| 3. Yosemite Field Station (USGS) | 14. Whitaker Experimental Forest (UC Berkeley) |
| 4. Sierra Nevada Research Institute (UC Merced) | 15. Baker Experimental Forest (UC Berkeley) |
| 5. Sagehen Creek Field Station (UC Berkeley) | 16. Sagehen Experimental Forest (USFS) |
| 6. Eagle Lake Field Station (UC Davis) | 17. Blacks Mountain Experimental Forest (USFS) |
| 7. Central Sierra Snow Laboratory (UC Berkeley) | 18. Challenge Experimental Forest (USFS) |
| 8. Sierra Nevada Field Campus (SFSU) | 19. Onion Creek Experimental Forest (USFS) |
| 9. Tahoe Environmental Research Center (UC Davis) | 20. Stanislaus - Tuolumne Experimental Forest (USFS) |
| 10. Sierra Foothill Research and Extension Center (UC Davis) | 21. Swain Mountain Experimental Forest (USFS) |
| 11. Onion Creek Experimental Watershed (UC Berkeley) | 22. Teakettle Experimental Forest (USFS) |
| | 23. Institute of Forest Genetics (USFS) |



BIODIVERSITY

- PRESERVING
 - Genetic & Biological diversity
 - Landscape connectivity



BIODIVERSITY

The Sierra Nevada is one of the most biologically diverse areas in the country, with over 3500 plant and 720 animal species.

Supports 1/2 of all plant species in California, including 200 rare plant species and 400 species endemic to the region

75 groves of Giant Sequoia-- the largest plants on earth

Supports 2/3 of all bird and mammal species
Supports 1/2 of all reptile and amphibian species
29 native amphibian species; 14 found only in the Sierra and of those, 12 are endangered
40 species of native fish; 6 listed as threatened or endangered and 12 are candidates for listing

17% of terrestrial vertebrate species in the Sierra are "at risk"



LANDSCAPE CONNECTIVITY

• PRESERVING

- Genetic & Biological diversity
- Landscape connectivity

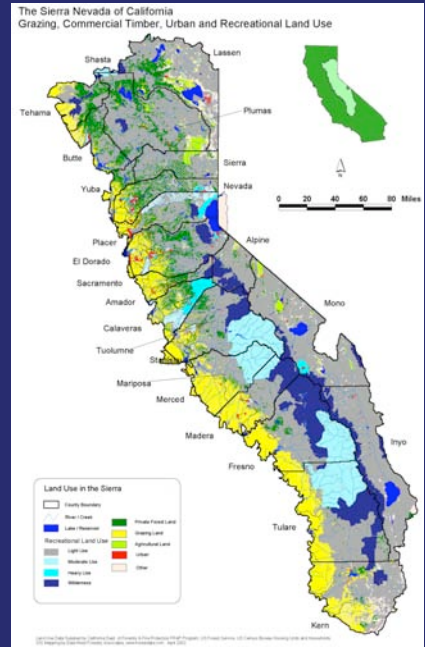
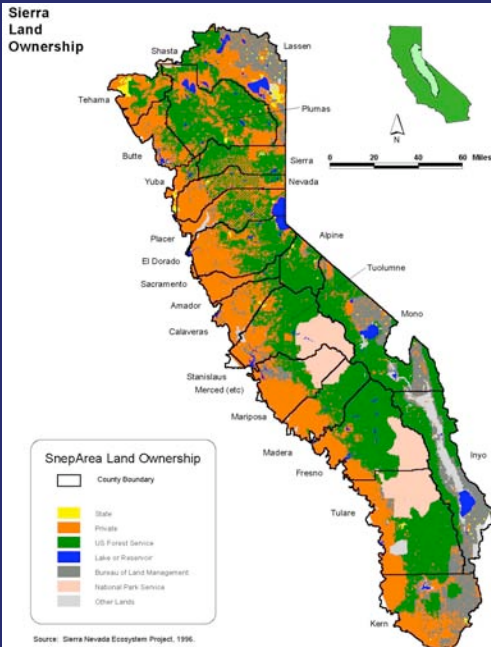
10 SIERRA NEVADA FOREST HABITAT TYPES

↳ PROTECTION FROM LAND USE CONVERSION:

1. Subalpine Conifer: 849 sq. miles, 96.1% protected
2. Lodgepole pine: 334 sq. miles, 95.5% protected
3. Jeffrey pine: 1511 sq. miles, 83.7% protected
4. Sierra mixed conifer: 2427 sq. miles, 71.8% protected
5. White fir: 370.9 sq. miles, 67.9% protected
6. Douglas fir: 122 sq. miles, 63.3% protected
7. Montane hardwood: 933 sq. miles, 51% protected
8. Ponderosa pine: 1866 sq. miles, 49.8% protected
9. Blue Oak- Foothill pine: 931 sq. miles, 18% protected
10. Blue Oak Woodland: 486 sq. miles, 5.5% protected



LANDSCAPE CONNECTIVITY



THREATS TO THE SIERRA'S ECOSYSTEM SERVICES

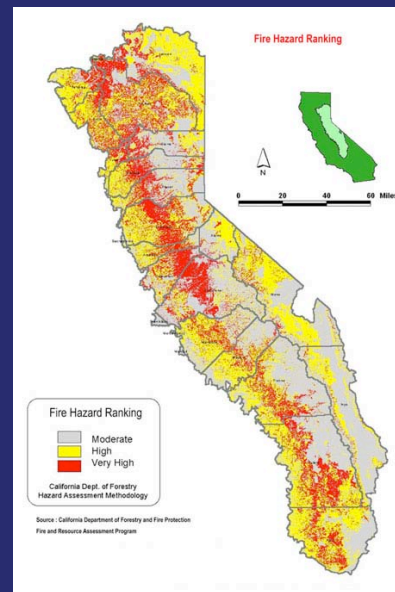
- CATASTROPHIC WILDFIRE
- FORESTLAND CONVERSION
- INVASIVE SPECIES
- UNSUSTAINABLE TIMBER HARVESTING
- UNMANAGED RECREATION
- CLIMATE CHANGE



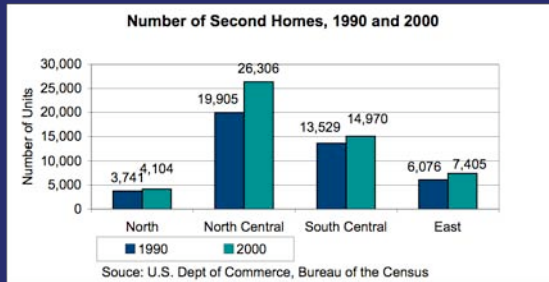
FIRE

Fires are bigger, hotter, and more frequent today than in measurable history

Costs of addressing immediate fuels management needs: \$327.9 million



DEVELOPMENT



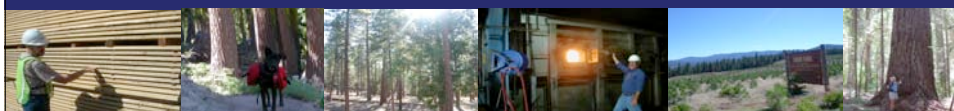
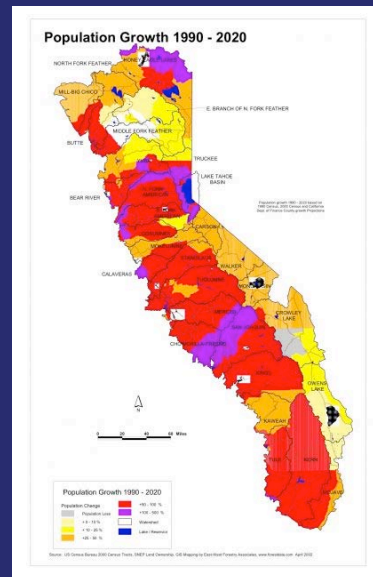
Population is expected to triple between 1990 and 2040



DEVELOPMENT

All Sierra waterways have impaired water quality due to development

4 of the top 5 counties with forestland conversion due to development are in the Sierra region: Butte, Placer, El Dorado, and Nevada. Counties with more land in TPZ have lower rates of forestland conversion



FRAGMENTATION

Current rate of residential development in the Sierra Nevada, 30% of forestlands will be converted in 20-25 years.



CLIMATE CHANGE

- Increased drought
- Increased fire risk
- Species will shift north and higher in elevation
- Uncertainty**

Increasing heat and declining water are killing off fir and pine trees at a rate almost doubled in the past 25 years. Research shows gradual and subtle weakening of trees in the 1,500- to 5,000-foot level, many of them brown and brittle from a lack of moisture and others susceptible to pest infestations.



OPPORTUNITIES

- CARBON TRADING
- BIOMASS
- STEWARDSHIP CONTRACTS
- C.R.O.P
- ECOSYSTEM SERVICES
- SUSTAINABLE FORESTRY
- SMALL DIAMETER WOOD PRODUCTS
- RE-LOCALIZATION / MARKETING



CHALLENGES

- LINKING RESTORATION AND ECOSYSTEM SERVICES TO A NEW ECONOMY
- CONFLICT OVER MANAGEMENT
 - REGULATORY BARRIERS
 - UNRELIABLE SUPPLY OF RAW MATERIAL
 - LACK OF INVESTMENT CAPITAL
 - WORKFORCE



LACK OF INVESTMENT

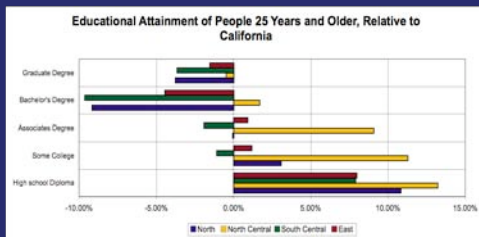
PHILANTHROPIC: The Sierra Nevada receives just \$26 per capita in philanthropic giving, compared to a statewide average of \$108 and a San Francisco average of \$678.

PUBLIC: Between 1996 and 2001, the Sierra received 1% of state and federal conservation acquisition dollars (outside of Tahoe); Sierra communities received \$27.5 million for water quality and habitat (less than 0.8% of Prop 50 funds); SNC received \$17.5 million (0.3 % of Prop 84 funds)

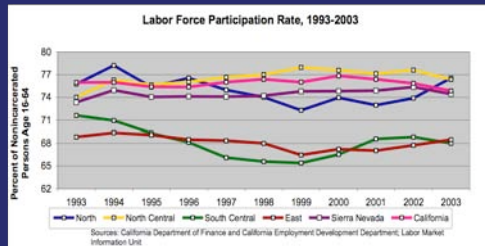
INVESTMENT CAPITAL: It's nearly impossible to secure investment dollars for new sustainable natural resource-based businesses due to complex regulatory hurdles and unreliable supply of resources



WORKFORCE



- 18 RCDs
- 16 Land Trusts
- 70 Watershed partnerships



WORKFORCE

Wages for Forestry Jobs in CA

	May-06 (source: U.S. I		
	Median Hour	Mean Hourly	Mean Annual
Forest and Conservation Workers	8.99	10.93	22730
Other Woodworkers	9.85	10.76	22390
Wood Model Makers	10.51	12.79	26600
Wood Sawing Machine Setters, Operators, and Tenders	12.38	12.96	26960
Cabinetmakers and Bench Carpenters	12.95	14.11	29360
Other Logging Workers	14.68	14.52	30210
Forest and Conservation Technicians	15.04	16.93	35220
Wood Patternmakers	15.45	16.74	34820
Log Graders and Scalers	16.81	16.67	34680
Logging Equipment Operators	17.34	18.37	38210
Carpenters	23.5	23.29	48440
Forest Fire Inspectors and Prevention Specialists	26.31	25.04	52090
Foresters	27.01	26.83	55810
Fire Fighters	28.19	27.92	58080
Zoologists and Wildlife Biologists	28.54	29.63	61620
Conservation Scientists	29.98	31.43	65370
Soil and Plant Scientists	31.45	32.53	67650

(U.S. Department of Labor, Bureau of Labor Statistics, May 2006)

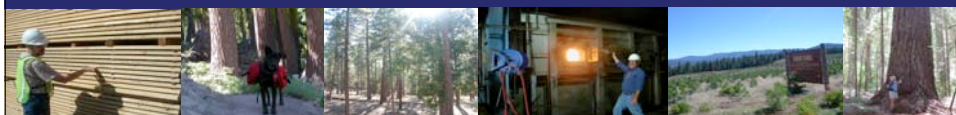


CARBON TRADING

California Climate Action Registry Forest Protocols

- Forest management
- Conservation (Avoided Deforestation)
- Reforestation
- [Hazardous Fuel Reduction]

California Air Resources Board Meeting on September 6 to discuss adoption of Forest Protocols



BIOMASS POWER



Current gross electrical generation potential from biomass is 9500 MWe, 3500 MWe from forestry

By 2020 biomass could supply 10% of CA's peak power needs (today's capacity meets 1.7% of peak needs)

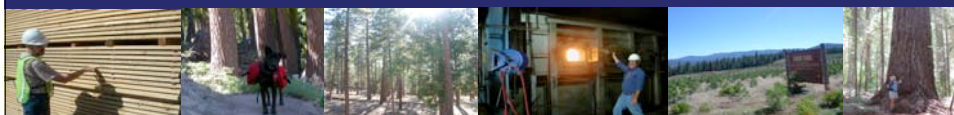
STEWARDSHIP CONTRACTING

White Mountain Stewardship Contract on Apache-Sitgreaves NF in Arizona

- Thin at least 150,000 acres (50% 5-9 in dbh)
- 70,500 acres of NEPA analysis with no appeals or litigation (1 objection filed)
- Received 6 Forest Products laboratory grants for \$250,000 each
- Thinning costs from \$1100/acre to \$550/acre
- Forest Energy Corporation doubled (pellet) supply contract with Home Depot
- Two new biomass plants (3MW and 20 MW)
- 13 businesses working with SC supply 450 full time jobs (318 in local area)
- 13 businesses spend over \$12 million on goods and services in local economy



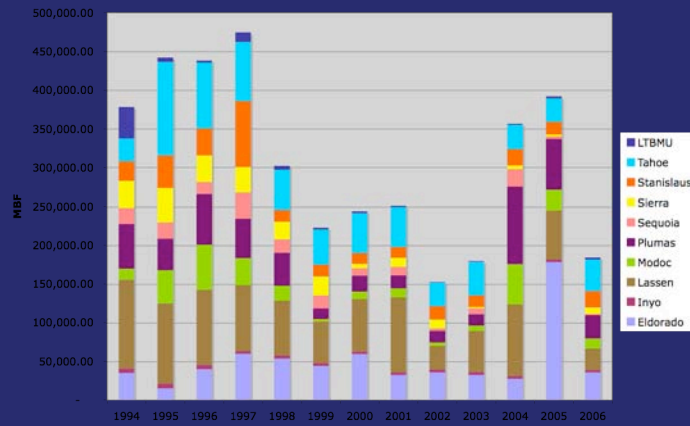
Long-term stewardship contracts have economic, ecological, and social benefits



C.R.O.P

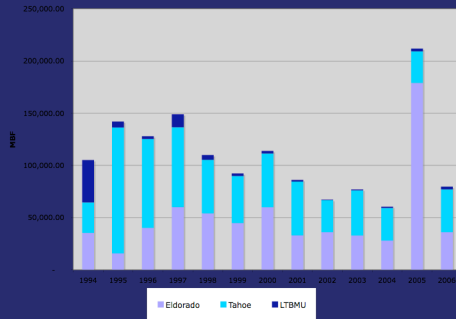
Coordinated Resource Offer Protocol to stabilize supply of resources and attract investment for new sustainable enterprise

Timber Sales Offered On Sierra Nevada National Forests

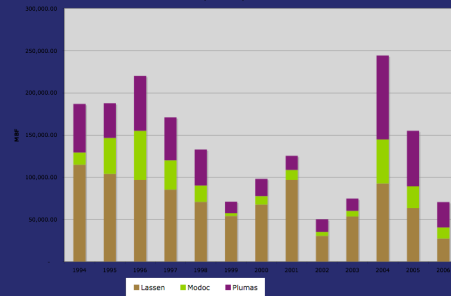


C.R.O.P

El Dorado, Tahoe, LTBMU Timber Offers



Modoc, Lassen, Plumas Timber Offers



ECOSYSTEM SERVICES

\$1 FOR THE SIERRA
A Sierra Business Council/National Forest Foundation Partnership

Nurture Nature

HELP ALL THE LOCAL CREATURES ENJOY A HEALTHY ECOSYSTEM.

We have added a \$1 contribution for ecosystem services to your bill. If you would like to add to or remove your contribution, please let us know when you pay your bill, and we'll cheerfully abide with your wishes. If you choose to participate, your dollar will be pooled with many others to support valuable projects that protect and restore Sierra Nevada forests. Your contribution will help keep these forests healthy and functioning to keep our air clear and our lakes blue.

Thank you for supporting businesses that help keep Sierra Nevada ecosystems healthy and its inhabitants and visitors happy.

The Member of the Sierra Business Council (SBC) is...
The Member of the National Forest Foundation (NFF) is...

For more information visit: www.sierracouncil.org or www.nff.org
Sierra Business Council | National Forest Foundation

SUSTAINABLE FORESTRY

- Southern California Edison - Shaver Lake Forest
- Collins Pine Company - Chester Forest

The FSC Logo identifies products which contain wood from well managed forests certified in accordance with the rules of the Forest Stewardship Council.

FSC-US-0059
FSC Trademark © 1996 Forest Stewardship Council

SMALL DIAMETER WOOD PRODUCTS

Northern Arizona Wood Products Association is a non-profit, member - directed organization, dedicated to "promoting the value-added utilization of small diameter wood"

Objectives

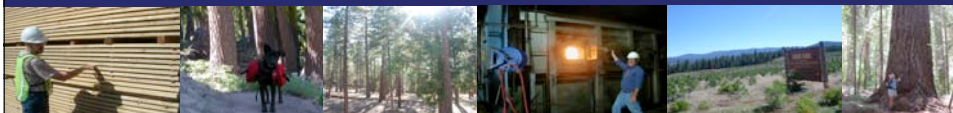
- To advocate for business and individuals that derive income from small diameter wood products.
- To create and retain jobs in the wood products industry.
- To promote partnering and collaboration among users and consumers of small diameter wood.
- To encourage a regional, cooperative perspective & approach to addressing small diameter wood issues.

Our Members include:
 Artists • Craftsmen • Manufacturers • Mill Operators
 Producers • Consumers • Dealers • Distributors
 or anyone who adds value to small diameter wood



RE-LOCALIZATION

- Demand for wood is increasing
- California imports 70-80% of the wood we use
- Sustainably harvested wood is the most environment-friendly construction material
- Renewable Energy Portfolio Standards
- Relocalize RETAIL
- Relocalize AGRICULTURE
- Relocalize ARTS
- Relocalize WASTE MANAGEMENT
- Relocalize ENERGY
- Relocalize FORESTRY
- Relocalize INVESTING
- Relocalize MANUFACTURING
- Relocalize GIVING



RE-SOURCE CENTERS

THE RE STORE
SINCE 1993

USED BUILDING MATERIALS & MORE

OUR NEW BELLINGHAM HOME IS OPEN!!! [More info](#)
2309 Meridian Street

Your complete Sales and Service Center for Used Building Materials and much more.

We offer quality building and home improvement materials, a wide variety of services including **sales, pick-up, salvage, and whole building deconstruction.**

- Retail locations in **Bellingham and Seattle**
- Field crews that pick up, salvage, and dismantle all over the larger Puget Sound region and central Washington.
- Macintosh I Explorer users, view in Netscape or Mozilla **OS 9 or OS X.**

Email Alert: Spammers are faking emails from our domain and can't be stopped.

What's New

Our New Home

Rockin' of the RE Store

Recycled Materials Fountain Shows

Info about Fountain Redesign Project

A Project of
RE-SOURCES
For Sustainable Communities

WHERE CAN YOU LEARN MORE?

- www.thrivingforests.org
 - Case studies
 - Networking
 - Best practices
 - Tools
 - Opportunities

Thrivning Forests Compendium



Thrivning Forests Compendium

Rapid development, a shifting economy, management debates, and years of fire suppression policy have created serious challenges to the health and well being of Sierra forests, wilderness areas, and forest communities. These challenges also obscure the opportunities we need to embrace in order to create a new thriving forest economy in the Sierra Nevada.

Sierra Nevada forests are true treasures. These forests are speckled with groves of Giant Sequoias, the largest trees on earth. Sierra forests have water, sun, and nutrients to allow for their rapid growth. The mosaic of Sierra forests provides valuable ecosystem services, from nutrient cycling, carbon sequestration, recreational opportunities, wildlife habitat, forest products, and more.

A Compendium is a concise, yet comprehensive compilation of a body of knowledge. Accounting for the specific challenges and opportunities in the Sierra Nevada region, The Thriving Forests Compendium includes an array of sustainable forestry projects in or relevant to the Sierra Nevada.

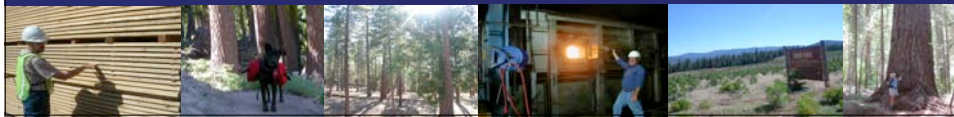
This project will also be useful to those outside of the Sierra Nevada, and we welcome submissions from all.

Audience and Contributors:

- Forest Managers and Land Owners
- Forest Communities and Communities that depend upon the Sierra
- Local, Regional, State and Federal Decision Makers and Regulators
- Conservation Organizations and Land Trusts
- US Forest Service, Federal Bureau of Land Management (BLM), California Department of Forestry and Fire (CDF), Nevada Division of Forestry State & County Parks & Recreation
- Resource Conservation Districts, Water Management Agencies, Fire-Safe Councils, County and Local Fire Agencies
- Forest Products Industry, Energy Industry, Commodities Markets
- Resource Conservation & Development Districts and Entrepreneurs

How to Use

The main categories on the left are further divided into subcategories, which are revealed when you



Heat & Energy :: Sierra Business...

HOME | JOIN SBC TODAY | STORE | CONTACT

SIERRA BUSINESS COUNCIL

ARTICLES | PUBLICATIONS | PROJECTS | ABOUT SBC | SERVICES | EVENTS

Thrivning Forests Compendium

Heat & Energy

Heat and Energy is produced from the forest. Familiar end use products, such as firewood, have heated homes and fired boilers for generations. Other fuel sources from forests and from forest products may be less familiar, as they are a primary fuel for other energy production. In this section, see examples of sustainable multi-benefit management for energy production, micro-grids, and independent energy systems for forest communities.

Case studies highlight the use of wood chips, firewood, and pellets for energy, heat and electricity, co-generation (the co-production of heat and electricity in the same system), liquid biofuels and gasification.

Categorized here by a primary function, each business or project may also address other economic, environmental, and community goals in forest communities. As such, you may find them cross-listed in other categories. See also Infrastructure: Power Plants.

To suggest a business or project to include in this category, email forestry@sbcouncil.org, or phone Sierra Business Council at 530-882-4800, or Download the questionnaire and send it to us.



Chips - Sierra Business Council



Chips

- Heat & Energy
- Chips**
- Firewood
- Liquid Biofuels
- Pellets
- Co-Generation
- Electricity
- Heat
- Other
- Community & Economy
- Conservation
- Ecosystem Services
- Forest Management
- Fuels Reduction
- Infrastructure
- Restoration
- Forest Products
- References

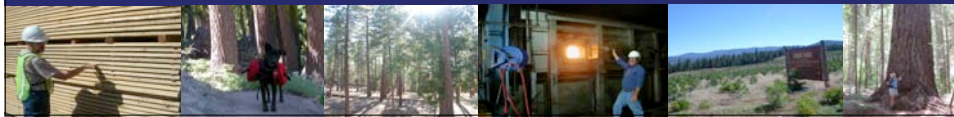
» Sierra Fresh Eco-Farm Fuel Source Development
» Calaveras Healthy Impact Product Solutions

Chips are small pieces of wood, coarser and larger than sawdust. They can be produced as by-products of timber processing or forest thinning. Some chips are used as landscape materials, or made into products like particleboard and insulation (see Forest Products: Construction Materials). This category addresses the use of chips as biomass for heat and electrical power generation.

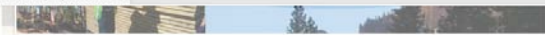
A Chip Unit is chip volume equal to one cord of pulpwood.

Categorized here by a primary function, each business or project may also address other economic, environmental, and community goals in forest communities. As such, you may find them cross-listed in other categories. See also: Infrastructure: Mill Repurposing: HDM Lumber

To suggest a business or project to include in this category, email forestry@sbccouncil.org, or phone Sierra Business Council at 530-582-4850, or Download the questionnaire and send it to us.



Calaveras Healthy Impact Prod...



Calaveras Healthy Impact Product Solutions (CHIPS)

- Heat & Energy
- Chips**
- Firewood
- Liquid Biofuels
- Pellets
- Co-Generation
- Electricity
- Heat
- Other
- Community & Economy
- Conservation
- Ecosystem Services
- Forest Management
- Fuels Reduction
- Infrastructure
- Restoration
- Forest Products
- References

Location: San Andreas, CA - Sierra Nevada Region - Central (Calaveras County)
Contact: Virginia Landreth (209) 498-3003 - virginia@mycalaveras.com

What is now Calaveras Healthy Impact Product Solutions (CHIPS) was conceived at a community meeting attended by over 100 people, to brainstorm how to successfully deal with a suite of social, economic, and environmental issues exacerbated by the closing of eight area lumber mills.

The community created CHIPS as an organizing structure to build on existing job skills of displaced workers, and find new uses and markets for natural assets. CHIPS technical feasibility and marketing study produced a new two-stage regional multi-disciplinary business plan that links businesses, government, and non-profit organizations to locally source new forest products - small diameter wood and underbrush from private and public lands, and manufacture and sell value-added forest products.

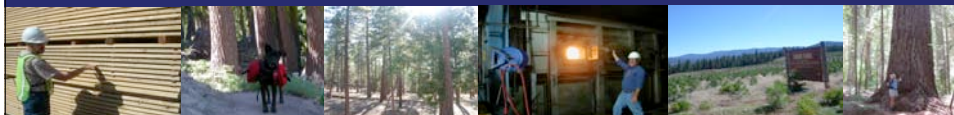
In the first stage, CHIPS builds on both displaced and new workers' skills in truck driving and heavy equipment operation, bookkeeping and clerical skills, training them to adapt to a new sustainable business model. The project generates revenue from sale of landscape chips and mulch by diverting forest residual material it diverts from the local waste stream with a stationary chipping project at a local transfer station.

Chipping crews also secure materials for CHIPS second stage activities, which will include two new industry components in addition to manufacturing value-added posts and poles, and craftsmen woodworking products. CHIPS has applied for Biomass Conversion Technologies Technical Assistance funding to build a facility for wood densification and manufacture products made from densified wood, and to generate energy for the operations from the burning of wood chips in a clean-burning biomass plant. The plant is designed in Holland.

The CHIPS project is still community-driven, and now has agency and organizational partners including Central Sierra RC&D, USFS, Public Works, the Probation Dept., Sierra Forest Legacy, and several Tribal Councils.

For more about:

- Biomass Conversion Technologies Technical Assistance funding, see links to federal and state funding
- Wood densification, download, a short manufacturing description, manufacturing and market study from West Virginia University Coop Extension
- FAQ's and Technical Data on Chip-fired biomass, see US Dept of Energy-Biomass
- Directory of biomass systems manufacturers and businesses, see Energy Sourceguide



QUESTIONS OR COMMENTS?



REFERENCES

- Nichols, M. 2002. California Legacy Project: A Resource Conservation Strategy. CA Resources Agency, Sacramento, CA.
- Stynes, D. J. and Y. Sun. 2003. Economic Impacts of National Park Visitor Spending on Gateway Communities: Systemwide Estimates for 2001. Michigan State University, Lansing, MI.
- Timmer, K. and Sierra Nevada Conservancy Working Group. 2002. Sierra Nevada Resource Investment Needs Assessment. Sierra Business Council, Truckee, CA.

