Developing Brush Management Plan

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HOUSTON LIVESTOCK SHOW AND RODEO™
HCalf
Beef Cattle Educational Program

Successful brush management improvements must be completed as part of a coordinated, long-range plan.

Systematic applications of the needed treatment is necessary to achieve the maximum results in line with the ecological goals and financial resources.

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Defining a Brush Management Plan

1. Establish objectives for the ranch that include rangeland, livestock and wildlife resources.
2. Determine brush problem and potential responses of control.
3. Identify feasible brush control alternatives.
4. Estimate treatment costs and responses.
5. Select brush control alternative.
6. Implement plan and monitor results.

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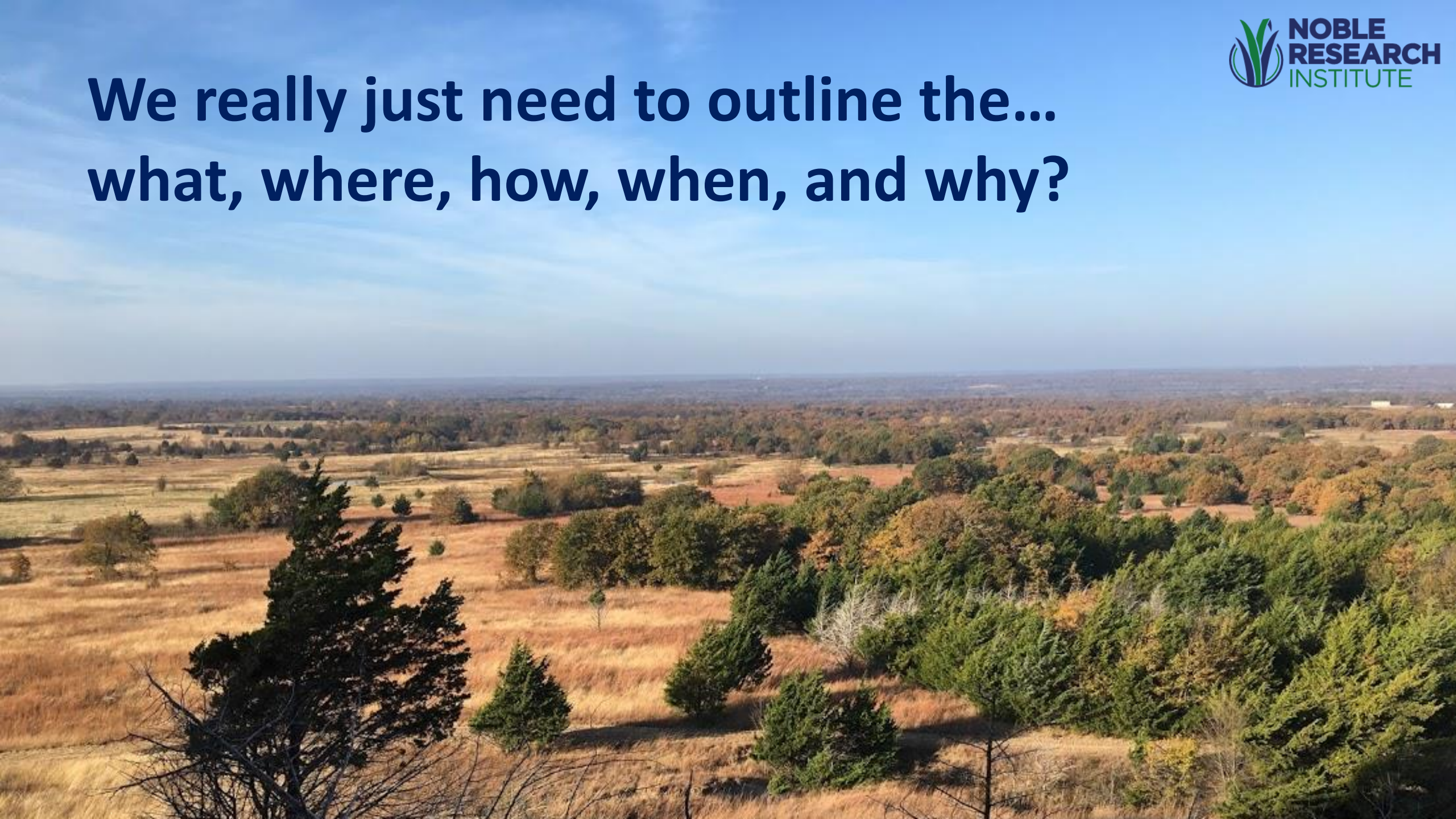
We really just need to outline the… what, where, how, when, and why?



The what: Know your Foe…

And how to manipulate it.

Know how your target will respond

Honey mesquite *(Prosopis glandulosa)*

Source: NPR

Honey mesquite *(Prosopis glandulosa)*

- **Prolific resprouter**
- **Timing of control is critical for foliar applications**
- **Forage value poor however beans are utilized**

Apical dominance of basal sprouters

- Vertical movement of growth regulators/Auxin that suppress the basal bud growth
- Top removal removes suppression of the growth regulator
- Result is a multi-stemmed shrub

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Honey mesquite *(Prosopis glandulosa)*

What Brush Management is NOT

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The where…

Google:
Web Soil Survey

Home | About Soils | Help | Contact Us

You are here: Web Soil Survey Home

Search
Enter Keyword Go
All NRCS Sites

Browse by Subject
- Soils Home
- National Cooperative Soil Survey (NCSS)
- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)
- Series Extent Explorer
- Geospatial Data Gateway
- eFOTG
- National Soil Characterization Data
- Soil Health
- Soil Geography

The simple yet powerful way to access and use soil data.

START WSS

Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center at the following link: USDA Service Center or your NRCS State Soil Scientist at the following link: NRCS State Soil Scientist.

Four Basic Steps

1 Define.

Use the Area of Interest tab to define your area of interest.

Click or Press the Enter

I Want To...
- Start Web Soil Survey (WSS)
- Know Web Soil Survey Requirements
- Know Web Soil Survey operation hours
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure
- Use Web Soil Survey on a mobile device

Announcements/Events
- Web Soil Survey 3.4.0 has been released! View Web Soil Survey release history
- Sign up for e-mail updates via GovDelivery

I Want Help With...
- Getting Started

Aerial resolution: Ecological Site Assessment Coffey Ranch

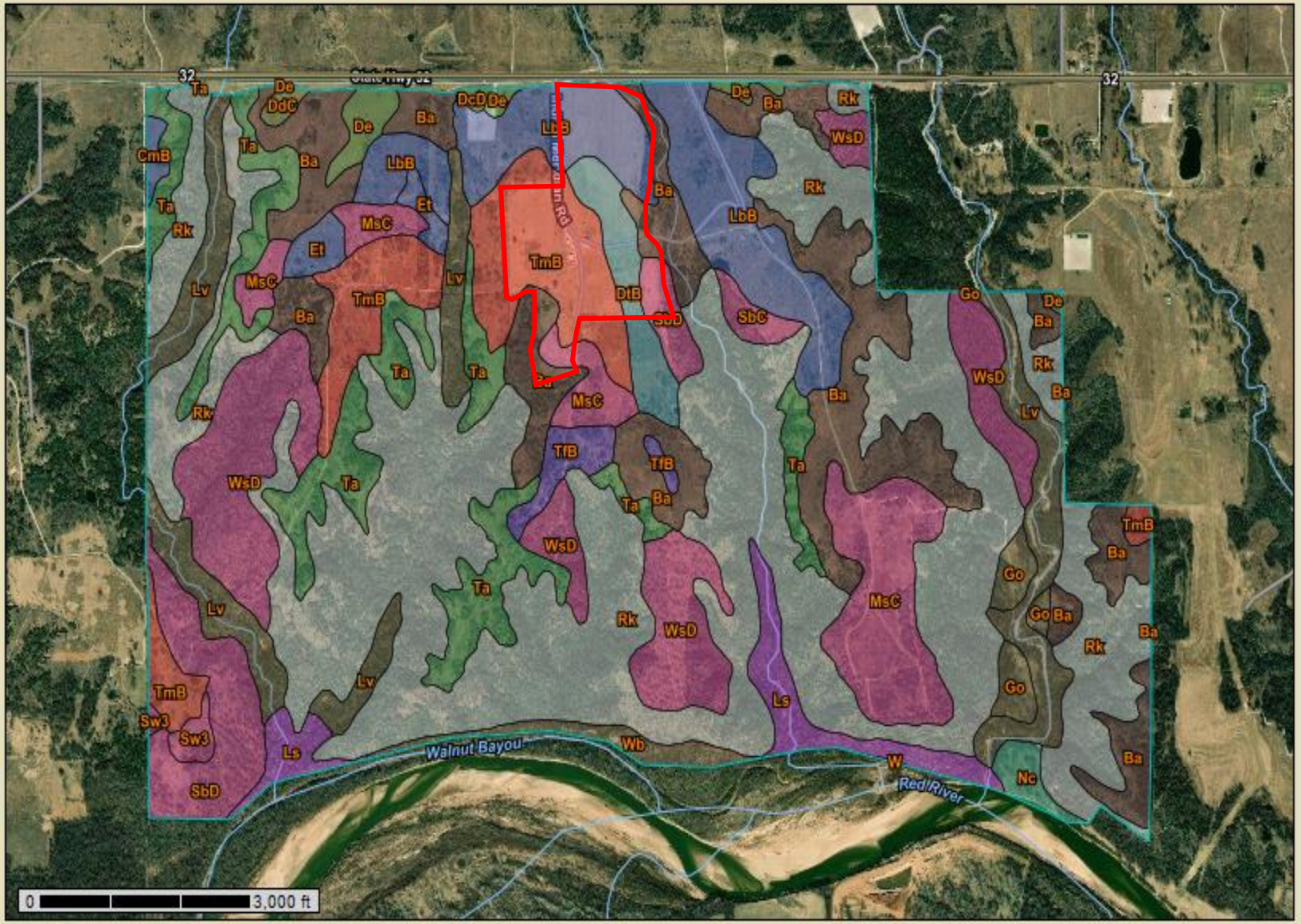
Ecological Sites

Open All | Close All

- All Ecological Sites
- R080AY045OK — Clay Bottomland
- R080AY050OK — Loamy Bottomland
- R080AY056OK — Loamy Upland
- R080AY073OK — Sandy Loam Upland
- R084AY075OK — Sandy Loam Savannah
- R084BY169TX — Deep Sand 29-33" PZ
- R084BY170TX — Loamy Bottomland 29-33" PZ
- R084BY171TX — Loamy Sand 29-33" PZ
- R084BY172TX — Sandy 29-33" PZ
- R084BY173TX — Sandy Bottomland 29-33" PZ
- R084BY174TX — Sandy Loam 29-33" PZ
- R084BY175TX — Tight Sandy Loam 29-33" PZ
- R085XY002OK — Clay Upland 38-42 PZ
- R085XY003TX — Claypan 35-40 PZ
- R085XY056OK — Loamy Upland 38-42 PZ
- R085XY177TX — Blackland 30-38" PZ
- R085XY178TX — Clayey Bottomland 30-38" PZ
- R085XY179TX — Clayey Slope 30-38
- R085XY180TX — Deep Redland 30-38" PZ

Legend

Scale (not to scale)



Search

Ecological Sites

Open All | Close All

- All Ecological Sites
- R080AY045OK — Clay Bottomland
- R080AY050OK — Loamy Bottomland
- **R080AY056OK — Loamy Upland**
  - This Ecological Site
  - **1.1 Tallgrass Prairie (Reference Community)**

View Plant Community Info

View Options

- Plant Community Photos
- Plant Community Description
- Vegetation Tables
  - Annual Production
  - Plant Species Composition
  - Plant Growth Curve
- Cover Tables
  - Soil Surface Cover
  - Ground Cover

Plant Community Photos — Tallgrass Prairie (Reference Community)

Tallgrass Prairie (Reference Community)

Description — Tallgrass Prairie (Reference Community)

The reference community for this site is an open tallgrass prairie dominated by little bluestem, big bluestem, sand bluestem, Indiangrass, and switchgrass. The major midgrasses and shortgrasses are sideoats grama, blue grama, meadow dropseed and Scribner's panicum. This site also supports a variety of forbs and legumes including catclaw sensitivebrier, leadplant, wild indigo, heath aster, Englemann's daisy, Maximillian sunflower, ashy sunflower, dotted gayfeather, western ragweed, Louisiana sagewort, Illinois bundleflower, pitchers sage, and others. Scattered prickly pear cactus, and soapweed yucca may be found on this site. This plant community has evolved through the collective influence of extremes in temperature, rain, wind, drought, fire, and seasonal herbivory by large ungulates, primarily bison.

Long term overgrazing decreases the more palatable grasses such as big bluestem indiangrass, and switchgrass as well as palatable forbs and legumes. Under this scenario, little bluestem, silver bluestem, mesquite, prairie threeawn, other annual and perennial grasses, and forbs will usually increase. The rate at which this occurs is dependent upon stocking rate and climatic patterns.

- 1.2 Little Bluestem Dominant
- 1.3 Midgrass Dominant
- R080AY073OK — Sandy Loam Upland
- R084AY075OK — Sandy Loam Savannah
- R084BY169TX — Deep Sand 29-33" PZ
- R084BY170TX — Loamy Bottomland 29-33" PZ
- R084BY171TX — Loamy Sand 29-33" PZ
- R084BY172TX — Sandy 29-33" PZ
- **R084BY173TX — Sandy Bottomland 29-33" PZ**
  - This Ecological Site
  - 1.1 Tallgrass Floodplain Community
  - 1.2 Tallgrass/Shrubland Transition Community
  - 2.1 Hardwood/Shrubland Transition Community
  - 2.2 Hardwood/Woodland Community
  - 3.1 Converted Land Community
- R084BY174TX — Sandy Loam 29-33" PZ
- R084BY175TX — Tight Sandy Loam 29-33" PZ
- R085XY002OK — Clay Upland 38-42 PZ
- R085XY003TX — Claypan 35-40 PZ
- R085XY056OK — Loamy Upland 38-42 PZ
- R085XY177TX — Blackland 30-38" PZ
- R085XY178TX — Clayey Bottomland 30-38" PZ
- R085XY179TX — Clayey Slope 30-38
- R085XY180TX — Deep Redland 30-38" PZ
- R085XY185TX — Shallow 30-38" PZ

Tables — Tallgrass Prairie (Reference Community)

Annual Production (Lbs/Acre)

Plant Type	Low	Representative Value	High
Grass/Grasslike	2,250	4,275	5,400
Forb	175	330	420
Shrub/Vine	50	95	120
Tree	25	47	60
Totals	**2,500**	**4,747**	**6,000**

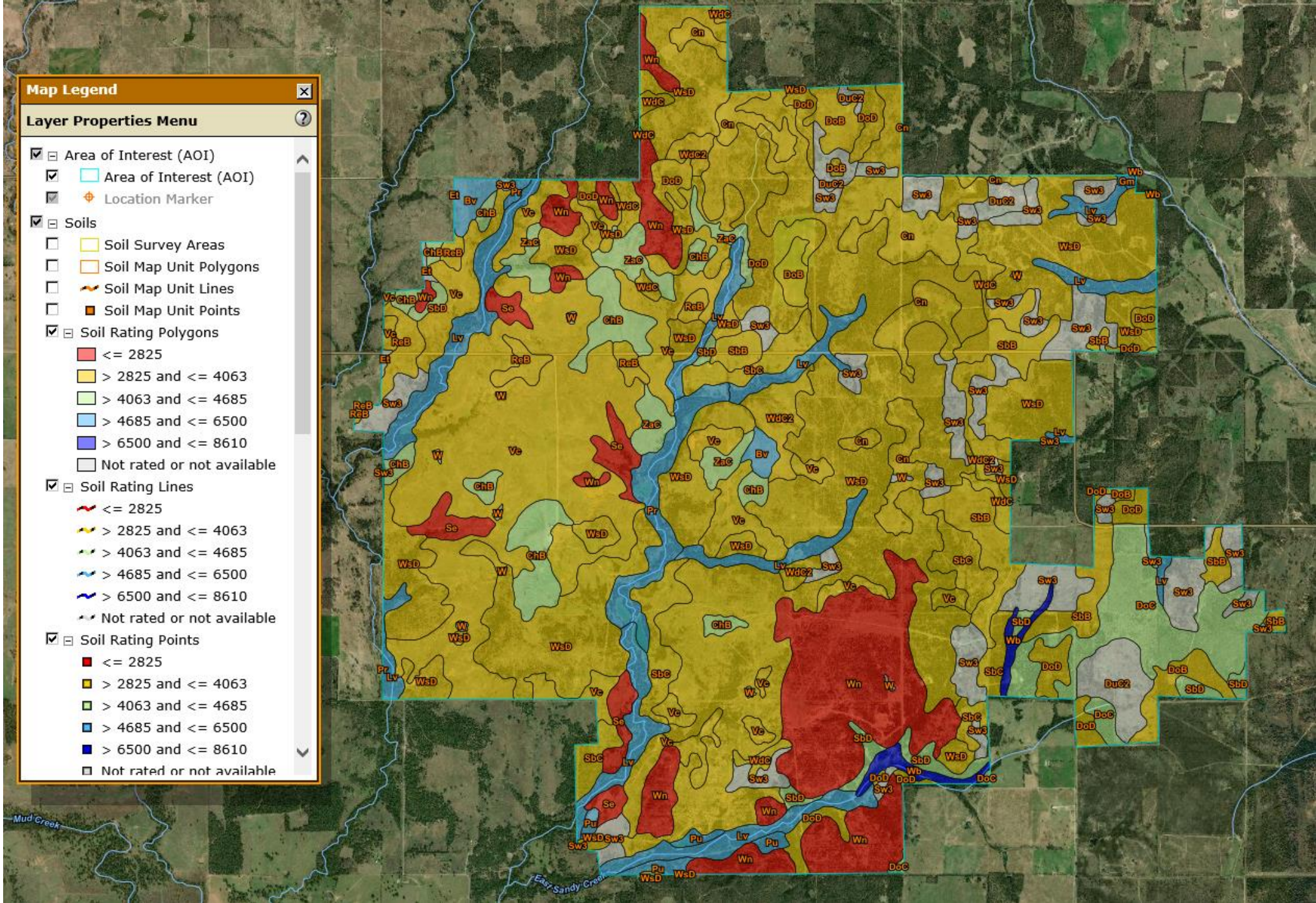
Plant Species Composition (Lbs/Acre)

Grass/Grasslike

Group	Plant Common Name	Plant Scientific Name	Annual Production Pounds Per Acre	
			Low	High
1			**2150**	**5160**
	big bluestem	Andropogon gerardii	250	600
	sand bluestem	Andropogon hallii	250	600
	switchgrass	Panicum virgatum	368	884
	little bluestem	Schizachyrium scoparium	632	1516
	indiangrass	Sorghastrum nutans	632	1516
	eastern gamagrass	Tripsacum dactyloides	19	44
2			**24**	**57**

Estimated Representative Production Values Lbs/Ac

Love County, Oklahoma



The How:

Brush Management Techniques

Brush Management Methods

The three most common methods of control that provide effective results are:

Mechanical

(grubbing, dozing, etc.)

Prescribed Fire

Chemical

**(Broadcast (Aerial or Ground),
(IPT) individual plant treatment)**

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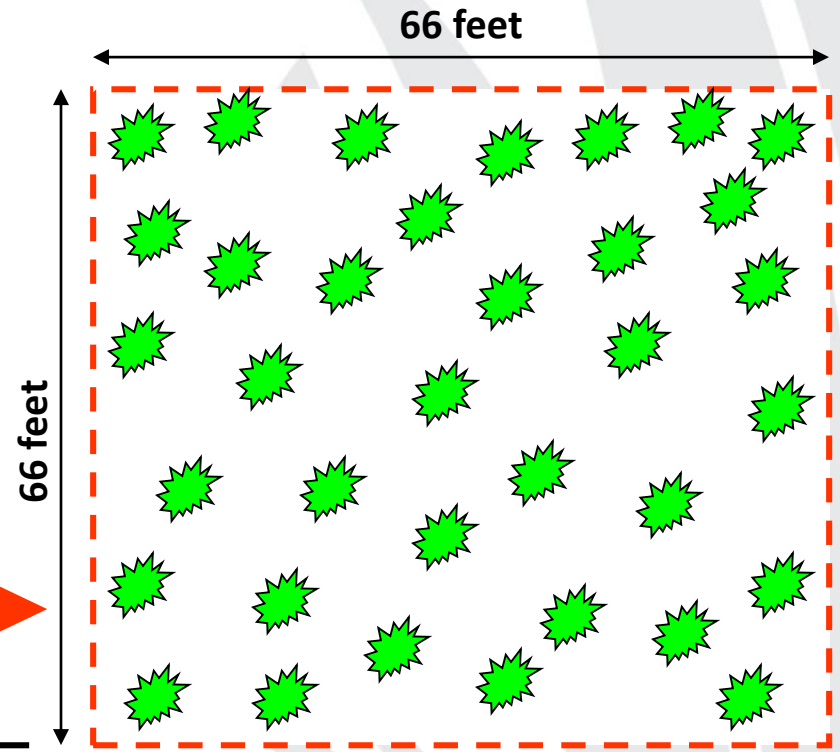
The “How” is often determined by Plant Density

* Mesquite densities greater than 400 plants per acre should be controlled by means other than Individual Plant Treatment (IPT).

* The following example is a simple method for determining the number of target plants per acre :

1. Measure off a 66 ft. x 66 ft. plot that is representative of area. This area is 1/10th of an acre.
2. Count the number of target plants that are rooted within the plot.
3. In this example there are 35 plants within the plot :

(35 plants X 10 = 350 plants/acre)



*Therefore, IPT would be feasible in this area (more than 400).

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There are lots of mechanical options…

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Mechanical Dozing: $100-$150/hour


Source: Cayman Compass

* Dozing is very unselective

* Tends to cause significant soil disturbance often requiring seeding

* Adequate soil moisture is required to limit shearing at ground level above buds.

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Mechanical Grubbing: $150-$250/Acre

* Power grubbing is most useful with scattered plants that are at least 3 ft. tall.

* The efficiency of power grubber's decreases as soil clay content increases and water content decreases.

* Low-energy power grubber's may be used on thin stands of small mesquite. Root diameter less than 4 in.

* Mesquite and hardwood roots must be grubbed at least 14 in. or deeper to remove all of the basal and root buds.

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Excavator Grubbing:

Excavator grubbing is used to very selectively remove resprouting target species. This method is much more selective than dozing.

*** This method works best on smaller size brush, however can remove larger brush but will take longer.**

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Hydraulic Shearing: $100-$150/Ac

• Hydraulic Shearing is used to selectively remove the target species at ground level.

* Shearing should not be used on areas that are to be reseeded

* Shearing should not be applied on areas that are very steep and or rocky

* If shearing “Re-sprouters” the stumps should be sprayed within 30 minutes, preferably immediately.

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Hydraulic Mulching

Mulching is an effective way to remove brush

* However, target species should be noted and most will resprout.

* Cost will depend on the density of the brush and the desired size of the mulch

* Positive is there are no brush piles, con is the mulch layer can limit forage recovery if its too thick and cost/ac is usually very high.

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Chemical Options- Decision is Density Dependent

- Pros
  - Wide spectrum of activity
  - Lack of re-sprouting
  - Reduced erosion risk
  - Speed

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Aerial Application $25-$120/ac depending on the mix

- Can cover large areas quickly
- Can spray inaccessible locations
- Able to treat trees and brush too large for a ground rig
- Susceptible to drift
- High application cost

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Boomless or cluster sprayer

- Ideal for rough terrain
- Less accurate
- Uneven spray distribution
- More susceptible to drift

Individual Plant Treatment

- Selective
- Good coverage
- Low equipment cost
- Labor intensive
- Exposure potential

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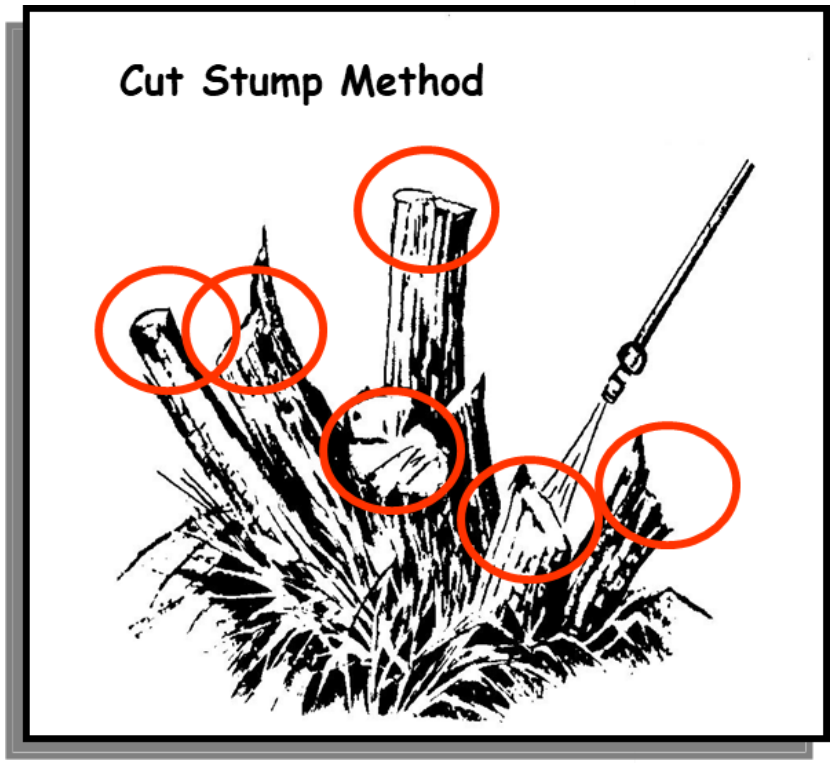
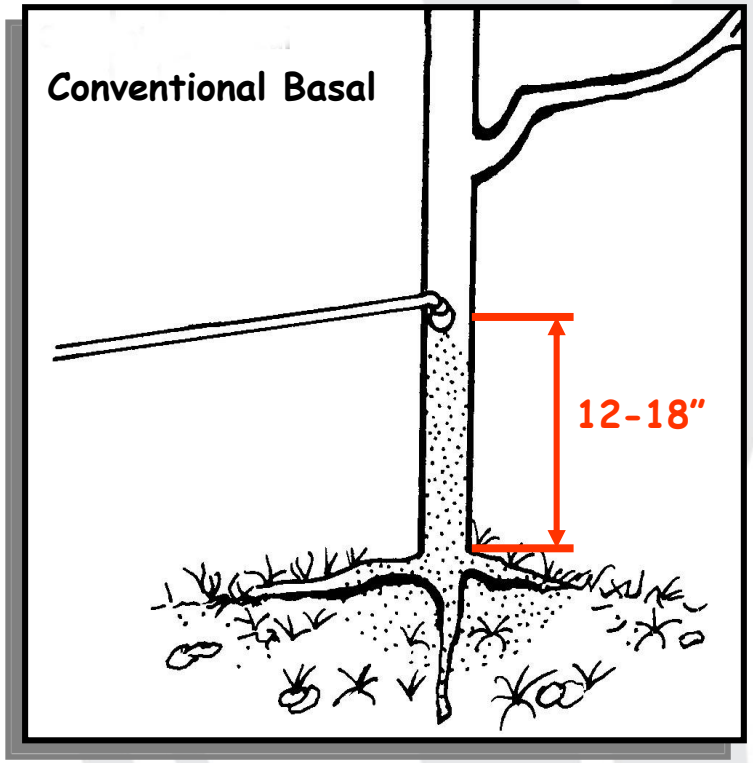
Individual Plant Treatment (IPT)





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https://texnat.tamu.edu/about/brush-busters/

Individual Plant Treatment (IPT) continued

* Regardless of the method you choose for (IPT), it will be necessary to mark the plants you treat.

* This will insure that all plants in the target area will be treated and minimize the number of untreated plants.

* There are commercial dyes that can be added to the herbicide mix, but they are sometimes difficult to see.

* Another option is to mark the treated plants with "Florescent Orange" spray paint. It is inexpensive and easy to see.

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Herbicide Use

Always read and follow label directions. It is the LAW!

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Follow-up Treatments

- Follow-up treatments should generally be planned 4-5 years following the initial treatment, however they will depend on the target species.

- Prescribed burning, IPT chemical control, and hand cutting are the 3 most common follow-up treatments

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Ag Tools

Mobile App

The Ag Tools mobile application is a set of calculators and utilities designed by the Noble Research Institute to help agricultural producers gain information as they make routine management decisions.

Calculators currently available:

- Body Condition Score Change
- Breeding Season
- Calving Season
- Frame Score
- Lime Application
- Pond Fish Stocking
- Supplement Conversion
- Value of Gain
- Boom Sprayer Calibration
- Boomless Sprayer Calibration
- Dry Fertilizer
- Orchard Sprayer Calibration
- Planter Calibration

More calculators will be added in the future.

The app can be downloaded for free through the Apple App Store or Android Google Play.

App Store Google Play

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BOOM SPRAYER CALIBRATION

(Ounce Calibration Method)

Materials needed are: measuring tape, a watch with a second hand or stopwatch, and a measuring jar graduated in ounces.
Note: This calibration method will only work on sprayers with equal distance between nozzles.

1 Thoroughly clean the spraying system and fill the sprayer tank with water. Then turn on the sprayer and check if each nozzle is putting out the same amount. Catch the spray from each nozzle for a given time period (usually 25 to 30 seconds is long enough) and record amount for each nozzle. The collected amounts should not vary by more than 10 percent across the boom.

2 Use the chart on the right for the distance to drive in field. Use nozzle spacing for broadcast booms. For directed and band rigs, use the row spacing. (Example: 20 inches between nozzles, you must travel 204 feet.) For spacings that are not shown on this chart, use 4,080 divided by the nozzle spacing to find travel distance.

3 Set the throttle and gear for spraying and operate all equipment to simulate the actual spraying operation. Do not rely on the speedometer to determine speed. Note the seconds required to drive measured distance.

4 Set the desired pressure on the sprayer (if the sprayer is power-take-off PTO driven, keep throttle setting the same as it was in the field). With the sprayer parked, collect the output from one nozzle for the recorded travel time in the previous step. On directed rigs, collect spray from all nozzles per row for the noted time, and use the total spray collected at one position for the following step.

5 Nozzle or nozzle group output in ounces equals the gallons/acres applied (10 ounces = 10 gallons per acre). If the gallons per acre result you receive is not reasonable for the product applied, change the rate by either:

A. adjusting the pressure and recalibrating,
B. adjusting the travel speed or
C. changing the nozzle size

6 As nozzles wear, their flow rate increases. If nozzle flow rates are 10 percent above those of new nozzles, replace them. Replace all nozzles on a single sprayer at the same time.

Effective Swath Width (Feet)	Travel Distance (Feet)
14	291
16	255
18	227
20	204
22	185
24	170
26	157
28	146
30	136
32	127
34	120
36	113
38	107
40	102

If you have any questions, please call your Noble soil/crop consultant at (580) 223-5810.

https://www.noble.org/videos/calibrate-boom-sprayer/

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BOOMLESS SPRAYER CALIBRATION

Materials needed are: measuring tape, a watch with a second hand or stopwatch, and a measuring jar graduated in ounces.
Note: This calibration method will only work on sprayers with equal distance between nozzles.

1 Thoroughly clean the spraying system and fill the sprayer tank with clean water. Turn on the sprayer and ensure the sprayer is emitting an even pattern.

2 Determine the effective spray width for your sprayer by measuring the total wetted spray width in feet and multiplying by 0.80 or 0.85. Multiply by 0.80 or 0.85 to ensure that you get good overlap in your pattern (Example total wetted spray width of 35 feet x 0.85 = effective spray width of 30 feet).

3 Use the chart at right for distance to drive in field. (Example: An effective swath width of 27.5 feet would require you to travel 199 feet.) For swath widths that are not shown on this chart, use 5,460 divided by the effective swath width to find travel distance.

4 Set the throttle and gear for spraying and operate all equipment to simulate the actual spraying operation. Do not rely on the speedometer to determine speed. Note the seconds required to drive measured distance.

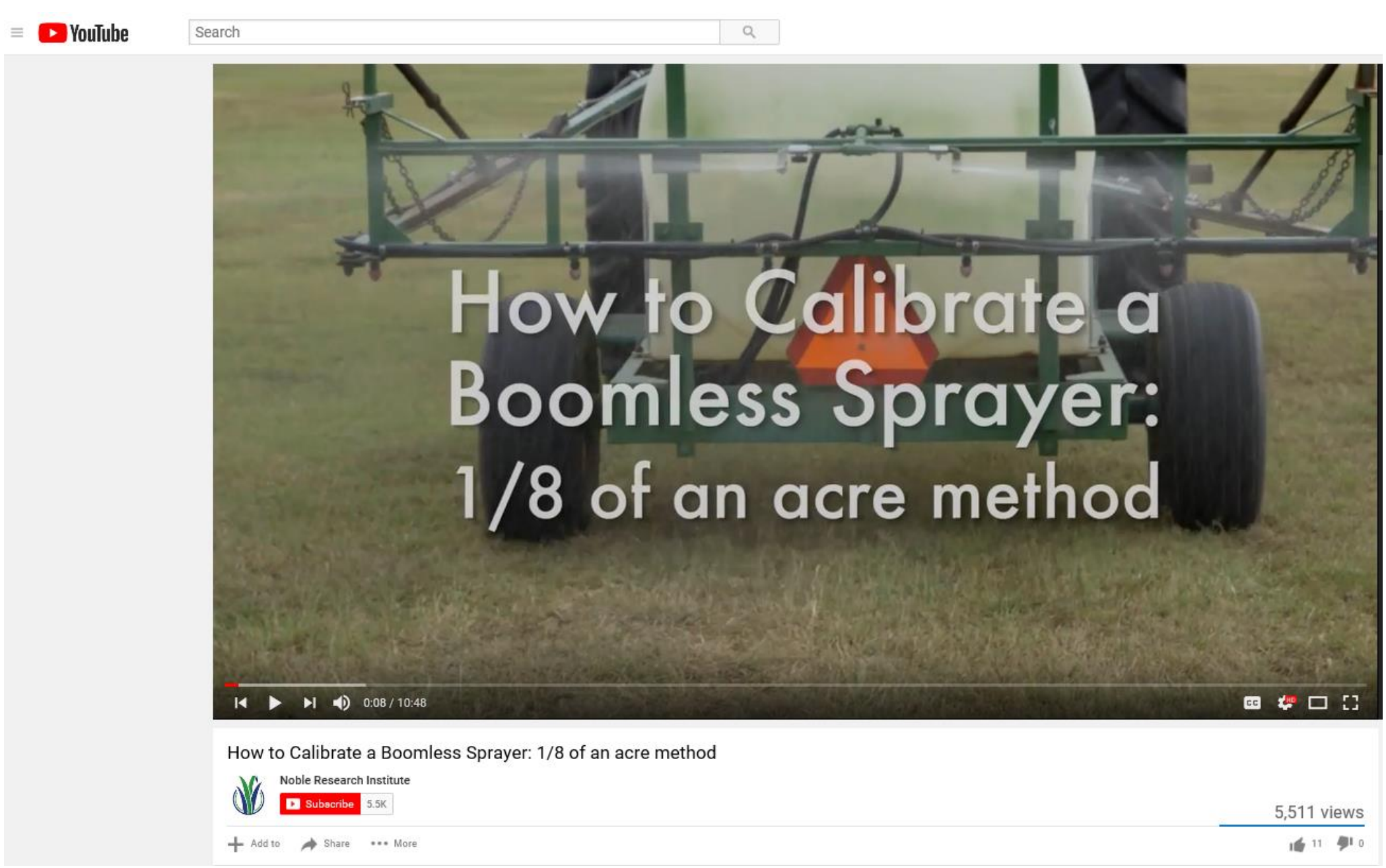
5 Set the desired pressure on the sprayer (If the sprayer is power-take-off PTO driven, keep throttle setting the same as it was in field). With the sprayer parked, collect the output from the sprayer for the recorded travel time in the previous step.

6 Sprayer output in pints equals the gallons/acre applied (10 pints = 10 gallons per acre). If the gallon per acre result you receive is not reasonable for the product applied, change the rate by: a) adjusting the pressure and recalibrating, b) adjusting the travel speed, or c) changing the nozzle size.

7 As nozzles wear, flow rate increases. If nozzle flow rates are 10 percent above those of new nozzles, replace them. Replace all nozzles on a single sprayer at the same time.

Effective Swath Width (Feet)	Travel Distance (Feet)
20	273
22.5	243
25	218
27.5	199
30	182
32.5	168
35	156
37.5	146
40	137
42.5	128
45	121
47.5	115
50	109

If you have any questions, please call your Noble soil/crop consultant at (580) 223-5810.



https://www.noble.org/videos/calibrate-boomless-sprayer/

The when…is dependent on the target species and the application method

Foliar Applications (IPT or Broadcast) Optimum spray timing :

- Spring/Summer when soil reaches 75ºF at a 12”depth. Make sure there is no leaf damage from insects, hail, etc. Leaves should be a uniform healthy green color.
- Physiological status of the plant, carbohydrates must be translocating to the basal bud zone. Also, make sure the plant has no leaf damage from insects, hail, etc., must be healthy, with dark green colored leaves
- Do not spray if plants are predominantly in the “long-shoot” or vegetative resprout stage. (i.e. following mechanical disturbance)

Basal Bark or Cut Stump timing:

- Both applications can be done anytime of the year, however cut stump treatments should be applied immediately after cutting on the freshly cut surfaces of stumps.

Mechanical

- Anytime there is adequate soil moisture

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The Why: Wildlife Considerations

Brush has some desirable attributes

It provides food and cover for many wildlife species, therefore...

... management objectives should accommodate the habitat needs of all wildlife.

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Why Should We Manage Brush?

More Water?

It Depends!!!

It is Complicated!

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North Concho Project

- Projected flow increase of 3-5 fold
- $14 million program (Saleh et al. 2009)
- Results not as expected (Wilcox et al. 2008, Wilcox et al. 2010)

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Pecos River

- Treated 60 miles of river for salt cedar
- No evidence of streamflow increase (McDonald et al. 2013)

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Other Results

- Decrease interception and evapotranspiration and increase in flow in small springs and seeps (Huang et al. 2006, Owens et al. 2006, Wilcox et al. 2006b, Heilman et al. 2009)
- Carrizo Wilcox Aquifer in South Texas show increase in recharge in wet years (Moore et al. 2012)

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Why Should We Manage Brush?

- Large parts of Texas and Oklahoma are now woodlands
- Increased forage production
- Richer biodiversity
- Improved wildlife habitat
- Rejuvenate small springs

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Brush Encroachment 1989-2019

Rangeland Analysis Platform

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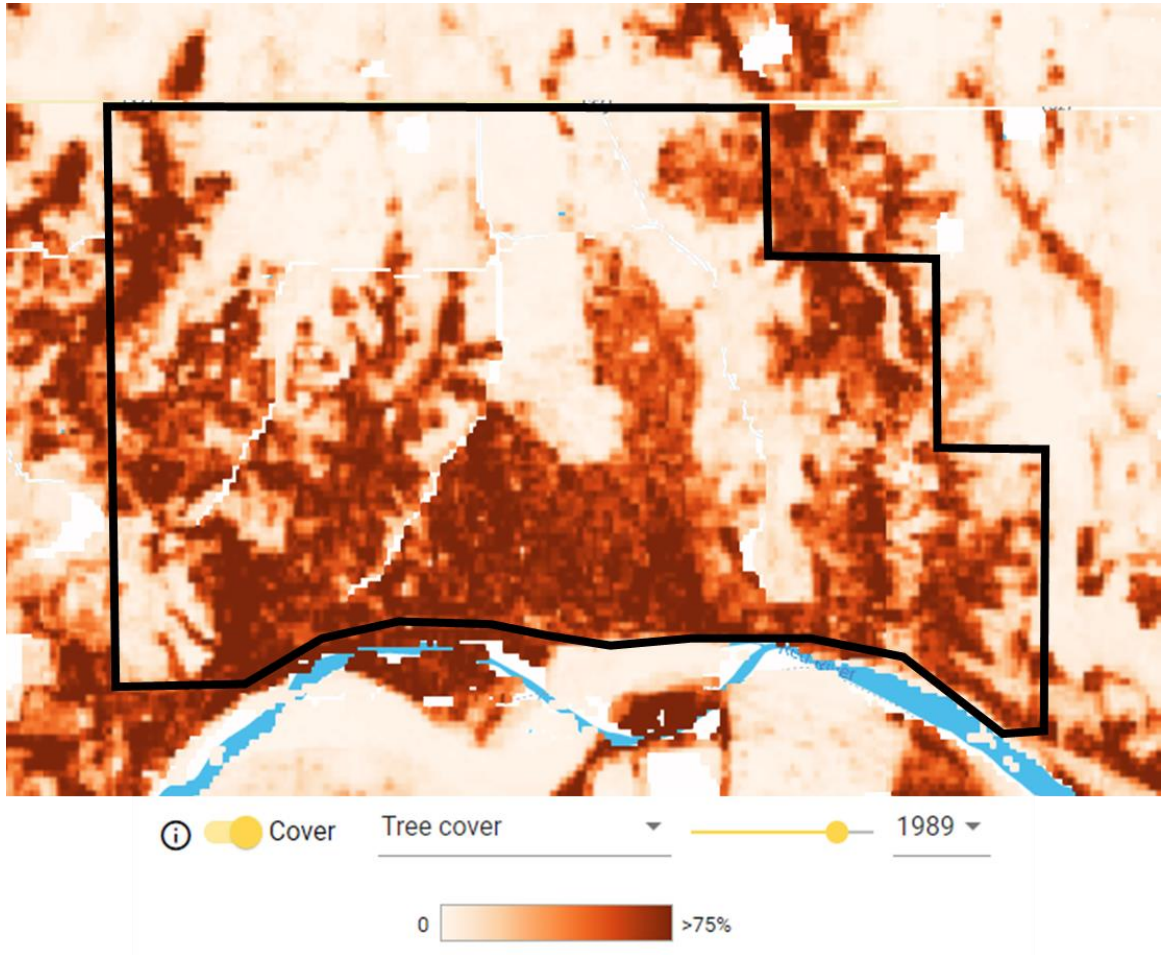
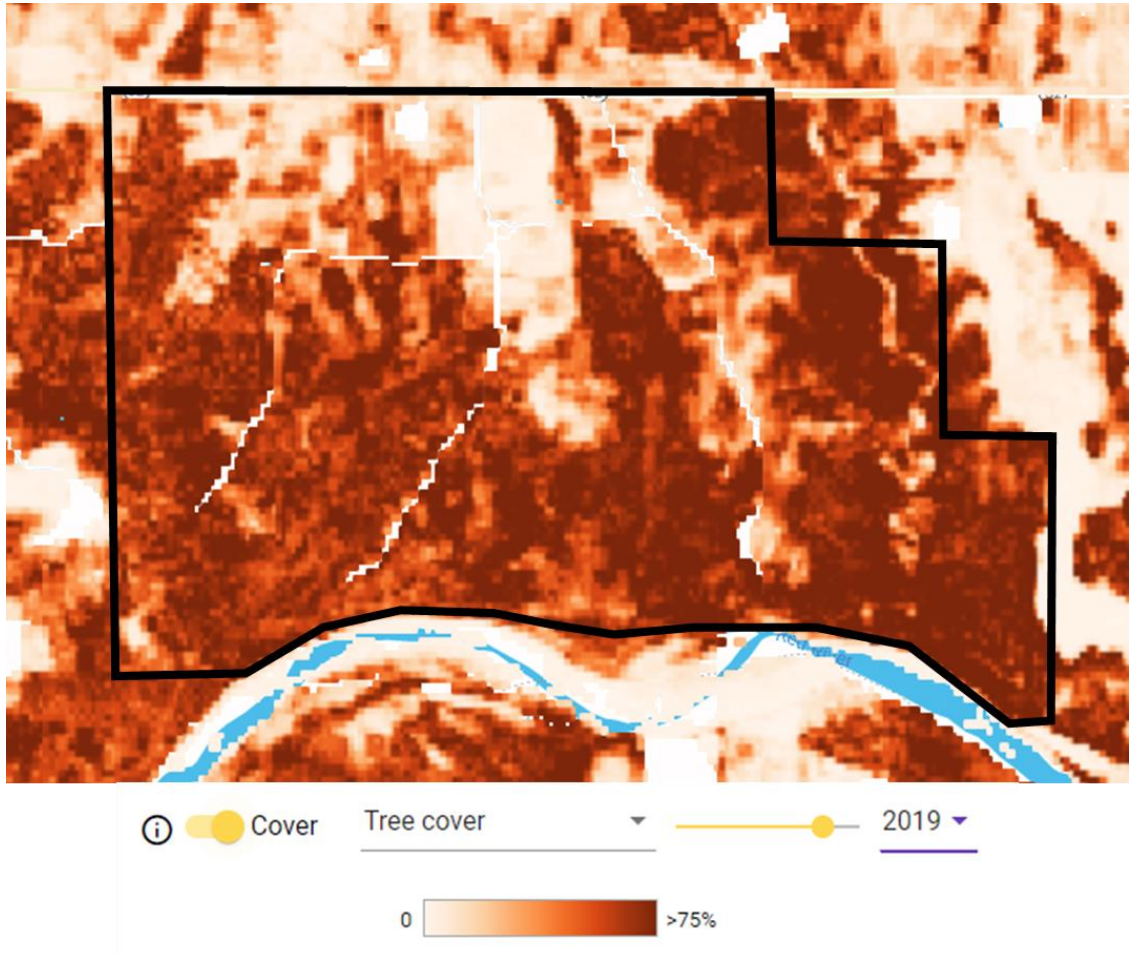
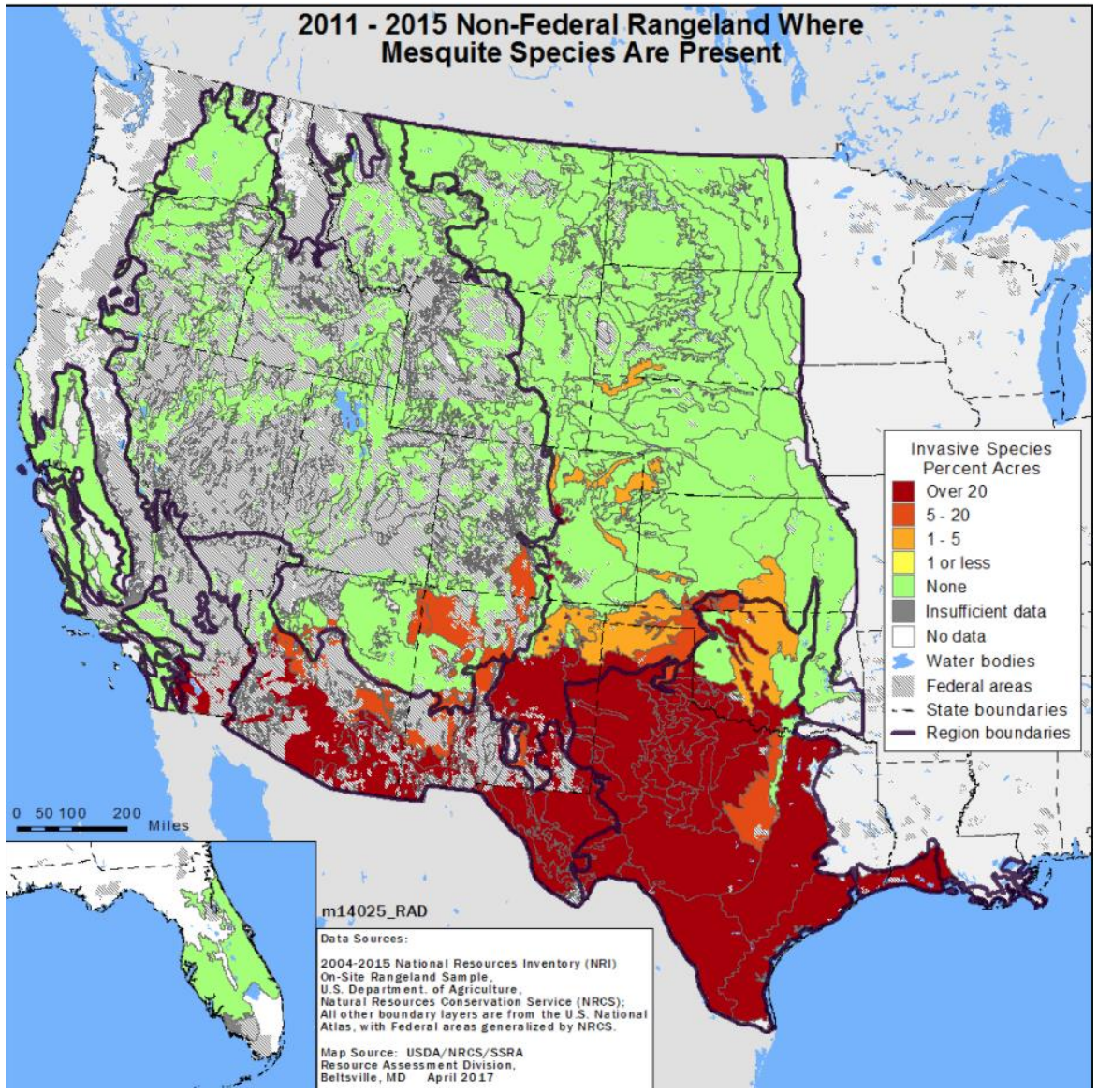
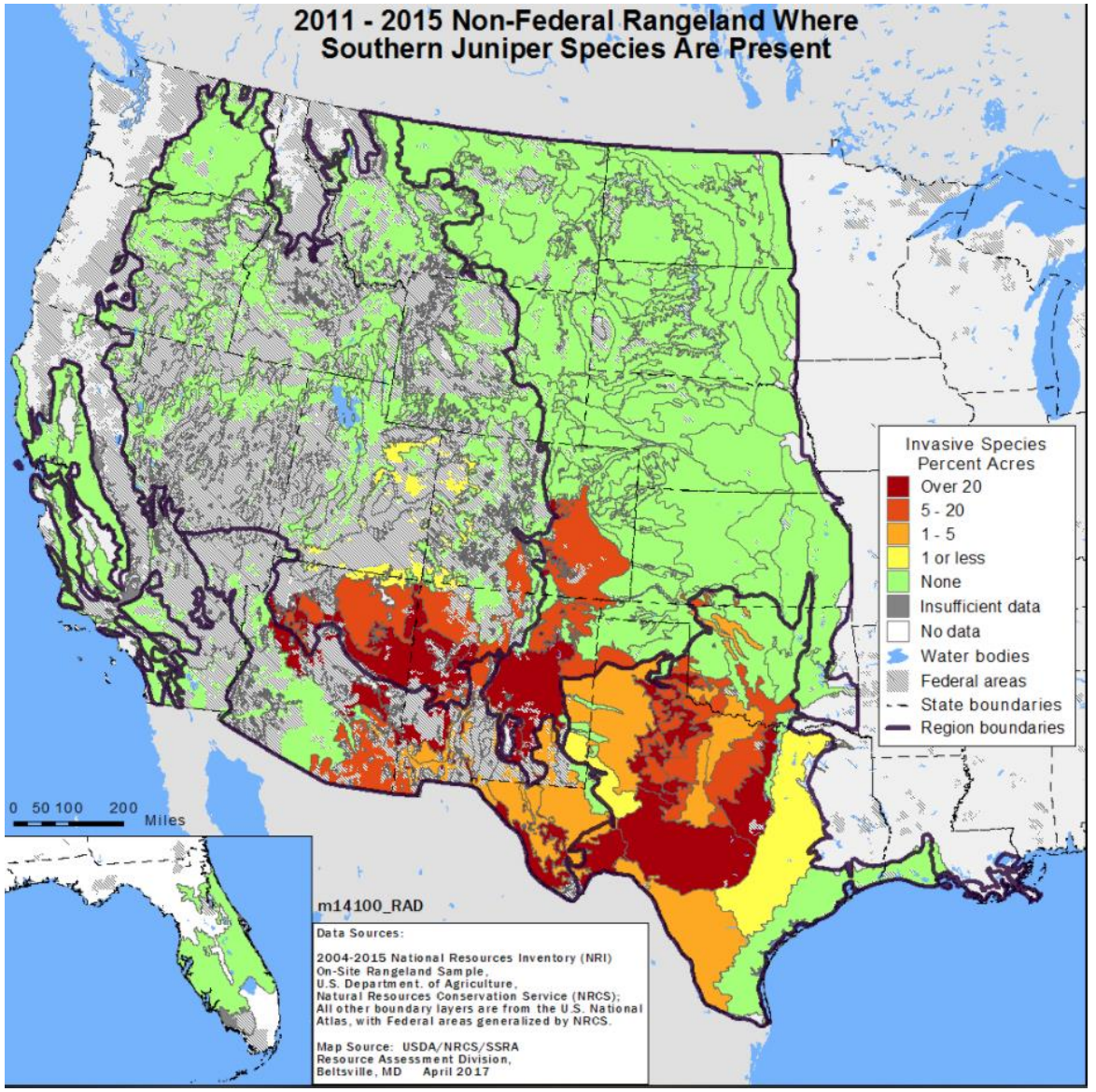




2018 National Resources Inventory
Rangeland Resource Assessment





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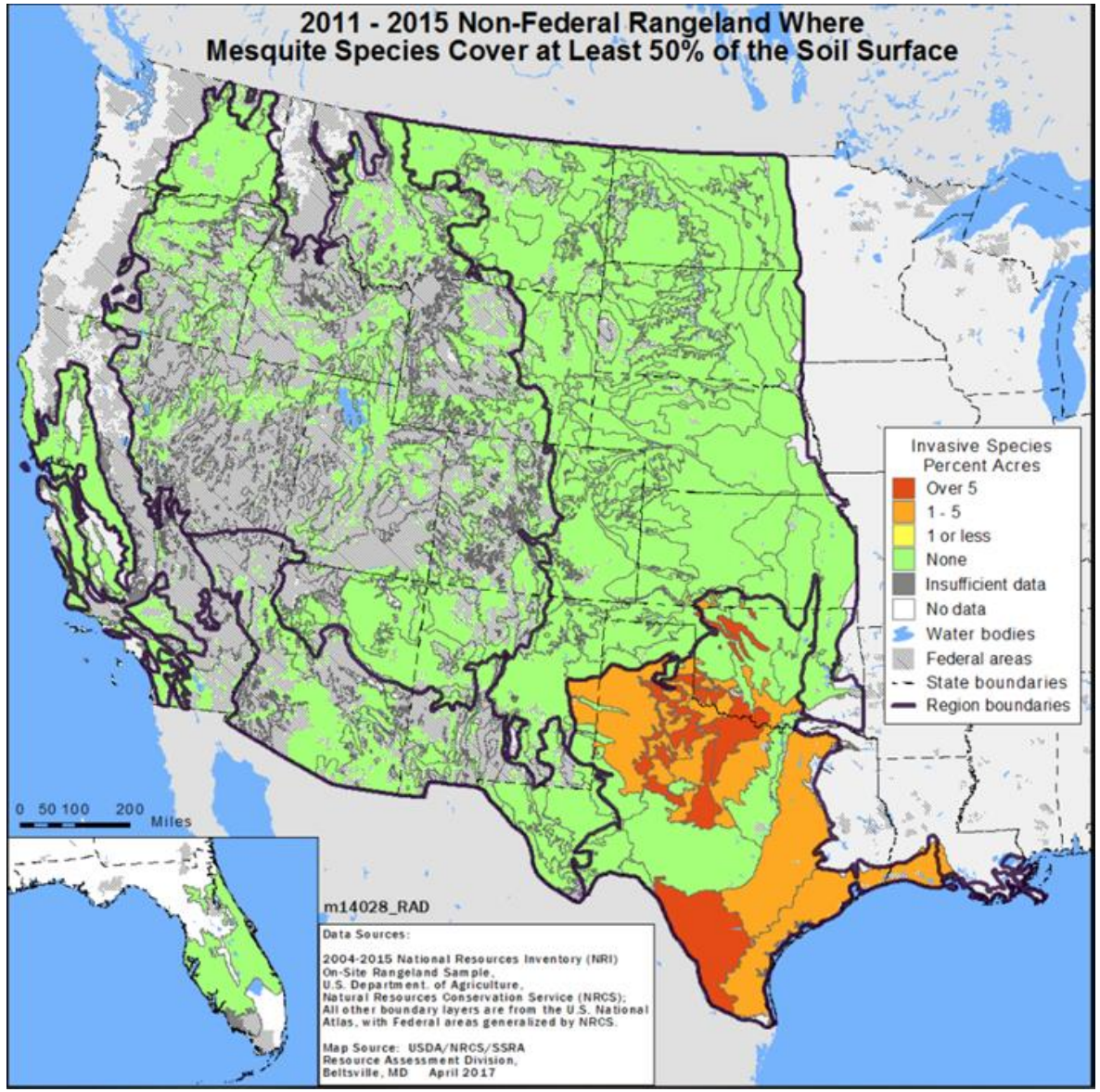
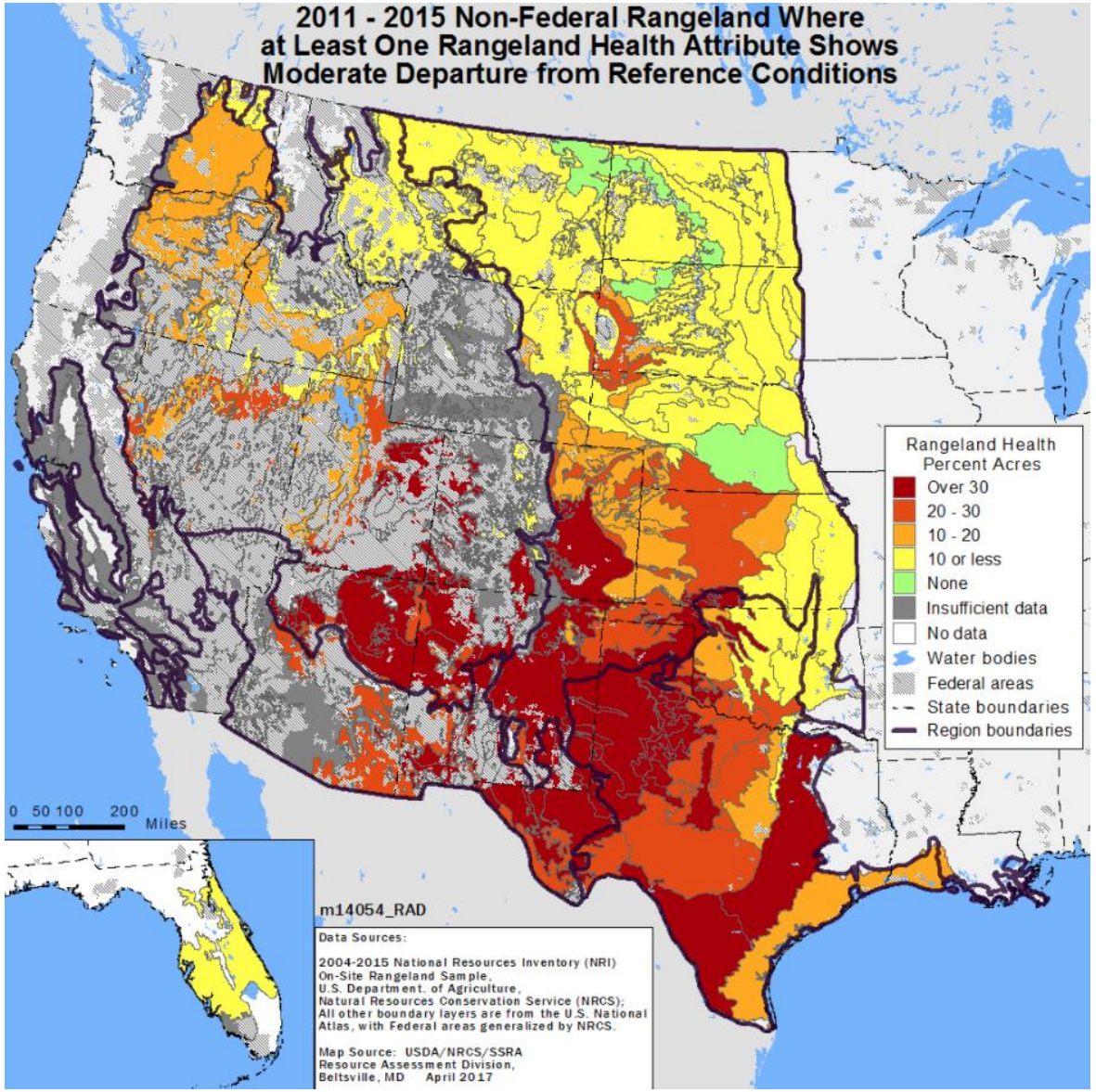
Rangeland Resource Assessment





The why: Time to Challenge Mental Models, Paradigms and Mindsets

Many times the ecological barriers to production are the easiest to address.

Other times it is perceptual misconceptions that can affect an operation the most…

What about the economics?

The Price of Procrastination

Honey Locust Research- Love County, OK

- Measured tree height
- Recorded time to spray each tree
- Calculated amount of herbicide used on each tree
- Valued time while spraying at $15 per hour
- Does not include time moving between trees – actual labor cost is higher than reported (could be much higher)

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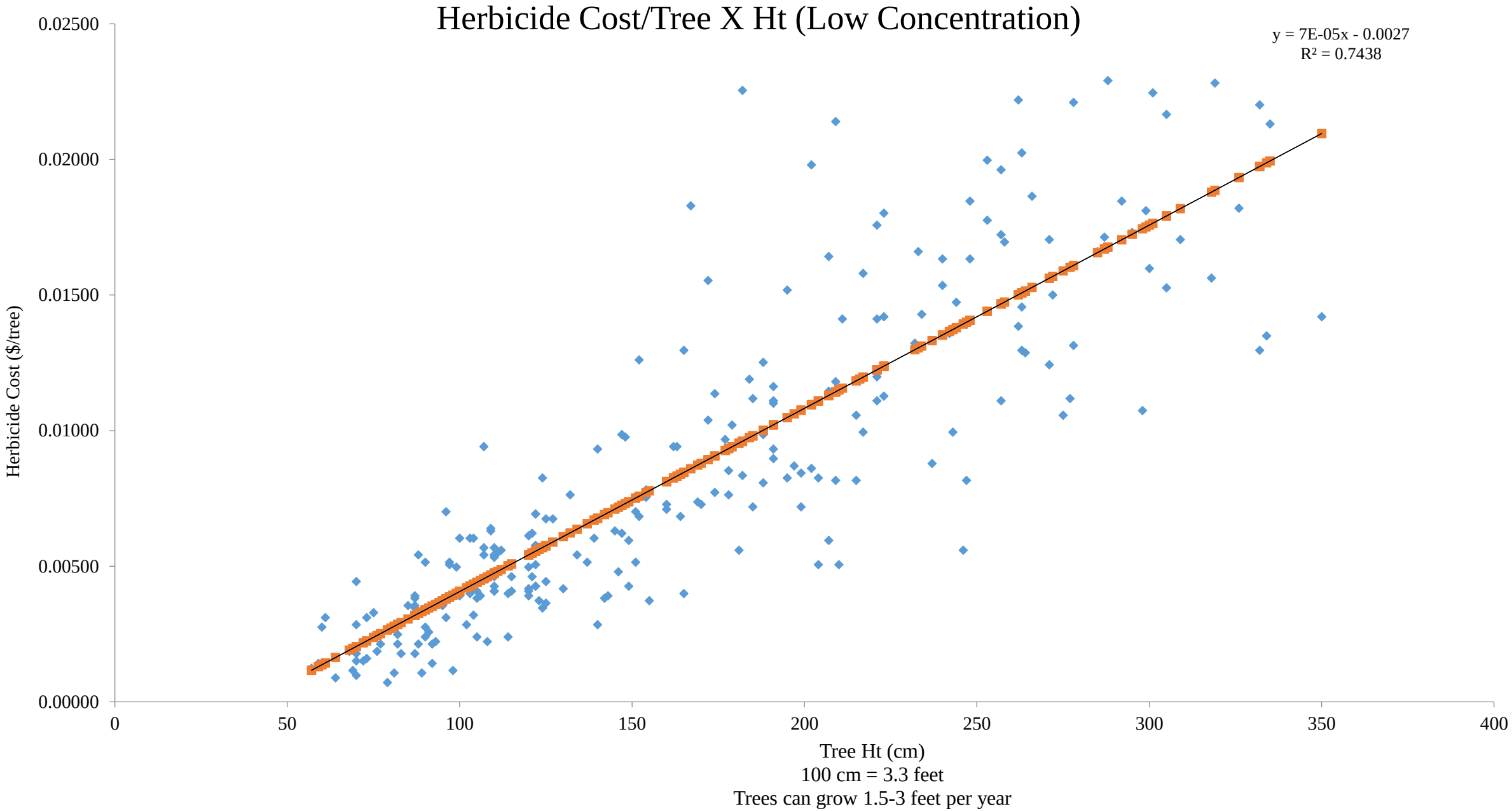
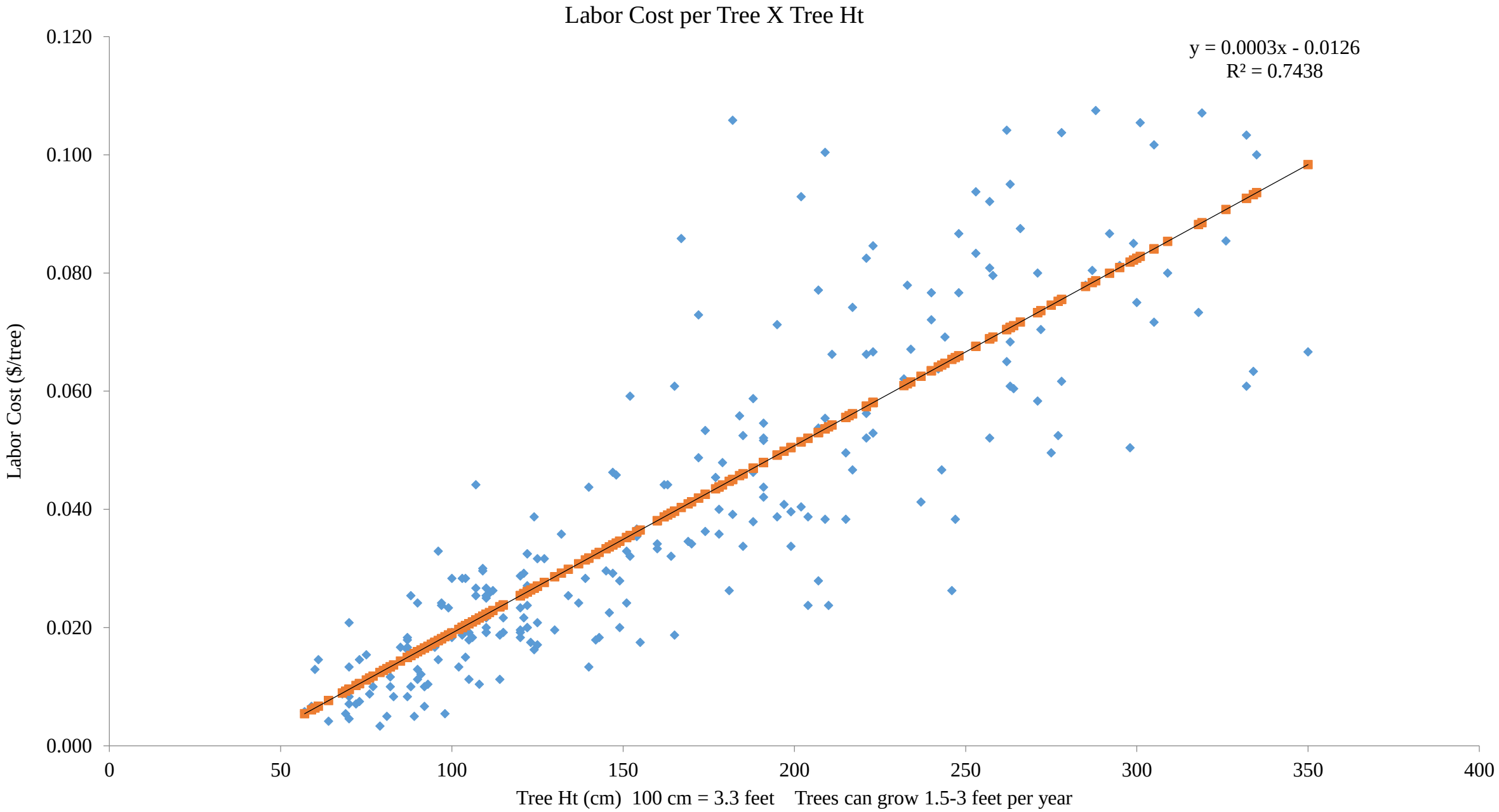
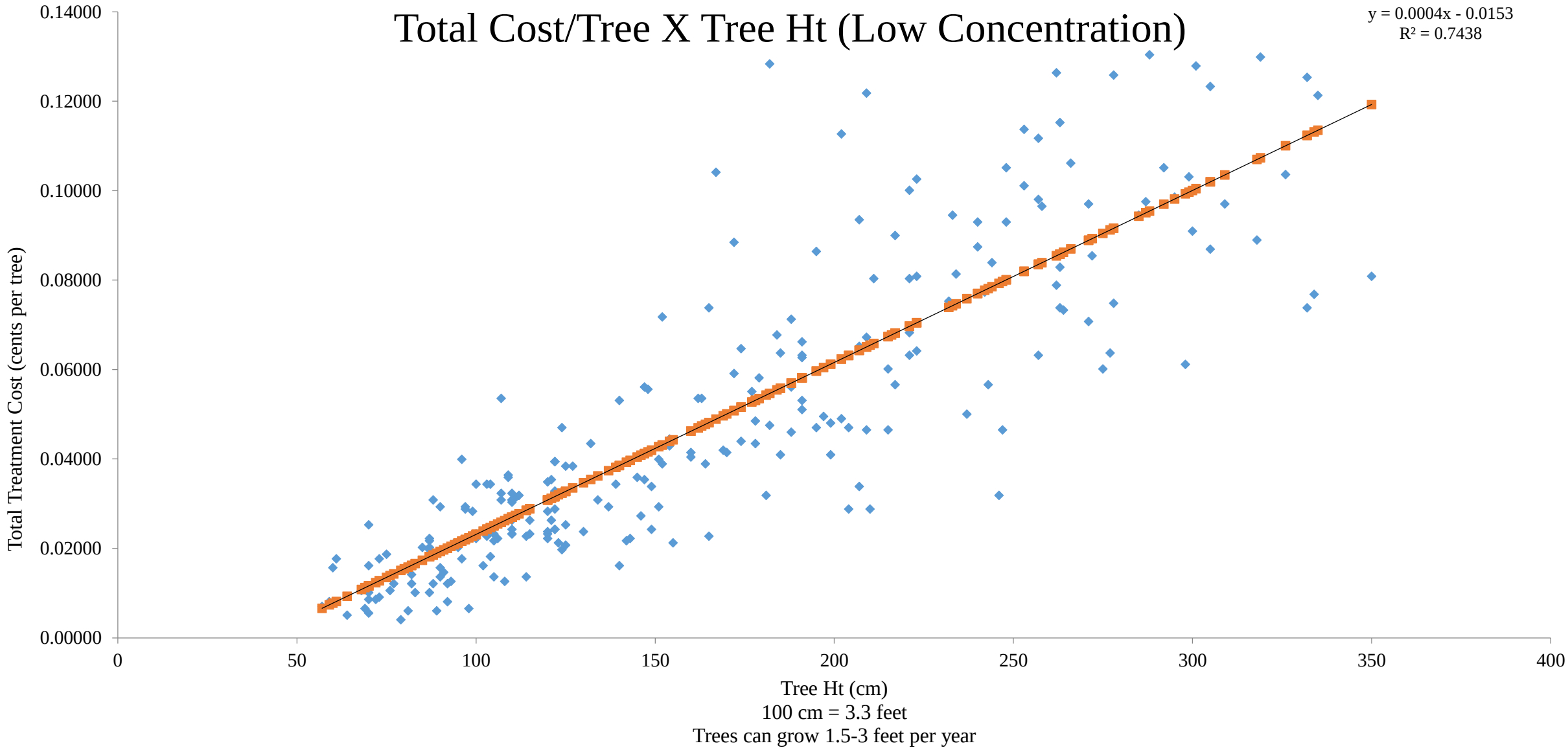

Herbicide Cost/Tree X Ht (Low Concentration)
y = 7E-05x - 0.0027
R² = 0.7438
Herbicide Cost ($/tree)
0.02500
0.02000
0.01500
0.01000
0.00500
0.00000
0
50
100
150
200
250
300
350
400
Tree Ht (cm)
100 cm = 3.3 feet
Trees can grow 1.5-3 feet per year


Labor Cost per Tree X Tree Ht
y = 0.0003x - 0.0126
R² = 0.7438
Labor Cost ($/tree)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
0
50
100
150
200
250
300
350
400
Tree Ht (cm) 100 cm = 3.3 feet Trees can grow 1.5-3 feet per year


Total Cost/Tree X Tree Ht (Low Concentration)
y = 0.0004x - 0.0153
R² = 0.7438
Total Treatment Cost (cents per tree)
0.14000
0.12000
0.10000
0.08000
0.06000
0.04000
0.02000
0.00000
0
50
100
150
200
250
300
350
400
Tree Ht (cm)
100 cm = 3.3 feet
Trees can grow 1.5-3 feet per year

Cost to Treat 500 Honey Locust Trees

Year	Tree Ht Inches	Cost Low Concentration
0	39	12.50
1	69	27.50
2	99	42.50

Assumes growth rate of 2.5 feet per year
73% of total cost is labor

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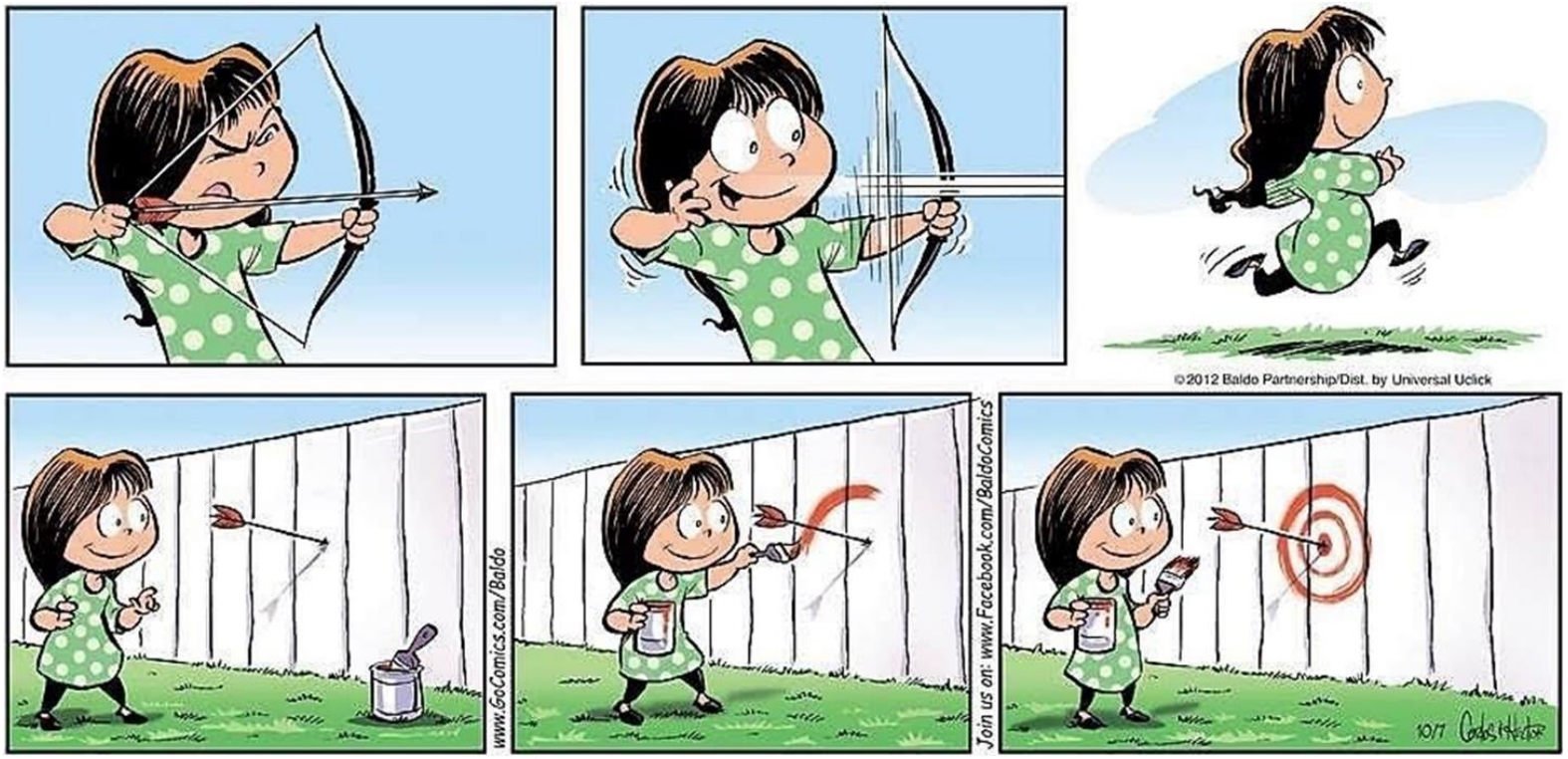
Efficient vs Effective



Efficient – We are really good at hitting our targets
Effective- We've done the right things to ensure we are aiming at the right target

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Key Take Away's

1. Understand your Context
   - Know your target species and how it responds
2. Pick the right application
   - Mechanical or Chemical (broadcast or IPT)
3. Put you dollars where you will receive the greatest ROI
4. Don't wait. Procrastination does not pay.
5. Plan your follow-up now.

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Questions?

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