CARBON FARM Planning

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STEP BY STEP

INTRODUCTION

Because ***CARBON*** can be *beneficially* stored long-term (decades to centuries or more) in ***soils and vegetation*** through biological ***carbon sequestration*** to mitigate climate change and ***increase agricultural sustainability.***

Carbon Farm Planning (CFP) is a whole farm approach to optimizing carbon capture on working landscapes.

CONSERVATION PLANNING
Through a carbon lens using the NRCS Conservation Planning Process to identify opportunities to:

- *Increase* terrestrial carbon
- *Reduce* the production of *greenhouse gases* on farm
- *Quantify* carbon benefits of conservation practices
- *Recognize* the co-benefits of increasing on-farm carbon:

  ↑Production, ↑Soil Health,
  ↑Water Quality, ↑Water Quantity

CARBON FARM PLANNING

NRCS Planning Process (3 Phases : 9 Steps)

Phase I. Collection & Analysis

(Understanding the Problems & Opportunities)

Step 1 - Identify Problems & Opportunities

Step 2 - Determine Objectives

Step 3 - Inventory Resources

Step 4 - Analyze Resource Data

Phase II. Decision Support

(Understanding the Solutions)

Step 5 - Formulate Alternatives

Step 6 - Evaluate Alternatives

Step 7 - Make Decisions

Phase III. Application & Evaluation

(Understanding the Results)

Step 8 - Implement the plan

Step 9 - Evaluate the Plan

CREATING A

CARBON FARM PLAN

Understanding the Problems & Opportunities

STARTING POINT

"Identify Problems & Opportunities"

"Determine Objectives" through a carbon lens!

- **Know your producer's** objectives
- **Understand your producer's operations**
- **Understand your producer's interest in Carbon Farming**
- **Know your producer's landscape**

CREATING A CARBON FARM PLAN
"INVENTORY RESOURCES"

GENERAL FACTORS

- Resource Concerns
- Vegetation Types
- Species of Special Concern
- Vegetation, Wildlife, Invasive Species
- Ecological Sites

•Aspect • Elevation •Slope •Soil

SITE SPECIFIC FACTORS

- Erosion/ Sedimentation, Carbon, Organic Matter
- Forest Management
- Salmonid Habitat
- Weeds
- Slope < 30% & Access : (Equipment)
- Baseline Soil Carbon/Organic Matter
- Certified Organic Crop Production
- Grass-fed Beef

CREATING A CARBON FARM PLAN

Explore the Farm with a Carbon Lens!

IS THERE POTENTIAL FOR

Seq- C Soil ?

Seq- C Vegetation ?

GET OUT YOUR TOOLS AND RESOURCES

- [x] Ranch Maps
- [x] Google Earth
- [x] Web Soil Survey
- [x] Ground Truth
- [x] GIS/Drones
- [x] COMET- Planner (2.0-CA)
- [x] Baseline Soil Sampling

CREATING A CARBON FARM PLAN

Farms/ Ranches have Both Unique GHG Emissions and Sequestration Opportunities

A Carbon Farm Plan should evaluate both, but:

Focus on Terrestrial Carbon Sequestration:

Soils

&

Vegetation

Other opportunities to evaluate : Water system improvements, renewable energy, biodigesters, etc

Many Farms/Ranches have already started reducing their carbon footprint and increasing carbon sequestration

CARBON FARM PRACTICE LIST

Below is a list of already approved soil carbon building practices.

The majority of these practices were selected from the USDA-NRCS GHG Ranking Tool.

- Anaerobic Digester
- Silvopasture Establishment
- Forage and Biomass Planting
- Nutrient Management
- Tree/Shrub Establishment
- Forest Stand Improvement
- Contour Buffer Strips
- Riparian Restoration
- Riparian Forest Buffer
- Riparian Herbaceous Cover
- Vegetative Barrier
- Hedgerow/ Windbreak/Shelterbelt Establishment
- Hedgerow /Windbreak/Shelterbelt Renovation
- Residue and Tillage Management, No Till/Strip Till/Direct Seed
- Multi-Story Cropping
- Alley Cropping
- Range Planting
- Herbaceous Wind Barriers
- Critical Area Planting
- Residue and Tillage Management
- Forest Slash Treatment
- Filter Strip
- Grassed Waterway
- Cross Wind Trap Strips Conservation Cover
- Wetland Restoration

CARBON FARM PRACTICES

WAIT DON'T STOP THERE!

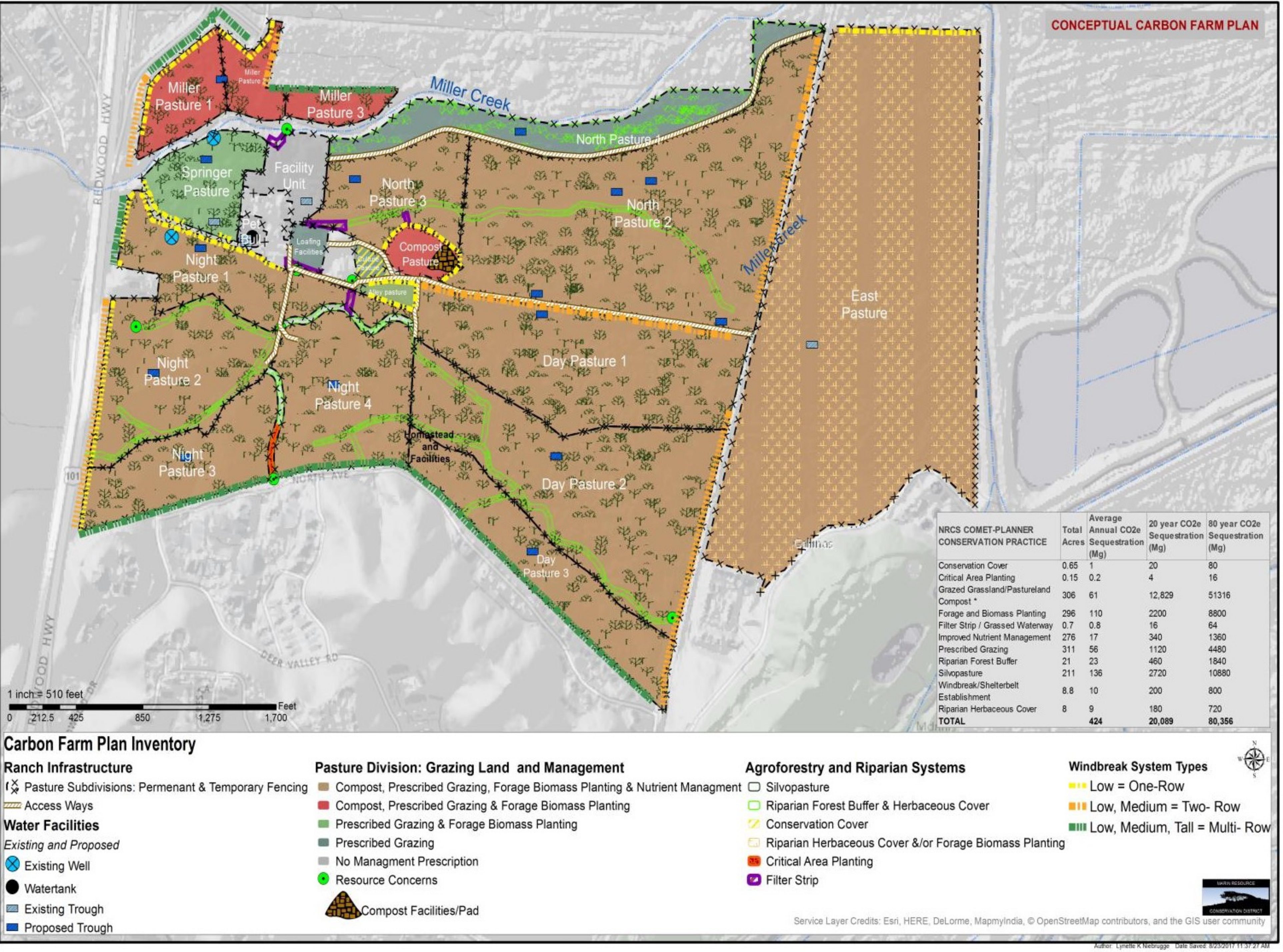
ARE THERE OTHER PRACTICES?

YES!

- Rangeland Compost: *Practice Standard in Progress*
- Pasture Cropping : *sowing crops into living, perennial (usually native) pastures and having these crops grow symbiotically with existing pastures*
- Paludiculture : *sustainable management of peatlands through wet agriculture*
- Biochar: *charcoal used as a soil amendment*
- Propose Your Own Practices

Potential Practices Based on Farm Scale Reconnaissance.

(Practices from COMET-Planner)



NRCS COMET-PLANNER CONSERVATION PRACTICE	Total Acres	Average Annual CO2e Sequestration (Mg)	20 year CO2e Sequestration (Mg)	80 year CO2e Sequestration (Mg)
Conservation Cover	0.65	1	20	80
Critical Area Planting	0.15	0.2	4	16
Grazed Grassland/Pastureland Compost *	306	61	12,829	51316
Forage and Biomass Planting	296	110	2200	8800
Filter Strip / Grassed Waterway	0.7	0.8	16	64
Improved Nutrient Management	276	17	340	1360
Prescribed Grazing	311	56	1120	4480
Riparian Forest Buffer	21	23	460	1840
Silvopasture	211	136	2720	10880
Windbreak/Shelterbelt Establishment	8.8	10	200	800
Riparian Herbaceous Cover	8	9	180	720
TOTAL		424	20,089	80,356

- Compost Application
- Rangeland/Grazing Management
- Forage Biomass Planting
- Silvopasture
- Windbreaks/ Hedgerows
- Riparian Restoration
- Riparian Forest Buffer
- Critical Area Planting

SITE VISITS: Limits and Opportunities

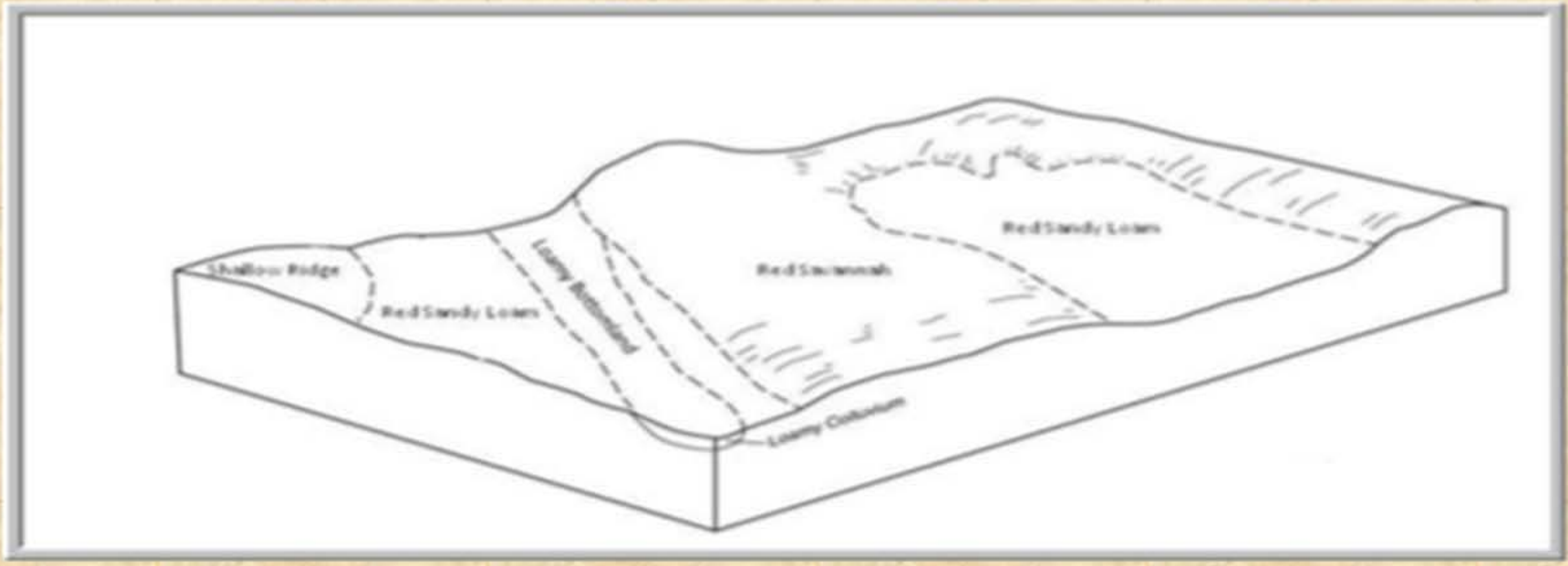
How do we know where carbon practices can and cannot be applied?

1. Ecological Sites
2. Management Limitations

ECOLOGICAL SITES

New Interagency Definition

An **Ecological Site (ES)** is a conceptual division of the landscape that is defined as a distinctive kind of land based on recurring soil, landform, geological, and climate characteristics that differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances.



http://jornada.nmsu.edu/files/InteragencyEcolSiteHandbook.pdf

SITE VISITS:
Limits and Opportunities

Management Limitations

Ecological Site

Land Use

Producer's Perception

SOILS

NRCS Web Soil Survey

Should we be sampling our soils?

Evaluating Soils: Soil Organic Matter

Obtain Soils Information

PROCESS: Web Soil Survey

1. **Create Area of Interest (AOI)**

- Import Shapefile (.shp, .shx and .prj)
- Navigate and Outline
- Enter Address or Lat/Long location

2. Evaluate Soils:

- Suitability and Limitations for Use
- Soil Properties and Qualities
- Ecological Site Assessment
- Soils Reports

3. Create Maps, Download Reports and Soils Data

https://websoilsurvey.sc.egov.usda.gov/

Photo Credit: Lynette K Niebrugge, Marin RCD

SOILS

TRICK QUESTION

Should you be sampling your soils?

Yes, if you want to:

- Track change over time
- Verify or inform a model
- Establish a baseline
- Nutrient Management

What do you test for?

- Bulk Density
- Soil Organic Matter/ TOC/ OC
- Nutrients
- Infiltration
- Moisture

Soil Organic Matter

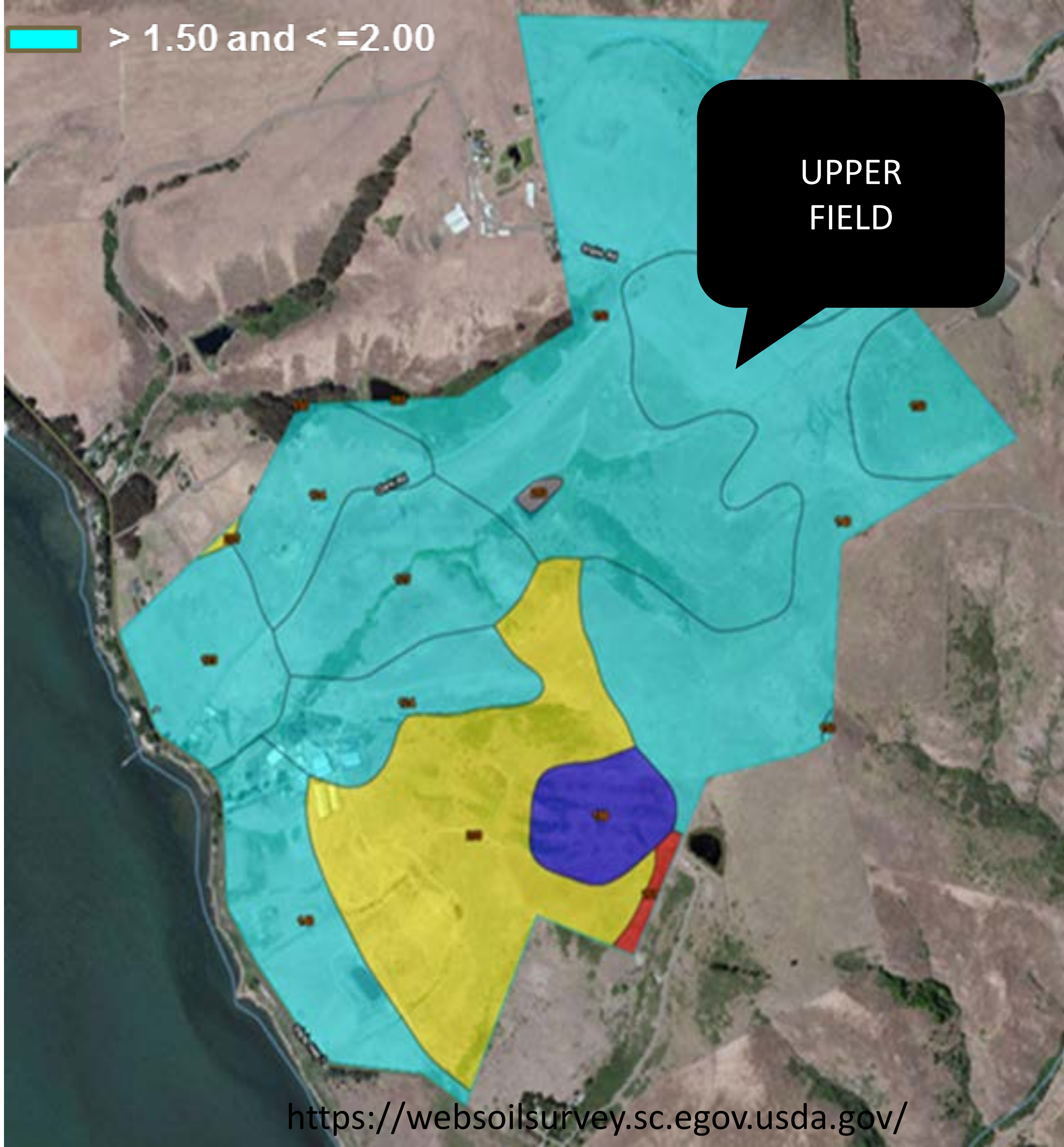
- Soil Web Soil Survey

Upper Field = < 2%

- Producers Soil Sample

Upper Field = 6%

Soil Organic Matter (som/2=soc*3.67=CO2e)



https://websoilsurvey.sc.egov.usda.gov/

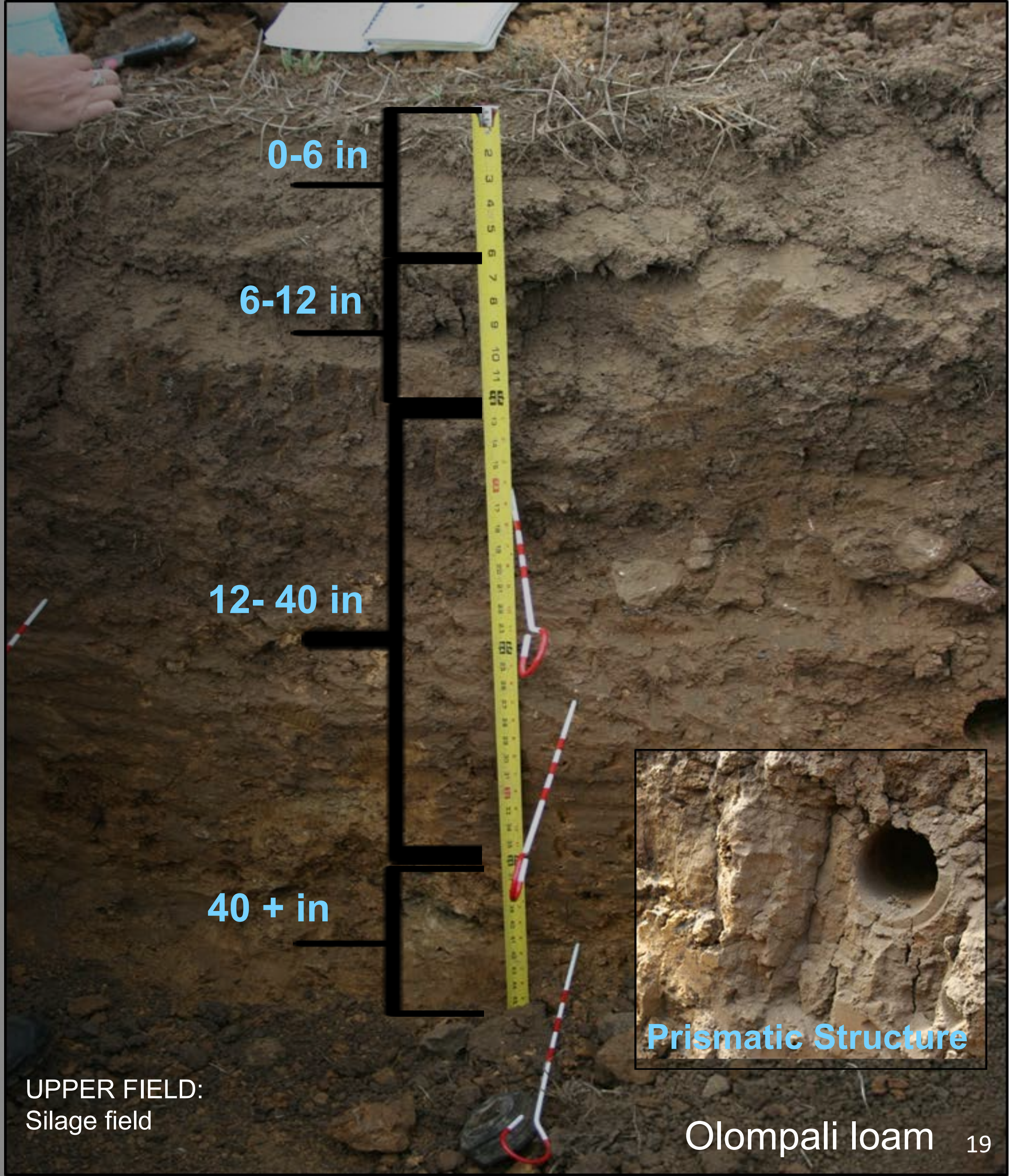
WHAT STORY DOES THIS SOIL PROFILE TELL US?

1. High SOC
- Historically plowed soil layer, 0-6 inches

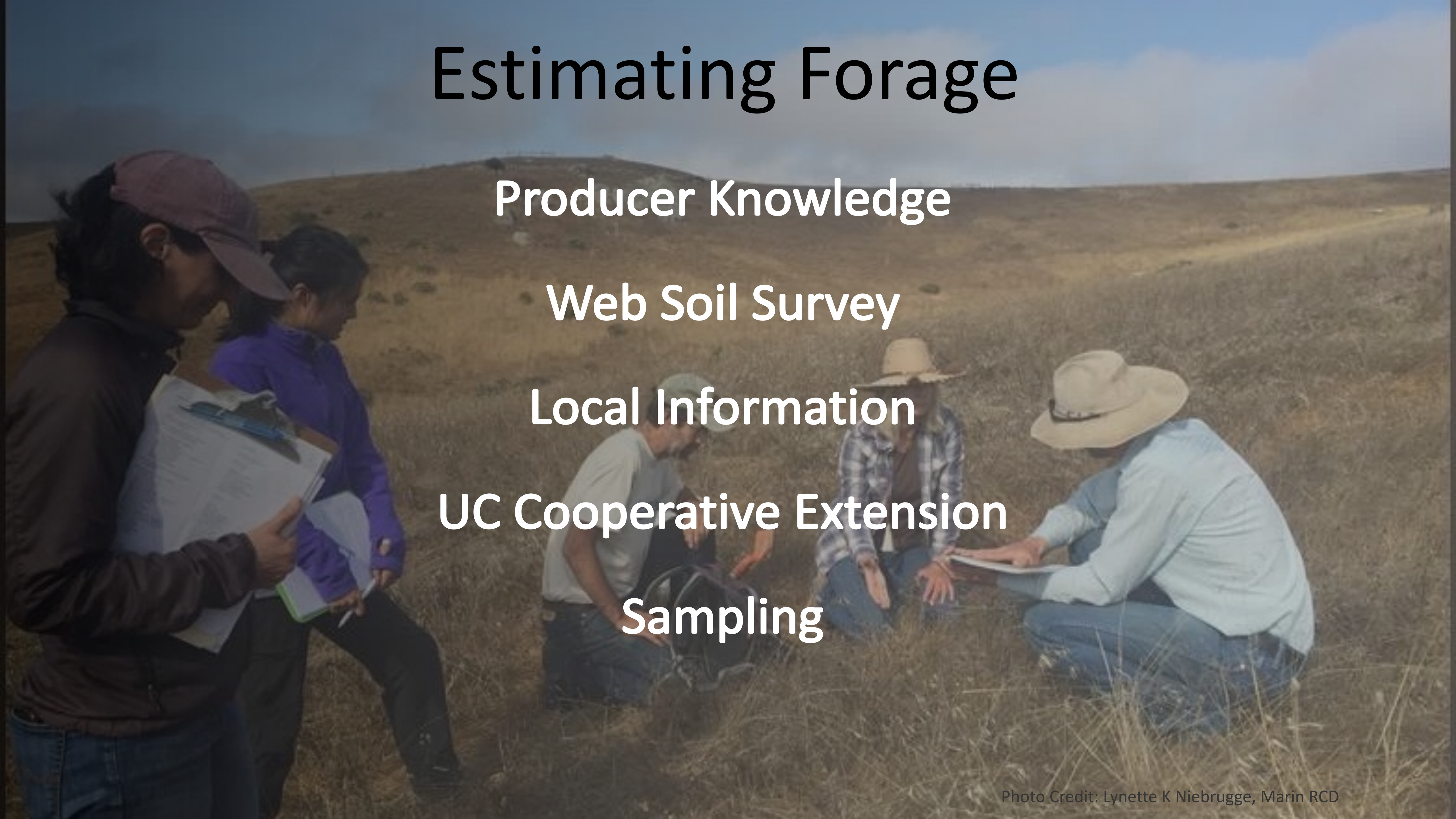
2. 0-6 & 6 - 12 inches: Granular Structure
- Many to Few: very fine to fine size roots.

3. 12- 40 inches: Prismatic/ Columnar Structure
- few fine to very fine roots

4. 40 + inches: Massive Structure
- no roots



Estimating Forage



Producer Knowledge

Web Soil Survey

Local Information

UC Cooperative Extension

Sampling

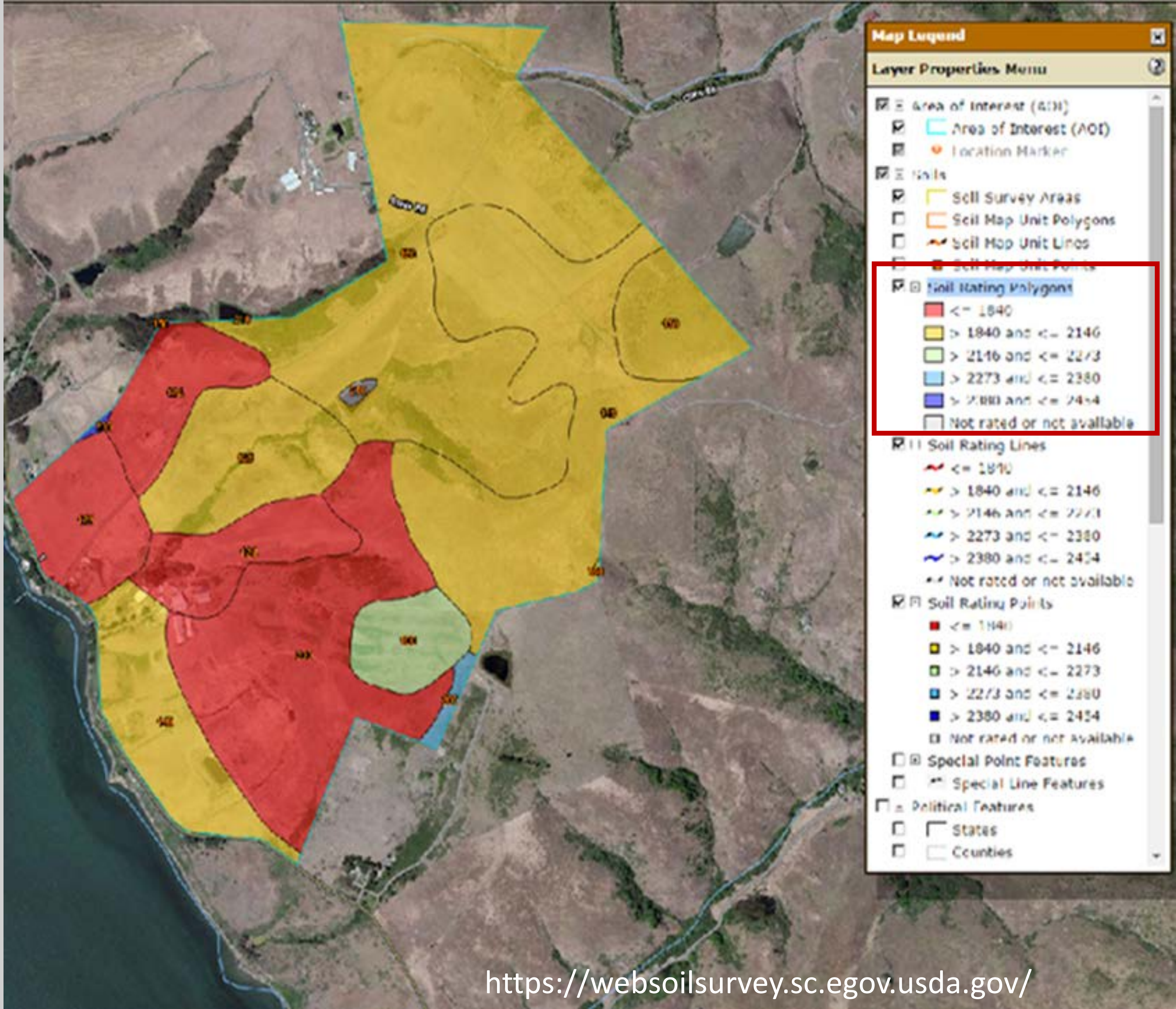
Photo Credit: Lynette K Niebrugge, Marin RCD

ABOVE GROUND BIOMASS

Estimating Range Production

Web Soil Survey

- Suitability and Limitations
- Vegetation Productivity
- Range Production (Normal, Favorable &/or Unfavorable Year)



https://websoilsurvey.sc.egov.usda.gov/

FORAGE

Estimated Total vs Available Forage & Livestock Carrying Capacity

	Favorable year	Average year	Unfavorable year
Total Tons	**11,926**	**8,716**	**5,490**
RDM**	1,570	1,570	1,570
RDM %***	13%	18%	29%
Available Forage Tons	10,356	7146	3920
AUM	23,013	15,880	8,712
AUY	**1,918**	**1,323**	**726**

1 AUM (animal unit month) is the amount of forage needed to support a 1,000 lb cow and her calf for one month; here it is assumed to be 900 lbs of dry forage.

1 AUY (animal unit year) is the amount of forage needed to support one animal unit (cow with calf, or equivalent) for one year.

*Data derived from Range Site production values, Santa Barbara County soil survey, USDA
** Average RDM is based on Bartolome et al 2006, minimum RDM for annual grassland/hardwood rangeland, 0-10% slopes and 25-50% tree cover. Higher RDM is recommended for steeper slopes and less tree cover.
*** Minimum percent of total production recommended for allocation to RDM

CALCULATING CARBON POTENTIAL

COMET- Planner

COMET- Farm

COMPOST- Planner

US Forest Service Models

California Oak Foundation

Others

Calculating Carbon Potential

- **COMET-PLANNER**

NEW COMET-Planner v2

http://www.comet-planner.com/

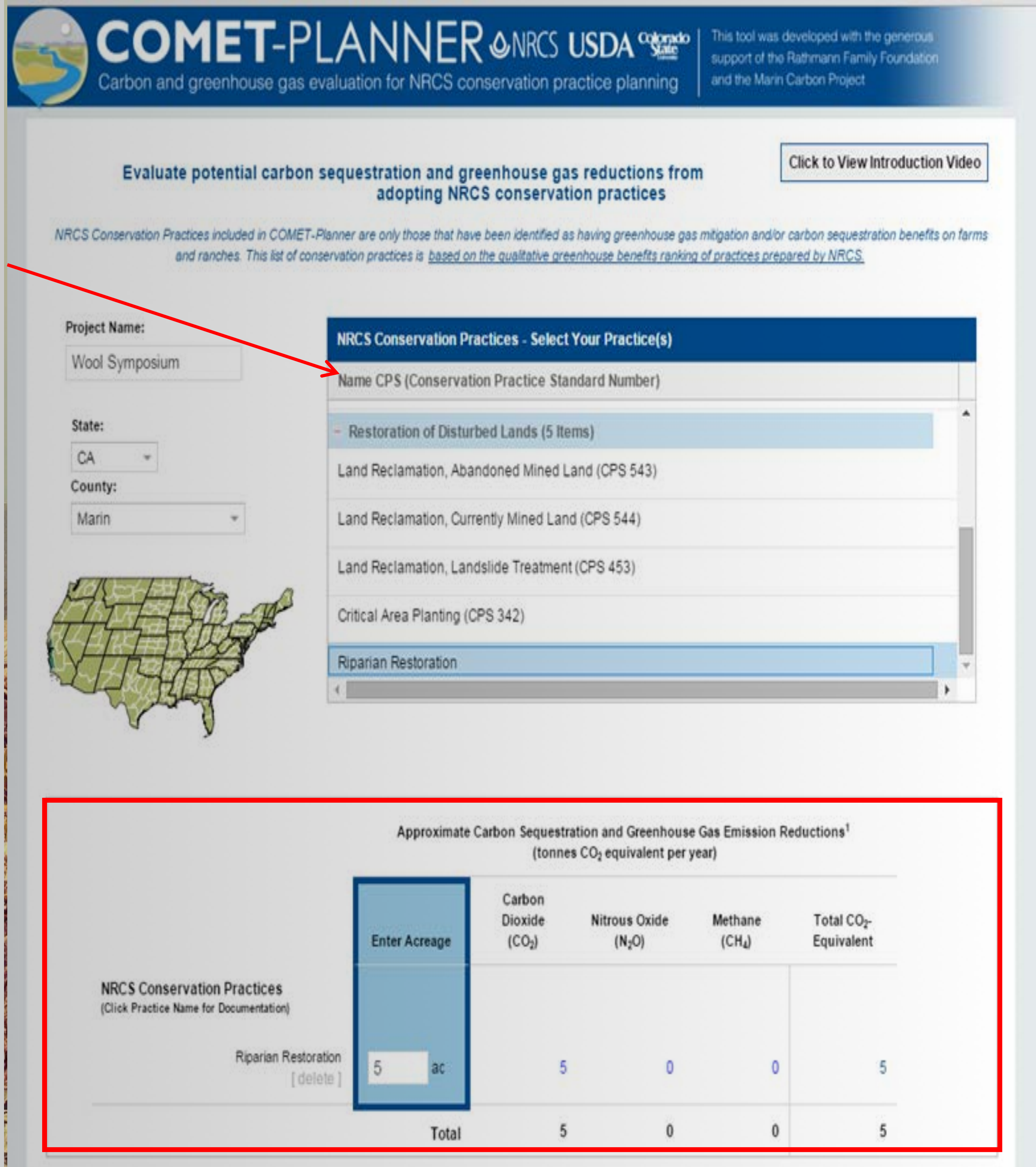
NEW COMPOST-Planner

http://www.compost-planner.com/

COMET-Farm

- **LOCAL DATA; other sources**

1. **COMPOST DATA**: R.Ryals et al 2013; M.DeLonge et al 2013
2. **CREEK CARBON DATA:** D.Lewis et al 2015
3. **Oak Woodland**, Gaman 2008
4. **US EPA 2011.** Market Opportunities for Biogas Recovery Systems at U.S. Livestock Facilities.
5. **USDA 2014.** Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory.



Riparian forest buffers are streamside plantings of trees, shrubs and grasses that reduce water pollution and bank erosion, protect aquatic environments, and enhance wildlife habitat.

Windbreaks are rows of trees and shrubs that reduce wind speed. They improve crop yields, reduce soil erosion, improve water-efficiency, protect livestock and conserve energy.

Silvopasture systems combine trees with forage and livestock production on the same field. The trees are managed for wood while at the same time provide shade and shelter for livestock.

Alley cropping systems are widely-spaced rows of high-value trees that create alleyways for crops. This system benefits trees and crops and provides annual and long term cash flow.

Forest farming is the cultivation of high-value non-timber crops (food, medicinal, and crafts) under the protection of a forest canopy that has been managed to provide a favorable crop environment.

Special applications are plantings used to solve unique problems. Examples include the utilization of wastewater to produce a short rotation woody crop and plantings to help stabilize streambanks.

Agroforestry & Riparian Systems

USDA Forest Service/Natural Resources Conservation Service National Agroforestry Center,
https://nac.unl.edu/multimedia/photos.htm

Agroforestry Systems

Calculating Carbon Potential: *Oak Woodlands*

Metric Tons (Mg) CO2e Sequestered in Mixed Oak Woodlands and Forests Current Conditions (Adapted from Gaman 2008)

GAMAN MODEL	Mixed Oak Woodland/Savannas 589 Acres	Mixed Oak Forest 1,098 Acres
TREE C (Mg/Acre)	28.75	100.85
Non –Tree C (Mg/Acre)	29.56	29.56
Total Tree C (Mg/Acre)	58.32	130.41
Total CO2e (Mg/Acre)	214.00	478.00
TOTAL Mg CO2e	126,066	525,508

Sierra Forestry Legacy, https://www.sierraforestlegacy.org/FC_FireForestEcology/TH_OakWoodlands.php

Agroforestry Systems

Calculating Carbon Potential:

Silvopastures (CPS 381) OR Tree and Shrub Establishment (CPS 612)

GAMAN MODEL	Mixed Oak Silvopasture 1000 Acres (Gaman 2008)	COMET-Planner
TREE C (Mg/Acre)	28.75	
Non –Tree C (Mg/Acre)	29.56	
Total Tree C (Mg/Acre)	58.32	
Total CO2e (Mg/Acre)	214.00	0.66
TOTAL Mg CO2e	214,00	52,800

Potential Metric Tons (Mg) CO2e Sequestered in NEW Mixed Oak Silvopasture

1,000 acres, at maturity (80 years)

Future Conditions

(Adapted From Gaman 2008)

Gaman, T. 2008. An inventory of carbon and California oaks. California Oak Foundation Addendum to Oaks 2040. http://www.californiaoaks.org/ExtAssets/CarbonResourcesFinal.pdf

https://www.progressiveforage.com/forage-types/grasses-and-grazing/trees-in-silvopasture-are-not-created-equal

Agroforestry Systems

Calculating Carbon Potential: *Riparian Systems*

Local Data
(Lewis et al, UCCE 2015)

COMET- Planner

Riparian Restoration

18.36 TonnesCO2e/acre/year (Lewis et al 2015)

Photo Credit: University of California Cooperative Extension , http://cemarin.ucdavis.edu/

Calculating Carbon Potential: *Riparian Systems*

3 Ways to Obtain Riparian Data

Riparian Carbon Capture Potential - Metric Tons CO2e per Year

Riparian System	Stream length	Acres	Mg CO2e/COMET- Planner Riparian Restoration only (1 Mg/acre/yr)			Mg CO2e/COMET-Planner Combined Riparian Forest, Herbaceous, Critical Area Planting and Riparian Restoration (4.36 Mg/acre/yr)			Riparian Restoration, Mg CO2e (18.36 Mg/acre/yr, Lewis et al 2015)		
			annual	15 years	45 years	annual	15 years	45 years	annual	15 years	45 years
Sycamore	1 mile	12	12	180	540	53	793	2378	223	3338	10015
Zaca	1.5 mile	18	18	270	810	79	1189	3567	334	5006	15022
Alamo Pintado	3.5 miles	42	42	630	1890	185	2775	8324	779	11682	35051
San Antonio	1.75 miles	21	21	315	945	92	1387	4162	389	5841	17525
TOTAL	**7.75**	**94**	**93**	**1,395**	**4,185**	**410**	**6,144**	**18,431**	**1,725**	**25,867**	**77,613**

Calculating Carbon Potential: *Compost Application*

Rangeland: 1.49 MT CO2e/acre/year

- R.Ryals et al 2013

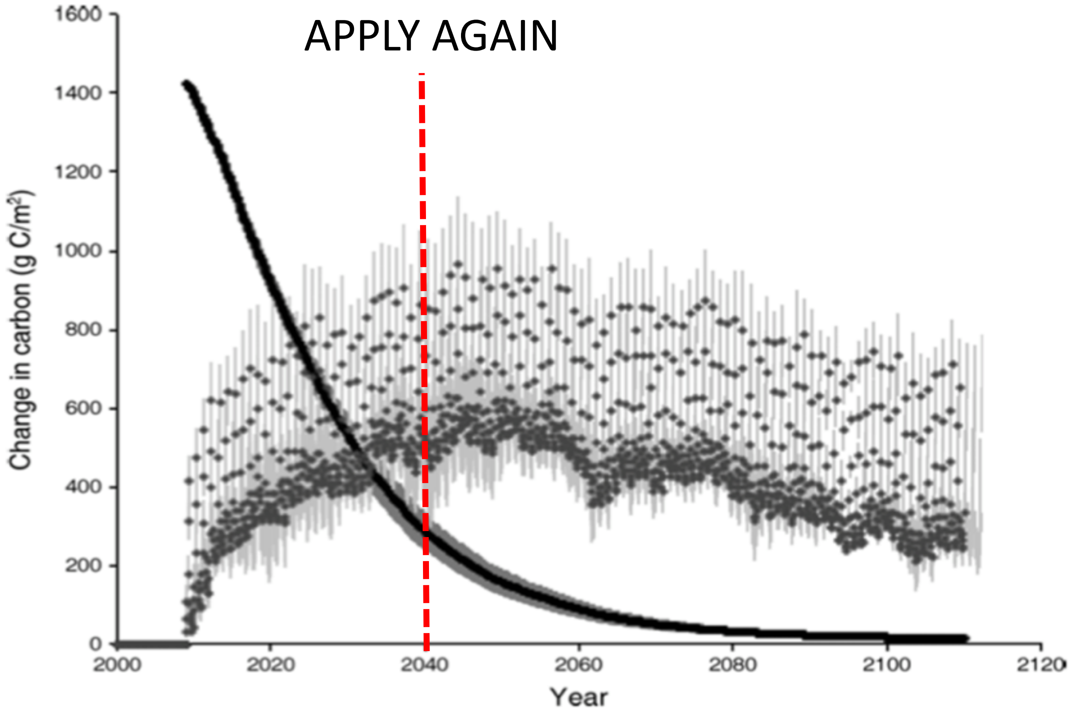
Cropland/Pastures: 0.18 MT CO2e/acre/year

- COMET-Planner (590)

COMPOST-Planner (CDFA 2017)

Calculating Carbon Potential : *Rangeland Compost*

Predicted Cumulative CO2e Sequestration Resulting From Compost Application on 4,300 acres of Grazed Grassland



Year	Cumulative Acres 1/4" Rate	Metric Tons CO2e 1/4" Rate	Cumulative Acres 1/2" Rate	Metric Tons CO2e 1/2" Rate
1	428	637.72	214	318.86
2	856	1275.44	428	637.72
3	1284	1913.16	642	956.58
4	1712	2550.88	856	1275.44
5	2140	3188.6	1070	1594.3
6	2568	3826.32	1284	1913.16
7	2996	4464.04	1498	2232.02
8	3424	5101.76	1712	2550.88
9	3852	5739.48	1926	2869.74
10	4280	6377.2	2140	3188.6
10 Yr Total		**35074.6**		**17537.3**
11	4280	41451.8	2354	3507.46
12	4280	47829	2568	3826.32
13	4280	54206.2	2782	4145.18
14	4280	60583.4	2996	4464.04
15	4280	66960.6	3210	4782.9
16	4280	73337.8	3424	5101.76
17	4280	79715	3638	5420.62
18	4280	86092.2	3852	5739.48
19	4280	92469.4	4066	6058.34
20	4280	98846.6	4280	6377.2
20 Yr Total		**98846.6**		**84497.9**
30 Yr Total		**162618.6**		**148269.9**

* 10, 20 and 30 year totals are cumulative for that period; yearly values represent amount of CO2 sequestered in that year only for all treated acres. Ryals and Silver 2013

Calculating Carbon Potential: *Cropland Compost*

Assumptions:
1% SOM = 0.5% SOC = 5 tons C/acre = 18.35 Mg CO2e/acre
Compost = 33% OM, or 16.5% C;

1” compost = 70 short tons/acre x 0.165 = 11.55 x 3.67/1.1 = 38.5 Mg CO2/acre.
Approximately one half of compost C is assumed lost annually under tillage.

Soil Type	Acres	Baseline SOM% (NRCS)	Additional CO2e Sequestered at 5% SOM Plow layer only
BbC	34	0.82	2608
EmC	56	1.03	4080
SaA	149	1.14	10554
SaC	14	1.14	992
SdA	277	1.16	19519
SdC	62	1.30	4209
SvC	22	1.5	2608
TOTAL	614		43,374 Mg CO2e

Sierra Forestry Legacy, https://www.sierraforestlegacy.org/FC_FireForestEcology/TH_OakWoodlands.php

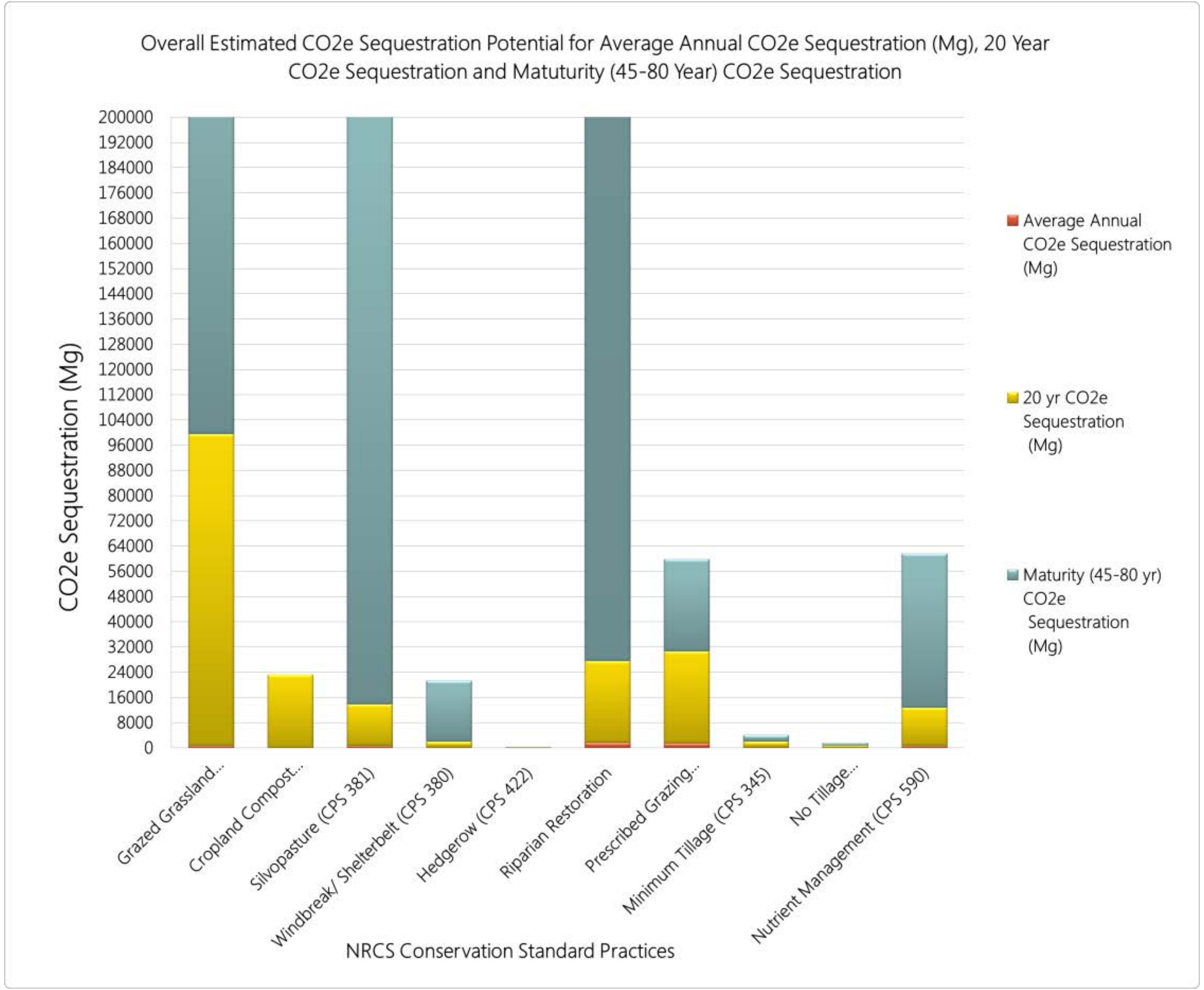
SUMMARY

Potential terrestrial carbon sequestration on an 8,000 acre Santa Barbara Ranch through implementation of conservation practices identified through the Carbon Farm Planning Process

CO2e reduction at Maturity = 708,270 Metric Tons = 149,109 Passenger vehicles driven for one year!

Practice	Average Annual CO2e Reduction	20 yr CO2e Reduction	CO2e Reduction at Maturity
Rangeland Compost	638 Mg	98,847 Mg	162,619 Mg (30 years)
Cropland Compost (590)	2,060 Mg.	23,200 Mg	43,374 Mg at 5% SOM
Shelterbelts (380)	98 Mg CO2e;	1,960 Mg	7,840-19,260 Mg at 80 years.
Hedgerows (422)	6 Mg CO2e	120 Mg	120 Mg CO2e
Prescribed Grazing (528)	1,460 Mg	29,200	29,200
Riparian Restoration	410 to 1,725 Mg	6,144-25,867 Mg at 15 years	18,431-188,117 Mg at 45 years.
No Till (329)	39 Mg	780 Mg	780 Mg
Minimum-Tillage (345)	100 Mg	2,000 Mg	2,000 Mg
Silvopasture (381)	660 Mg	13,200 Mg	214,000 Mg
Nutrient Management (590)	610 Mg	12,200 Mg	48,800
Totals	**6,081- 7,396 Mg**	**187,651 - 207,374 Mg**	**527,164-708,270 Mg**

Charts



Overall Estimated CO2e Sequestration Potential for Average Annual CO2e Sequestration (Mg), 20 Year CO2e Sequestration and Matuturity (45-80 Year) CO2e Sequestration
CO2e Sequestration (Mg)
200000
192000
184000
176000
168000
160000
152000
144000
136000
128000
120000
112000
104000
96000
88000
80000
72000
64000
56000
48000
40000
32000
24000
16000
8000
0
Grazed Grassland...
Cropland Compost...
Silvopasture (CPS 381)
Windbreak/ Shelterbelt (CPS 380)
Hedgerow (CPS 422)
Riparian Restoration
Prescribed Grazing...
Minimum Tillage (CPS 345)
No Tillage...
Nutrient Management (CPS 590)
NRCS Conservation Standard Practices
Average Annual CO2e Sequestration (Mg)
20 yr CO2e Sequestration (Mg)
Maturity (45-80 yr) CO2e Sequestration (Mg)

Soil, Water and Carbon

Estimated Additional Soil Water Holding Capacity With Carbon Farm Plan

Implementation, 8,000 acre Ranch, Santa Barbara County, CA

Assumption:
1% SOM ≈ 1 acre inch WHC

PRACTICE	DESCRIPTION	20 YEAR SOM INCREASE (Mg)	ANNUAL WHC INCREASE BY YEAR 20 (AF)
Compost application on Rangeland (NRCS practice standard in development)	Application of 1/4” of compost to 4300 acres of permanent pasture.	53867 Mg	493.78
Compost application on Cropland (590)	Application of 1” of compost to 617 acres of cropland.	23637.05 Mg	216.67
Shelterbelt (380)	13.6 miles (90 acres) of 50’ wide shelterbelts	1068.12 Mg	9.79
Prescribed Grazing (528)	Grazing management to favor perennials and improve production on 7300 acres.	15912.80 Mg	145.86
Riparian Restoration	Restoration of 94 acres of riparian system along 7.75 miles of stream corridor Planting of native trees and shrubs.	3043.23 Mg (derived from Lewis et al 2015)	27.89
Minimum-Tillage (345)	Conversion of tilled crop fields to minimum tillage on croplands	1089.91 Mg	9.99
Silvopasture (381)	Establish trees on approximately 1,000 acres) of treeless pasture.	4027.24 Mg (derived from Gaman 2008)	36.91
TOTAL		**103,070.36**	**917.52**

[1] Lewis et al 2015 model coefficients indicate annual increases of soil carbon = 0.2 kg/m^2. 1 acre = 4046.85642 m^2.

Co-Benefits

Co-Benefits allow you to outline benefits of your practices above and beyond GHGs!

What benefits can Carbon Farming provide?

On Farm and Globally

- Annual Avoided Emissions from Methane and Fossil Energy Consumption
- Habitat Structural and Species Diversity
- Improved Water Holding Capacity
- Improved Soil Quality and Fertility/ “Health”
- Improved Water Quality
- Net Primary Productivity
- Stabilize Soils
- Increase soil depth
- Sequester Carbon

Photo Credit: Unknown

CARBON FARM PLANNING

Co-Benefits

How do we describe Co-Benefits?

Potential Carbon Beneficial Practices and Estimated Effects

PRACTICE	DESCRIPTION	CO2e SEQUESTERED	CO-BENEFITS	REFERENCE
1. Compost application on Rangeland (NRCS interim practice standard in development)	Application of 1/4" of compost to 428 acres of permanent pastures each year. Increase soil organic carbon, water and nutrient holding capacity;	At a rate of 1.49 Mg CO2e per acre per year, sequester 638 Mg CO2e on 428 new acres each year, 35,075 Mg over 10 years, 98,847 Mg over 20 years and 162,619 Mg CO2e over 30 years.	Improved water holding capacity, soil quality and fertility, net primary productivity and forage production.	Ryals and Silver 2013, DeLonge et al, 2014; Ryals et al 2015.
2. Compost application on Cropland (590)	Application of 1" of compost to 617 acres of cropland. Increase soil organic carbon, water and nutrient holding capacity and crop production.	At a rate of 19.25 Mg CO2e per acre per year, sequester up to 2,060 Mg CO2e on 107 new acres each year. At 5% organic matter on all 600 crop acres, sequester a total of 43,374 Mg CO2e	Improved water holding capacity, soil quality and fertility, net primary productivity and crop production.	Ryals and Silver 2013, DeLonge et al, 2014;
3. Fencing or Access Control (328/ 472)	Temporary electric or permanent fence protection for tree and shrub cover establishment for 21.35 miles of windbreak, shelterbelt and riparian plantings.	Increase soil and biomass carbon capture on protected sites	Stabilize soils, improve water capture, water quality and habitat structural and species diversity.	Supporting practice.

Measurement Methodologies*: Process for Decision Making*

Monitoring Soil Carbon

Sampling Soils for Organic Carbon

Protocol By Ken Oster, USDA- Natural Resources Conservation Service – 6/3/2016

1	**2**	3	4	5	6
7	**8**	9	1	11	12
13	14	15	**16**	17	18
19	**20**	21	22	23	24
25	26	**27**	28	29	30
31	**32**	**33**	34	35	**36**

(10) Grid with 10 randomly selected intersection points.
https://www.random.org/integers/

Monitoring and Record Keeping

Implementation Timeline

CONSERVATION PRACTICE	LOCATION & EXTENT	CO_2e BENEFIT	ASSOCIATED BENEFITS							NOTES	DATE
NRCS Practice (s) & Associated Number	Identify Location (See CFP Map) & Monitoring Photo Points	Calculated Using: COMET-Farm, COMET-Planner, or Local Data	Soil Health	Water Quality	Water Quantity	Wildlife Enhancement	Plant Community	Air Quality	Producer - Economic	Funding Source	Implemented &/or Maintained
Riparian Forest Buffer/ Riparian Restoration (391)	Unnamed tributary, lower reach on pasture three ▪ 2 of 6 miles	Local Data: Lewis et al.	X	X	X	X	X	X		Marin RCD	Fall, 2017
Compost Facility (317)	South Chicken Yard	N/A					X		X		Fall, 2017
Windbreak/ Shelterbelt/ Hedgerow (422/380/620)	West Pasture 4, along fence line (south - north) ▪ 550 linear feet	COMET- Planner	X	X	X	X	X	X			Fall, 2018
Compost Application; pasture & crop land (484/590)	Apply ¼” of compost to 115 acres of 350 acres of prescribed pastureland & 1” of compost to 10 of 10 acres of cropland	Local Data: Ryals and Silver 2013	X	X	X		X		X		Fall, 2018

A SUCCESSFUL CARBON FARM PLAN CULTIVATES CARBON FARMERS!

Photo Credit: Marin Agriculture Land Trust

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A plan is a living document.
A plan should evolve as new information and new tools become available.

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