



Truckee Tahoe Airport District

Land Management Report

2020-2023



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Introduction

Truckee Tahoe Airport (“the airport”) is a regional airport located just southeast of the Town of Truckee and northwest of Lake Tahoe, that spans both Nevada County and Placer County. It is a unique airport in that it is owned by the Truckee Tahoe Airport District (TTAD or District) - a special district that covers approximately 485 square miles within eastern Nevada County and Placer County.

The District has an open space conservation program and manages over 2,199 acres of open land in partnership with the Truckee Donner Land Trust (TDLT), Trust for Public Land, Northern Sierra Partnership, and the Town of Truckee. This land is used as a buffer between the airport and its surrounding communities, providing open space, scenic views, and recreational activities for the District community.

The management of these lands also aligns with the District’s Strategic Plan, that lays out goals to maintain or improve the open space lands while also providing recreational opportunities for the local community. The Strategic Plan also touches on forestry management, with goals to improve forest health on the open space lands, reduce the risk of catastrophic wildfire, preserve and enhance wildlife habitat, protect the cultural resources, and maintain water quality within the lands.



Land Management Overview

Including the airport and its associated land, there are 5 primary land areas that Truckee Tahoe Airport manages that make up a total of 2,199 acres, as well as one 151 acre parcel of land that is held as a conservation easement. The land areas include the Truckee Tahoe Airport, Waddle Ranch, Ponderosa Golf Course, Martis Valley Estates (the “L” shaped property), Alder Hill Beacon, and the conservation easement - Jones Property (otherwise known as Elizabethtown Meadows). Waddle Ranch is the largest of these land parcels at 1,512 acres, while the airport is the second largest at 602 acres. The remaining 82 acres of land are divided between Ponderosa Golf Course (53 acres), Martis Valley Estates (18 acres), and Alder Hill Beacon (14 acres). Truckee Tahoe Airport owns the 5 parcels of land, and manages the land under the conservation easement.

Table 1. Acreage by Property

Property	Owned Acres	Conservation Easement Acres
Truckee Tahoe Airport	602	-
Waddle Ranch	1,512	-
Ponderosa Golf Course	53	-
Martis Valley Estates	18	-
Alder Hill Beacon	14	-
Jones Property	-	151
Total	2,199	151

The land can also be divided into four different management zone areas including:

- Developed areas
- Intensive recreation facilities
- Aquatic resources
- Open space

The developed areas cover the smallest amount of land at 18.7 acres and include roads, parking lots, navigational beacons, and other developed areas that support the airport's activities. The management of these lands provides access for fire suppression and public safety, public access to the open lands, ensures water quality and protection, controls invasive plant species, and ensures water availability for wildfire suppression.

Intensive recreation facilities cover about 190 acres including the Ponderosa Golf Course, aero club, and campground. Management priorities for this land includes maintaining the facilities for public use, providing recreational opportunities for the local community, conserving and protecting water quality, and reducing wildfire risk.

The aquatic resources zone includes about 314 acres of land and management priorities include protecting and enhancing water quality, controlling invasive plant species, protecting cultural resources, habitat preservation, restoration, and enhancement, and protecting the native wildlife.

Lastly, the open space lands are the largest of the four management zone areas, covering over 1,826 acres of undeveloped areas. The management priorities for the open space lands include supporting airport operations and safety, providing passive recreation opportunities aligned with open space values, maintaining forest health and reducing wildfire risk, protecting, enhancing, and restoring native habitats and wildlife, controlling invasive species, protecting cultural resources, and accommodating limited development activities and ensuring they align with open space values. In addition to these goals, the management of the open space lands also impacts the carbon stored in the land, and the impact on the carbon sequestration will be explored further later in this report.

Table 2. Acreage by Land Management Zone

Property	Aquatic Resources	Developed Land	Intensive Recreation Facilities	Open Space
Truckee Tahoe Airport	39	6	145	413
Waddle Ranch	225	11	-	1,277
Ponderosa Golf Course	7	0	46	-
Martis Valley Estates	3	1	-	15
Alder Hill Beacon	-	0	-	14
Jones Property	41	1	-	109
Total	314	19	190	1,827

Vegetation Types on Open Space Land

The majority of open space land the airport manages lies within either the land immediately surrounding the airport or within Waddle Ranch. Waddle Ranch alone contains nearly 70% of the open space land, while another 23% lies within the area surrounding the airport. The conservation easement at Jones Property contains another 6% of the open space land, with the last 1% divided between Martis Valley Estates and Alder Hill Beacon.

Within these open space land areas there are various kinds of vegetation and plant life, however, the majority of the land cover is defined by Eastside Pine, Sagebrush, and Sierran Mixed Conifer. Over 45% of the open space land is defined by Eastside Pine, with another 21% Sagebrush, and 18% Sierran Mixed Conifer. The open space lands, particularly the forested areas, not only provide scenic views and recreational opportunities for the local community, but also serve as carbon sinks sequestering large amounts of carbon dioxide from the atmosphere.

Table 3. Vegetation Types and Acreage

Land Cover Type	Acres
Eastside Pine	1,037
Sagebrush	468
Sierran Mixed Conifer	407
Bitterbrush	158
Wet Meadow	80
Dry Meadow	25
Montane Riparian	24
Montane Chaparral	9

Eastside pine habitat is typically found at elevations of 4,000 - 6,500 feet, and is largely characterized by ponderosa pine, along with Jeffrey pine, lodgepole pine, white fir, and other conifers. The open space land on Waddle Ranch, and the Jones property contain the majority of the Eastside pine habitat, with about 56% Ponderosa pine, 24% Jeffrey pine, and 20% white fir. Historically, these stands were logged in the late 19th century, and continue to be selectively thinned periodically. Mechanical thinning at Waddle Ranch has occurred regularly since 2001 to reduce the risk of wildfire and enhance forest health. These efforts have been largely successful, with only one fire, impacting only 95 acres, occurring since 1924.

Due to the absence of wildfire, the stand density at Waddle Ranch is more dense than typical Eastside pine stands. Waddle ranch is classified as Dunning's Site Class III, a measure of forest productivity, and stands of this same class usually measure about 75 square feet per acre, whereas Waddle ranch was measured at about 100 - 140 square feet/acre with minimal surface fuels. Though the increased density may lead to increased fire vulnerability, it also sequesters more carbon than a less dense stand.

A seedling inventory was also done for Waddle Ranch and found about 135 seedlings per acre, with a breakdown of 47% white fir, 40% Ponderosa pine, and 13% Jeffrey pine. The prominence of white fir poses a risk to forest health as white fir is more susceptible to fire than either Ponderosa or Jeffrey pine, on top of being less resistant to drought and insect damage. It is recommended that the airport target these trees in future thinning treatments to reduce wildfire risk and allow the other species types to grow.

Land Use Management

This section summarizes the land uses and management activities undertaken by the Truckee Tahoe Airport District since 2020, broken out into the 6 different land areas the airport manages. Depending on the land area sections may include descriptions of recreational activities, status of roads and trails on open space lands, and describe the practices employed to manage the forestry and fuels on the land. Additionally, where applicable, emissions estimates associated with the use of the land are provided, specifically where forestry activities such as thinning and mastication are involved.

Truckee Tahoe Airport

The airport's open land is approximately 602 acres of undeveloped land within the airport property. This land is primarily undeveloped but includes a glider port, a campground, a skydiving, and a skydiving business. The glider park operates year round with eighty acres of land dedicated to non-motorized glider flights and operations with approximately 5,000 glider flights each year. The local vegetation is mostly open conifer woodland and sparse shrubland and grassland. The land areas are managed for both public and aviation safety, and land management activities include mastication, mowing, and selective tree thinning.

Waddle Ranch

Waddle ranch is the largest land area managed by the Truckee Tahoe Airport at 1,512 acres and with its vast open land areas serves as a huge carbon sink, provides habitat for the local wildlife, and provides many benefits to the local community. This area is permanently protected through a conservation easement held by Truckee Donner Land Trust. Waddle Ranch is mostly undeveloped land and contains conifer forest, shrublands, riparian areas, and a seasonal lake (Dry Lake or Lake Ella). There are also hiking and biking trails, and dirt roads that the airport maintains within the property. Land management activities on Waddle Ranch are aimed at maintaining forest health and reducing the risk of wildfire and include activities such as periodic understory mastication and forest thinning.

The primary goals of the land management at Waddle Ranch are to provide open space and recreational opportunities for the local community as well as tourists, and to sustainably manage the forest while maintaining a forested feel and ambiance on the trails of the Waddle Ranch Preserve. Within Waddle Ranch there are approximately 7 miles of trails for visitors to hike and for emergency access. Much of the maintenance in recent years has been focused on expanding the trailhead at the main access point, adding interpretive signage, and creating new trails.

In addition to reducing wildfire risk and ensuring the safety of the local community, the forest thinning activities within Waddle Ranch also impact the emissions from the land. With Waddle Ranch containing large swaths of conifer forest, the land there serves as an enormous carbon sink and the protection of that land is critical to ensuring the carbon stays sequestered in the ground and trees. Reducing wildfire risk is doubly important as a wildfire would not only wipe out a large amount of wildlife habitat and endanger the local community, but also release a huge amount of carbon that is stored in the trees. The continued management of the forested land, including thinning and biomass removal, will be important to avoid wildfire and the release of these emissions.

The general prescription treatment involved the thinning of targeted suppressed and intermediate trees to reduce competition, while preserving the largest and healthiest conifers to enhance fire resilience. Surface fuels such as native shrubs

and bushes were also strategically retained in areas clear from the overstory conifer dripline to reduce fire hazard, but also to maintain wildlife habitat. Snags - dead trees that remain upright - greater than 16 inches in diameter at breast height (dbh) were also retained, with a minimum of 2 per acre. This overall prescription treatment was based on a fire assessment where data such as anticipated flame length, rate of spread, and intensity of wildfires was taken into account. One of the goals of the treatment was to create enough discontinuity, both horizontally and vertically, of fuels within the stands to greatly reduce the risk of wildfire.

The treatment of the forest stand was implemented through a variety of different methodologies. The preferred methodology was during periods when suitable pine sawlog markets were strong and targeted trees were mechanically cut and skid for processing into small logs and chips. The trees were cut, processed, and the biomass was removed from site to an off-site facility. When the pine sawlog market was weak, the treatment was undertaken using mechanical mastication, targeting trees 12 inches in dbh or less. These trees, along with shrubs and woody debris were masticated and the wood chips were then spread out on the ground. The mastication achieves a similar effect to the mechanical cutting and biomass removal, yet retains more live biomass as mastication is only feasible for trees 12 inches in dbh or less. In particularly sensitive areas where regulations or best management practice exclude the use of mechanical thinning, hand thinning was used to carry out the prescribed treatment. For areas where hand thinning took place, only trees 10 inches in dbh or less were targeted. The Dry Creek drainage area is the only area that received the hand thinning treatment method, while all other areas within Waddle Ranch did not have such stringent regulations or were accessible by machinery to mechanically thin and masticate.

Since 2009 various treatments of mechanical thinning, biomass removal, mastication, and hand thinning across the open lands on the Waddle Ranch Preserve have occurred. In 2020 an additional treatment of about 273 acres also occurred as part of a larger project that was supported by CAL FIRE's California Climate Investment funding. This treatment included the mechanical thinning and biomass removal of over 500,000 board feet of wood taken across 237 acres, and is the focus of the emissions estimates provided further in this report.

Jones Property (Elizabethtown Meadows)

The Jones Property, also known as Elizabethtown Meadows due to its wet meadow systems, is a 151 acre area located just south of Waddle Ranch. Acquired by Truckee Donner Land Trust in 2011, the District holds a land conservation easement to preserve it indefinitely. This land area is defined primarily by conifer forest, shrublands and riparian areas, as well as a large wet meadow system that occupies the majority of the southern half of the property. Within the Jones Property lies the Elizabethtown Meadows Trail, which connects the southern end of the Waddle Ranch Preserve to the Northstar California resort nearby. This trail is highly popular and used by the local community for hiking, trail running, and mountain biking. The airport, in collaboration with TDLT and Truckee River Watershed Council (TRWC) have undertaken habitat restoration projects in this land area, to address road erosion and enhance the local habitat. Carbon emissions estimates for the habitat restoration projects on the property are not accounted for due to limited data availability and minimal overall impact on all property land use emissions.

Ponderosa Golf Course

The Ponderosa Golf Course is a 57 acre property located just northeast of the Truckee Tahoe Airport. The District acquired the property in 2008 to prevent future residential and commercial development and provide recreational activities for the surrounding communities. The Truckee Donner Recreation and Park District manage the golf course under a lease agreement, focusing mainly on water quality maintenance, irrigation management, and reducing fertilizer and pesticide runoff. There are no undeveloped land areas present on this property.

Martis Valley Estates (“L” shaped property)

Martis Valley Estates is an 18 acre undeveloped property sitting just north of the Ponderosa Golf Course. The property, shaped like an “L”, extends north and east and almost connects the golf course to the airport. The property is flanked by single-family homes to the east and west, and serves as an extension of the residents’ backyards. A community walking and biking trail is maintained by the District, and runs through the middle of the property, also serving as an emergency access road. The land is primarily defined by conifer forest. The District, in collaboration with TRWC, works to maintain the dirt road and improve the drainage on the property, to ensure continued emergency access, minimize erosion, and improve water quality on the property.

Alder Hill Beacon

Alder Hill Beacon is the smallest property in this land management report at 14 acres. It is located north of Truckee, between the Tahoe Donner and Prosser Lake Heights residential communities. The land is predominantly undeveloped, featuring conifer forest with dirt roads and trails that are utilized by residents commuting between the two communities. The Alder Aviation beacon used by the airport is located adjacent to the north of the property, and access to the beacon for maintenance and repairs is facilitated through the property.

Emissions Impact

The prescribed treatment of the land in regards to fuels and forestry, particularly the mastication or thinning and removal of biomass reduces the risk of wildfire and enhances the forest health in the long term, reducing competition and giving the larger healthier trees space to continue growing. However, in the short term there are other impacts. Forests naturally act as a carbon sink, absorbing and sequestering carbon dioxide through photosynthesis. However once thinned, cut down, and removed from the land, that sink no longer exists and the sequestered carbon escapes. The thinning of the forest may lead to an enhancement in overall forest health and reduce risk of intense wildfire, ultimately sequestering more carbon in the long term, however, in the short term, this releases more carbon into the atmosphere.

The amount of above-ground carbon stored in a tree varies by species type but can be estimated based on the biomass and species of the tree. Over the years there have been various prescribed treatments of thinning and mastication to the forest stands on Waddle Ranch, helping to reduce the risk of wildfire and avoid catastrophic loss of vegetation and wildlife. Additionally, by avoiding wildfire the airport has been able to maintain the forest stand at large and keep the carbon sequestered within the living biomass.

Looking particularly at the mechanical thinning that occurred in 2020 on Waddle Ranch, there was about 500,000 board feet of wood taken from approximately 273 acres of Eastside pine habitat. The removal of this biomass led to the short term release of carbon emissions to the atmosphere by removing a carbon sink. Although the long term carbon impact may be net positive by allowing the remaining trees to continue growing and sequestering carbon, while at the same time reducing the risk of wildfire that would release even more carbon, the short term impact of thinning is the loss of carbon.

Based on species type, total acreage of the tree stands on Waddle Ranch, and the amount of board feet removed, nZero estimated the amount of carbon sequestered in the forest stands at Waddle Ranch, as well as approximated how much carbon was released into the atmosphere by the thinning that occurred in 2020. For the baseline carbon sequestered in the land that the airport manages, the total acreage of Eastside Pine and Sierran Mixed Conifer was multiplied by a standard emission factor for the amount of carbon stored in typical Ponderosa pine stands. Given the prominence of Ponderosa pine on the Waddle Ranch Preserve, along with the similarities to other species on the preserve, this was the chosen emission factor which was applied to the entire acreage of land that is covered by both Eastside Pine and Sierran Mixed Conifer. Across the 1,445 acres of land these trees cover, there is approximately 331,453 metric tons of carbon dioxide sequestered in the land, including live trees, standing dead trees, understory, and down dead wood.

Table 4. Carbon sequestered in forested areas

Total Forested Acres	Total Sequestered Carbon (MT CO ₂)
1,445	331,452

On the 273 acres of land that was treated in 2020 by mechanical thinning, nZero calculated the amount of biomass removed based on the density of the tree species that was thinned. It was assumed across the 500,000 board feet taken that 56% was Ponderosa pine, 24% was Jeffrey pine, and 20% was white fir. These percentages are based on the estimations of forest cover from the Truckee Tahoe Land Management Plan. Once the volume of total biomass for each species removed was calculated, nZero estimated the amount of carbon released under the assumption that 55% of tree biomass is made of carbon. That carbon value was then converted to carbon dioxide. The total amount of carbon dioxide removed from the land as a result of the 2020 tree thinning was 1,086.1 metric tons of carbon dioxide. The estimated total carbon originally sequestered on those 273 acres was 62,642.1 metric tons of CO₂, so the thinning only resulted in a small fraction - less than 2% - of the carbon dioxide stored in the land to be released. See Table 3 for a breakdown of the amount of carbon dioxide removed by species type.

Table 5. 2020 Selective Tree Thinning Removed 500,000 board feet

Species	Biomass of tree (tons)	MT CO ₂ Removed
White fir	96	214
Jeffrey pine	115	257
Ponderosa pine	277	615
Total	488	1,086

Emissions Calculation Methodology

The general methodology for calculating the carbon sequestered in forested lands the airport manages includes choosing the appropriate emission factor for the amount of carbon sequestered in a particular forest type - in the airport's case Ponderosa pine - and then multiplying that factor by the acres of forest. It was assumed that the forest had not been clear cut within the last 120 years. The following equation was used for calculating the carbon sequestered in the forested land that Truckee Tahoe Airport manages:

$$[\text{acres of forested land}] \times [\text{carbon/acre in Ponderosa pine stands}] = \text{CO}_2 \text{ sequestered}$$

To estimate the amount of carbon removed from thinning activities, the volume of biomass of each species removed was estimated by applying the percentage breakdown of tree species in Waddle Ranch to 500,000 board feet removed, and then a standard factor of 0.55 carbon/biomass of tree was used to estimate the amount of carbon in the biomass removed. The carbon was then converted to carbon dioxide by multiplying by 3.67. The general equation is as follows:

$$[500,000 \text{ board feet}] \times [12 \text{ cubic feet}/1 \text{ board feet}] = 41,666.67 \text{ cubic feet of wood}$$

$$[41,666.67 \text{ cubic feet of wood}] \times [\text{species wood density}] = \text{volume of wood for each species}$$

$$[\text{volume of wood}] \times [0.55 \text{ carbon/tree biomass}] \times [3.67 \text{ carbon dioxide/carbon}] = \text{total carbon dioxide removed}$$

Summary

The Truckee Tahoe Airport District has presided over and managed over 2,000 acres of land surrounding the airport for well over a decade now. Across 5 owned land areas and one conservation easement, the airport manages a variety of different terrains for the betterment of the land and surrounding communities. The airport leads a variety of different land management activities across the surrounding lands including keeping invasive species at bay, maintaining developed areas such as the golf course for recreational purposes, maintaining hiking and biking trails, maintaining roads for emergency access, and managing the forests and vegetation on open space land.

The vast majority of open space land containing forested areas is located on Waddle Ranch and is the main focus for forestry and fuel management for the airport. The two primary goals the airport has regarding these forested open space lands are to enhance the forest health and to reduce the risk of wildfire through the removal of hazardous fuels. Various tree thinning and mastication activities have taken place over the last 15 years, with the most recent treatment taking place in 2020 when they thinned approximately 270 acres of land, and harvested about 500,000 board feet. This thinning resulted in about 62,642 metric tons of CO₂ being removed from the land in the short term, however greatly reduced the risk of future wildfires and provided the remaining vegetation room to grow and sequester additional carbon. While the short term impacts of tree thinning may be the removal of a carbon sink from the land, it is important to consider the long term impacts on the sequestration of carbon, as well as the other benefits thinning has for the surrounding community.

Looking forward, the continued management of the open space lands surrounding the Truckee Tahoe Airport will be critical not just to provide safety and recreational opportunities for the local community, but to ensure the forest stands remain as a carbon sink. The long term survival and growth of these stands will ensure a huge amount of carbon remains sequestered in that land and the stands will serve as a carbon sink for years to come. The airport should continue to thin the stands as they deem necessary to reduce the risk of wildfire, making sure to take into account previous assessments done on flame length, rate of spread and fire type.

Sources

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