

**DEPARTMENT OF FORESTRY AND FIRE PROTECTION**

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Mendocino County Board of Supervisors
501 Low Gap Road
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Re: Agenda Item 4(a), November 15, 2021 Board Meeting

Members of the Board,

Thank you for your interest in how Jackson Demonstration State Forest (JDSF) is contributing to both the State and County's ambitious climate change goals. I'd like to outline the climate benefits being provided by JDSF while also meeting other public objectives for the State's Forests such as economy, ecology, and social well-being.

Forest wide, JDSF is storing 19 million metric tonnes of carbon dioxide equivalent (CO₂e) as of our last inventory in 2017. The rate of additional carbon being sequestered per year is approximately 200,000 metric tonnes of CO₂e per year forest wide. To put this in perspective, the EPA estimates the average passenger vehicle emits 4.6 metric tonnes of carbon dioxide per year¹. On an annual basis, the incremental growth of the forest at JDSF offsets the emissions of over 43,000 passenger vehicles. That is over 2/3 of the passenger vehicles estimated to be registered in Mendocino County in 2019².

By practicing sustainable forest management, JDSF maintains high rates of sequestration and increases the resiliency of the stored carbon. Many of our practices are consistent with the Air Resources Board Cap and Trade Program's improved forest management protocols, including increasing the overall age of the forest, increasing forest productivity and health, and maintaining high stocking levels³. There is no ambiguity in this State policy; other landowners in your County are being paid for these same activities.

JDSF is a working forest that is managed for a multitude of goals and objectives, including timber production, research, recreation, carbon sequestration, wildlife, watershed, fire hazard reduction, and social and cultural well-being. To achieve these diverse goals the forest has been zoned into Landscape Allocations (reference attached map). This does not point to the forest being maximized for timber production, but rather a broad range of forest structures for multiple objectives. Logging is a tool we use to achieve these desired forest structures, and only after a rigorous planning and permitting process.

¹ <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>. Accessed 11/11/21

² <https://www.dmv.ca.gov/portal/uploads/2020/06/2019-Estimated-Vehicles-Registered-by-County-1.pdf>. Accessed 11/11/21

³ "Cap and Trade US Forest Projects Protocol." 2014 California Environmental Protection Agency: Air Resources Board. Accessed 11/11/21

<https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2014/capandtrade14/ctusforestprojectsprotocol.pdf>

The timber harvest planning process starts with a Registered Professional Forester (RPF) consulting the Forest Management Plan and our library of known resources for any guidance or constraints. The RPF then does a field evaluation to determine feasibility and comes up with a proposed plan to be evaluated by the Jackson Advisory Group (JAG). The JAG conducts a site visit as part of a publicly noticed meeting, reviews the plan's components for consistency with the Forest Management Plan, and gives advice on improvements or modifications. The RPF then develops the Timber Harvesting Plan with input from biologists, geologists, archaeologists, and botanists for public and regulatory review by CAL FIRE, California Department of Fish and Wildlife, North Coast Regional Water Quality Control Board, and the California Geological Survey. Once approved the RPF develops one or more timber sales that can include restoration activities, recreation improvements, research, and demonstration projects. These are sold on a publicly noticed competitive basis to get the best value for the State. This process can take anywhere from 9 months to 2-years, with the timber sales designed to be operated over either one or two seasons.

Sustainable forest management at JDSF contributes to the economic well-being of Mendocino County. Since 1990, JDSF has harvested 472,606,080 board feet of timber, providing approximately 7,500 jobs with over \$200 million local wages and providing approximately \$3.3 million in timber yield tax revenue to Mendocino County. Please see the attached JDSF harvest summary document which illustrates that harvests are substantially less than growth, and this activity does not support the conclusion that JDSF is optimized for timber production. Sustainable forestry has been compatible with meeting the growth and transition of recreation needs in that same time frame. A growing user base is mountain bikers seeking scarce public lands available for this purpose. JDSF contributes to this and other recreational tourism (camping, horseback riding, mushroom picking) as well.

Other state policies that comprise natural and working lands include the Draft Climate Adaptation Strategy (9/29/21), Wildfire and Forest Resilience Action Plan (January 2021), and Draft Natural and Working Lands Climate Smart Strategy (10/11/21) to achieve the State's 30x30 goals. The State includes working forestlands in these strategies with the full understanding that sustainable forestry is implemented by Licensed Timber Operators through logging. This last document directly identifies the value of Demonstration State Forests to private landowners in the following way:

CAL FIRE's Demonstration State Forests show how forests can be managed for multiple objectives at once—timber production, recreation, watershed protection and restoration. This is demonstrated through research projects and experimental harvest techniques that teach us more about how to balance the effects of management in dynamic forests. The Demonstration State Forests provide a unique set of circumstances for testing a variety of forest treatments in one location. The experiments and research conducted on state forests helps inform management practices for California's private forestland owners, who own 40% of California's forestland.

JDSF welcomes research and has robust datasets available to help answer the questions posed in this resolution about the carbon implications of forest management. Since 2010 carbon research has been conducted at JDSF. Today a mobile biochar production unit is

being tested by Takachar, winner of Prince William's inaugural Earthshot Prize. We also are a replicate in a national study looking at wood decomposition and its role in the forest carbon cycle⁴. JDSF is committed to continuously increasing the scientific knowledge of forested ecosystems.

We share the desire of the Board in maintaining JDSF as a fire resilient and carbon rich forest while also providing other ecological, economic, and social well-being benefits to Mendocino County and the State of California. The premise of the Resolution before you today, is that JDSF is currently not aligned with the State's climate change goals or being managed based on science. CAL FIRE rejects that premise. Since purchasing the property from the Caspar Lumber Company, over 70-years ago, the State of California has managed this forest for a variety of uses, and has a team of educated, competent, capable, and dedicated staff managing this land for a wide variety of benefits for this and future generations.

Anyone that wants to influence the management of JDSF need only step forward and participate in the open, public, and transparent processes available to them. The Jackson Advisory Group meets at least twice a year, all timber harvesting plans are available for review and comment, and the Forest Management Plan is considered by the Board of Forestry and Fire Protection every 10-years with the next review in 2026. Our staff is available for tours or to provide information to interested groups. The forest is generally open for your own self-directed tour or to do your own fact-finding on the status of our forest. We are proud to be a part of the Mendocino County Community.

Please don't hesitate to contact me with any questions about JDSF.



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CAL FIRE

State Forests Program Manager

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⁴ Trettin, Carl C., Andrew Burton, Martin F. Jurgensen, Deborah S. Page-Dumroese, Zhaohua Dai, RamOren, Brian Forschler, Jonathan Schilling, and Daniel Lindner, 2021, Wood Decomposition and its Role in the Forest Carbon Cycle: The FACE Wood Decomposition Experiment. General Technical Report SRS–262

JDSF AND CARBON: Managing Forests for the Future

General Carbon Facts

- **Carbon (C)** – A basic building block for all life on earth. When found in our atmosphere as carbon dioxide (CO₂) it is one of the greenhouse gas (GHG) elements that regulates earth's temperature and contributes to global climate change.
- Healthy forests have the capability to sequester (capture) and store large amount of carbon. Forests can be both carbon sinks (storage) and sources (emitters).
- The forest carbon cycle is an incredibly complex, dynamic topic with ongoing research. Forest stand structure, species composition, age, and natural disturbance cycles can all influence the carbon cycle.

Carbon Storage vs. Carbon Sequestration

- **Carbon Storage** – Forests store carbon in the trees' bole (stem), branches, roots, and soil. This carbon is most secure in ecosystems that are **resilient** to disturbance.
- **Carbon Sequestration** – Through photosynthesis, trees combine CO₂ from the atmosphere with water from soil and convert them to oxygen and sugars using the power of the sun. The sugars provide energy for tree growth (carbon storage) and the oxygen is released back into the atmosphere. Vigorously growing trees can sequester large amounts of carbon through this process.

Existing
Forest =
Carbon
Storage

Active Forest
Growth =
Carbon
Sequestration

Carbon in a Managed Forest: Short-term vs. Long-term Carbon Storage and Sequestration

- **Short-term carbon storage:** Looking at only a short time frame (1-15 years) for carbon storage.
- **Long-term carbon storage:** Looking at a longer time frame (20-hundreds of years) for carbon storage.
- California's Cap and Trade program recognizes that forests can mitigate climate change by increasing or conserving forest stocks through reforestation, avoiding conversion (changing land use), and improving forest management. Improving forest management includes activities that increase the overall age of the forest, increase forest productivity and health, and maintaining high stocking levels¹.
- Though it may seem counterintuitive, short term responses such as halting all timber harvests can slow sequestration or may result in a less resilient forest. Forests today, and in the future, facing climate uncertainty, need to be diverse in the face of human caused and natural disturbance such as wildfire, insects, disease, and drought.
 - Creating more **resilient** forests by using management activities, including managing stand density, using prescribed fire, and maintaining a network of fuelbreaks across the landscape, can address the risk of losing the forest and its carbon benefits. Periodic timber harvests are used to manage density and maintain forest health. Both California Policy and third parties² recognize that redwood forest products continue to store carbon and provide a net carbon benefit.
- Disturbances within the forest release carbon and convert some trees from carbon sinks to carbon sources which can no longer contribute to future sequestration.
 - Dead material can and still does contribute to the forest ecosystem as habitat, nutrient cycling etc.
- Management activities (prescribed burning, timber harvesting, fuels treatments etc.) will reduce the immediate (short-term) carbon storage but can increase the stability or resiliency, of stored (long-term) carbon and maintain high rates of carbon sequestration³.

Resiliency - the stands ability to persist after a disturbance.

¹ "Cap and Trade US Forest Projects Protocol." 2014 California Environmental Protection Agency: Air Resources Board. <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2014/capandtrade14/ctusforestprojectsprotocol.pdf>

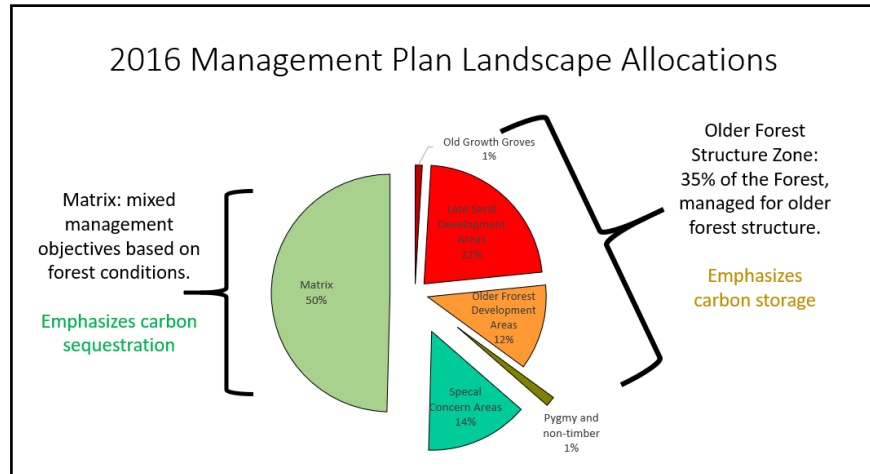
² Sahoo and Bergman. 2020. "Cradle-to-Gate Life-Cycle Assessment of Redwood Lumber in the United States. USDA, US Forest Service. https://www.fpl.fs.fed.us/documnts/fplrp/fpl_rp706.pdf

³ Hurteau et al. 2010. "The Carbon Cost of Mitigating High-Severity Wildfire in Southwestern Ponderosa Pine." *Global Change Botany*. 17(4):1516-1521 DOI:10.1111/j.1365-2486.2010.02295.x

California's Wildfire and Forest Resilience Action Plan. 2021. Forest Management Task Force. <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>

JDSF and Forest Carbon

- JDSF is a working forest that is managed for a multitude of goals and objectives, including timber production, research, carbon, wildlife, restoration etc.
 - To achieve these goals, the Forest has been “zoned” into Allocations, addressing different forest resources across the landscape.
- JDSF manages to foster both higher **carbon storage** (old growth & Older Forest Structure Zone) and **carbon sequestration** with vigorously growing stands created through periodic harvests.
- JDSF manages across all size and age class, including large trees, to control density, provide for long-term sustainability, and maintain high rates of sequestration through faster growing young trees. Old growth reserves, scattered individual old growth trees, and younger trees with exceptional wildlife attributes are protected across the landscape.



JDSF and Governor Newsom’s 30x30 Plan

- The 30x30 strategy is largely based on maintaining current ecosystems along with utilizing new energy measures to keep the average global temperatures from rising⁴.
 - Conserving ecosystems and working lands as they are, decreases the amount of development (conversions) that can occur, which protects ecosystems.
- JDSF and other demonstration state forests are included in the draft Natural and Working Lands Climate Smart Strategy Document.
 - The draft stressed the importance of Demonstration State Forests with their research and exploration of how to balance management activities in complex ecosystems⁵.
- “Nature-based solutions” defined by the Strategy Document include utilizing longer **rotation ages**. JDSF demonstrates longer rotation ages than are common in the redwood region. This allows JDSF to grow larger/older trees which provide both aesthetic and economic values.
 - The dynamics of stand growth is a more important factor than individual tree size when thinking about carbon sequestration rate:
 - In crowded stands, even large trees can grow at a slower rate. However, a timber harvest can give each tree space and nutrients to grow at a faster rate, sequestering more carbon.

Rotation Age – the age that an individual tree can be harvested.
Harvest Entry – the number of years between harvests for a stand.

Volume is used as a proxy for carbon. JDSF Old Growth Groves **store** more carbon per acre, but they comprise less than one percent of JDSF.



Volume is used as a proxy for carbon. Even with annual harvests of 26 ft3/ac on average across the Forest, it is growing more (**sequestering**) than the Old Growth Groves on an unit area basis.

To demonstrate a climate resilient forest, both older forest structure (storage) and vigorously growing (sequestration) trees are needed to mitigate climate change and enhance other resources.

⁴ Dinerstein, E. et al, 2019. “A Global Deal for Nature: Guiding principles, milestones and targets.” *Science Advances* 5(4):eaaw2869. DOI: 10.1126/sciadv.aaw2869

⁵ “Natural and Working Lands Climate Smart Strategy - Draft.” 2021. *Nature-based Climate Solutions*. https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/FINAL_DesignDraft_NWL_100821_508-opt.pdf

HOW MUCH DOES JDSF HARVEST AND WHAT DOES THAT MEAN FOR CARBON AND THE MENDOCINO ECONOMY?

Jackson Demonstration State Forest (JDSF) was created to be a model of sustainable forest management for the redwood region. Sustainable forest management carefully balances the amount of volume (wood) grown over time (i.e. 5 to 10 years) to the amount of volume harvested across the entire landscape each year. Forests that are managed sustainably have more diversity in plants and wildlife, and continuously sequester carbon.

Since 1990, JDSF has cut 472,606,080 board feet of volume, enough to build 26,725 houses. Figure 1 illustrates the amount cut each year. Forest wide inventories, Continuous Forest Inventories (CFI) and third-party Forest Resources Inventories (FRI), are cyclically conducted on JDSF every 5 to 10 years. They are used as monitoring tools to document the growth of the forest through decades.

Figure 2 (below)

demonstrates that while JDSF is harvesting nearly every year, the growth of the Forest is continuing to far surpass what is harvested and is in an upward trend. To relate this to climate change, active forest growth is carbon sequestration while the existing forest is carbon storage. Through harvests, JDSF is meeting consumer demand for wood products while creating space and freeing nutrients, water, and sunlight to increase stand

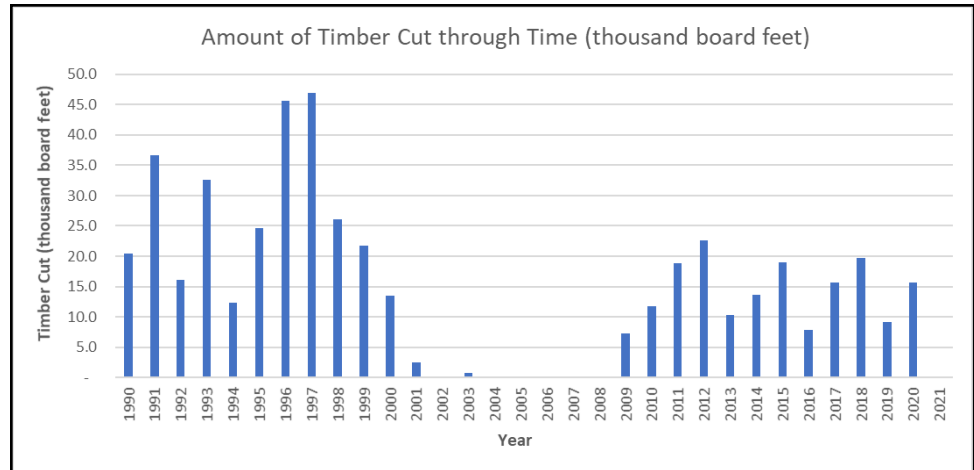


Figure 1: Amount of volume cut from 1990 to present. Data was obtained from JDSF cutting records. 2021 data has not been finalized at this time. The gap between 2003 and 2009 is the shut down that resulted in the current Forest Management Plan.

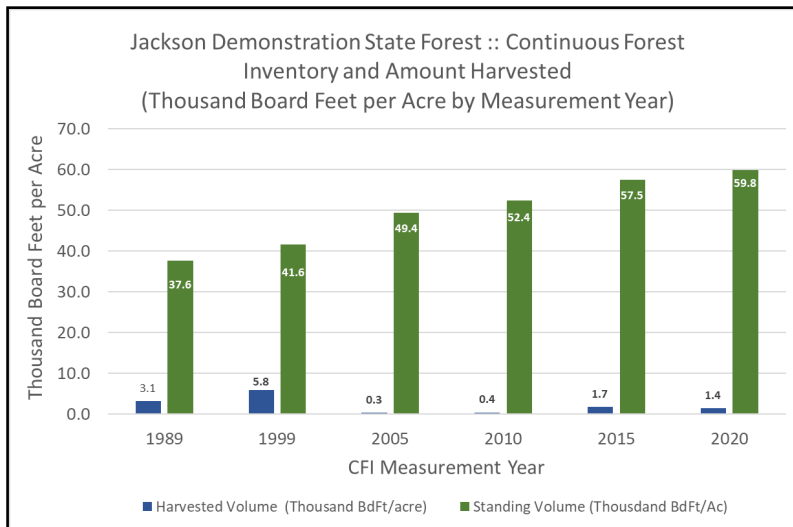


Figure 2: JDSF standing volume per acre compared by harvest amount per acre. The amount of harvested volume (blue) is for the time period between the dates (i.e. the 1989 blue = 3.1 thousand board feet per acre was harvested between the years 1989 and 1985). The amount of standing volume (green) is the volume measured at that date (i.e. the 1989 green = 37.6 thousand board feet per acre was measured to be standing in 1989). Growth is the difference between each year's standing volume (i.e. growth between 1989 and 1999 was 4 thousand board feet per acre).

growth and foster a new generation of vigorously growing trees. This cycle allows the forest to continuously sequester and store carbon¹.

The JDSF Environmental Impact Report (2008) Forest Management Plan (2016) conducted economic analysis which concluded that for every 10 million board feet of annual harvest:

- 160 jobs are created
 - \$4.3 million of local wages paid
 - \$184,000 in local taxes generated
- Since 1990, JDSF has provided for:
- ~7,561 jobs
 - ~\$203.2 million local wage.
 - Mendocino County ~\$3.3 million in timber yield tax revenue that contributes to the County's General Fund and Mendocino County Water Agency Board Fund².

¹ Lippke et al. 2021. "The Plant a Trillion Trees Campaign to Reduce Global Warming – Fleshing out the Concept." *Journal of Sustainable Forestry*. 40(1): 1-31
<https://doi.org/10.1080/10549811.2021.1894951>

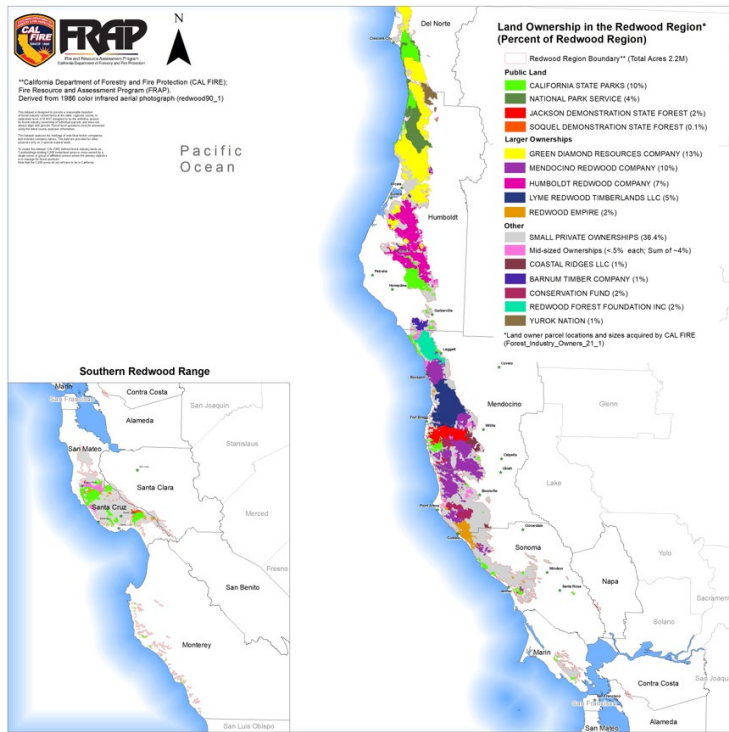
² Angelo, Carmel, J. and Weer, Lloyd. 2020. FY 2020-21 Adopted Budget. *State of California, County of Mendocino*.
<https://www.mendocinocounty.org/home/showpublisheddocument/39202/637414011645070000>

Jackson Demonstration State Forests role in Climate Change within the Redwood Region

The Resolution seeks to gain more knowledge of JDSF's role in carbon sequestration and wildfire resiliency.

In these times of more awareness to climate change and more impactful wildfires, there are questions about how to

best manage the forests of California to be resilient to changes, capture and store more carbon, and maintain ecosystem function when disturbances do occur. To make an effective difference in climate change and make the entire state resilient to wildfire, all landowners need to be working together; this is not something one or two landowners can achieve by themselves. One of JDSF's primary missions is to be a demonstration to the Redwood Region on how to be a working, multi-use forest, that sustainably harvests high-quality timber products, while managing for other goals. The map to the left illustrates the land ownership and economic context of the Redwood Region:



- Small landowners ~36%
- Mid-sized landowners ~11%
- Larger landowners ~37%
- Publicly Owned Land ~16%

Carbon and wildfire resiliency are compatible within the existing JDSF Forest Management Plan, which took into

consideration state policies, laws, and landscape planning, as well as public input in its creation. JDSF works to maintain equilibrium between resource values and demonstrations relevant to a range of stakeholders by emphasizing specific goals and forest structure:

Older Forest Structure Zone

This zone makes up 35% of JDSF. It links JDSF's Old Growth Groves and creates an older forest corridor across JDSF.

Stakeholder:

- Small to mid-sized landowners
- Public interested in restoration and aesthetics

Manages for:

- characteristics that support older forests:
 - larger trees
 - improved wildlife habitat
- Easily demonstrates long-term carbon storage and how to maintain stored carbon in older forests in the face of a wildfire.

Matrix

This zone makes up 50% of JDSF.

Stakeholder:

- Mid-sized to larger landowners
- Public interested in economic resource protection

Manages for:

- Predominately partial harvests (selection) but also demonstrates a range of forest structures that are regionally relevant.
- Timber production with longer rotation ages.
- Easily demonstrates rapid carbon sequestration and how to manage working lands to decrease the impacts from wildfire.

JDSF is well poised to be the example for the rest of the Region. Harnessing the carbon sequestration and storage potential of redwood forests is dependent on solutions relevant to the 84% of the land that is privately owned. JDSF, about 2% of the Region, can research, educate, and demonstrate the potential for redwood forests to mitigate and adapt to climate change. The knowledge gained as a Demonstration Forest will have greater value to current and future generations in Mendocino County, the Redwood Region, and California as a whole, than being placed in preserve status.

Forest Management and Special Concern Areas 2015

