

Juniper Thinning Project on the C. L. Browning Ranch – Blanco County, Texas

One Ranch Manager's Report:

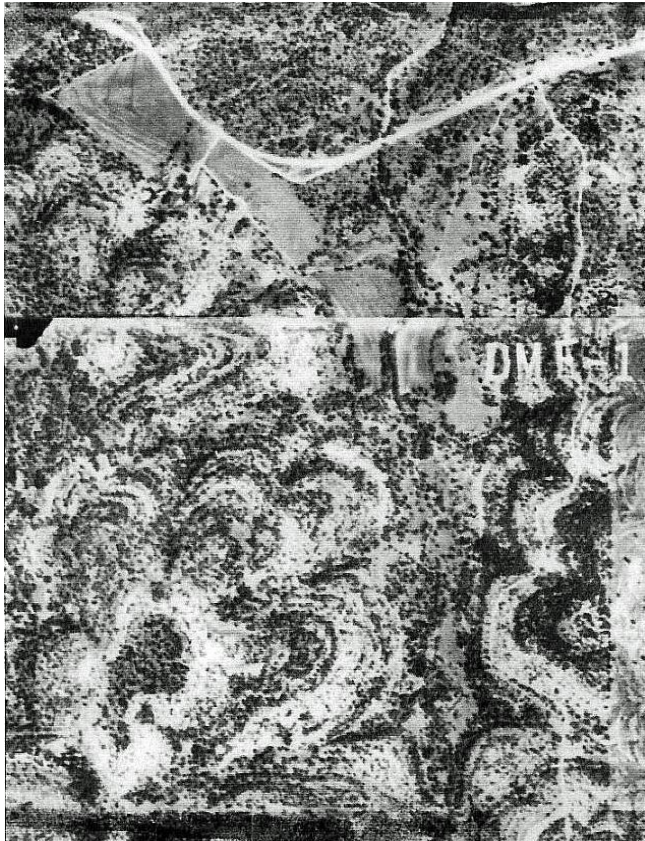


In 2002, the 979-acre C.L. Browning Ranch in Blanco County, Texas began converting its rangelands from roughly 75% oak-juniper woodland to roughly 75% open grassland. In an attempt to contribute to the common knowledge of this management practice, relevant ecologic and economic data were collected before, during and after a 442-acre thinning project in 2011. The following is a summary of the process and associated cost for the project.

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Project Planning:

The first step for the C.L. Browning Ranch juniper thinning project was to research historical aerial imagery in attempt to determine the locations of old-growth oak-juniper woodlands. These areas, along with any slope greater than fifteen percent, prime Golden-cheeked warbler nesting areas, north-facing slopes, and riparian corridors were located in the field and identified as areas to not thin. These areas were designated as permanent woodlands where selective tree plantings activities occur to diversify the mix of species.

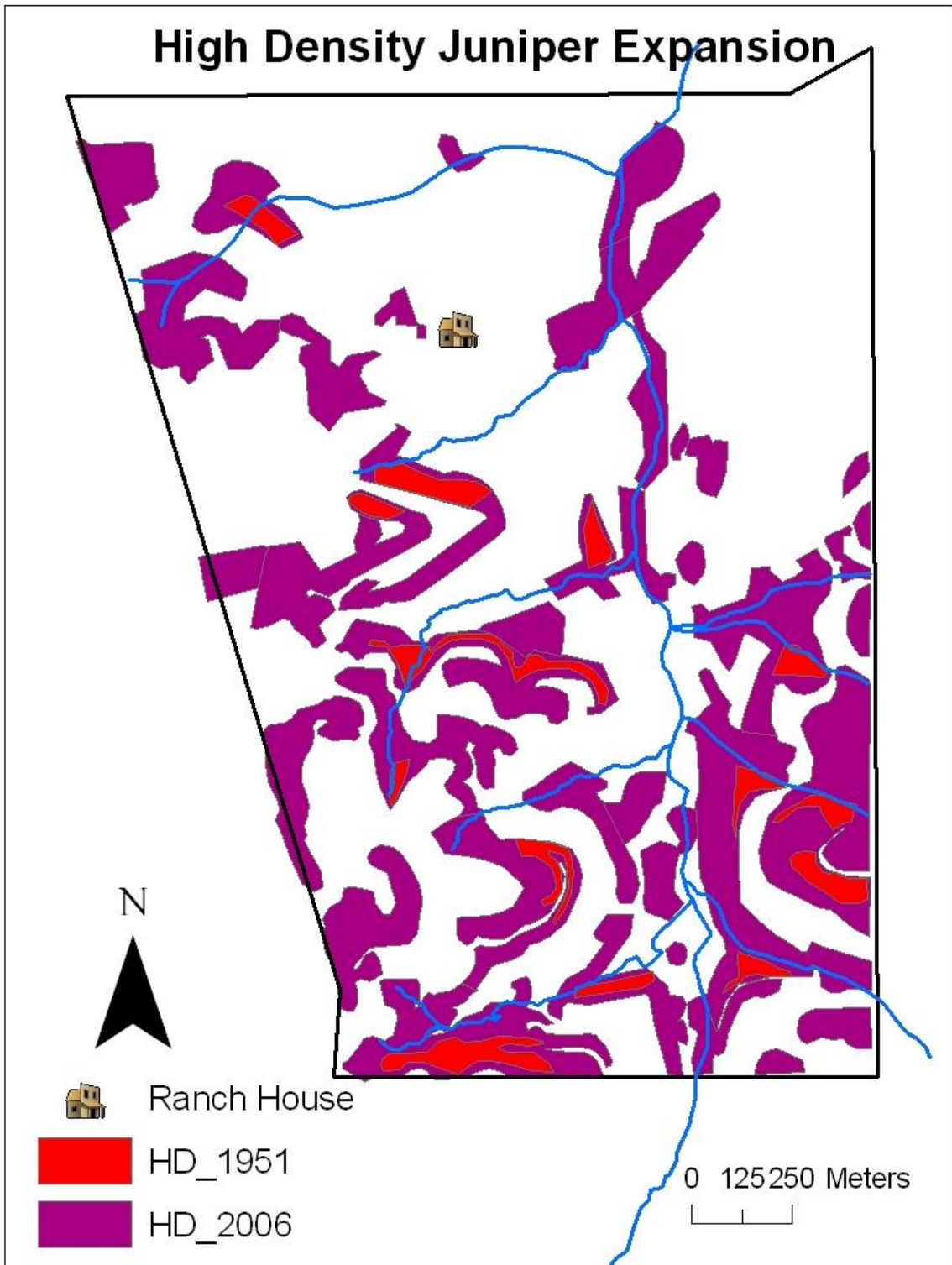


1965 aerial photo



1995 aerial photo

Aerial photographs like the ones above were obtained from the Texas Natural Resource Information System [<https://tnris.org/>] and helped to identify where thickets of oak-juniper woodlands historically existing on the Ranch. One general observation made from these images is that the densest woodlands on the ranch are found on the east side (right), especially in the tributary canyons and along the east fence line.



This image shows the growth pattern of dense oak-juniper woodlands on the Ranch from 1951 (shown in red) to 2006 (shown in purple). While not exact, comparing and visualizing this rough data further helped us to understand the historical vegetation pattern on the Ranch. Almost all of the red 1951 areas were left untouched during the thinning project.

Tools and Equipment:

Determining where and where not to thin is an important first step for any juniper thinning project. This determination drives the decision on which thinning method and type of equipment to use, such as mechanical vs biological control or bulldozer vs skid steer machinery. On the C.L. Browning Ranch, the shallow soils and steep slopes eliminated bulldozers as an appropriate option yet the density of juniper eliminated fire as a safe control method. For these reasons, skid-steer loaders and hand crews were selected as a responsible and effective way to thin the juniper. After testing all appropriate makes and models of skid steers and hydraulic tree shears, the 70 + horsepower Bobcat model and the 14" Dymax tree shear were determined to be most effective tools for project. The foam-filled tires and steel tracks significantly improved our stability and traction when operating on steep slopes.



S630 Bobcat skid steer loader with foam-filled tires, steel tracks, and a tine-fork grapple
<http://www.bobcat.com/loaders/skid-steer-loaders/models/s630/features>

During a 2011 thinning project, the skid steer was able to cover about one and three-quarters of an acre per machine hour at a completion level of roughly 85%. In most cases, once the juniper tree was cut down, the operator then drove the skid steer over the tree to crush and flatten it down. When possible, the cut juniper was positioned parallel to the contours to help hold back eroding soil

Dymax 14" Ranch Axe Tree Shear
<http://www.dymaxinc.com/attachments/1161/>



The Bobcat skid steer was purchased from Bobcat of Austin, while the Dymax tree shear was purchased from Holt Caterpillar of Austin. To avoid down-time due to maintenance issues, we take with us into the field the most common supplies and replacement parts, such as hydraulic hoses, fittings and couplers, extra shear blade bolts, fluids and filters.



Supply wagon and tarp tent for lunch breaks

The role of the hand crew during the C.L. Browning juniper thinning project was to work in the areas where the skid steer could not safely access, such as underneath oaks and elms, steep slopes, and near waterways. During a 2011 thinning project, a two-man ground crew following in the wake of skid steer was able to complete just under three acres per day. The list of field-tested equipment that worked for the C.L. Browning Ranch includes Stihl MS 261 chainsaws with 16 inch bars guiding Stihl yellow label .325" high-kickback chain, and Corona Super-Duty 32" loppers.



Hand Crew Essentials: Chaps, hard hat with ear muffs, eye protection, chainsaw, loppers, gloves, and good boots

Protective chainsaw chaps, hard hats with ear muffs, durable gloves and boots are needed for safe ground-crew operations on a juniper thinning project. The chaps pictured were purchased from Stihl, and the helmet with ear muffs was purchased from Elvex. The Stihl chainsaw and Corona loppers were purchased from the local feed and ranch store.

Chainsaws and chaps: <https://www.stihlusa.com/>

Helmets: <http://www.elvex.com/head-face-ear.htm>

Loppers: <http://coronatoolsusa.com/wl-6490-super-duty-bypass-lopper-37-in.html>

Project Costs:

The 2011 juniper thinning project employed three full time workers plus three part time workers who worked a total of 3,500 man-hours over a 125-day period at an average wage rate of \$17.50 per hour

The Bobcat S220 was financed in 2010 over 40 months at 0% with monthly payments of \$875.

The Dymax 14-inch Ranch Axe tree shear was purchased from Holt Caterpillar in 2007 for \$6,000.

The three Stihl MS 260 chainsaw used during the project cost \$450 each, while one roll of .325 high-kickback chainsaw chain un-assembled costs \$330. All chains were made and sharpened on site using Stihl chain-making tools and an Oregon bench-mounted chain sharpener.

The two Super-Duty Corona loppers used during the project cost \$130 a piece.

The 205 skid-steer machine hours required to complete the project consumed 1,750 gallons of diesel purchased at an average costs of \$3.30 per gallon.

The skid steer was able to thin 80% of the work site at an average rate of 1.73 acres of juniper per machine hour. Total rate of thinning including the ground crew averaged 2.85 acres per day.

Total costs to thin 75% of the juniper over a 442-acre work site averaged \$287.50 per acre, or \$102,000. Matching funds provided through the Texas State Soil and Water Conservation Board's Water Supply Enhancement Program totaled \$68,400.

2011 Prices for Alternative Thinning Methods:

T320 Bobcat skid steer loader with mulching attachment =	\$100,000
Tigercat M726E wheeled mulcher =	\$335,000
- Rental costs =	\$250 - \$275 per machine hour
Vermeer 1800XL chipper =	\$65,000

Lessons Learned:

Leaving the cut brush on the ground to blanket the site has produced several un-anticipated benefits. In addition to slowing down soil erosion and providing more moist and shaded conditions for grass growth, we have observed numerous desirable woody trees and shrubs growing under the branches of the cut juniper. Continued management of the White tailed deer density will help these woody species to mature. We have also documented an increase in the Bobwhite quail populations, especially in the areas where the brush was left on the ground.



A Texas Red Oak growing through the branches of a cut juniper

If the cut juniper must be picked up and disposed of, such as in the case of an agricultural producer, a cost analysis based on the density and acreage of juniper to thin might reveal that wheeled mulchers, forestry mowers, or chippers are the most cost-effective and ecologically-beneficial methods in the end. The additional cost and ground disturbance to pick up, pile, and burn can equal the original thinning cost per acre. The measurable trend toward hotter summers and more frequent, extended periods of drought across Texas will continue to restrict the number of days when burning is permitted and feasible.

We stopped all equipment operation in the field during the nesting season from mid-February until mid-July, except when our cost-sharing project schedule did not provide us with this flexibility. Avoiding the use of heavy equipment during this critical time helps to minimize disturbance not only to ground nesting birds such as quail and turkey, but also young fawns.

A side benefit to equipment operation in the field during the fall and winter is the spread of ripened warm-season grass seed that typically mature in October to December. The soil disturbance created by the equipment makes for excellent seed planting locations.

Begin controlling the regrowth juniper about five years after thinning. Lopping junipers under twelve inches is seldom an efficient use of time. The Ashe juniper needs to be cut below its lowest green branch for control. The younger the tree, the more likely it is that the lowest green branch is buried under dirt, grass, or leaf litter and less likely that the person lopping will cut below this branch. Allowing the tree to grow for a few years usually brings the lowest green branch above the surface and therefore more visible to the person lopping.