Ebbetts Pass Forest Watch
Post Office Box 2862
Arnold, California 95223
209-795-8260
www.forestwatchers.org

Ebbetts Pass Forest Watch comments on Draft California Climate Adaptation Strategy

California Resources Agency Secretary Mike Chrisman
Deputy Secretary for Climate Change and Energy, Anthony Brunello
California Resources Agency
1416 Ninth Street, Suite 1311, Sacramento, CA 95814

RE: Draft California Climate Adaptation Strategy

via email to: adaptation@resources.ca.gov

September 16, 2009

Dear Secretary Chrisman and Deputy Secretary Brunello:

Ebbetts Pass Forest Watch (EPFW) thanks you for this opportunity to submit comments on the 2009 California Climate Adaptation Strategy Discussion Draft (draft CAS), released August 3rd, 2009.

Ebbetts Pass Forest Watch is a not for profit organization dedicated to healthy forests and watersheds. We have been active in monitoring and commenting on private land forest practice issues in the Sierra Nevada for the past nine years. Our members and organizational partners extend statewide.

Climate change is, for EPFW, a real and urgent issue. We are keenly aware of the direct impacts that climate change is already having on our Sierran communities and forests. As well, like many others we are aware of the many integral ways that forests impact climate change and how climate change will impact forests. Creating a successful and feasible adaptation plan related to forests is vital for the future wellbeing of California's citizens, economy, and natural resources. To that end, we offer the following comments and suggestions on the draft CAS in order that it become the most useful and complete document possible.

EPFW Comments on the Draft CAS

The most glaring overall omission in the forestry chapter is that it fails to develop the linkage between known or anticipated climate change effects and commercial forest management (i.e., logging or timber harvest), thereby missing crucial adaptation strategies to achieve forestry sector adaptation goals. There is a presumed sense communicated that "traditional economic uses of these working landscapes" (Introduction, p. 105) are benign for climate purposes when, in fact, this is not at all true.

One of the introductory sentences (p. 105) states that: "Population growth and land use change may create additional stresses that increase vulnerability to impacts from climate change." In fact, it is not just land use "change" but current and future and use "choices," such as a choice of timber harvest method, that may dramatically affect climate change effects.

Suggested edit: p. 105: "Population growth and land use ~~change~~ choices may create additional stresses that increase vulnerability to impacts from climate change."

Since, as detailed in the Introduction, over 15 million acres of California's land is defined as timberland, it certainly deserves at least as large a sub-section of discussion in this chapter as "Reforestation, Urban Forestry and Forestland Conversion." What happens on the multi-million acres of timberland is more crucial than that occurring on even tens of thousands of acres of converted land, much of which may remain with 10 or more percent of canopy cover. Harvest decisions that affect carbon and climate for decades need to be discussed and their contributions or damage to adaptation efforts must be brought forward.

Suggested change: Insert a section on "Forest Management Choices" into Chapter IX of the Draft CAS.

Another omission noted by EPFW is that Chapter IX does not clearly make the point that the forestry sector is the only one that can both emit or sequester carbon, and that management decisions (i.e., adaptation strategies) will determine the balance of emission and sequestration.

> "According to the California Energy Commission, California lost 30% of its sequestration capacity in the last decade alone. It is clear, therefore, that forests may be sources of carbon dioxide or sinks of carbon dioxide, *depending upon how people decide to manage them*." Laurie Wayburn, President,Pacific Forest Trust, Presentation to the California Climate Action Registry's Conference May 6, 2003.

As well, the chapter does not clearly state that adaptation strategies must be developed to assure that the state's forests become the greatest carbon sinks possible immediately and into the future.

Suggested change: Develop an adaptation strategy principle that prioritizes maximum, immediate sequestration of carbon as crucial to all forestry adaptation strategies.

In March 2006 the California Energy Commission released an important report called *Climate Change Impacts on Forest Resources White Paper: A Report from the California Climate*

Change Center.[1] This report (hereafter called "White Paper") provided sound and scientifically-defensible management recommendations for the state's forested lands under climate change conditions. EPFW feels omission of these recommendations from the Draft CAS ia an unfortunate oversight that must be corrected.

Here are recommendations from the White Paper's section 4.3, "Adaptations for Forest Health":

> One preventative response is to retain a mixture of species and ages in the mixed conifer forests. Monodominant stands are at most risk. Designing diverse forest structures with multiple species where appropriate alleviates some risk associated with even-aged, single-species stands. A spatially mixed forest limits the spread of both pathogens and insects.
>
> Another effective adaptation would be to maintain lower tree densities. By reducing fuel loads and reducing competition, lower-density stands provide structures that are more resilient to catastrophic events like fire and epidemics.

Suggested change: Include management recommendations from the *Climate Change Impacts on Forest Resources White Paper: A report from the California Climate Change Center* in Chapter IX of the Draft CAS.

The importance of the recommendations listed above are manifold and central to EPFW's belief that forest management choices need to be addressed in the CAS. Management of California's forests affects every major delineated climate change effect.

Currently, in the Sierra Nevada, evenaged management, i.e., clearcutting and methods closest to clearcutting (hereafter called "clearcutting") have become the predominant method of timber harvest. Since 1996, one company alone has gained approval for over 250,000 acres of such harvest. This poses huge climate change implications for all the elements discussed in Chapter IX. To remain silent on it in the CAS is to ignore a monstrously-huge elephant under the rug and to risk great future harm to California, its economy, natural resources, and citizens.

Conditions exacerbated by clearcutting under climate change conditions include:

- Fragmentation of habitat and migration corridors as species attempt to relocate
- Loss of biodiversity
- Disruption of water supply reliability, timing, and quality
- Threat of increased and more frequent catastrophic wildfire
- Increased insect and pathogen damage to or destruction of forest land
- Increased temperatures in the forested regions

Each of these conditions will now be discussed:

- **Fragmentation of habitat and migration corridors as species attempt to relocate**

Climate change is affecting all species from the larger ones such as trees (discussed on page 105) to the smallest plants and animals. Each of them must adapt as temperatures, precipitation

[1] CEC-500-2005-193-SF; http://www.energy.ca.gov/2005publications/CEC-500-2005-193/CEC-500-2005-193-SF.PDF

regimes, and fire seasons are altered.[2] Any activity which makes this process harder or more likely to fail should not be condoned or tolerated under climate change conditions. Clearcutting, with its deep ripping and disruption of the soil, conversion of all native overstory and understory plants of varied ages to plantations of very young seedlings of just a few conifer species, and chemical treatments with herbicides, destroys habitat of the species that formerly lived within a harvest area and makes survival under difficult circumstances more trying. Additionally, since there has not been adequate or complete statewide mapping of crucial wildlife corridors or sensitive species, timber harvesters can disrupt crucial migration routes or species unknowingly. Due to these issues, EPFW suggests the following adaptation strategies:

Suggested Adaptation Strategies:
Short-term:

By January 1, 2011, develop accurate mapping of habitat corridors for wildlife and plant species and sensitive resources within forested regions of California.
Long-term:

By 2013, assure through legislative and regulatory means that intensive forest management (i.e., clearcutting or similar harvest, extensive biomassing, roadbuilding, or conversion to human land uses) does not occur within vital corridors needed by species under climate change conditions and does not disrupt sensitive resources.

- **Loss of biodiversity**
  Clearcutting removes oaks, other hardwoods and non-commercial species of trees and native plants. This practice significantly reduces biodiversity, thus further exacerbating the impacts of climate change. The resultant plantation is not a biodiverse forest but rather a collection of seedlings later trees) of one age and limited species. Hardwoods and native ground cover, relied on by many species of wildlife for habitat and food, have been eradicated.

  As well, the native plant species do not easily get re-established after the repeated use of multiple herbicides. The effect is the same as the danger to biodiversity discussed on page 109 as an effect of wildfire: "More frequent fires may also result in vegetation conversion by repeatedly killing regeneration. Vegetation conversions can impact biodiversity, habitats, watershed conditions, timber resources and other goods and services." This vegetation conversion is being seen all across the Sierra Nevada from widespread clearcutting.

Suggested Adaptation Strategy:
Severely curtail clearcutting and similar harvest practices across California's forested lands to protect range biodiversity.

- **Disruption of water supply reliability, timing, and quality**

It is often forgotten that water, not wood fiber, is the most important product from California's forests. With the threats from a changed temperature and water regime due to climate change,

[2] The habitat challenges being faced by all species is clearly acknowledged in the Draft CAS "Water Management" Chapter. "In addition, climate change may make preservation and restoration of habitat more difficult. The ecological requirements of cold-water fishes provide an example. Climate change may warm rivers and streams, with less water available for ecosystem flow and temperature needs in spring and summer. In many low- and middle-elevation streams today, summer temperatures often approach the upper tolerance limits for salmon and trout; higher air and water temperatures will exacerbate this problem." (p. 79)

protecting our water is the sole most important task we can undertake. The forestry sector is vital to this endeavor. As stated on page 77 of the Draft CAS, "Nearly 75 percent of California's available water supply originates in the northern third of the state (north of Sacramento), mainly from water stored in the Sierra Nevada snowpack." The chapter goes on to say:

> First, increasing winter and early spring temperatures will cause earlier melting of the Sierra Nevada snowpack – the most important seasonal surface reservoir of water in California. Historically this snowpack has released about 15 million acre-feet slowly over the warming spring and summer months (one acre-foot provides the annual water needs of one to two families).2 California's water storage and conveyance infrastructure gathers this melting snow in the spring and delivers it for use during the drier summer and fall months. This same infrastructure is also used for flood control in the winter and early spring by keeping lower reservoir levels. With earlier snowmelt and heavy winter/spring rains possibly coinciding, difficult tradeoffs may need to be made between water storage and flood protection. (p. 78)
>
> Existing storage and conveyance facilities have been built and operated based on historical patterns of rain and snowfall. Over the last century, the average early spring snowpack runoff has decreased by about 10 percent, a loss of 1.5 million acre-feet of water.
>
> Using historical data in conjunction with climate and hydrologic models, the Department of Water Resources projects that the Sierra Nevada snowpack may be further reduced from its mid-20th century average by 25 to 40 percent by 2050. (p. 80)

Obviously, anything that aids the retention of snowpack and delays run-off is to be encouraged through adaptation measures, while anything that hurts these goals should be stopped. Selection harvest, as set forth in the White Paper management recommendation, supports the desirable ends while clearcutting exacerbates the negative effects of clearcutting.

Clearcutting has been known for centuries to lead to increased run-off with concomitant sedimentation (which lessens water storage in reservoirs by using up valuable space with sediment). It has also been well-linked to earlier spring run-off with the linked result fo less water available in summer to meet water needs of natural resources and people. All of these are negative effects already being seen from climate change, especially in the SierraNevada. The following quotes from a doctoral dissertation on water effects in the Sierra highlight some of these points.[3]

> Bates and Henry conducted a 15-year study "on the effects of clearcutting in Colorado snow-zone watersheds. Their results were similar to many other studies, from the Paulini brothers [in 1607] to the present—cutting increases peak flows and increases sedimentation [in] watersheds." (14)
>
> "Harr et al. found that…clearcutting increased storm runoff in coastal Oregon watersheds." (56)

[3] Euphrat, Frederick D. *Cumulative Impact Assessment and Mitigation for the Middle Fork of the Mokelumne River, Calaveras County, California.* A dissertation submitted in partial satisfaction for the degree of Doctor of Philosophy in Wildland Resource Science in the Graduate Division of the University of California at Berkeley, 1992.

> "[Study of harvest method and amount of bare ground] suggests that, per unit of ground, the potential for stream channel effects from surface soil erosion is greater on clearcuts." (100)
>
> "Bare ground is a potential source area for stream sedimentation, because machine-operated ground creates surfaces of relatively lower permeability over which overland flow is more likely to carry sediment." (69)
>
> "Significant differences were found between the clearcut and selectively harvested sites…All of the sites had been tractor-harvested…Most notably, clearcut sites had significantly more equipment-operated ground than selective-harvest sites….[T]ransects of harvest areas showed a difference in the amount of bare ground between selection and clearcut sites, significant at the 90% level…indicative of probable source areas for sediment transport." (70)

An environmental report conducted for the company doing nearly all the clearcutting in the Sierra told them in 2000 that "The use of the clearcut silvicultural method would likely result in greater water runoff from individual timber harvest units."[4] The same report noted that:

> A study that compared the effects of timber harvest practices on peak flows in two Sierra Nevada watersheds, showed an increase in peak flows following a forest canopy reduction of 58 percent. The amount of peak flow increase was not quantified due to limited data. The author also concluded that an increase in exposed snowpack allowed for greater heat transfer into the snowpack contributing to increased peak flows (Marvin 1996). (p. 65)

The "Water Management Chapter" of the Draft CAS tells us that:

> While some climate models predict an overall drying of California's climate, at the same time there are also continued risks from intense rainfall events that can generate more frequent and/or more extensive runoff and flooding.
>
> Additionally, periodic larger than historical floods are expected to occur, especially in the southern parts of the Sierra Nevada, where a transition from snow to more rainfall will occur. Flood peaks can increase erosion rates that results in greater sediment loads and turbidity….. (p. 81)

This corresponds to what Euphrat found occurring in the Sierra:

> These data show that the runoff generated from large storms in the Mokelumne watershed has significantly increased over the period 1930-1980, the period in which these basins experienced timber harvesting and roadbuilding activities. Because the effect does not appear to be flattening out over time, the change in runoff characteristics may well be tied to timber harvesting as well as road densities. Timber harvesting affects runoff by its reduction of vegetation cover and subsequent impacts on the snow pack. It may be fair to say that more recent timber harvesting, affecting annually and

[4] Foster Wheeler Environmental Corporation. *Watershed Assessment Upper Mokelumne River, Volume I — Watershed Assessment;* Prepared for Sierra Pacific Industries. August 2000. p. 111.

cumulatively greater and greater areas, combined with roads, skid trails, and tree removal, is creating progressively greater runoffs from large storms, with the largest storms displaying the greatest increased of runoff.

Hewlett and Helvey[5] found similar results on a 108 acre watershed in North Carolina, and attributed the increase in quickflow to increased runoff from saturated surfaces. (104)

There is much more scientifically-sound data that could be presented regarding water quality, quantity and timing, but EPFW believes this is sufficient evidence to urge the Resources Department to consider Adaptatin Strategies that take timber harvest methods into account.

Suggested Adaptation Strategies:
Severely curtail clearcutting and similar harvest practices across California's forested lands to protect state water.

Threat of increased and more frequent catastrophic wildfire

Many of the adaptation strategies put forward in Chapter IX of the Draft CAS concerned the legitimate concerns over more frequent and intense wildfires under climate change conditions. Unfortunately, clearcutting also contributes to this same problem. Dense, young plantation trees up to 40 years old with thin bark, low limbs, and crowns of essentially the same height contribute to the threat of increased catastrophic crown fires. Following is a sampling of expert opinion about this issue that needs addressing within the CAS:

From the California Board of Forestry and Fire Protection, discussing the Sierra's Tahoe Basin:

"Extensive harvest in the late 1800s and early 1900s resulted in an overall young forest. There is concern that these changes have contributed to an increased likelihood of severe fire. Younger forests are more susceptible to mortality from fires. This is due to the lower height and size of small trees. Their bark is thinner, and their crowns are lower to the ground, making them more susceptible to lethal heating by flames of a low height. With much of the Basin in a younger state, a large proportion of it could burn severely, with high rates of mortality. These two human activities— creating younger forests by harvesting older trees and suppressing fires that otherwise would have burned off accumulated fuel—have increased the likelihood of severe fire in the Basin."[6]

"Since European settlement of the United States, fire has been altered substantially by anthropogenic factors acting as root causes of the current fire crisis, including.… increases in fuel accumulation through active creation of dense tree plantations and a buildup of shade-tolerant conifers from fire suppression (Agee 1993; Arno & Allison-Bunnell 2002;

[5]Hewlett, J.D and J.D. Helvey. 1970. Effects of forest clear-felling on the storm hydrograph. Wat. Res. Res. 6(1):768-782.

[6] http://www.bof.fire.ca.gov/pdfs/OALEmergencyfinal%206_20_05withOALedits%20.pdf
State Board of Forestry and Fire Protection. "Findings Pursuant to Government Code Section 11346.1(b) in Support of Adoption of Emergency Rules to Implement Lake Tahoe Region Exemption Emergency Rule, 2005." Final Version with OAL Edits 6_20_05. Notice Date: June 13, 2005. p. 8

Odion et al 2004); ...[and] losses of fire-resilient properties at the stand and landscape levels through the removal of large trees and "legacy" stand components and homogenization of fuels across large landscapes (Lindenmayer & Franklin 2002; Brown et al 2004; Such fundamental changes in fire behavior may be amplified by a predicted incremental lengthening of the fire season and increase in fire intensity in the western United States, exacerbated by global warming (McKenzie et al 2004)."[7]

From "Turning Plantations into Healthy, Fire Resistant Forests: Outlook for the Granite Burn:"
Both fire and competitive stress threaten the development of the plantations into mature forest ecosystems….In some areas, the over story density of pole sized trees compounds the hazard by providing a uniform high-density canopy fuel complex that could not only carry crown fire, but would also trap convective heat and increase crown scorch and mortality….
Silviculturalists from both the federal and private side are concerned about how to handle well-growing plantations of this age. Mike Landram, R5 Regional Silviculturist, defined three pressing problems driving a need for action:

- Where the pine plantations have taken, independent of fuel concerns, the stands are overstocked.
- Competition and beetles, in addition to the creation of continuous crown fuels, constitute considerable threats to the development of these plantations. High tree density tends to increase tree damage through increased crown scorch resulting from limiting the escape of the convective heat rising from the surface fire.
- The USDA Forest Service does not have a sufficient Timber Stand Improvement budget to do much about it. Landrum estimates that at least 300,000 acres within Region 5 need treatment. Many of the private plantations are in a similar situation, and contribute to the landscape level problem.[8]

Suggested Adaptation Strategy:
Severely curtail clearcutting and similar harvest practices across California's forested lands to support forest resiliency to periodic fire, protect communities, and reduce the most severe forms of wildfires.

- **Increased insect and pathogen damage to or destruction of forest land**

Insect and pathogen damage is of great concern under climate change conditions. Millions of acres in Canada and the United States are already devastated by these conditions. The Sierra is already also experiencing pine bark beetle. As the White Paper discussed, weaker trees are

[7] "Beyond Smoke and Mirrors: A Synthesis of Fire Policy and Science." Dominick A. Dellasalla, Jack E. Williams, Cindy Deacon Williams, and Jerry F. Franklin. *Conservation Biology.* Volume 18, No. 4, August 2004. p. 977

[8] Sapsis, Dave (Fuel and Fire Behavior Specialist) and Brandow, Clay (Watershed Specialist). "Turning Plantations into Healthy, Fire Resistant Forests: Outlook for the Granite Burn." Fire and Resource Assessment Program; California Department of Forestry and Fire Protection. October 9, 1997.

vulnerable.[9] Certainly, small plantation trees under hotter, drier conditions are likely to be weaker. As well, it is well-accepted that forested areas with a monodominant species as occurs in plantations is most vulnerable to infestations. The strategic answer is obvious:

Suggested Adaptation Strategy:
Severely curtail clearcutting and similar harvest practices across California's forested lands to support forest resiliency to avoid insect and pathogen infestation.

- **Increased temperatures in the forested regions**

Chapter IX of the CAS discusses in the "Urban Forestry" section the benefit of shaded areas from trees as lowering ambient temperature. This commonsense and practical approach to increased temperatures is one that should be transposed to the forested areas. Young clearcut plantations are significantly hotter than surrounding canopied forests. The effect extends to the edges of adjacent forests, causing drying and stressing of nearby trees. Extreme heat of soils in clearcut areas is also detrimental. Again, the strategy response is clear:

Suggested Adaptation Strategy:
Severely curtail clearcutting and similar harvest practices across California's forested lands to support the natural cooling impact of forests and support adequate canopied shade in forested areas.

- **Biomass**

Although biomass to thin forests and produce energy may provide important benefits when properly used, it may also result in extremely negative "unintended consequences" if a "gold rush" mentality is created and it is not approached prudently. Biomass activities may not be carbon "neutral" as claimed in this document. Care must be exercised to assure that biomass activities produce positive effects.

Suggested Adaptation Strategy:
Conduct rigorous unbiased research and studies of biomassing and its long-term effects. Adopt prudent standards for projects supported by the State for climate adaptation.

Thank you for your serious consideration of our comments. We look forward to seeing the final version of the CAS.

Feel free to notify either of us if you have further questions.

Sincerely,

Addie Jacobson

[9] "Weak trees are less able to resist pathogen infections and insect attacks, regardless of whether the pests are native or recently arrived." 22. section 4.3.

For Ebbetts Pass Forest Watch

Susan A. Robinson
For Ebbetts Pass Forest Watch