California Tahoe Conservancy
Agenda Item 6
June 18, 2026

Tahoe Conservancy Greenhouse Gas Emissions Synthesis

Executive Summary

The State of California is committed to achieving a just and equitable transition to carbon neutrality by 2045 (Executive Order B-55-18, 2018). Achieving this ambitious goal requires both significant reductions in greenhouse gas (GHG) emissions and removal of carbon dioxide from the atmosphere, including sequestration in forests, soils, and other natural landscapes. The California Tahoe Conservancy (Conservancy) is taking actions to combat climate change. As part of this, Conservancy staff conducted a GHG synthesis of operations, which the Board requested and discussed at its April 2024 meeting, to identify major sources of emissions and find opportunities to achieve this state goal.

Background

Excessive burning of fossil fuels, which releases significant amounts of GHGs, has caused long-term warming of the planet and climate change. Climate change threatens Lake Tahoe with warmer temperatures, less snowpack, earlier stream runoff, more extreme floods, droughts and heatwaves, shifts in lake level, and more severe wildfires and smoke. To combat these trends, California aims to build a 100 percent clean energy grid and achieve carbon neutrality by 2045. The State has called for accelerated climate action via the latest California Climate Adaptation and Natural and Working Lands Climate Smart strategies.

The Conservancy is proactively adapting to climate change and making the Lake Tahoe Basin's (Basin) extraordinary natural resources and communities more climate resilient. The Conservancy manages, acquires, and restores natural lands, improves public access, and provides grants to partners to conduct multi-benefit projects in the Basin. Conservancy fuel reduction projects help forests adapt to drier conditions, disease, and pest invasions, while also reducing catastrophic fire risk to communities. Conservancy wetland restoration projects increase water storage and carbon sequestration while maintaining sensitive habitats and wildlife connectivity. Conservancy trail construction projects connect communities and lead to fewer miles being driven. This work provides multiple benefits to ecosystems and communities while advancing climate resilience throughout the Basin.

The Conservancy is also taking a lead role to directly address climate change with partners. The Conservancy collaboratively led the development of the Tahoe Climate Adaptation Primer, the Tahoe Climate Resilience Action Strategy, and the Lake Tahoe Climate Adaptation Action Portfolio and vulnerability assessment for priority resources. Other efforts include:

- a grant to the Tahoe Regional Planning Agency to create a climate dashboard to monitor and record progress on climate action strategies,
- a grant to the Desert Research Institute to model watershed hydrology and analyze the vulnerability of each sub-watershed within the Basin to climate change impacts,
- a grant to the Tahoe City Public Utility District for the North Lake Tahoe regional GHG emissions inventory, and
- a contract with the University of Nevada, Reno for a carbon emissions and sequestration study on Basin wetlands.

This work helps the Conservancy and its partners understand climate change dynamics and helps the State meet the 2045 GHG reduction goals. However, for the Conservancy to forward its mission to restore and enhance the natural and recreational resources of the Basin, and to manage and protect its nearly 4,700 state properties, its current management and operations produce GHG emissions. Conservancy staff seeks to understand the largest sources of emissions from Conservancy operations, and the best opportunities to significantly reduce emissions. The purpose of this GHG synthesis is to assess GHG emissions for Conservancy operations, buildings, and vehicles.

GHG Synthesis Methods

For this synthesis, Conservancy staff calculated GHG emissions for forestry and wetland restoration, and recreation and access projects using data obtained from California Department of Forestry and Fire Protection (CAL FIRE) and California Air Resources Board reports, published literature, and project-level California Environmental Quality Act documents. The staff calculated GHG emissions from the Conservancy's buildings and vehicles using Liberty Utilities invoices and fuel receipts. Most of the numbers in this GHG synthesis are estimates. In some cases, the staff used only one or two studies to derive specific numbers because of the lack of analogous data. Conservancy staff vetted the forestry data in this GHG synthesis with CAL FIRE staff. Conservancy staff vetted the wetland numbers with researchers at the University of Nevada, Reno.

The Tahoe Livable Communities (TLC) program was not included in this synthesis because the program's activities do not have direct emissions. The TLC program is mainly focused

on avoided emissions, such as supporting the creation of walkable, bikeable communities, and acquiring land, which is outside the intent of this synthesis.

GHG emissions in this synthesis are measured as carbon dioxide equivalents (CO_2e), capturing the impacts from multiple gases. A ton of CO_2e is equivalent to the emissions of an average gas-powered vehicle driving from Mexico to Canada. Every ton of CO_2e released increases climate change and the associated impacts of climate catastrophes, and those impacts will continue until that carbon is removed from the atmosphere. With existing technologies, the cost of removing atmospheric carbon is as high as $1,000 per ton.

Sources of GHG Emissions

The Conservancy's yearly GHG emissions vary widely depending on the amount and size of projects implemented. Total yearly emissions range from 2,000 metric tons (MT) of CO_2e to 5,000 MT CO_2e. Conservancy baseline operation emissions include building utilities (33 MT CO_2e per year), fleet (40 MT CO_2e per year), and routine land management (40 MT CO_2e per year). In comparison, the 2021 Caldor Fire emitted 9.9 million MT of CO_2. Conservancy GHG emissions are 0.000014% of total California emissions, which in 2023, were 360.4 million MT CO_2e.

The activity associated with the highest emissions is constructing paved Class 1 trails at 178 MT CO_2e per acre of trail. This is mainly due to emissions to build a paved trail, from factors such as the use of fossil-fuel-powered heavy equipment and petroleum-based asphalt, soil carbon impacts, tree removal, and trucking of materials to the site. While constructing paved trails emits large amounts of GHG emissions per acre of trail, the Conservancy does not typically construct large sections of trails on an annual basis.

Conservancy wetland restoration activities can also result in significant emissions on a per-acre basis. Large watershed projects involve fossil-fuel-powered heavy equipment to alter or build stream channels, remove trees, and excavate and haul thousands of tons of non-native fill. The recently completed Upper Truckee Marsh Restoration Project—which restored 14.5 acres of wetland, and moved 40,000 cubic yards of material to fill the aquatic-invasive-species-laden "Sailing Lagoon" and to create the pilot river channels—emitted up to 59 MT CO_2e per acre or over 850 MT CO_2e in total. However, the Conservancy typically only implements similar large-scale watershed projects every five to ten years, and implementation often spans multiple years.

Conservancy staff analyzed available research, project data, and partner studies to estimate the emissions per ton of biomass removed across forestry treatment types. Mechanized equipment treatments generally remove the most material from the landscape and emit approximately 2.3 MT CO_2e per ton of biomass removed. These

emissions result from heavy equipment harvesting and hauling sawlogs and biomass from the site and the emissions from the biomass processing facilities. Manual thinning and chipping with chainsaw crews emit roughly 1.8 MT CO_2e per ton, with emissions from equipment, hauling, and processing material. Manual thinning and pile burning likely emit slightly less, at around 0.9 MT CO_2e per ton, with emissions only from equipment and pile burning. Low intensity prescribed broadcast burns typically remove less material and emit approximately 0.75 MT CO_2e per ton of biomass, as there is less equipment use and no hauling or processing of material. When considering the level of certainty for these rough estimates and project variability, the staff found the emissions per ton more similar across treatment types than the staff expected.

While burning forest fuels on the landscape does release GHGs into the atmosphere, the staff's analysis shows that emissions from removing, hauling, and processing biomass are only slightly higher per ton than burning onsite. Therefore, the staff does not see GHG emissions as a critical driver to select treatment types until new technologies or approaches become available. Forest health and community protection objectives are key considerations for forestry treatments, along with site specifics and constraints. For example, prescribed burning is the most effective treatment in building climate resilience and forest health; low intensity fire recycles nutrients from vegetation to the ground and increases soil fertility, maintains diverse habitats, reduces wildfire risk, and restores an important natural process to fire-dependent forests. However, Basin land managers generally use this treatment where initial fuels reduction treatments are complete, and where other conditions support this approach.

Conservancy GHG emissions are tied to current fossil fuel equipment and energy consumption, which are necessary for operations and to complete critical projects. Though Conservancy projects are emissive, they build resilience to a changing climate and have many co-benefits such as reduced wildfire risk, community protection, improved hydrologic processes, biodiversity and habitat protection, increased access for recreation, and supporting walkable and bikeable communities.

Emissions Reductions and Sequestration

Many Conservancy activities help reduce GHG emissions. For instance, developing trail networks will reduce vehicle miles traveled as more people walk and bike. However, these types of reductions are not included here as this synthesis is intended to highlight opportunities to reduce emissions.

Conservancy restoration projects also have the potential to increase carbon sequestration, which can help reduce net GHG emissions. In the case of forestry

restoration, these increases will be tempered by a continually warmer and drier climate. Published data shows that the average rate of carbon sequestration across the Sierra Nevada is 0.134 MT CO_2e per acre per year. The Conservancy owns 5,520 acres of forest, which can sequester 740 MT CO_2e per year. However, more recent unpublished data show the sequestration rate of Sierra Nevada forests is continuing to decline. This is because expected droughts will increase tree mortality and reduce growth rates, leading to less carbon sequestration. In fact, due to climate change impacts, researchers expect, even with active forestry management, a loss of forest carbon stock by about 50 percent from 2022 to 2071. Wetlands sequester large amounts of carbon. A highly functioning wetland can sequester up to 3.46 MT CO_2e per acre per year. The Conservancy owns 848 acres of wetlands, potentially sequestering 2,933 MT CO_2e per year. However, climate change is causing wetlands to dry out, dramatically degrading their ability to sequester carbon. Restoring forests and wetlands will continue to be a priority for the Conservancy to combat these climate change trends, protect diverse habitats, and maintain ecological function. Forest restoration is critical to reduce risk of forest loss due to drought, wildfire, and infestations.

Ongoing Conservancy activities, including forest and wetland restoration, likely emit more GHGs than Conservancy lands currently sequester. However, the sequestration potential of these lands is significant and comparable to current emissions, demonstrating the importance of continuing restoration to sequester GHGs now, flatten the curve, and approach carbon neutrality. Efforts to sequester GHGs are important to ensure the Conservancy does not miss opportunities now, because anticipated climate change impacts will continue to reduce the rate of carbon sequestration in the Basin over time. In addition, phasing in lower emission approaches and new technologies in Conservancy operations will greatly reduce GHG emissions and help achieve carbon neutrality.

Opportunities to Reduce GHG Emissions

This GHG synthesis has identified opportunities for the Conservancy to reduce emissions. The Conservancy will continue to transition its fleet to electric vehicles while exploring opportunities to transition facilities from natural gas to cleaner technologies, such as heat pumps. Other emerging technologies—including electric heavy equipment and haul vehicles, and carbon negative biomass processing and reuse—can also help reduce emissions from various restoration actions.

Many of the steps needed to reduce GHG emissions are too large for the Conservancy to tackle alone. Luckily, the state of technology for clean vehicles and heavy equipment is rapidly advancing. Equipment operators can use battery-electric vehicles for restoration projects with local and regional hauls, and hydrogen fuel-cell systems may offer longer

ranges with faster refueling. Innovative and local building materials should be used as much as possible. Concrete additives such as biochar can reduce the GHG footprint of concrete significantly. Local and recycled building materials can further reduce the GHG footprint. The development of carbon neutral or negative biomass facilities, such as the upcoming Cabin Creek Biochar facility, can further reduce GHG emissions from forestry projects that will remove forest slash. Implementing these new technologies will require state level policy or guidance, directing agencies to choose the least emissive approaches available. Statewide incentives may be needed to justify contractor investments in new technologies, and the contracting process must factor GHG emissions into contract bids.

Implementing these approaches may mean paying more for projects upfront but such expenses will help reduce the avoided long-term impacts and expense from the damage caused by increased GHGs. The Conservancy strives to support and use the best available science and is often on the front lines of innovation. Although when compared to other industries, the Conservancy's GHG emissions are small, adopting new approaches that can be replicated across the State is a fitting role for this agency.

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