Urgent action is needed in the Sierra Nevada to avoid devastating impacts on California's environment and economy.

Photo courtesy of the U. S. Forest Service

SIERRA NEVADA CONSERVANCY

The State of the Sierra Nevada's Forests

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SIERRA FORESTS AND WATERSHEDS IN PERIL

This report is intended to inform policy makers, interested parties and the public of the dire current state of many of the forests of the Sierra Nevada, the critical benefits that are at risk, and the key policy and investment issues that must be urgently addressed if these forests are to be returned to a healthy, resilient state. This report may be updated from time to time based on new information or changed conditions, and it will be followed by a Sierra Nevada Forest and Community Action Plan, which the Sierra Nevada Conservancy (SNC) will develop in coordination with a wide array of concerned parties.

EXECUTIVE SUMMARY

There is a growing understanding that many Sierra Nevada forests are not healthy and that overgrown forests are susceptible to disease and intense wildfire. There is likewise broad consensus that science-based ecological restoration of our Sierra Nevada forests must be dramatically increased in order stem the tide of large, uncharacteristic wildfires. These wildfires threaten the very lifeblood of California -- the forested watersheds of the Sierra Nevada.

The State of Sierra Nevada's Forests Report identifies the wide range of benefits provided by our Sierra Nevada forests and watersheds that are at risk:

- The Region is the origin of 60% of California's developed water supply.
- These watersheds are the primary source of fresh water flowing into the Sacramento-San Joaquin Delta, California's water "hub."
- The forests of the Sierra Nevada store massive amounts of carbon, assisting in the state's efforts to combat climate change.
- The forests and watersheds provide crucial habitat to hundreds of species.
- The area provides world-class recreational opportunities enjoyed by millions from around the world.
- The Region is a major producer of wood products and hydro-electric power.

Key findings of this report include the following:

- ✓ The United States Forest Service Region 5 (USFS) estimates that between six and nine million acres of lands for which they have management responsibility are in need of restoration. In order to return these lands to ecological health, a two to three times increase in the pace and scale of ecological restoration must occur.
- ✓ The amount of area consumed by fire in the Sierra Nevada continues to increase. More land has burned in the first four-and-a-half-years of this decade than seven entire decades in the past.

- ✓ Between 1984 and 2010, there was a significant increase in the number of acres within a forest fire burning at high-intensity, from an average of 20% in mid-1980s to over 30% by 2010.
- ✓ High-intensity burn areas can experience runoff and erosion rates five to ten times greater than low- or moderate-intensity burn areas. The sediment that is carried in the runoff not only degrades water quality and damages infrastructure, it fills reservoirs, reducing storage capacity.
- ✓ The 2013 Rim Fire, the largest fire in the recorded history of the Sierra Nevada, burned 257,000 acres, almost 40% of which was at high intensity. Estimates are that that fire produced the same amount of greenhouse gas emissions that 2.3 million vehicles produce in a year.

Many Sierra Nevada forests are unhealthy and susceptible to disease and intense fire.

This report identifies the following impediments to increasing pace and scale, and potential solutions to these challenges:

- Funding currently available is inadequate in relation to the need for forest restoration, especially for critical projects that don't "pay for themselves" with removed material.
- Improving the efficiency of lengthy and complex planning processes and encouraging efforts to address larger landscape restoration projects in a collaborative manner must occur.
- In order to adequately handle the pace and scale of needed restoration, wood and biomass processing infrastructure in the Sierra Nevada must be enhanced.
- Acknowledging the important ecological role of fire and increasing the use of prescribed and managed fire as a forest restoration tool is necessary.

Failure to understand the urgency of the situation in the Sierra Nevada will have devastating impacts on California's environment and economy. The potential for more megafires like the Rim Fire is high and the trend of larger, more intense fires is clear, with the current drought and ongoing temperature increases making the situation all the more urgent.

This report provides a framework through which this issue can be addressed. It will require a renewed commitment at the state, federal and local levels. The alternative of the status quo is simply not acceptable.

Smoke plume from the 2014 King Fire in El Dorado County. Photo courtesy of Tim Webster.

OVERVIEW

The Sierra Nevada Region is an area of great significance to the State of California. Comprising about 25% of California's total land area, the Region is California's principal watershed. Other key contributions include:

- The Region is the origin of 60% of California's developed water supply.
- These watersheds are the primary source of fresh water flowing into the Sacramento-San Joaquin Delta, California's water "hub."
- The forests of the Sierra Nevada store massive amounts of carbon, assisting in the state's efforts to combat climate change.
- The forests and watersheds provide crucial habitat to hundreds of species.
- The area provides world-class recreational opportunities enjoyed annually by millions from around the world.
- The Region is a major producer of wood products[1] and hydro-electric power.[2]

Giant Sequoias are the largest living things on Earth and only grow in the Sierra Nevada.

As California grapples with issues such as meeting the State's water supply needs, climate change, mandates for decreasing greenhouse gas emissions, and meeting ecosystem restoration and water reliability goals in the Delta, ensuring that the Sierra is able to continue to provide these benefits becomes even more critically important.

The 2013 Rim Fire burned approximately 400 square miles, making it the largest fire in the recorded history of the Sierra Nevada and third largest in the state.

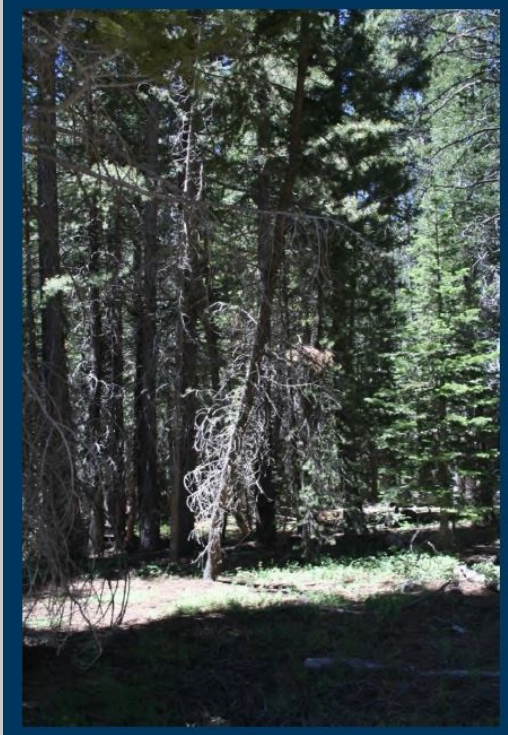
Unfortunately, the declining health of many of the Sierra's forests and watersheds is putting these benefits at great risk because it has created a landscape that is highly susceptible to uncharacteristically large and damaging wildfires. Not only do extreme fire events affect everyone in California who relies on the water and other services the Region provides, they also hit our pocketbooks as we must often spend large sums to fight them. In 2008, the state spent over $1 billion and the U.S. Forest Service spent approximately $700 million fighting fires in CA.[3] Without factoring in structure damage and tourism losses, the suppression costs and damage to San Francisco Public Utility Commission infrastructure from the Rim Fire topped $150 million.

In recent years, California has seen a steady increase in the amount of forests lost to large damaging fires, such as the 2013 Rim Fire. The potential for even more of these "megafires" is increasing in the Sierra Nevada Region. Aggressive fire suppression, conflict over forest management and a lack of financial resources over the past decades have led to a dangerous situation in many parts of the Sierra – significant areas of overgrown, diseased, dry and threatened forests.

The U.S. Forest Service manages 6.3 million acres in the Sierra Nevada, which is approximately 60% of the Sierra Nevada's total forested land area. To address the unhealthy state of much of the forest land under their management, in March 2011 USFS Region 5 released its Leadership Intent for Ecological Restoration,[4] which is a call to action to increase the pace and scale of forest restoration in this Region. The Regional Forester estimates the need to be 500,000 acres annually, which is at least two to three times greater than current efforts. In fact, the USFS Region 5 estimates that between six to nine million acres of the land they are responsible

"The United States Forest Service Region 5 estimates that between six and nine million acres of the land they are responsible for managing in California are in need of restoration."

Forest restoration work removes excess brush and trees, returning the forests to a more healthy and resilient state.



Before Photo Credit: The Nature Conservancy After

for managing in California are in need of restoration. While there are no Sierra Nevada-specific numbers available, a significant portion of this land is within the Region.

The unnatural conditions that currently exist mean that many fires provide fewer ecological benefits, and more ecological damage than historic fires. Additionally, the high cost of fighting fires has often resulted in reducing funds available for critically needed restoration efforts (at least on federal lands).

Today, the body of evidence relating to the positive impacts of forest restoration treatments in reducing fire size and intensity continues to grow. Often, treated areas provide an opportunity for firefighters to make a stand, as fire behavior changes, with fires spreading more slowly and burning with less intensity in treated areas. While a detailed review of the effects of treated areas on the Rim Fire is forthcoming, initial observations suggest that communities benefited and fire intensity decreased as a result of forest treatments. (Of the 257,000 acres the Rim Fire burned, 36,000 acres had been recently treated or had previously managed fire on them). For example, at the Hodgdon Meadow Residential Area in Yosemite National Park, prior treatments allowed firefighters to successfully protect all facilities in the area, and the treated area itself sustained little to no damage from the fire.[5]

Unfortunately, despite best intentions and a significant amount of activity, very little progress has been made towards achieving the goal of a significant increase in the pace and scale of restoration.

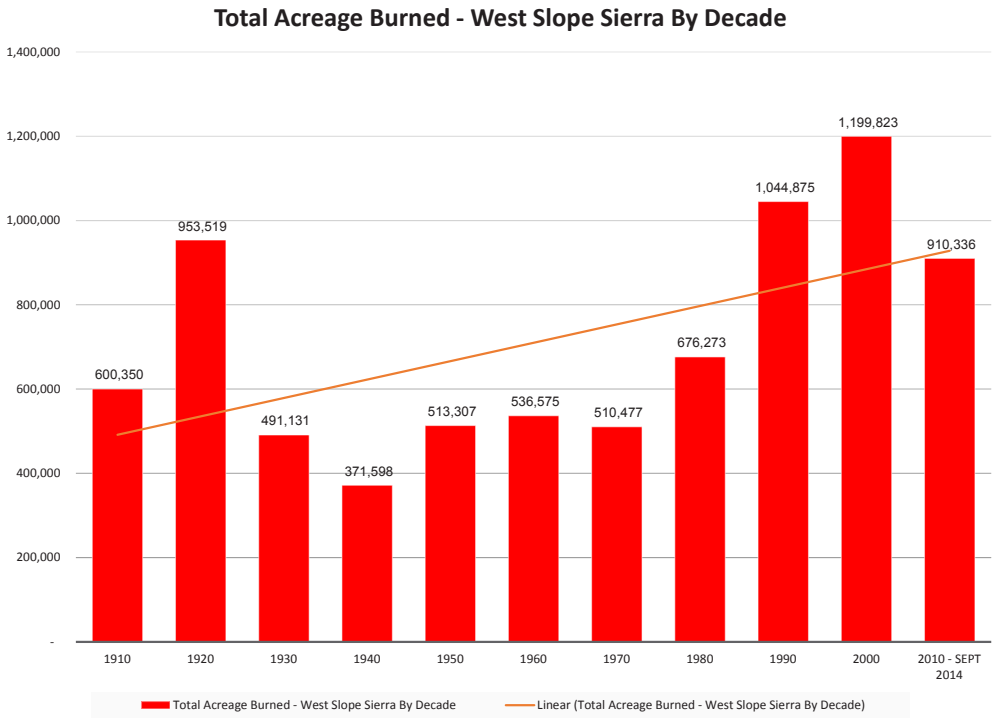
Wildfire Threat is Increasing

It is important to understand that fire is a natural part of the Sierra ecosystem. Historically, wildfires in the Sierra were predominately low-intensity and removed excess fuel, thinned vegetation, and reduced competition for nutrients and water, resulting in healthy forests resilient against insects, disease and fire.

> ***"Wildfires in California have become larger and more extreme over the last two decades and many predict that this trend will continue to increase unless the pace and scale of forest restoration dramatically increases."***

Unfortunately, a century of fire suppression and conflict over forest management has altered much of the landscape. As a result, wildfires in California have become larger and more extreme over the last two decades and many predict that this trend will continue to increase unless in the pace and scale of forest restoration dramatically increases. Simply put, there is too much fuel in many of today's forests for them to burn in a safe and ecologically beneficial manner.

- The amount of acreage burned is increasing over time. As shown in the chart below, the total acreage burned on the west slope of the Sierra has trended upward over the last century. More acres burned in the two decades of 1990 and 2000 than any other previously recorded decade. More land has burned in the first four-and-a-half-years of this decade than seven entire decades in the past.



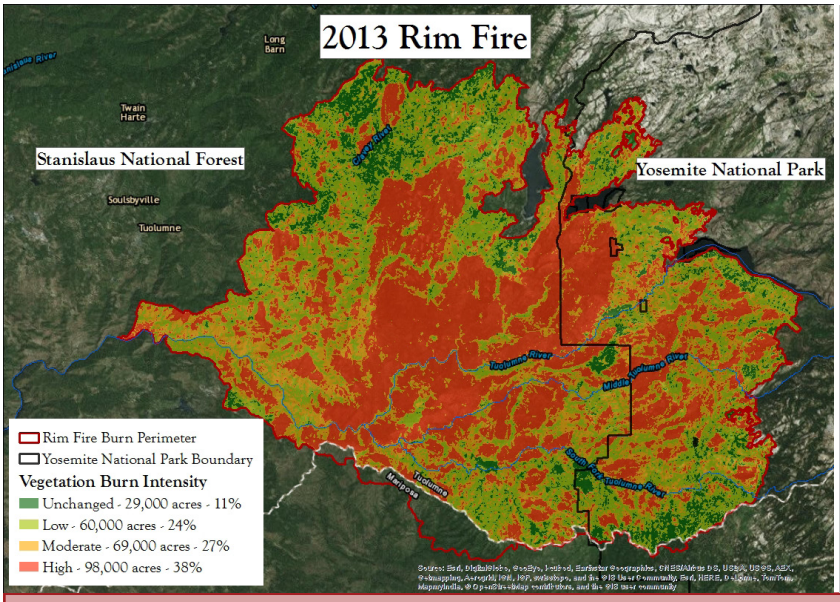
> ***The total acreage burned on the west slope of the Sierra has trended upward over the last century - the average size of the area burned in each decade has risen by almost 300,000 acres from 1910 to today.***

- The number of large fires is also increasing: the average number of 900+ acre fires each year in the Sierra Nevada area has grown from three to seven since 1950.[6] In 2013, the Sierra Nevada experienced its largest fire in recorded history – the Rim Fire at more than 257,000 acres.
- Between 1984 and 2010, there was a significant increase in the number of acres within a forest fire burning at high-intensity, from an average of 20% in mid-1980s to over 30% by 2010,[7 8] and the trend is continuing upward. The Rim Fire burned at nearly 40% high-intensity.
- The shrub regeneration that occurs after a high-intensity fire leads to forest conditions which are likely to burn again at high-intensity.[9 10 11]

The increase in size and severity of fires in the Sierra has added a new word to our lexicon: megafire. Megafires, like the Rim Fire, are expensive both economically as well as ecologically. Some of the direct impacts of the Rim Fire have included:

- $127 million for fire suppression
- Greenhouse gas emissions equal to the annual emissions of 2.3 million vehicles
- 3/4 of the area's known great gray owl nests, and 1/4 of the areas where spotted owls and goshawks roost and nest destroyed
- $8.5 million for emergency road, trail, and watershed stabilization efforts
- $35 million for the San Francisco Public Utility Commission to buy alternative energy due to damage to hydroelectric powerhouses and for repairs to its grid
- Millions in losses to the ranching community as a result of destruction of grazing lands, killed livestock, and damaged infrastructure
- An estimated $2.75 million loss in revenue from visitor lodging in Tuolumne County

The effects of climate change will only make matters worse. As increasing temperatures bring about drier conditions, the result will be longer fire seasons and increased risk of pest and disease infestation in the forests. The more we improve the health of our forests, the better able they will be to withstand these impacts.



There has been an increase in the number of acres that burn at high-intensity in the Sierra. The Rim Fire burned at nearly 40% high-intensity.

California's Water Supply at Risk

As noted earlier, the forested watersheds of the Sierra Nevada are the origin of more than 60% of the state's developed water supply. Water is first stored in the snowpack and later captured in reservoirs that provide water for domestic, agricultural and environmental use.

Large intense fires can have significant effects on this system. For example, due to large increases in runoff and the lack of vegetation to stabilize soil, high-intensity burn areas can experience runoff and erosion rates five to ten times greater than low or moderate-intensity burn areas.[12] The resulting sediment enters nearby creeks and rivers, degrading water quality and adversely affecting aquatic habitat. Plumes of sediment entering reservoirs after post-fire rain events can impact reservoir operations until the sediment settles out to the bottom, where it reduces water storage. After the Bagley Fire of 2012, which burned just over 46,000 acres of the Shasta-Trinity National Forest, significant erosion, totaling approximately 110,000 cubic meters of sediment (enough to fill 44 Olympic-sized swimming pools), entered the watershed surrounding Lake Shasta.

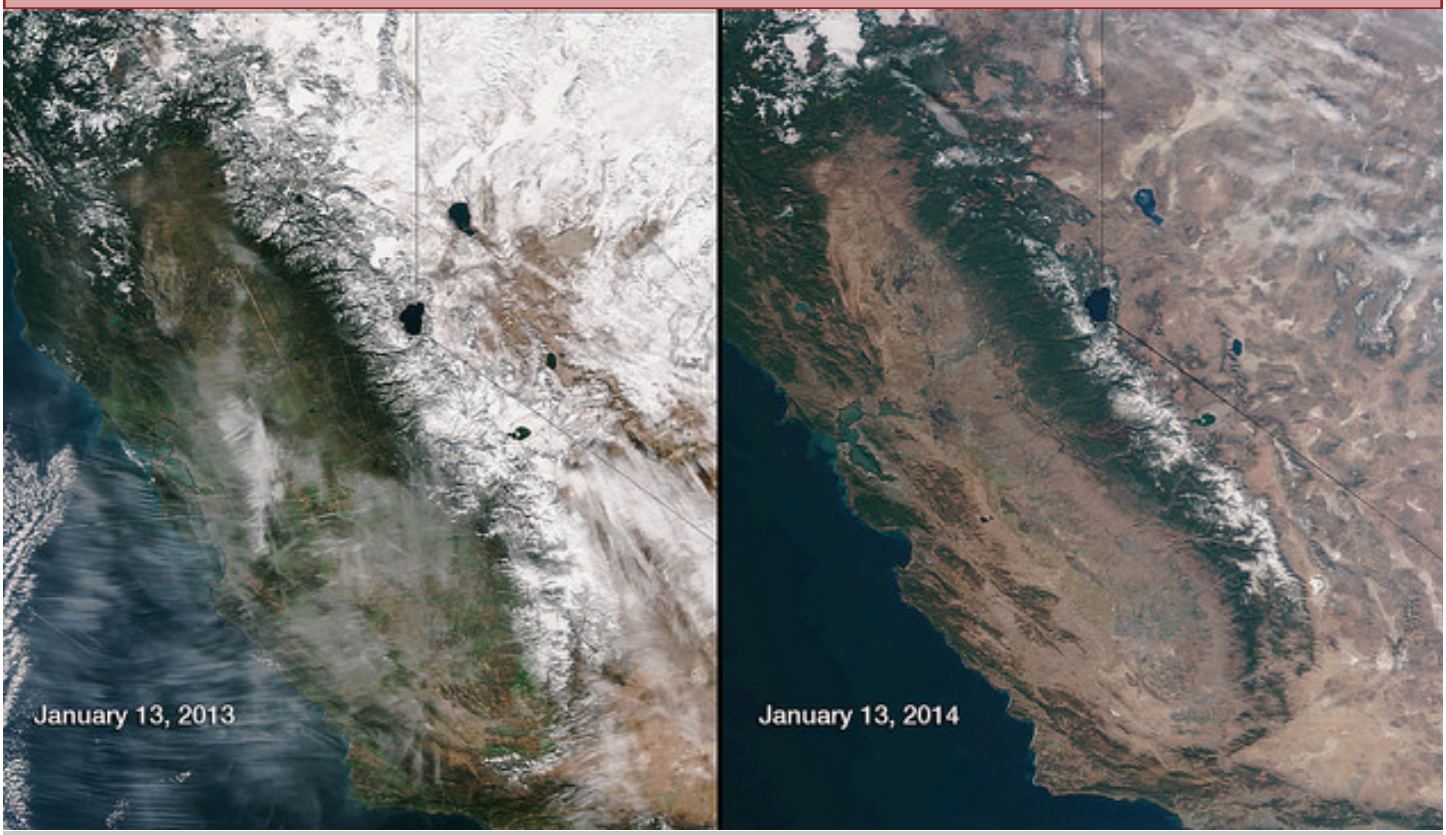
A large landslide of 1997 covered Highway 50 and dammed the South Fork of the American River after the Cleveland Fire.

Photo courtesy of the California Department of Transportation

Better forest management relates to water supply in another important way. Up to 60% of snowfall may not reach the ground when trees are too close together.[13] Snow left in the tree canopy is at risk of being lost back to the atmosphere instead of adding to the snowpack. Depending on the weather conditions, between 15% and 60% of the snow caught in trees can be lost,[14] making it unavailable to downstream water uses. That said, adequate forest canopy cover remains important because snowpack in clearings melts earlier in the year due to direct exposure to sunlight and higher winds, compared to areas with a forest canopy.[15]

"High intensity fires can be followed by severe erosion that destroys infrastructure, impacts water quality, and decreases storage capacity in downstream reservoirs."

Therefore, if a high-intensity wildfire rips through an overgrown forested area and kills everything in its path, the snowpack in that area can melt too early in the year to be useful to California's water needs. Forest management activities could lead to an increase in the snowpack, both by reducing the risk of wildfire and creating right-sized gaps in the canopy so that snow can fall to the ground but still receive enough shade to



Managing forests in a way that may increase snowpack becomes even more important in the face of climate change. At 33% of average, the snowpack of the drought year 2014 could become typical in coming decades if the decline is at the worse end of the predicted changes.

Image credit: NASA/LANCE/EOSDIS MODIS Rapid Response Team

be protected.[16] As with other benefits, management must be carefully integrated to address multiple ecological needs.

Increasing snowpack and available water storage will become even more important in the face of climate change as the amount of snowfall declines. The Sierra snowpack today is estimated, on average, to be 10% smaller than it was 100 years ago,[17] and is predicted to decline by 30 to 70% by the end of the century. A 50% reduction in snowpack is equal to the loss of 7.5 million acre-feet of water, or enough for 14 million families a year. In addition, scientists predict more rain and less snow in some areas, which will shift peak runoff from late spring to early spring or even winter. Earlier snowmelt combined with the larger rain events expected as a part of climate change could result in flooding and increased strain on levees, as well as an inability to capture the flows for later use. Lower water availability in late summer will make it more difficult to manage saltwater surge into the Delta, putting drinking and agricultural water supplies at risk.[18]

Increased Air Pollution and Greenhouse Gas Emission

As wildfires burn, they release carbon dioxide, nitrogen oxide, volatile organic compounds, and particulate matter into the atmosphere.[19] The effects on public health range from eye and respiratory tract irritation to more serious disorders, including reduced lung function, bronchitis, exacerbation of asthma and other pre-existing respiratory and cardiovascular diseases, pulmonary inflammation, a compromised immune system, and even premature death.[20]

Initial estimates indicate that the Rim Fire released 11 million metric tons of greenhouse gasses (GHGs), or roughly equivalent to the annual GHG emissions from 2.3 million cars.

Photo courtesy of the Christian Science Monitor

The Region stores 420 million tons of carbon within its productive forests,[21] the equivalent to the annual emissions of over 400 coal-fired powerplants. Each year, when the fire season is not too extreme, these forests sequester enough additional carbon to offset the annual carbon dioxide emissions of almost 2.7 million passenger cars (or 10% of all registered automobiles in California in 2013).

Initial estimates indicate that the Rim Fire released 11 million metric tons of greenhouse gases (GHGs). Based on the U.S. EPA's web site, that's roughly equivalent to the annual GHG emissions from 2.3 million cars. Computer modeling of the Sierra has found that fuel treatments that alter the size and intensity of wildfires could reduce the amount of carbon emitted by fires from 36 to 85%. In addition, removing smaller, overgrown biomass from stands reduces the water stress for the remaining trees, enabling them to thrive. This is important, because, for many species, larger trees accumulate carbon faster than smaller trees.[22]

"The forests of the Sierra Nevada Region store 420 million tons of carbon, the equivalent to the annual emissions of over 400 coal-fired powerplants."

CURRENT EFFORTS

There are a number of important efforts occurring in an attempt to address the current situation. Building upon and enhancing these efforts provides a sound foundation for increasing the pace and scale of forest restoration.

The Sierra Nevada Forest and Community Initiative

The intensity of the issues facing the Sierra has led to unprecedented collaboration among groups and stakeholders, many who previously found themselves in conflict. In general, there is consensus that many federally managed forests in the Region are dangerously overgrown and that action needs to be taken now to avert crippling problems in the future. A broad array of interests are actively working with the USFS and industry to develop science-based approaches to remove the excessive growth and turn the resulting wood and biomass into products that have economic value.

The dire state of Sierra forests is bringing together stakeholders who previously were in conflict with one another.

Participants at the Rim Fire Restoration EIS meeting, co-facilitated by the SNC and USFS.

At the state level, the Sierra Nevada Conservancy is actively working to build on this consensus and is supporting efforts to increase the pace and scale of restoration through the Sierra Nevada Forest and Community Initiative (SNFCI). Established in 2011, the SNFCI Regional Coordinating Council includes a wide range of diverse perspectives, including local government, environmental and conservation organizations, the wood products industry, fire safe councils, and public land management agencies.

According to the USFS, "Only an environmental restoration program of unprecedented scale can alter the direction of current trends."

The work of the Coordinating Council supports and informs local collaborative efforts as they convene, identify issues, develop projects and secure funds to implement projects and processes in local areas in support of Initiative goals. Generally speaking, the Coordinating Council focuses on policy, investment, and science and research issues that affect the success of the SNFCI.

Among other activities, the Coordinating Council has been actively working with USFS Region 5 leadership to help them turn the vision of the Leadership Intent into tangible implementation measures, including identifying and coming together to address policy-level barriers that must be overcome for us to reach our goals. This level of support for USFS at the regional and statewide levels is needed, given that, according to the USFS, "Only an environmental restoration program of unprecedented scale can alter the direction of current trends."

Several communities throughout the Sierra Nevada have launched efforts to develop additional biomass-to-energy facilities, but more needs to be done to address the ongoing need in the Region.

At the local level, the Sierra Nevada Region can boast significant collaborative efforts of highly diverse and productive stakeholders. This culture of collaboration has yielded a number of successes at the local level, although much more needs to be done across the Region. Significant efforts include the following:

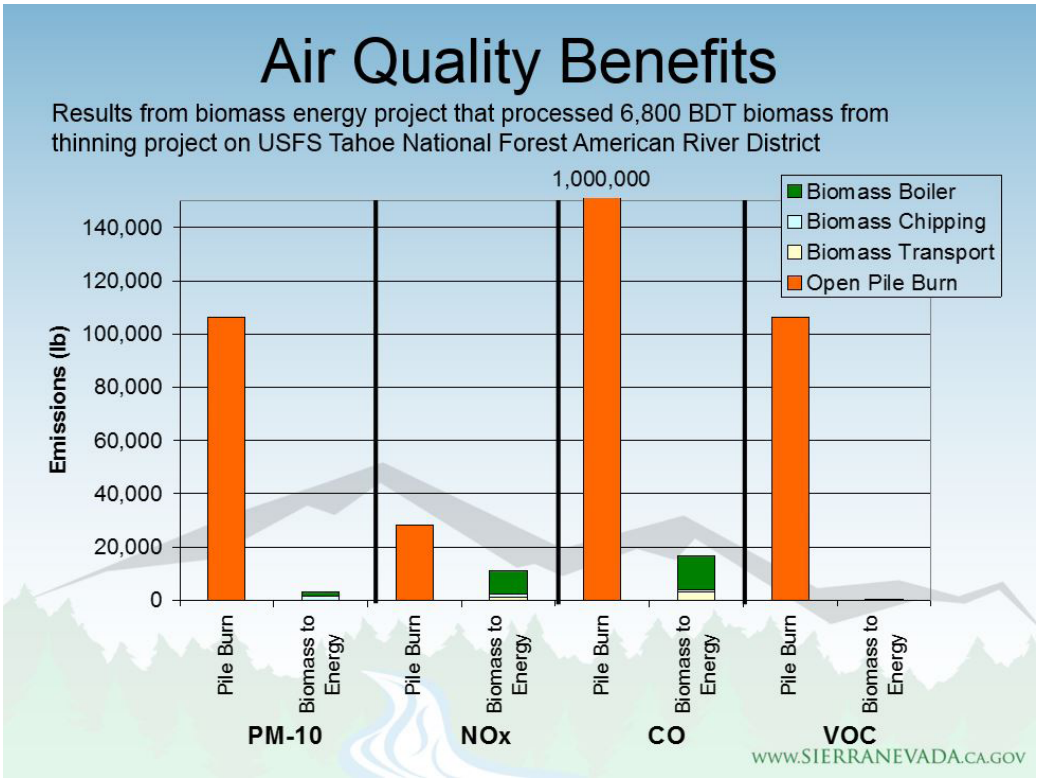
- Three Collaborative Forest Landscape Restoration Program (CFLRP) Funding Awards went to projects in the Sierra Nevada: the Dinky Creek Collaborative in 2010 ($829,000), the Amador-Calaveras Collaborative Cornerstone Project ($730,000), and the Burney Hat Creek Basins Project ($605,000) in 2012.
- The Cabin Creek biomass facility in eastern Placer County is nearing commencement of construction activities. The North Fork Biomass Project in eastern Madera County cleared their last planning hurdles in April 2014 with the approval of a Conditional Use Permit that supports the construction of a state-of-the-art bioenergy facility. The SNC is currently tracking numerous other biomass utilization efforts in different stages of development throughout the Region.
- Significant funding was secured for Biomass Utilization Projects in June 2013 from the USFS Woody Biomass Utilization Grant Program, including grants to the Sierra Institute for Community and Environment in Plumas County ($250,000), and Calaveras Healthy Impact Products Solution in Wilseyville ($184,405).
- A highly collaborative expedited National Environmental Policy Act process was developed for the Rim Fire Restoration Salvage Environmental Impact Study in the spring of 2014.

Biomass Utilization

Although there is a clear need to thin smaller trees and other biomass from the forests to improve ecological function and reduce fire risk, these projects are often not feasible from a financial perspective because there is limited market value for the biomass that is removed. Converting biomass to clean, renewable energy and value-added wood products not only creates local economic development opportunities, but also generates revenue that can help fund needed forest restoration projects.

Converting biomass from forest restoration efforts into energy rather than piling and burning it reduces emissions by over 30%. It also generates revenue that can be used to offset costs of the restoration work.

Recent state planning efforts and policies are increasing support for the use of biomass to create renewable energy while reducing the risk of wildfire. California's 2012 Bioenergy Action Plan includes a broad array of action items to promote forest bioenergy. The SNC is identified as one of the key responsible agencies for these action items, particularly in assisting forested communities to develop small scale forest bioenergy facilities.



This chart from a study completed in Placer County compares air quality impacts between pile burning and converting biomass to energy in a facility.

Shortly following the adoption of the Bioenergy Action Plan, legislation requiring large utilities to purchase bioenergy was signed into law. Senate Bill 1122 (Rubio, 2012)[23] requires the state's three large investor-owned utilities to collectively purchase 50 Megawatts (MW) of energy from new facilities sized at three MW or less using byproduct of sustainable forest management. This would dispose of forest waste from roughly 31,000 acres of forest restoration annually. The California Public Utilities Commission is currently considering implementation orders for

this legislation and at this time it is unclear how helpful this may be in promoting smaller scale biomass energy facilities. Even with the potential assistance provided by SB 1122, additional efforts are needed to promote increased biomass utilization.

An estimated 125,000 acres of 32 million forested acres statewide (0.4%) are currently managed each year with mechanical treatments that remove biomass. On 75,000 of those acres, the removed biomass is disposed of through piling and open burning. This available biomass could sustain over 100 MW of renewable electricity generation if it were brought to a bioenergy facility. Such a diversion of pile and burn material to produce renewable energy reduces GHG emissions by over 30%. As the chart on the previous page illustrates, the emission reductions from using modern technology to convert the biomass into energy rather than piling and burning the material are substantial. The analysis takes into account all emissions generated, including transporation of the biomass to a facility.

As mentioned earlier, it is estimated that about 500,000 acres of annual treatments on USFS lands would restore the health of the forests and help keep pace with future forest growth. Diverting the biomass generated by these forest treatments from pile and burn material to bioenergy facilities could reduce GHG emissions by 3.15 million metric tons annually. This would add up to 18.37 million metric tons of GHGs over 10 years, which is equivalent to eliminating 3.9 million cars from the road.

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Integrated Regional Water Management (IRWM)

The Department of Water Resources (DWR) developed the IRWM program to promote regional collaboration in managing the many aspects of water-related issues such as economic vitality, water supply reliability, storm water and flood management, water quality improvements, and ecosystem protection and enhancement. IRWM crosses jurisdictional and political boundaries and involves multiple agencies, stakeholders, individuals and groups. Ultimately, IRWM establishes a prioritization process intended to determine which projects best meet regional needs and to encourage the development of those projects.

IRWM groups have formed to cover virtually all of the Sierra Nevada. They have developed prioritized lists of projects needing funding within their watersheds and are seeking funding for them

from DWR and other sources. Because many of these groups recognize the linkages between forest health and water quality and supply as well as other environmental benefits, some of them are seeking funding for projects to implement forest management, and watershed protection and restoration projects. Sierra IRWM applications have ranged from forest ecosystem support projects such as fuels reduction and meadow, creek and stream restorations, to removal of invasive species, and water-supply and infrastructure projects. Unfortunately, very few forest-related IRWM projects have been funded to date. Nonetheless, the IRWM funding process provides a significant and relevant opportunity for investment in forested watersheds.

The California Water Action Plan

At the end of 2013, the Secretaries for Natural Resources, Environmental Protection, and Food and Agriculture came together, under the Governor's direction, to develop The California Water Action Plan. At a statewide scale, the plan identifies "key actions for the next one to five years that address urgent needs and provide the foundation for sustainable management of California's water resources."

The importance of the Sierra to the state's water resources is clearly recognized in the California Water Action Plan.

The importance of the Sierra to the state's water resources is clearly recognized in the plan, which identifies a set of activities to reduce the significant risks posed to the water resources flowing from the Sierra and other watersheds in the state. Specifically, it calls for:

- Restoration of forest health through ecologically sound forest management
- Protection and restoration of degraded stream and meadow ecosystems to assist in natural water management and improved habitat
- Support and expansion of funding for protecting strategically important lands within watersheds to ensure that conversion of these lands does not have a negative impact on our water resources

California Forest Carbon Plan

In 2006, the State of California passed AB32, the California Global Warming Solutions Act. This state law mandates that California reduce greenhouse gas (GHG) emissions to 1990 levels by 2020 and acknowledges that further GHG reductions will be required in the future.

Healthy Sierra Nevada forests have an important role to play in helping the state achieve AB 32 goals. Forests are included in the Natural and Working lands section of the Scoping Plan Update which calls for the development of a Forest Carbon Plan. A Forest Carbon Action Team, lead by CAL FIRE, is actively working to develop GHG emissions targets, strategies, and investment options that enhance forest capacity to sequester carbon. This is important because forest management is a factor in determining whether or not our future forests will sequester or release carbon.

Ongoing Research

A significant amount of research has been done on the issues associated with unhealthy forests, and there is substantial scientific information available that supports the need for restoration and the benefits associated with such activity. Additional research is also currently underway which will help us to further understand and quantify the dynamics of the resources within the Region and how specific activities that improve the health of Sierra forests and watersheds impact the resource values they provide. Specific research is aimed at learning more about:

Photo of Rollins Reservoir, Colfax, CA

Research is currently underway that will help quantify the amount of available storage in our key reservoirs, the rate at which they are filling with sediment, and actions that can be taken to minimize storage loss through restoring forests and watershed health.

- How management techniques that improve the ecological resilience of forests can enhance and protect the snowpack, thereby increasing water supply reliability
- The amount of current available storage in our key reservoirs, the rate at which they are filling with sediment, and actions we can take to minimize storage loss though restoring forest and watershed health
- The impact of forest health treatments on endangered species
- Additional quantification of the carbon benefits of forest health treatments, and how those benefits could be multiplied through the appropriate use of biomass
- The benefits to water storage and timing of water release that results from restoring degraded meadows
- The water use of overgrown forests and the potential increase in water yield that will result from forest thinning treatments
- More comprehensive quantification of the costs of extreme fire events, including impacts on health, tourism, insurance, and utilities

ONGOING CHALLENGES

Though there are many positive efforts underway in the Sierra Nevada, the need for restoration is so great that our progress towards restoring balance and health to our forests, communities and economies is inadequate. Major impediments to increasing pace and scale exist, and must be addressed to the appropriate extent if we expect to make meaningful progress toward our goals. There are a multitude of challenges, but we have identified the following five as the most immediate and limiting:

Insufficient funding and resources

The amount of funding available for forest restoration is inadequate to meet the need of significantly increasing the pace and scale of forest restoration. Given the nature of the National Forest lands, restoration efforts must include mechanical treatment as well as the increased use of prescribed and managed fire. By strategically conducting mechanical fuels reduction efforts combined with the careful use of fire, costs associated with fire suppression can be reduced significantly over time.

While many projects can "pay for themselves" through the sale of wood products (including biomass), this is not feasible for many other crucially important projects, so funding is needed to complete them. Not only is the level of funding inadequate to meet the need, federal funding policies often further limit resources for restoration projects. For example, policies related to funding fire suppression often result in funds that would otherwise be available for restoration being "swept" to pay for suppression. The inability to fund restoration projects ultimately leads to higher suppression costs, and the cycle is repeated.

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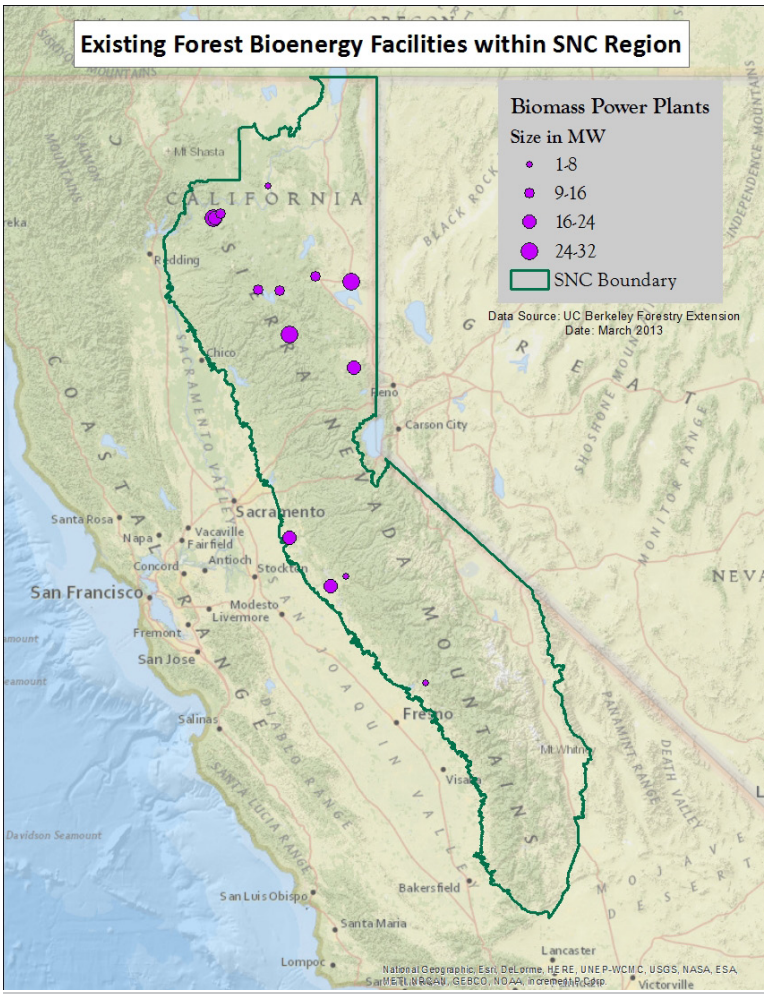
Increasing the harvest of timber in an ecologically sound manner can offset a portion of the need for additional, dedicated funding for restoration efforts. While this subject continues to garner some controversy, progress had been made in an approach to managing federal lands, including timber harvesting, which has support from many environmental groups. There is broad consensus among a wide range of stakeholders for General Technical Report 220 (and associated information). This guidance document proposes an ecosystem management strategy for Sierran mixed-conifer forests. This report was published by the USFS Pacific Southwest Region scientists, and the management recommendations in it emphasize the ecological role of fire, changing climate conditions, sensitive wildlife habitat, and the importance of a varied forest structure.



There isn't enough biomass processing infrastructure to meet the need.

Lack of wood/biomass processing infrastructure

The decline in timber output from public lands has also affected the timber industry that was historically a central component of the Sierra Nevada economy, leading to mill closings, lost jobs, and decreasing potential financial capital. Though there is now a focus on re-establishing a smaller-scale, highly-distributed wood processing industry to add value to forest treatment by-products and support local economic development. The existing capacity is not adequate to handle the pace and scale of restoration needed in the Sierra Nevada. For instance, last summer, the Honey Lake biomass power plant had a full yard and stopped all chip deliveries for the year on August 1, 2013, at a time when forest restoration was in full swing and biomass outlets were still very much in demand.[24] This resulted in a number of proposed projects not being completed.

The increase of large fires, such as the Rim Fire, puts additional pressure on the system as the limited capacity for wood processing in the Sierra Nevada becomes focused on processing salvage-logged timber. This throws into question the fate of the desperately needed restoration treatments slated for unburned but overgrown areas if there is nowhere for this wood to go for processing.

Lengthy/complex planning processes (NEPA, CEQA, and ESA)

Projects on federally managed lands are subject to review under the National Environmental Policy Act (NEPA) while projects on other lands in California are subject to the California Environmental Quality Act (CEQA). The complexity of completing these processes, and the length of time necessary to complete them, are usually dependent on the scope and location of the project. They may also be impacted if the project is in a sensitive location, impacts sensitive species, or other factors. Completion of the environmental assessment process under NEPA for complex fuel reduction projects can take up to two years or more. Completion of the environmental assessment process under

CEQA for complex projects can take up to one year or more. Both processes can also be costly, requiring large amounts of staff time and/or contracts with private consulting firms.

Marten photo courtesy of the U.S. Forest Service

When a project is located on federally managed lands and the project is funded in part or in whole through state or local public funds, both NEPA and CEQA requirements must be met. The best scenario for this requirement is to prepare a joint document incorporating the requirements of both laws simultaneously. When this is not possible, a two-tiered environmental review process may be required, resulting in additional staff resources, costs, and time.

Developing projects on a larger landscape scale may provide greater efficiency in complying with NEPA and the Endangered Species Act and other requirements.

Projects may also be impacted by the Federal and/or State Endangered Species Act (ESA). The primary goal of the ESA is to prevent extinction of imperiled plant and animal life (listed species), and secondarily, to recover or lessen threats to the survival of listed species. When a listed species or its habitat is present within a project area, measures must be incorporated into the project to ensure protection of the species or a special permit must be obtained.

Developing larger landscape restoration projects has the potential of providing greater efficiency in complying with these laws. Further, addressing environmental issues in a proactive, collaborative manner can significantly reduce conflicts that have often led to delay or non-implementation in the past.

Need for increased use of fire as a management tool for restoration

A significant portion of USFS lands are not able to be treated through mechanical means for a variety of reasons. Even if the current rate of mechanical treatments increased four to five times, it would still be less than one-third of what is needed.[25] Therefore, an effective approach to restoration must include conducting mechanical fuels reduction efforts where feasible and, for the high percentage of ground where mechanical thinning is not possible, using planned or prescribed fires (fires that are set intentionally to remove unwanted vegetation) or managed fire (fires that are started unintentionally but which can be managed to provide ecological benefits) to treat the landscape.[26]

Fire had a much more active role in the Sierra Nevada in the past than it does today and current best science makes a strong case for an expanded managed fire program to increase the pace and

scale of restoration. For instance, one study shows that plant species diversity increased by two or more times once fire was reintroduced to the forest.[27] In addition, some local air quality management districts have been working cooperatively with land managers, understanding that the consequences of uncontrolled wildfires are far more detrimental than fire used as a management tool.

As fuel loads increase, rural home construction expands, and budgets decline, delays in implementation will only make it more difficult to expand the use of managed fire. Without proactively addressing some of these conditions, the status quo will relegate many ecologically important areas (including sensitive species habitat) to continued degradation from either no fire or wildfire burning at high-intensity.[28]

Prescribed burn photo courtesy of Susie Kocher, U.S. Forest Service

While the case for increasing managed fire on the landscape is strong, there are some challenging issues standing in the way. One of the most formidable is regulatory requirements. The California Air Resources Board (CARB) and local air districts impose very tight restrictions on burn windows and duration of prescribed fires, which can make it difficult to implement them. Unfortunately, this may have the unintended consequence of enabling larger, more damaging fires to occur, which emit far more pollution into the atmosphere than would have been released by the prescribed fires. Providing greater flexibility to use fire to prevent megafires is essential to restoring our forests to resiliency.

Even if the current rate of mechanical treatments on Forest Service lands increased four to five times, it would still be less than one-third of what is needed.

One of the best tools available for encouraging the use of fire as a management tool is increasing communication and outreach with regulatory agencies, partners and stakeholders. This outreach should include engaging CARB, Federal Environmental Protection Agency (EPA) and Forest Service leadership more effectively, and developing strong messaging that stakeholders must “Pick Your Smoke” given the realities of life in a fire-prone environment and the potential for increased fire size and intensity if we don’t take immediate action.

Need to increase use of contracting tools that maximize local benefits to forest communities

Calaveras Healthy Impact Product Solutions, Inc. crews working in the forest.

Declines in available timber harvest for local companies to process has significantly impacted the economy of the Sierra Nevada and the well-being of its residents. For example, between 2000 and 2008, the Sierra Nevada Region Gross Domestic Product (GDP) averaged between $14,000 and $17,000 less per person than the rest of California. Despite the USFS's expressed desire to keep economic benefits in local communities, and a number of innovative collaborations underway throughout the Sierra Nevada, it has proven very difficult for most local contractors and wood processing businesses to compete successfully for forest service contracts against larger, often out-of-state, businesses with lower overhead and operational costs.

Engaging local crews in forest restoration work brings jobs to communities in the Sierra, many of which are economically disadvantaged.

Some forests in Region 5 have begun to identify mechanisms that provide some level of local preference in the bidding process, and the SNFCI Regional Coordinating Council is currently working closely with USFS Regional Office and Sierra Cascades All Lands Enhancement group (SCALE) to develop a toolkit that will help forest supervisors and collaboratives throughout the Region give greater weight to local socioeconomic benefit when awarding contracts. While these efforts are a good start, a much larger group of unified, high-level leadership is needed to make the paradigm shift that will be required to overcome institutional barriers and a lack of clear policy direction at the federal level.

CONCLUSION

Without bold action to increase the pace and scale of forest restoration in the Sierra Nevada, California will face ongoing adverse impacts to its environment and economy. The foundation for such an effort exists, but strong policy and investment actions are needed at the federal and state levels if we are to reverse the trends of more, larger and increasingly severe fires in the Region -- trends that threaten to rob California of many important benefits, including carbon storage, water supply, wildlife habitat and some of the most iconic landscapes in the world.

The SNC is developing a Sierra Nevada Forest and Community Action Plan building upon and enhancing existing efforts, both at a Regional and watershed level. The Sierra Nevada Conservancy will provide leadership and focus, and engage interested parties who share our vision and commitment to restoring our forest to health and resiliency. The alternative of continuing down the path we are on should not be acceptable to anyone who benefits from, and cares about, this incredible piece of the California landscape.

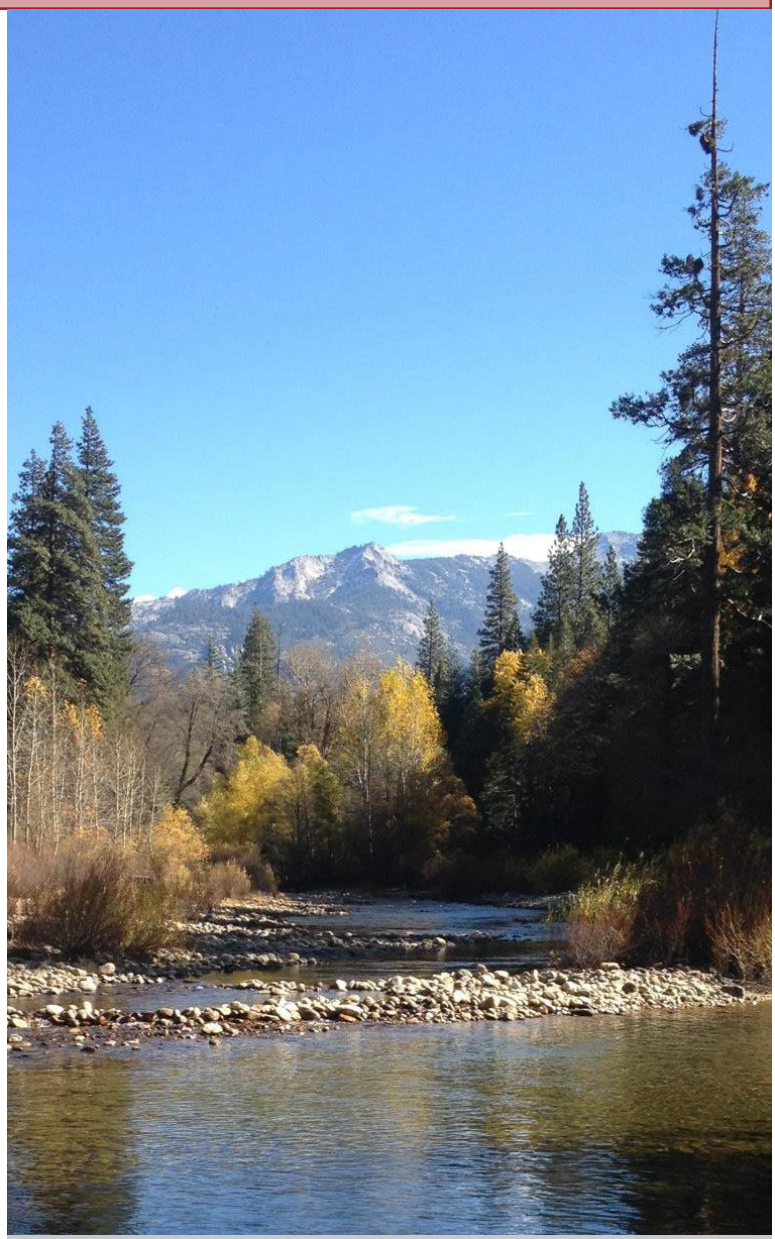


Photo of the Kings River courtesy of the Friends of the South Fork Kings

Without bold action, the iconic landscapes of the Sierra and the many benefits they provide to all Californians are at great risk.

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The Sierra Nevada Conservancy is a state agency that carries out a mission of protecting the environment and economy in a complementary fashion across 25 million acres, one-quarter of the state. To learn more, please visit the Sierra Nevada Conservancy Web site.

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