

## **Forest Carbon Plan – Science Review**

At the request of FCAT a group of researchers were asked to review the Forest Carbon Plan. The following is a summary of comments from science review team. Common themes among reviewers included: forest health, increased vulnerability of forests to wildfire and pest outbreaks, influence of stand density on forest health, need for monitoring, importance of headwater forests, water as a primary co-benefit, need for a carbon accounting framework that includes baseline conditions.

### Summary of Science Review Comments

The FCP is clear in portraying the current condition of California's forests as highly vulnerable to wildfire and insect infestation, which places years of sequestered carbon at risk to be released to the atmosphere with resulting negative climate effects. Such assertions are well beyond hypothesis; they are evidenced by the sheer scale of arrested and reversed sequestration resulting from massive wildfires and beetle infestation in recent years.

The relationship between the density of forest stocking and forest resilience/health is a well-understood component forest management.

Managing forests for long-term carbon storage will require that stocking levels be managed at levels where the forested stands are more resilient to wildfire and infestations.

In managing to reduce risks of catastrophic loss of forest carbon due to wildfire and infestation, forest carbon stocks may need to be reduced, at least in the near term, to achieve more stable forest carbon stocks over the long term.

The FCP does not clearly define how management activities will be quantified in terms of greenhouse gas (GHG) terms. A GHG accounting framework is needed to move beyond a description of the threats to long term carbon storage and proposed mitigation actions to a quantification of the results achieved by the defined courses of action.

a GHG accounting framework is requisite to understanding the potential emissions associated with the baseline case. It is also needed to estimate the emissions reductions associated with the possible interventions.

Researchers are documenting the death of large trees both in California and internationally; there could be an optimum under future climates of mid to large size trees, and that there might be a faster turnover of forests than what we are used to seeing.

Transition from mature forest to shrub without active reforestation a long-term, if not semi-permanent, reduction in forest carbon.

Meadow restoration should be prioritized on the basis of recharge projected to have the least future change.

Mountain meadows – Projections of future hydrology (primarily recharge that supports meadows) should be used to prioritize restoration efforts. Some of these meadows will not be sustainable regardless of restoration efforts in the face of warming and less snow.

Regional prioritization should consider - forests projected to be at risk due to climatically driven landscape stress. Particularly those at snow line in regions with shallow soils and impermeable bedrock.

Monitoring for progress and healthy forests needs to track long term changes in headwater streamflows. Wherever restoration or thinning has occurred, should, over time, increase in seasonal baseflows, indicating a less arid and stressed environment.

Monitoring - remote sensing should be used to demonstrate changes in evapotranspiration that is indicative of the appropriate water balance. You can have the same carbon stock with lots of smaller trees that use up all the soil water versus fewer larger trees that sequester C and use less water.

Monitoring – Need to support research on fog to help anticipate future stresses on redwoods, or if they could be expanded.

Monitoring or headwater forests for water supply and overall forest health; use of remote sensing to track changes in greenness.

Need to support research that identifies wildfire risk in real-time and is spatially discrete.

Include results from paired watershed studies that demonstrate influence of forest management on water quantity.

Promote education of wildfire risks in WUI.

considering the synergistic effects of fire suppression, widespread logging operations with more recent warming promoting forest densification, leading to greater competition for water in the last 6 years promoting tree stress leading to tree death due to lack of suitable water, disease and pest outbreaks.

With the shifting bioclimatic envelop required to support forests the state is actually losing this vegetation type.

Define what is meant by the term resiliency.

Note which pests affect which trees.

Concern over loss of Sugar Pine in recent years.

Constraints – On USFS lands the cost of putting up a timber sale: planning, NEPA, layout, etc. costs the USFS more than the revenue generated from the sale.