Jackson Demonstration State Forest (JDSF) Management Plan Update
Public Workshop: Restoration Ecology
Agenda

Monday, November 18, 2024
Location: Saturday Afternoon Club, 107 S. Oak St, Ukiah
Time: 6-8 PM
UKIAH ZOOM Link: https://us02web.zoom.us/j/89089799804

Thursday, November 21, 2024
Location: Fort Bragg Town Hall, 363 N. Main St, Fort Bragg
Time: 5-7 PM
FORT BRAGG ZOOM Link: https://us02web.zoom.us/j/81563263495

Objectives: ● Understand the purposes of a public "Demonstration" Forest ● Understand the management zones and the elements and examples of ecological management at JDSF ● Provide input on ecology management objectives and priorities at JDSF for the management plan update	
I.	**Welcome, Land Acknowledgement and Community Agreements**
II.	**Overview of Meeting Objectives and Agenda**
III.	**Understand the Purposes of a Public "Demonstration" Forest**
IV.	**Overview and Explanation of Land Allocation Zones**
V.	**How Research and Restoration come to JDSF and Examples of Ecological Management at JDSF**
Break	
VI.	**Public Input on Restoration Ecology and Management Zones at JDSF**
VII.	**Prioritizing Ecological Management Objectives for next 10 years**
VIII.	**Closing and Next Steps**

JDSF AND LAND ALLOCATIONS:
A Forest Management Plan Abstract

Background Facts

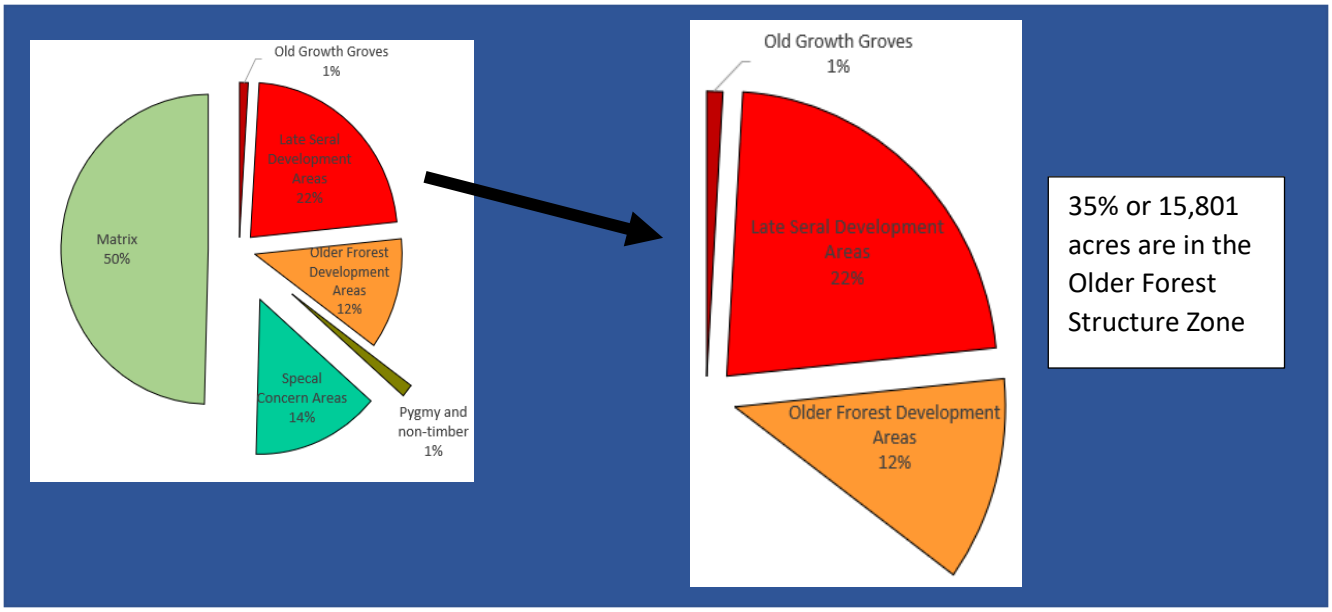
- Management is based on State and Board of Forestry policy stating that the State Forests shall be retained in timber production for research and demonstration purposes, while recognizing recreation as a compatible land use on Jackson Demonstration State Forest (JDSF).
- Forest Management Plan (FMP) – blueprint to the forest management of JDSF:
  - Current version is the 2016 update
  - Revised every 10 years with input from the public – next update in 2026
  - Implementation of the FMP moves the forest towards the desired future forest conditions and provides for long-term forest health

JDSF = 48,652-acre redwood/ Douglas-fir Forest

JDSF Land Allocations

Implementation of all the land allocations, allows the Forest to maintain a diverse 'library' of different stand structures and conditions to accommodate a range of research and demonstration opportunities. The **Older Forest Structure Zone** extends across JDSF from East to West and North to South, which provides a wildlife corridor of older forest across ownership boundaries (State Parks) and across the landscape *(FMP, Pg 70)*.

Older Forest Structure Zone



Land Allocation Classifications

Old Growth Groves: (~1% of Forest) 11 Old Growth Groves scattered across the Forest, along with the residual remnant Old Growth Trees, are preserved and are not harvested.

Old Growth Definition: An old-growth conifer tree is any live conifer, regardless of size or species that was present in the original stand before the first historic logging on JDSF (1860), based upon the professional judgement of JDSF staff *(FMP, Pg 104)*.

Main management goals:

- Maintain the health/resiliency to all disturbances *(FMP, Pg 24; 40-41)*
- Maintain Old Growth Groves

Management activities include:

- Prescribed fire
- Understory vegetation management

Old Growth-like stand structure and traits includes multiple canopies, larger limbs, deformities in trees, good spacing, larger trees etc.

Late Seral Development Areas (LSD): (~22% of Forest) Managed to accelerate the development of larger trees/other older forest structure with fewer future harvests *(FMP, Pg 67)*. These include Water and Lake Protection Zones (WLPZ).

Main management goals:

- Guide younger stands to increasing "Old Growth-like" traits
- Promote wildlife habitat, "Old Growth-like" stand structure
- Maintain health and resiliency to all disturbances

Management activities include:

- Limited timber harvesting (uneven-aged management silviculture or non-traditional silvicultures) with longer intervals between harvests
- Prescribed fire
- Timber stand improvement
- Understory vegetation management

Older Forest Development Area (OFDA): (~12% of Forest) Stands managed on longer intervals between harvests, for growing larger trees for harvest, while creating/maintaining an older forest structure *(FMP, Pg 67)*.

Main management goals:

- Create a demonstration for small/non-profit landowners who manage for a variety of objectives (aesthetics, wildlife habitat, timber harvests/restoration)
- Increase the number of larger trees while managing across all size classes
- Provide a contiguous older forest corridor across JDSF both East/West and North/South connecting Old Growth Groves and Late Seral Development Areas

Contiguous older forest corridor = 6,803 acres

Management activities include:

- Timber harvesting (uneven-aged management silviculture) with longer intervals between harvests
- Prescribed fire
- Timber Stand Improvement
- Understory vegetation management

Matrix: (~55% of Forest) Stands managed with a variety of silvicultural methods to create a dynamic, heterogeneous forest landscape. Area managed to form diverse levels of forest succession for research opportunities, and demonstrations for large/small landowners. The Matrix allows for a bit more discretion to try new silvicultural techniques, create different stand structures and address questions/concerns from the entire redwood region *(FMP, Pg 67-69)*.

Main management goals:

- Derived based on stand conditions, long-term planning, research projects, wildlife/ecological conditions, etc.
- Create the diverse 'library' of opportunities for research and demonstration for both large and small landowners that has not been discussed with previous allocations
- Along with the **Older Forest Structure Zone**, will provide a range of forest succession patterns for both ecological and research purposes

Older Forest Structure Zone – includes Old Growth Groves, Late Seral Development Areas and Older Forest Development Areas

Management activities include:

- Timber harvesting (predominantly uneven-aged management silvicultures with limited even-aged management silvicultures)
- Prescribed fire
- Timber Stand Improvement
- Understory vegetation management

Special Concern Areas: (~14% of Forest) This includes areas such as Eucalyptus infestation areas, Woodlands Special Treatment Areas, State Parks Special Treatment Areas, Neighbor Buffers, Power line rights-of-way, Recreation buffers, "Mushroom Corners", and others. Management goals are specific to the unique elements i.e. the Eucalyptus Infestation Zone management activities focus on restoring the native vegetation, while not increasing the Eucalyptus population.

Main management goals:

- Varied; depends on the site conditions and goals of the FMP *(FMP, Pg 194-197)*

Management activities include:

- Timber harvesting (uneven-aged management silviculture)
- Prescribed fire
- Vegetation management projects

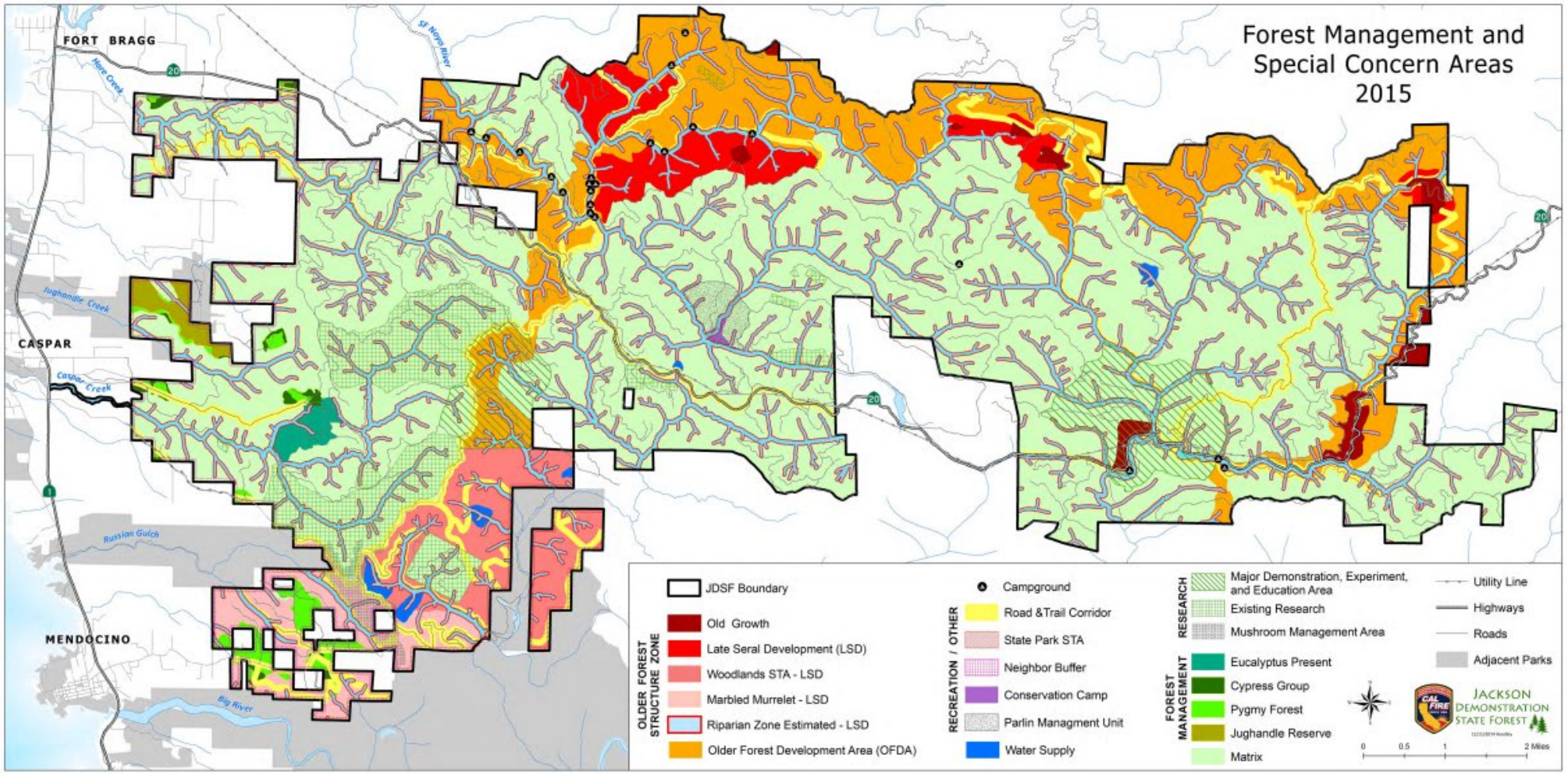
Pygmy and Related Non-Timber Areas: (~1% of Forest) Includes Cypress, Pygmy, Bob Woods Meadow, etc.

Main management goals:

- Managed to promote the health and resiliency to all disturbances for unique ecosystem *(FMP, Pg 194)*

Management activities include:

- Prescribed fire
- Understory vegetation management


Forest Management and Special Concern Areas 2015
FORT BRAGG
CASPAR
MENDOCINO
Noyo River
Hare Creek
Jughandle Creek
Caspar Creek
Russian Gulch
Big River
OLDER FOREST STRUCTURE ZONE
JDSF Boundary
Old Growth
Late Seral Development (LSD)
Woodlands STA - LSD
Marbled Murrelet - LSD
Riparian Zone Estimated - LSD
Older Forest Development Area (OFDA)
RECREATION / OTHER
Campground
Road &Trail Corridor
State Park STA
Neighbor Buffer
Conservation Camp
Parlin Managment Unit
Water Supply
RESEARCH
Major Demonstration, Experiment, and Education Area
Existing Research
Mushroom Management Area
FOREST MANAGEMENT
Eucalyptus Present
Cypress Group
Pygmy Forest
Jughandle Reserve
Matrix
Utility Line
Highways
Roads
Adjacent Parks
JACKSON DEMONSTRATION STATE FOREST
0 0.5 1 2 Miles

JDSF Forest Zoning Land Allocations	Old Growth Reserve	Late Seral Development Zone	Old Forest Development Area	Matrix and Research Areas
Management Objective	Maintain forest health and resilience.	Accelerate the development of larger trees and older forest structure.	Manage forest with extended harvest rotations and higher levels of forest habitat complexity.	Manage forest with a variety of silvicultural methods to create a heterogeneous landscape and support forest research and demonstration.
Prescribed Fire	Re-introduce beneficial fire to support ecological process. Treat surface and ladder fuels to reduce unnatural fuel accumulations from fire exclusion.	Burn prescription may be designed to create habitat features such cavities in reserve trees as well as thin small trees	Burn prescription should prioritize consumption of surface fuels with minimal damage to tree stems.	Integrate fire in timber harvesting reduce post harvest slash and thin smaller trees in order to reduce fire hazard.
Road Management	No new roads are built	Maintain and upgrade roads and culverts to prevent sedimentation. When feasible, decommission riparian adjacent roads and relocate access roads on ridgelines.		
Wildlife Benefits	Large trees with deep plated bark, basal cavities, large limbs, complex crowns, and multiple canopy layers create complex wildlife habitats that support nesting, among other activities.	This forest will grow large trees at a faster rate when thinning provides space for selected trees to grow. Old growth like traits are developed to promote wildlife habitat. Buffering the old growth groves increases habitat.	Tree diameter growth is accelerated by thinning. High canopy retention provides continuous “nesting” type habitat. Strategic distribution provides wildlife corridors both north/south and east/west across forest.	Harvest options include creating more open forest stands or early seral habitat with abundant forage resources while retaining vertical structures for cover and roosting.
Considerations during harvest tree selection	Management limited to understory vegetation management to promote stand level fire resilience.	Wildlife trees with structures such as flat tops, tuning forks, etc., are retained. Target densities of 4 snags greater than 30” are maintained. Selection silviculture focuses growth on residual trees. Canopy openings promote large branch development.	Tree selection is designed to meet objectives for both habitat creation and future timber quality. Snags and exceptional habitat trees are retained. Selection silviculture focuses growth on healthy trees for long term growth of high-quality wood products. Developing some younger/ smaller trees will ensure harvests are sustainable.	Tree selection is consistent with sustainable forestry approaches while protecting rare wildlife and botanical resources. Retrained trees are healthy and can produce quality wood products. Creating growing space for some young trees is included. Forest Management Plan gives maximum flexibility to these areas.

JDSF Forest Zoning Land Allocations	Old Growth Reserve	Late Seral Development Zone	Old Forest Development Area	Matrix and Research Areas
Forest Research Potential	Wildlife habitat, redwood genetics.	Ecological fire for habitat restoration, forest thinning for accelerated restoration, corridor ecology, disturbance resistance silviculture.	Forest restoration techniques within working forests that can be scaled to non-industrial and non-profit landowners across the redwood region. Balancing carbon storage and sequestration.	A broad diversity of forest management activities provide opportunities for both short- and long-term research or demonstrations of novel management techniques and habitat elements.
Recreation	Popular areas for visitors based on social value. Limited opportunity for new trail development. Protecting some endangered species from disturbance should be considered at some sites.	Popular areas for visitors based on aesthetic values. Trails development should be carefully considered to avoid year-round noise disturbance.	This is an area to encourage recreation, as aesthetic values match popular preference.	Recreation is one of the forest uses. Maintaining long term research integrity is priority at some sites. Educational opportunities regarding forest management abound.
Target demographic for management demonstration	State Parks, NGOs, Private landowners capable of funding road and river restoration without income from harvest.	State parks, NGOs, Private landowners for whom restoration through active management is an option.	Land trusts and small to medium private landowners aiming to balance restoration of road, rivers, and forest stand structure with financial needs.	Broadest group including both forest landowners with primary interest in producing wood products as well as regulators and public interested in these lands.

Land Allocation Glossary

- **Active Management** – any practice taken by JDSF staff to maintain the Forest. Activities of active management include silvicultural methods (harvesting), timber stand improvement, prescribed fire, invasive weed control, understory vegetation management, etc. Examples of other State and Federal agencies that practice active management are State Parks, National Parks, and National Forests.
- **Disturbances** – an event within a forest that can cause unwanted large-scale mortality or change the landscape in a drastic manner. Disturbances include wind, fire, pests, disease, and floods.
- **Ecosystem** – a biological community of interacting organisms and their physical environment. Examples include pygmy vs meadow vs old growth grove vs early successional forest type.
- **Even-aged Management** - managing a stand that is one-aged or one size class. Management activities include Variable Retention, Shelterwood, Seed Tree, and Clear cuts. JDSF has strict restrictions on even-aged management on the Forest *(FMP, Pg 10).*
- **Forest Composition** – the species that make up the forest.
- **Harvest Entry** – the number of years between harvests for a stand.
- **Heterogeneous Forest Structure** – a mosaic; having variation in stand conditions, age classes, and forest composition across the landscape i.e., mixed age redwood & Douglas-fir stand like JDSF.
- **Homogenous Forest Structure** – having little to no variation in stand conditions, age classes and forest composition across the landscape i.e., a Christmas tree farm or a lodge pole pine stand.
- **Passive Management** – a 'hands-off' approach that humans do not interfere with the progression of a landscape. An example of State and Federal agencies that practice passive management are Wilderness Areas.
- **Pre-commercial Thinning** – thinning or removing of some sub-merchantable (less than 12 inches Diameter at Breast Height (DBH)) trees with the end goal of promoting the growth of the remaining trees.
- **Riparian Zone** – referring to the map legend on page 4. These are Watercourse and Lake Protection Zones (WLPZ) that are given varying buffer protections based on the Forest Practice Rules.
- **Rotation Age** – the age that an individual tree can be harvested.
- **Silviculture** – the art and science of manipulating the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs, goals and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis.
- **Timber Stand Improvement** – any activities that promote the growth of native species within a stand. Activities include pre-commercial thinning and hardwood management.
- **Uneven-aged Management** – managing a stand for multiple age classes within the stand. Management activities include single tree selection, group selection, and cluster selection.
- **Understory Vegetation Management** – activities that typically promote the reduction of fire fuels within the understory of a forest. Includes invasive weed control, mastication, lopping, chipping, pile and burning.
- **Water Supply** – referring to the map legend on page 4. These are water supply sites for either the State Forest or neighbors.

References:

Jackson Demonstration State Forest Management Plan. 2016. California Department of Forestry and Fire Protection, Natural Resources Agency, State of California. https://www.fire.ca.gov/media/ncejt2mz/2016-jdsf-mgmt-plan-final_ada.pdf https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/calfire-website/what-we-do/natural-resource-management/demostration-forests/jackson/files/jdsf---forest-management-plan-2016.pdf?rev=c807b92a89b64bb49d2d804a485a9df1&hash=5EC3CCD97382C029F031A1E40F3F1025

"Option A": *Jackson Demonstration State Forest Management Plan for the achievement of Maximum Sustained Production of High-Quality Timber Products in accordance with Title 14 CCR 913.11(a) California Dept. of Forestry & Fire Protection.* October 2014. The Resources Agency, State of California. Peterson Gulch THP (1-14-122MEN).

California PRC § 4361.5 https://leginfo.legislature.ca.gov/faces/codes_displayexpandedbranch.xhtml?tocCode=PRC&division=4.&title=&part=2.&chapter=9.&article=

Board of Forestry Policy 0351.2 https://bof.fire.ca.gov/media/9117/9-6-chapter_0350_forestmanagement-ada.pdf

JACKSON DEMONSTRATION STATE FOREST

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 (CO_2) 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 and sources.
- 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.

Existing Forest = Carbon Storage

Carbon Storage vs. Carbon Sequestration

- Carbon Storage – Forests store carbon in the trees' bole, branches, roots, and soil. This carbon is most secure in ecosystems that are resilient to disturbance. JDSF stores ~19 million metric tonnes of CO2 across the Forest.
- Carbon Sequestration – Through photosynthesis, trees combine CO_2 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. JDSF is sequestering ~200,000 metric tonnes per year which is enough to offset the annual emissions of 19,000 average Californians[1].

Active Forest Growth = Carbon Sequestration

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

- California's Cap and Trade program recognizes that forests can mitigate climate change by increasing or conserving forest stocks through reforestation, avoiding conversion, 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 levels[2].
- Though it may seem counterintuitive, halting all timber harvests might have a negative affect on carbon sequestration as it can lead to overcrowding, which stresses the trees and leaves them vulnerable to disease, pests, and disturbances. Forests today, and in the future, facing climate uncertainty, need to be diverse to withstand human caused and natural disturbances.

Resiliency - the stands ability to persist after a disturbance.

- Creating more resilient forests by using management activities, including varying 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 parties[3] 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 will reduce the short-term carbon storage by removing vegetation, but can increase the stability, or resiliency, of long-term carbon storage by reducing the stress of competition from other trees; and maintain high rates of carbon sequestration through vigorously growing trees[4].

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[1] "Latest GHG Inventory shows California remains below 2020 emissions target." California Greenhouse Gas Emission Inventory Program. *California Air Resources Board*. July 28, 2021. https://ww2.arb.ca.gov/our-work/programs/ghg-inventory-program

[2] "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

[3] 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

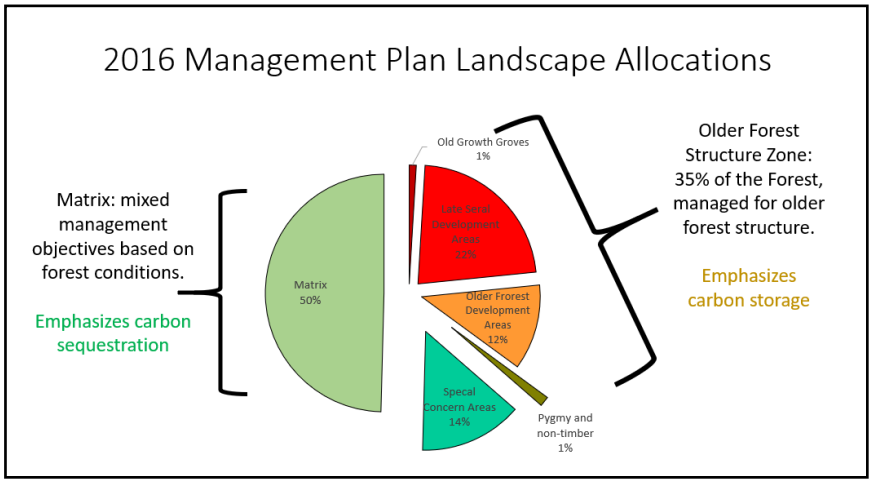
[4] Hurteau et al. 2010. "The Carbon Cost of Mitigating High-Severity Wildfire in Southwestern Ponderosa Pine." *Global Change Botany*. 17(4):1516-1521 DOI:10.1111/j.1365-2486.2010.02295.x

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

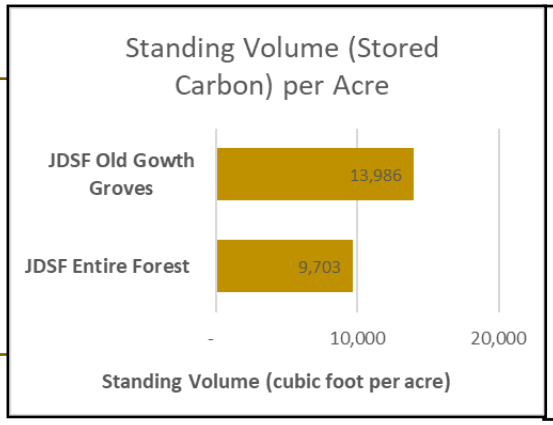
December 2021

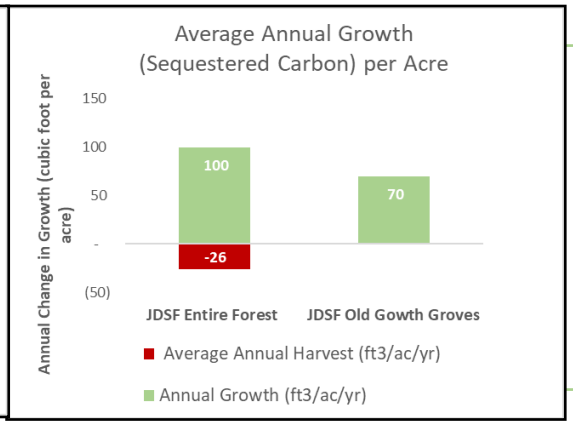
JDSF and Forest Carbon

- JDSF is a working forest that is managed for a multitude of goals and objectives, including timber production, research, carbon storage and carbon sequestration, and restoration etc.
    - To achieve these goals, the Forest has been divided 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.
- Dynamics of stand growth is a more important factor than individual tree size, so JDSF manages across all size and age classes, 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.



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 a 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.

JDSF and California's Climate Change Goals

- JDSF and other Demonstration State Forests (DSF) are included in the draft Natural and Working Lands Climate Smart Strategy Document by stressing the importance of their research and exploration of how to balance management activities in complex ecosystems[5].
    - DSF are well poised to be the example for the rest of the State on balancing the need to manage natural resources while conserving ecosystems.
- 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. Longer rotation ages are a "Nature-base solution" as defined by the Strategy Document.

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

[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

Forest Carbon Glossary

- **Bole**: the tree's stem.
- **Cap and Trade Program**: visit https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2014/capandtrade14/ctusforestprojectsprotocol.pdf
- **Carbon**: A basic building block for all life on earth. When found in our atmosphere as carbon dioxide (CO_2) it is one of the greenhouse gas (GHG) elements that regulates earth's temperature and contributes to global climate change.
- **Carbon Sequestration:** Any process by which CO_2 is removed from the atmosphere and stored in solid or liquid form. Through photosynthesis, trees combine CO_2 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. Active Forest Growth = Carbon Sequestration.
- **Carbon Sink:** a negative source of CO_2 in the atmosphere via absorption and storing of carbon in vegetation, the atmosphere, and the ocean.
- **Carbon Source:** a positive source of CO_2 to the atmosphere.
- **Carbon Storage:** Forests store carbon in the trees' bole, branches, roots, and soil. This carbon is most secure in ecosystems that are resilient to disturbance. Existing Forest = Carbon Storage.
- **Climate Uncertainty:** while the climate is changes and humans have caused some extent of that, there is disagreement about what the future will hold for the climate. Exactly how hot, dry, cold, wet, or what extreme weather is unknown. All current knowledge is based on models and previously recorded records that we can make inferences on to lead to best management practices, but no one knows what the future holds.
- **Conservation:** seeks the sustainable use of nature by humans (includes permitted hunting, limited harvesting/gathering of forest materials, monitored water use, and regulated recreation – camping, hiking, biking, horse-riding).
- **Conversion:** change in land use, i.e. forests to crop farm land (vineyards or marijuana) or urban development.
- **Composition:** the makeup of the forest in terms of the living organisms or groups of organisms and non-living components present in the forest; all the tree species that are found in the forest.
- **Disturbance:** events that change the structure and composition of a forest ecosystem, beyond the growth and death of individual organisms. Disturbances, both human-induced and natural, shape forest systems by influencing their composition, structure, and functional processes.
- **Forest Management Activities:** prescribed burning, timber harvesting, fuels treatments etc.
- **Forest Structure:** the vertical and horizontal spatial arrangement of the component parts of the forest ecosystem.
- **Fuels Treatments:** Activities that change the continuity (or density) of the vegetation. Treatments include: lop and scatter, pile and burn, mastication, prescribed burning, and chipping.
- **Green House Gases (GHG):** Atmospheric gases, both natural and anthropogenic, that allow solar radiation to reach the Earth's surface and re-absorb infrared radiation emitted by the Earth.
- **Harvest Entry:** the number of years between harvests for a stand.
- **Long-term Carbon Storage:** Looking at a longer time frame (20-hundreds of years) for carbon storage.
- **Nature-Based Solutions:** visit https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives /Expanding-Nature-Based-Solutions/FINAL_DesignDraft_NWL_100821_508-opt.pdf
- **Old Growth:** any live conifer, regardless of size or species that was present in the original stand before the first historic logging on what became JDSF (1860).
- **Photosynthesis:** the process by which plants use sunlight, water and carbon dioxide to create oxygen and energy in the form of sugar.
- **Preservation:** protecting nature from human over-use (leave no trace model).
- **Resilient or Resiliency:** The stands ability to persist after a disturbance.
- **Rotation Age:** the age that an individual tree can be harvested.
- **Short-term carbon storage:** Looking at only a short time frame (1-15 years) for carbon storage.
- **Stand Density:** the number of stems per acre on a landscape.
- **Vigorously Growing:** determined by the growth rate of the stand.
- **Volume used as Proxy for Carbon:** Volume is correlated with carbon calculations. Volume is easier to understand and visualized.

Multi-Decade Climate Change Study Coming to JDSF

Have you ever wondered how coastal redwood ecosystems will react to the rapidly changing climate conditions? Is there anything we can pro-actively do to prepare? JDSF in collaboration with Dr. Sarah Bisbing, Associate Professor of Forest Ecosystem Science at the University of Nevada Reno, is embarking on a multi-decade study to test four forest treatment (silvicultural) prescriptions that will be replicated and monitored on JDSF, and discussions are already under way to expand the study north and south across the redwood range.

"We're testing three different methodologies for potentially mitigating the effects of the legacy of fire suppression as well as ongoing climate change," said Dr. Bisbing. "The experiment is fully replicated at [three core sites] across the Sierra Nevada so we can ask, 'within a given location, is treatment A more effective than treatment B, and then across the Sierra Nevada in the same forest type, if treatment B is more effective at site one, is it also effective at site two, three, and so on?' And, at a total of seven sites, we reforested with different species and different seed sources to ask which will survive these conditions."

This experiment compliments the ongoing national experiment, Adaptive Silviculture for Climate Change (https://www.adaptivesilviculture.org/) and the Sierra Nevada Adaptive Management Experiment (https://www.adaptive-forest-management-experiment.com/). The latter of which includes LaTour and Mountain Home Demonstration State Forests as part of a north-south transect of sites across the Sierra Nevada Mountain Range, also lead by Dr. Bisbing.

Humboldt and Del Norte area listening session participants at a Redwood Rising project site.

JDSF staff and researchers from Dr. Bisbing's lab have spent the summer learning from state, Tribal, non-profit, and private redwood forest managers what they perceive as the biggest threats to the persistence of redwood forests and how they are actively preparing their

forests for those threats. Listening sessions have been held in Santa Cruz, Mendocino, and the Humboldt/Del Norte area. With that information JDSF has found a site just north of the Camp 20 Day Use Area that represents common stand conditions across the redwood range. Staff has been busy installing monitoring plots and collecting pre-treatment data.

The four treatments at JDSF will be:

- **Resistance:** Prepares a stand structure that is open, park-like, and forces fire to stay on the ground. Disconnects overstory trees from understory fuels and favors large trees that can rapidly respond to increased resource availability.
- **Resilience:** Creates stand conditions that will allow forests to recover from different possible disturbances (drought, fire, pests, and disease). Establishes a patchy, diverse forest structure while retaining locally rare species.
- **Transition:** Helps forests adapt to a changing climate where they cannot recover without human intervention. Creates new openings for reforestation trials, ranging from ¼`- 1 acre and covering approximately 10% of treatment area.
- **Control:** Take no action and allow natural processes to work without intervention.

The permanent monitoring plots will be re-measured post-treatment and on five-year intervals for at least 20 years. The research team is analyzing the forest conditions and results of the listening sessions to propose the parameters of each treatment and any maintenance requirements. This will give the researchers powerful data to analyze forest changes in response to different climate change impact scenarios such as tree regeneration failure, shifts in species' range, or disturbances from drought, insect damage, or fire.

This experiment is one of the many ways CAL FIRE's Demonstration State Forest Program is informing forest management into unknown future climate conditions. You can learn more about this experiment by attending the upcoming Jackson Advisory Group (JAG) meeting on November 15. Dr. Bisbing will present the experiment to the JAG and public and it will include a field tour. Please contact us at JDSF@fire.ca.gov or (707) 964-5674 for information about the JAG meeting or this experiment.

Research, Science & environment

Twenty-year study confirms California forests are healthier when burned — or thinned

UC Berkeley researchers found that prescribed burning, restoration thinning can reduce wildfire risk and boost a forest's resilience to climate change. And, using any combination of these treatments is far better than doing nothing.

By Kara Manke

UC Berkeley's Blodgett Forest Research Station is the home of an ongoing, 20-year study investigating the impacts prescribed fire and restoration thinning on forest health and wildfire risk in the Sierra Nevada. Scroll through the slideshow to show how these treatments have transformed different corners of the forest over the past two decade

Ariel Roughton/UC Berkeley

December 12, 2023

A 20-year experiment in the Sierra Nevada confirms that different forest management techniques — prescribed burning, restoration thinning or a combination of both — are effective at reducing the risk of catastrophic wildfire in California.

These treatments also improve forest health, making trees more resilient to stressors like drought and bark beetles, and they do not negatively impact plant or wildlife biodiversity within individual tree stands, the research found. The findings of the experiment, called the Fire Surrogate Study, are published online in the journal *Ecological Applications*.

“The research is pretty darn clear that these treatments are effective — very effective,” said study lead author Scott Stephens, a professor of fire science at the University of California, Berkeley. “I hope this lets people know that there is great hope in doing these treatments at scale, without any negative consequences.”

Last year, California announced a strategic plan for expanding the use of prescribed fire to 400,000 acres annually by 2025. However, the use of beneficial fire continues to be hindered by multiple factors, including the lack of a trained workforce, the need for specific weather conditions for burning, and fears about potential risks.

This study shows that restoration thinning is also a viable option for forest management and can be used in tandem with beneficial fire without harming forest health or biodiversity.

“Our findings show that there’s not just one solution — there are multiple things that you can do to impact the risk of catastrophic fire,” said study co-author Ariel Roughton, research station manager at Berkeley Forests. “Folks can choose from different combinations of treatments that might fit their needs, and we can show them how those treatments might impact things like wildfire behavior, tree growth and carbon holding in their forests.”

UC Berkeley’s Blodgett Forest Research Station is a model for how California can reduce the risk of severe wildfire and improve the ecological health of its forests. (UC Berkeley video by Roxanne Makasdjian and Jason Blalock)

Surrogates to wildfire

Over the past two decades, Stephens and other researchers at Berkeley Forests have used prescribed burning, restoration thinning or a combination of both to treat plots of land at Blodgett Forest Research Station, a 4,000-acre experimental forest located about 65 miles northeast of Sacramento on the unceded lands of the Nisenan peoples.

The Fire Surrogate Study was one of 13 studies across the U.S. first launched in 1999 with funding from the U.S. Joint Fire Science Program. Its aim was to study whether the two treatments could mimic the beneficial impacts of lightning fires and Indigenous burning practices on California’s forests, which have become dense and overgrown after a century of logging and fire suppression.

“Prescribed fire and restoration thinning are both surrogates for wildfire, a key process that happened frequently in California before European colonization,” Stephens said. “The impetus of this study was: If you’re going to implement these treatments at a large scale, is there anything that’s going to be lost?”

The study created nine experimental plots and three control plots at Blodgett. Three of the experimental plots were managed only using prescribed burns; three burns occurred over the course of 20 years. Three other experimental plots were first thinned and then burned, and the final three were treated only with restoration thinning. The control plots were left to grow without human interference except continued fire suppression.

At the end of the 20-year period, the researchers surveyed the vegetation in each plot and used computational modeling to estimate how many trees were likely to survive wildfire. They found that all three types of experimental plots were significantly more resilient to wildfire than the control plots, showing an 80% likelihood that at least 80% of trees would survive.

They also calculated the "index of competition," a measure of how strongly trees must compete for resources like sunlight, water and soil nutrients. By removing excess trees and vegetation, thinning and burning both limited the amount of competition between trees, making them less vulnerable to stressors, like drought and bark beetles.

Scott Stephens at Blodgett Forest Research Station in late 2021.

Evett Kilmartin/UC Regents

However, the plots that were treated with a combination of thinning and fire had the best index of competition, suggesting that they would be the most resilient to the impacts of climate change.

"When you combine thinning with fire, you're able to modify all different levels of the forest structure, and it speeds up the timeline for achieving a more resilient structure," Roughton said.

Restoration thinning can also provide financial benefits: Often, larger trees can be sold to sawmills, and the proceeds can be used to help offset the cost of forest management. Over the course of 20 years, the treatments at Blodgett were entirely paid for by revenue from timber.

"When I go to Sacramento and talk about [forest management] with legislators, the first question they always ask is about cost," Stephens said. "People in the state government are telling us that they can't be the sole source support for this work. That's why the economics are so important."

Trial by fire

In September 2022, the forests at Blodgett were subjected to a real-life test: On the morning of Sept. 9, 2022, the Mosquito Fire breached the north side of the property, burning approximately 300 acres before it was contained two days later.

One of the study's control plots was located directly in the path of the blaze, and more than 60% of the trees in this plot were completely scorched. However, neighboring experimental plots that had been treated with prescribed burns served as "fuel breaks," burning less hot than the control and acting as staging areas for firefighters.

"We think that, overall, our management actions, coupled with the weather, did have a pretty big impact on the behavior of the fire," Roughton said.

The researchers have received a four-year grant from the Joint Fire Science Program to continue the Fire Surrogate Project. With the help of the grant, they have established a new control plot to replace the one that burned and plan to apply a fourth fire to the experimental burn-only plots.

They are also collaborating with the United Auburn Indian Community to reestablish Indigenous cultural burning at Blodgett.

"We want to be part of the solution, and that's part of our mission at Blodgett," Roughton said. "We hope that by doing these studies and bringing folks here to see the effects of the different treatments, they will take that back and apply it to the land that they're going to be

managing.”

Additional co-authors of the study include Daniel E. Foster, John J. Battles, Alexis A. Bernal, Brandon M. Collins, Rachelle Hedges and Robert A. York of UC Berkeley and Jason J. Moghaddas of the Spatial Informatics Group. This project was originally funded by the U.S. Joint Fire Science Program, and it has received additional support from the California Fourth Climate Change Assessment, the McIntire-Stennis Program, the California Greenhouse Gas Reduction Fund, and the UC Office of the President’s UC Laboratory Fees Research Program. Smart Practices and Architecture for Prescribed Fires in California was also important to keeping this long-term project active.

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A Forest Bursting with Life - Remarkable Array of Wildlife Photographed as Part of New Study at JDSF

A black bear.

While a trip into JDSF may feel like we humans are the only mammals in the forest, a new research project utilizing wildlife cameras shows that it is teeming with life! JDSF is initiating a program to incorporate static wildlife cameras (camera-trapping) as a long-term annual monitoring method across the forest. This project will track the diversity and distribution of mammals associated with vegetative structure and composition, and more specifically, evaluate how the mammal community responds to a range of disturbances (e.g. timber harvest, mechanical fuel treatments, prescribed fire, road use, and recreation).

JDSF recently implemented a fuels treatment study (Greenhouse Gas Fire Fuels Mitigation Study) to examine a range of standard vegetation treatments. These treatments aimed at reducing fuel loading in the coast redwood zone on forest stands 7-10 years post-harvest to promote a greater fire resilient ecosystem. An important component of this study is to evaluate the effects of several treatments (e.g. mastication, prescribed burning, and combined treatments) on the bird, bat, and terrestrial mammal communities. Through the current study, several months of pre-treatment camera-trapping data has been collected, along with biological monitoring data. Now, mastication has started at several sites.

This monitoring effort will continue for several years post-treatment to compare pre-disturbance baseline animal numbers at control and treatment areas in six replicate areas, with the objective to document changes in animal community structure and determine if and how long it takes these communities to recover to their pre-disturbance state.

During the first three months of camera-trapping a total of 10,204 images were collected from 18 cameras spread across six replicate sites (3 cameras per site) during late April 2023 through the first week of August 2023. A total of 22 wildlife species were detected, 16 of which were mammals.

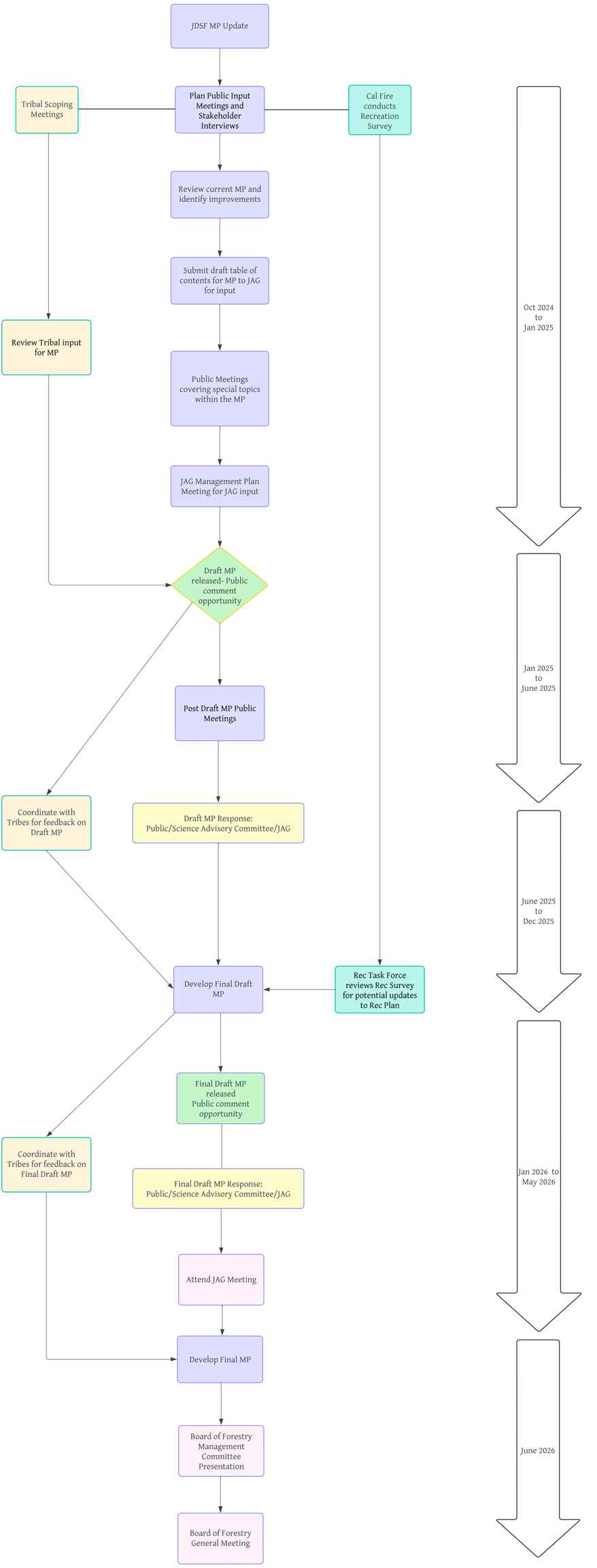
Columbian black-tailed deer, western gray squirrel, Douglas squirrel, and American black bear were detected at all six sites. Many of the wildlife images were of deer (bucks in velvet, does, and fawns), which would frequently browse vegetation in view of the camera for long periods of time during the nighttime hours. Notable detections included a pregnant deer photographed in May returning two months later with a fawn trailing behind, predation of a western gray squirrel and chipmunk by a bobcat, detection of the nocturnal Humboldt flying squirrel at three sites, detection of various mid-sized carnivores, and a close-up of a pileated woodpecker.

A fawn trailing behind its mother.

This research will assist forest managers and policy makers in gaining a better understanding of how these treatments not only affect fuels treatments and forest resilience, but also how they may affect public trust resources. The results of this study will inform a variety of decision-making processes and is integral to a program of continual improvement of forest management that ensures consistency with the JDSF Management Plan, California Forest Practice Rules, and the California Environmental Quality Act.

Learn more about research at JDSF HERE.

More images of wildlife photos from JDSF can be found HERE.


JDSF MP Update
Tribal Scoping Meetings
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Review current MP and identify improvements
Submit draft table of contents for MP to JAG for input
Review Tribal input for MP
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Final Draft MP released Public comment opportunity
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Attend JAG Meeting
Develop Final MP
Board of Forestry Management Committee Presentation
Board of Forestry General Meeting
Oct 2024 to Jan 2025
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