SYMPOSIUM: Modeling social-ecological systems as part of the Lake Tahoe West Restoration Partnership

Collaborative Science for Landscape Management: Lessons Learned from the Lake Tahoe West Restoration Partnership

Topic: Collaborative approaches to conservation - public/private partnerships

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As part of the Lake Tahoe West Restoration Partnership, scientists, land managers, and stakeholders undertook a collaborative modeling effort to inform comprehensive landscape restoration across more than one-third of the Lake Tahoe Basin. This presentation will discuss lessons learned for conducting collaborative, management-relevant science. The goal of the modeling effort was to understand likely outcomes of different management approaches under a changing climate up to 100 years into the future to inform a collaborative landscape restoration strategy. Participants identified several key lessons that may inform future collaborative science, as follows. Collaborative modeling can help diverse interests agree on restoration goals and thresholds, understand possible futures, evaluate tradeoffs between key values, and develop a consensus-based vision and approach for restoring a complex landscape. However, collaborative modeling â€' particularly in a large process with multiple teams and agencies involved â€' requires a large time and resource investment. Participants should clarify expectations regarding goals, timelines, and workloads at the start of the process, and design the project to balance these needs. The need for new science should emerge from the collaborative process as participants identify key questions and uncertainties essential to resolve disagreements and inform management. Collaborative science should focus on addressing these key uncertainties and questions and avoid more peripheral topics. Choice of models should be collaborative and informed by clear understanding of the models' capacities and limitations. Highly technical content and long timelines for collaborative science will pose barriers for some participants, such as stakeholders representing local community interests; process design should factor in level, type, and timing of engagement needed for different participants. Finally, collaborative science efforts would benefit from facilitation by trained facilitators with technical competence and science training in the fields being analyzed.

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Developing snowpack/forest management support tools for montane forests in the Sierra Nevada

Topic: Natural areas management in light of climate change

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Montane snowpack in the Sierra Nevada provides critical water resources for ecological functions and downstream communities. Understanding the effect of forest removal (e.g. forest thinning) on the snowpack in montane forests is critical to designing effective strategies that account for the co-management of several ecological services such as wildlife habitat, soil erosion, and water quality and quantity. Given the complex and heterogeneous effects that the forest canopy exerts on snow accumulation and melt, and the need to include different climates and forest structures, a multi-site, high-resolution study is required to understand how forest thinning affects snowpack over large areas. Here, we apply a high-resolution (1-m) state-of-the-art snow model to simulate the impact of forest thinning on the snowpack across a variety of sites with lidar-based forest characterization in the northern Sierra Nevada. The snow model is an ideal tool to study the influence of forest thinning on snowpack because it explicitly represents many of the physical processes affecting the snowpack mass and energy balance in the forest, such as tree shading, wind redistribution of snowfall, and canopy interception and sublimation of snowfall. The model is run with the current lidar-based forest structure (height and density), and two virtual thinning scenarios in which trees below 10 and 20-m are removed, during wet and dry years. This multi-site and -year approach allows us to quantify the impact of forest thinning on melt volumes across a gradient of climates and forests conditions, where current dry/warm places may serve as a proxy for future warmer and drier conditions in the Sierra Nevada. The wide range of snowpack conditions and forest structures represented in this study enables us to create a decision support tool that can be extrapolated to sites with different environmental conditions. This tool is expected to help guide ongoing and future forest thinning strategies in the Tahoe Basin that aim to increase melt volumes and mitigate the historically declining snowpacks in the region.

Key planning tools for the Lake Tahoe West Restoration Partnership: Resilience Assessment and Restoration Strategy

Topic: Managing fire regimes in a changing world (good fire/bad fire)

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The Lake Tahoe West Restoration Partnership (LTW) is a multi-agency, collaborative effort to increase the resilience of the forests, watersheds, recreational opportunities, and communities on Lake Tahoe's west shore. Lake Tahoe West's resilience-based approach emphasizes scaling up and accelerating restoration efforts to address a large landscape and all land ownerships, planning for a dynamic and changing future, and addressing a comprehensive set of landscape values. Through an iterative process, with manager, stakeholder and scientist input, ecological and social landscape values and services, and primary disturbances that are important to understand the current state of resilience of the west shore were identified and evaluated in a Landscape Resilience Assessment (LRA). The LRA used quantitative and spatially-explicit data to compare current conditions to historic and/or contemporary reference conditions to determine which portions of the landscape and which landscape values and services are the least resilient to disturbances. The LRA results indicated that much of the Lake Tahoe Basin's west shore is likely not resilient to a variety of disturbances. The LRA, combined with computer modeling and expertise to better understand risks and likely outcomes of different treatment approaches, provided the foundation for development of a science-based Landscape Restoration Strategy (LRS). The LRS guides watershed and forest restoration approaches on the west shore over the next two decades to increase social-ecological resilience. The LRA and LRS are foundational products that support landscape level planning. They reflect an extraordinary amount of collaboration and consensus building among agencies, scientists, and stakeholders. This talk will discuss how the LRA and LRS were developed, focusing on key components of the methods, and how the results were translated into actionable management projects.

Modeling social-ecological systems as part of the Lake Tahoe West Restoration Partnership

Topic: Managing fire regimes in a changing world (good fire/bad fire)

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Collaborations between scientists and land managers are increasingly important to guide large landscape restoration efforts. Efforts to promote social-ecological system resilience depend upon scientific frameworks for evaluating how different potential management strategies will influence ecological and social indicators across broad spatial and temporal scales. These efforts involve collectively identifying indicators and thresholds that reflect desired future outcomes and then projecting how different management strategies will perform given changes in future climates. As part of the Lake Tahoe West Restoration Partnership, a science team worked with resource managers and stakeholders to model future forest ecosystem dynamics in response to five management scenarios over 100 years across a 60,000 acre landscape in the Lake Tahoe basin of California and Nevada. Forest growth and fire dynamics were modeled using the LANDIS-II landscape platform, on which we based additional modeling to evaluate changes in wildlife habitat, water, and economics. We evaluated how the different management strategies would affect outcomes important to stakeholders, including abundance of old trees, wildlife habitat, fine sediment, water quantity, implementation costs, fire characteristics and threats, air quality, cultural resource quality, and carbon sequestration. The scenarios spanned a wide range of management inputs, from wildfire-suppression only, fuels reduction near communities, moderate and extensive restorative thinning and/or prescribed burning, all under different future climates. The team found that moderate and extensive thinning or burning treatments would promote overall objectives better than no treatment or community protection only, with the exception of carbon sequestration and treatment costs. Over the long-term, more treatment would reduce the wildfire threat to communities, the risk of unnaturally large patches of high intensity burns, and days of extreme emission of smoke into downwind communities. More extensive treatments were projected to increase water yield and promote the growth and occurrence of pine and aspen trees. The modeling considered how increased treatments, especially burning, might promote cultural resources important to the Washoe Tribe, who consider Lake Tahoe the center of their ancestral home. Ramping up the amount of prescribed burning, however, would pose risks to water and air quality, which could be mitigated with careful planning. Managers and stakeholders used the findings of this integrated modeling effort to inform the design of a landscape restoration strategy that balanced risks and benefits based on a robust scientific foundation.

Simulating wildlife habitat dynamics to inform best management strategies under a changing climate

Topic: Natural areas management in light of climate change

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Angela M. White, Timothy Holland, Eric Abelson, Alex Kretchun, Charles Maxwell and Robert Scheller

Many forests of the western United States have undergone over a hundred years of anthropogenic impacts that have led to increased tree density, homogenization in forest structure, and accumulation of woody material, all of which pose threats to valued social and ecological features. Forest conditions in California are particular extreme, as evidenced by recent waves of tree mortality and unprecedented large and destructive fires. Collaborative approaches to finding solutions have been identified by the US Forest Service as key to making restoration progress. In California, the US Forest Service and collaborators recently formed a science-management partnership intended to increase the pace and scale of forest restoration on a 60,000-acre landscape in Lake Tahoe. Using LANDIS-II we modeled how forest management and natural disturbance processes (such as wildfire and bark beetle outbreaks) alter habitat for terrestrial vertebrate species over the next century on the west shore of Lake Tahoe. Although wildlife populations are susceptible to many stressors, we assumed that the probability of a species' persistence over the long-term would in part be determined by the maintenance and configuration of high-quality reproductive habitat patches on the landscape. Suitable reproductive habitat for upland-associated vertebrates was interpreted at each decadal time step. Results suggested that the average number of species with high-quality habitat was expected to increase under all scenarios due to forest growth out-pacing stand replacing disturbances. Scenarios that incorporated more aggressive treatments led to the highest mean performance of biodiversity metrics including species richness, redundancy in ecological function, and diversity supported in early, mid and late seral habitat conditions. This highly collaborative effort has enhanced our understanding the effectiveness of different management actions in achieving desired outcomes, while addressing significant uncertainties, such as the impacts of climate change.

Collaborative approaches to conservation - public/private partnerships

Farm to Forest

Topic: Collaborative approaches to conservation - public/private partnerships

Cory Gritzmacher
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Farm to Forest

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Mequon Nature Preserve has been doing active land restoration for over 15 years on 438 acres in southeastern Wisconsin. What began as a dream for one man has turned into a nature oasis for over 20,000 people that visit the preserve on an annual basis. MNP took it's first section out of agriculture almost 15years ago. That area today has become an environmental corridor that connects two previously existing woodlots on the property. MNP's 150 year master plan directs the transformation of 400 acres of agriculture fields into a mosaic of hardwood forests, wetlands and prairies.

Over that past 15 years MNP has created with the help of its' partners and funders over 24 acres of wetlands and has 250 acres in active land restoration. MNP recently removed 65 acres from agriculture production in fall of 2016, which was the largest section taken out of agriculture at one time over the past 15 years. Once home to corn and soybeans is now home to over 10,000 native trees and shrubs. The project area has also created a 5 acre wetland systems by simply breaking drain tile that was installed in the early 1900's. The entire 65 acres project area was seeded with native prairie seed from local genotypes. The now thriving prairie will aid in soil health, prevent erosion and create habitat as the trees to continue to grow to become a forest once again.

MNP is now home to 12 species of fish, 5 native crayfish species, 6 frog and 1 toad species and tiger salamanders. Bird diversity has increased from 68 species in 2007 to over 184 species in 2018, which is a great indicator of successful habitat restoration.

MNP will share some of the dramatic before and after photos of restoration from over the past 15 years. Share lessons learned, challenges and success that MNP has encountered while taking on this ambitious goal.

Opportunities for shared stewardship after fire in the Carlton Ridge Research Natural Area, western Montana

Topic: Collaborative approaches to conservation - public/private partnerships

Mary Manning
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The Research Natural Area (RNA) program is one of the oldest formal programs in the U.S. Forest Service (USFS). Since 1927, RNAs have been systematically established on the national forests and grasslands to represent a wide range of vegetation types in a national network of protected reference sites. These sites are designated in perpetuity for research, education, and the conservation of biological diversity. To date, 533 RNAs have been designated across the nine USFS regions, protecting approximately 600,000 acres. In the USFS Northern Region's Lolo National Forest (LNF), the Carlton Ridge RNA was established in western Montana in 1987 to protect a unique, extensive stand of alpine larch (Larix lyallii). This open, park-like forest community occurs at elevations from 7900 to over 8400 feet, on a subalpine ridge that escaped glaciation and has deep, well-developed soils. Such an extensive deep soil setting has not been documented elsewhere for this tree species. In 2017, the Lolo Peak wildfire burned much of the RNA and surrounding area, creating a complex burn mosaic in which some areas burned severely, killing all alpine larch trees, and others experienced little or no fire. This burn pattern has created opportunities for research and monitoring of post-fire response of this unique vegetation type, which will provide important findings to LNF resource managers and the scientific community. Alpine larch has also been identified as a tree species especially vulnerable to climate change and this burn may create opportunities for monitoring alpine larch populations after fire into the new climate future. The USFS Rocky Mountain Research Station (RMRS), along with the LNF and Northern Regional Office, is collaborating with the non-profit Friends of Lolo Peak (FOLP) to develop a citizen science research and monitoring project that will document fire effects and post-disturbance ecosystem response in this unique plant community. In particular, conifer recruitment will be monitored along biophysical, elevational and fire severity gradients. LNF and RMRS personnel are co-developing the sample design and associated site selection, and FOLP volunteers will work with RMRS on data collection. While many examples of the USFS's policy of shared stewardship preempt wildfire, this is an excellent demonstration of how shared stewardship following fire can foster collaborative conservation and research opportunities in USFS RNAs, and lead to novel methods for management of this high elevation species.

SYMPOSIUM: Shared Stewardship: working together to make decisions and take actions on the land

Advancing NM's collaborative management- a new comprehensive spatial risk assessment for shared stewardship priorities

Topic: Conservation successes in working landscapes

Anne Bradley
The Nature Conservancy

Steve Bassett
The Nature Conservancy

The Nature Conservancy worked closely with the New Mexico Division of Forestry to develop a statewide comprehensive risk analysis and associated spatial data to assist the state in completing its update of the Forest Action Plan. The analyses also contributed substantially to the identification of potential joint priorities for the state and the Southwestern Region of the Forest Service. The statewide assessment of values and threats and robust engagement in the Forest Action Plan were made possible by nearly two decades of cross-jurisdictional collaboration between agencies, NGOs, and tribes in New Mexico to work together to restore watersheds and protect communities from large fire impacts. This partnering approach has been especially important for a state with relatively few resources to bring to bear on natural resource problems. The enabling conditions for collaboration and opportunities for cross-jurisdictional resilience-building identified in the Forest Action Plan will be described

Shared Stewardship, Shared Outcomes

Topic: Collaborative approaches to conservation - public/private partnerships

Laura Ault
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Managers and owners of forested land in Utah face many challenges, among them catastrophic fires, drought, insects and disease, invasive species. Of particular concern are longer fire seasons and the increasing size and severity of wildfires, along with the expanding risk to communities, water sources, wildlife habitat, air quality, and the safety of firefighters.
To address these concerns at a landscape scale, the State of Utah (State) and the USDA Forest Service (Forest Service) entered into a Shared Stewardship Agreement. On May 22, 2019, Utah Governor Gary R. Herbert and USDA Secretary Sonny Perdue signed the Agreement for Shared Stewardship between the State and the Forest Service Intermountain Region. Under the agreement, the State and Forest Service will focus on landscape-scale forest restoration activities that protect at-risk communities and watersheds.
The State and Forest Service have worked collaboratively to identify and map priority landscapes that will guide activities across jurisdictional boundaries. Shared Stewardship is about setting priorities together and combining resources to achieve cross-boundary outcomes using every available authority and tool to support partnership efforts to improve forest health and target treatments in the highest priority landscapes, thereby protecting at-risk communities and watersheds from catastrophic fire. The State of Utah and the Forest Service will work in partnership to restore these priority landscapes using all available tools.

Shared Stewardship: Strategies for Engaging Community-Based Partners

Topic: Collaborative approaches to conservation - public/private partnerships

Karen Hardigg
Rural Voices for Conservation Coalition

Shared stewardship recognizes that both public land managers and the communities in which they are located, along with other stakeholders, can share responsibility and accountability for being stewards of the land, and can work together across ownership boundaries to accomplish common management objectives. The approach also recognizes that conservation and local community benefits are related and can be mutually supported. At its core, shared stewardship encourages the Forest Service to partner with a diversity of groups and organizations to accomplish its mission.

The Rural Voices for Conservation Coalition (RVCC) has worked closely with the Forest Service on implementing the vision of shared stewardship in the West. We have worked with partners to improve implementation of collaborative restoration projects that cross ownership boundaries by focusing on how agencies, landowners, and organizations can partner to accomplish work on the ground. In this presentation we will share best practices and strategies for including and working with community and collaborative partners. Themes will be drawn from applied research, peer learning exchanges, and case studies.

Shared Stewardship: working together to make decisions and take actions on the land

Topic: Collaborative approaches to conservation - public/private partnerships

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