Title

Reforestation as a Forest Carbon Project: An Outreach Toolkit for Conservation Organizations and Landowners

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INTRODUCTION

This toolkit includes a series of presentations that can be used for educational purposes to describe the basics of forest carbon projects. These presentations were developed as a result of years of experience working on forest carbon projects domestically and internationally, and in particular, from experience working in Shasta County as a part of the WESTCARB project. Much of the information they contain is the result of lessons learned in Shasta County.

The presentations are intended to give an overview and provide a basic foundation of knowledge; they are not intended to prepare individuals to develop a forest carbon project from start to finish. If individuals or organizations have further interest in learning about or pursuing a forest carbon project, they should contact a forester, project developer or other specialist who has detailed knowledge of and experience in terrestrial carbon projects and markets.

The following presentations are included in this toolkit:

1. WESTCARB Outreach Efforts in Shasta County, CA
2. Forest Carbon: Basics of Terrestrial Offset Projects
3. Project Examples: Pilot Reforestation Projects in Shasta County, CA
4. Developing and Registering a Forest Carbon Project in Northern California
5. Reforestation: A Case Study of Registration under the Climate Action Reserve (CAR)

The presentations are included here for reference, along with notes as appropriate. Each presentation is also available as a PowerPoint document.

For more information, please contact

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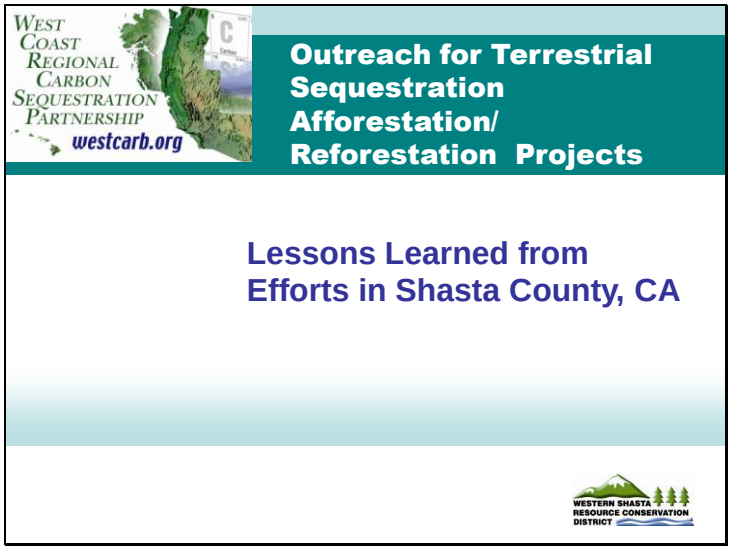
Leslie Bryan, Western Shasta Resource Conservation District, 530.365.7332, leslie@westernshastarcd.org

WESTCARB OUTREACH EFFORTS IN SHASTA COUNTY, CA

Slide 1



Slide 2

Outreach efforts were directed at various audiences, which included local and regional agencies, organizations, and individuals. While messages were consistent, they needed to be tailored to the audience's understanding and background.

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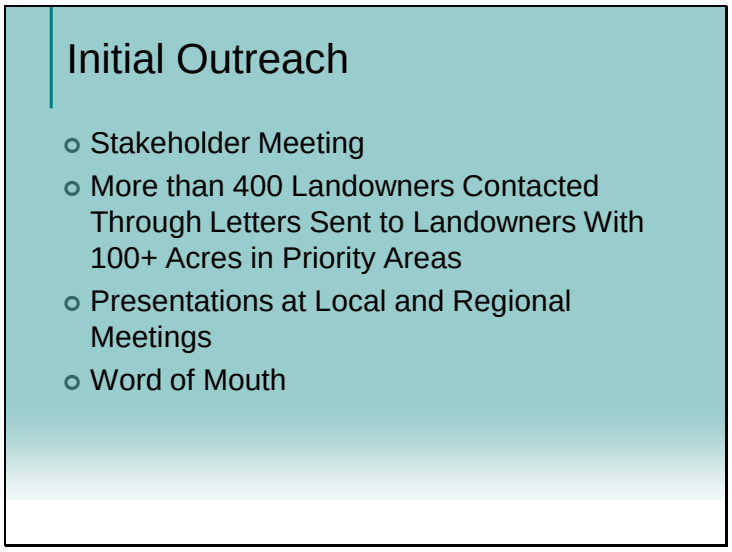
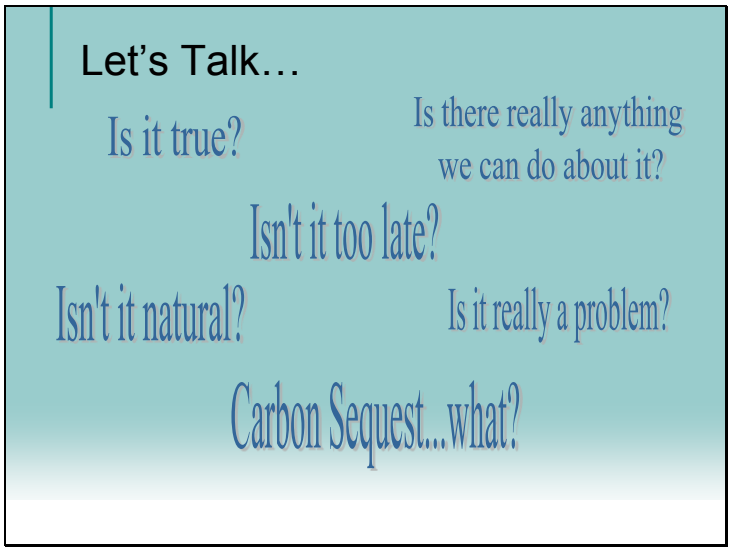


To elicit interest, a stakeholder meeting was held, and scoping letters sent to targeted landowners. These activities were followed up with presentations to multiple interests.

Slide 4



Conversations in meetings and with individuals typically began with a broad overall discussion on the topic of climate change and terrestrial sequestration. Sources for more information on climate change were provided, and landowners were invited to take a survey to assess project potential as well as their interest in participating in a pilot project.

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More than 50 landowners were formally surveyed for the purpose of identifying types of landowners who may be interested in committing themselves to future participation in climate mitigation forest plantation programs, to understand the conditions which landowners might be interested, and to identify sites to perform site evaluations.

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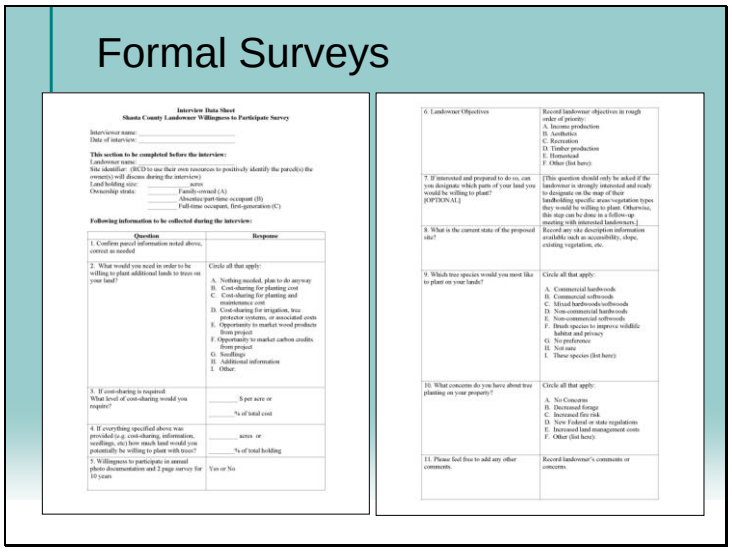
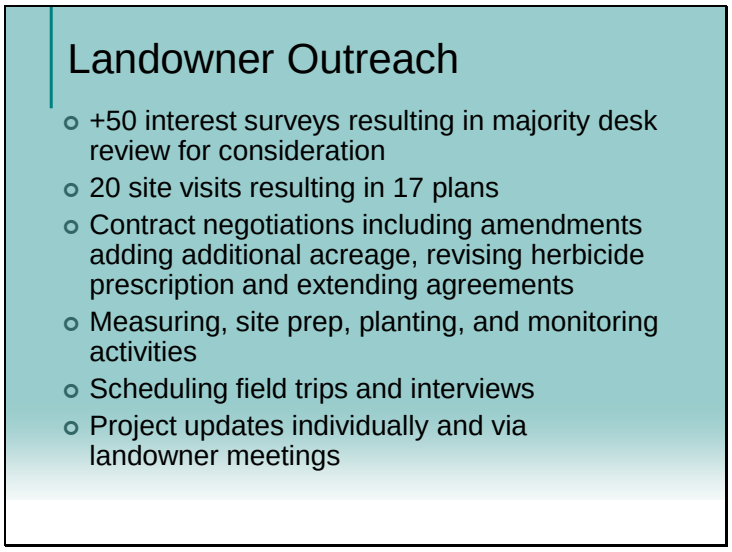


Surveys were performed over the telephone and in person. The survey included questions such as what assistance (technical, material, or financial) was needed by the landowner, what their objectives were for their property, what the proposed planting site was like currently (accessibility, slope, existing vegetation, legal description etc.), what species of trees were preferred, and what concerns the landowner had (if any) regarding planting trees on their property.

Slide 7



Ongoing communication with participating landowners was necessary throughout the project period from project selection through project implementation and monitoring.

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Each step in the process elicited additional questions and discussion. Time necessary for each landowner contact varied depending on landowner knowledge and interest. Significant time was allotted for landowner contact, especially during the time landowners were deciding if they would participate in a project.

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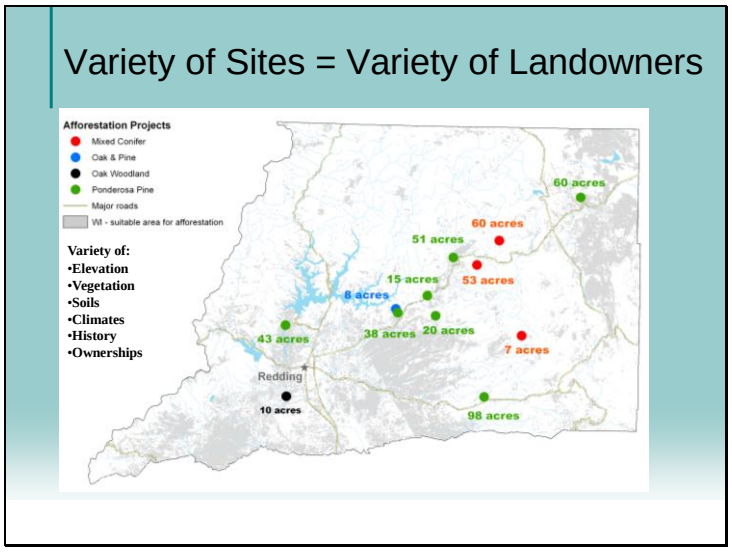
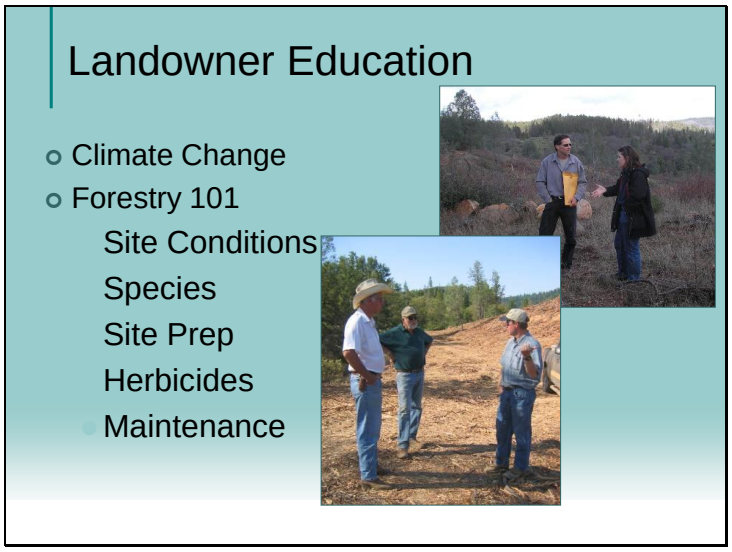


Projects varied in location, size, and ownership type (ex. family-owned, resident, absentee, timber producer, homestead, mixed conifer, oak woodland etc.).

Slide 10



Type of information and education requested varied depending on landowner. Landowners not familiar with forestry practices required different efforts than those knowledgeable in forest practices. Landowners provided information valuable for project planning and development.

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Throughout project implementation, communication between landowner, forester and contractor was vital. Open consistent communication helped develop good working relationships and common understanding.

Slide 12

Outreach to the community was performed consistently through multiple venues.

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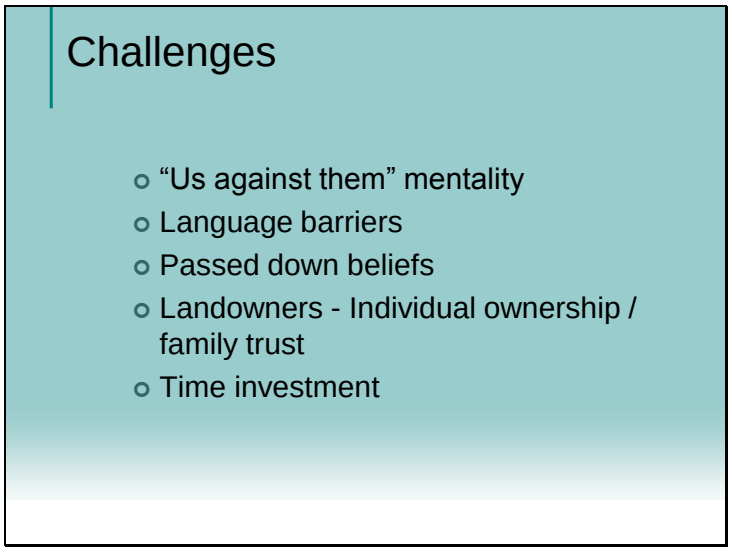
Presentations were made to a variety of groups and included land management, conservation, and economic interests.

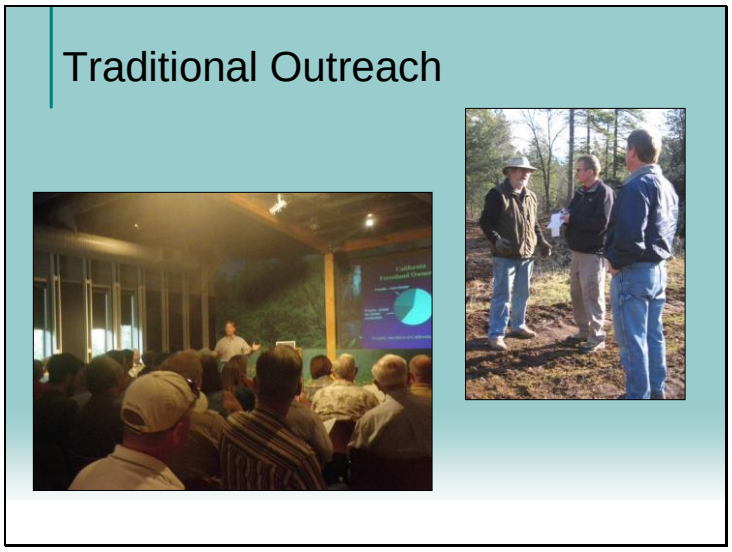
Slide 14


Each Landowner/Group is Unique
Values
Understanding of Natural Systems
Concerns
Goals

Slide 15

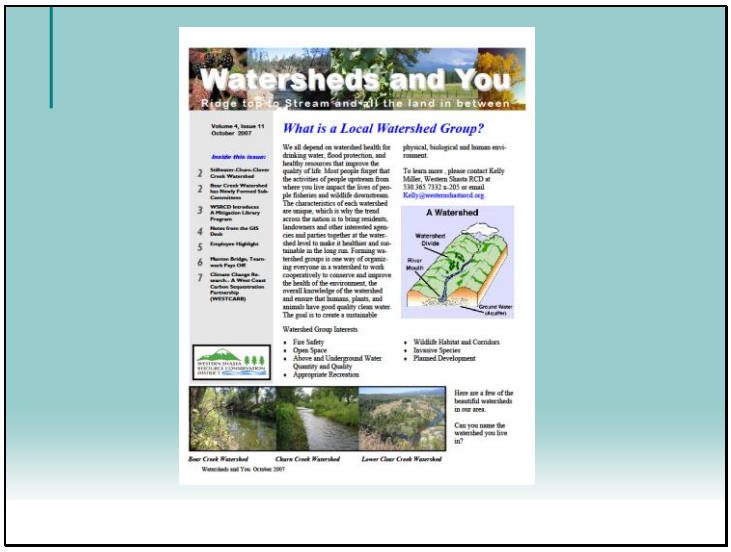

Challenges
“Us against them” mentality
Language barriers
Passed down beliefs
Landowners - Individual ownership / family trust
Time investment

Slide 16



Traditional venues such as meetings and interviews were useful to get the word out.

Slide 17

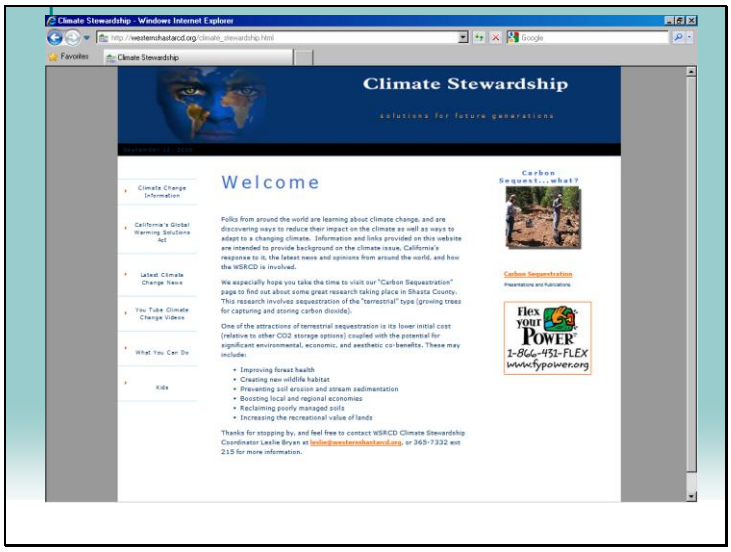


Print media such as newsletters and newspapers were also used.

Slide 18

Today there are many additional outreach venues available that can be used to reach multiple and diverse audiences.

Slide 19

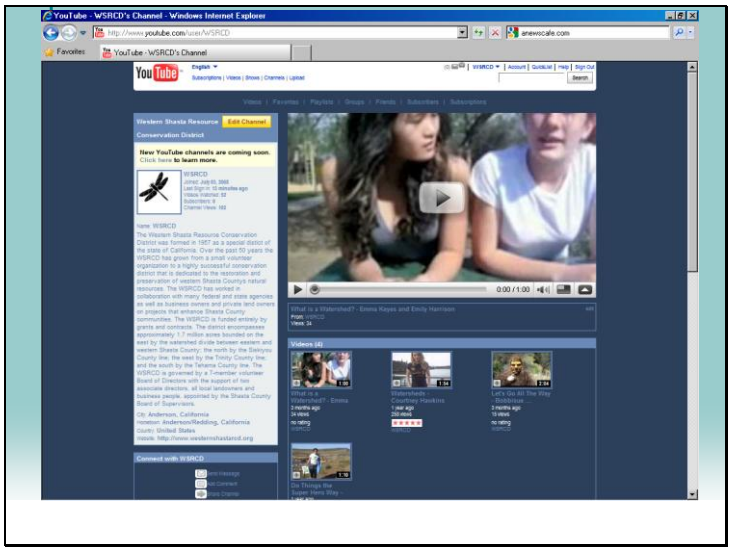


Websites are a great tool to educate, and begin conversations. Links to non-biased information was welcomed by visitors.

Slide 20

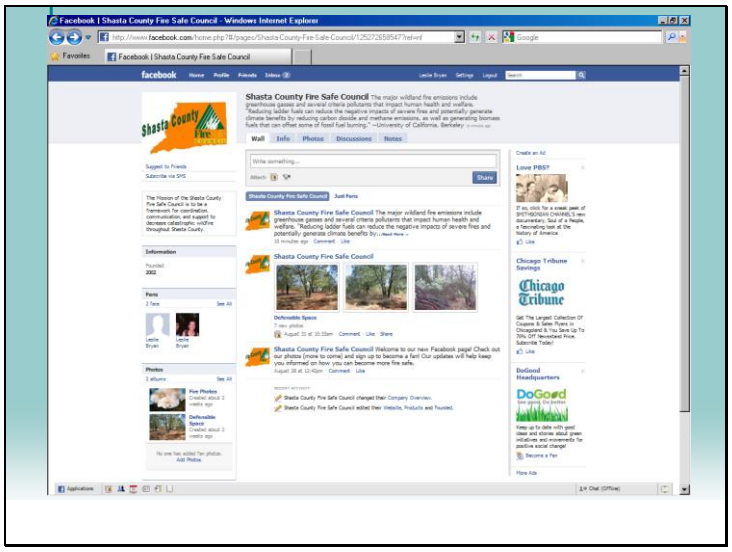
Educational presentations and activities were included in local festival programming.

Slide 21



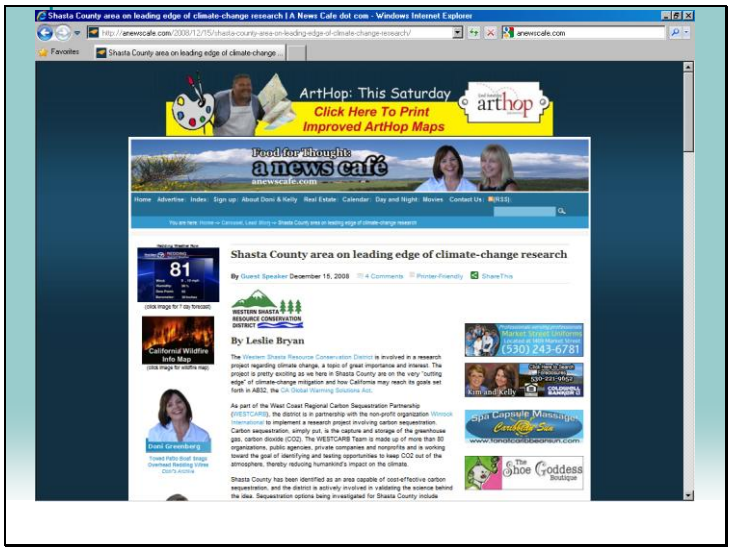
Video contests were held to engage local youth in the topics of climate change and carbon sequestration.

Slide 22



The currently popular social media network Facebook was used for outreach in collaboration with the county Fire Safe Council.

Slide 23



Webzines proved to be an increasingly popular avenue for getting the word out.

Slide 24

Multiple educational resources have existing curriculum and/or are available to collaborate on community education and involvement.

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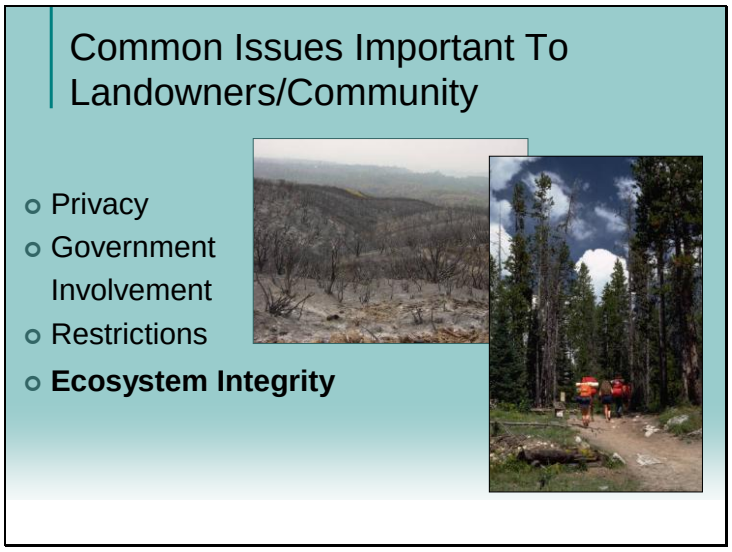
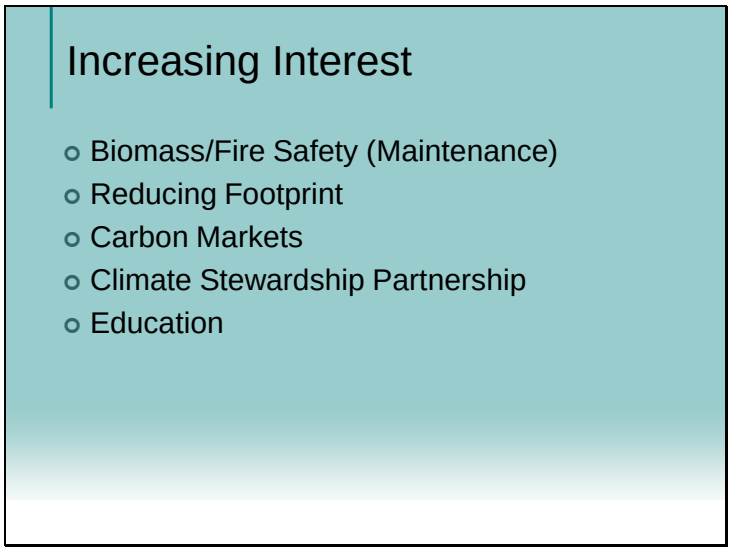


While many landowners and community members have concerns that make them wary of participating in organized programs, they also wish to maintain healthy ecosystems in their community. This presents an opportunity for opening discussion and recognizing common goals.

Slide 26



Interest in terrestrial sequestration is increasing by a diverse variety of groups/types of people (individuals, organizations, foresters, utility companies, watershed groups, fire safe councils, education community and others…)

Slide 27

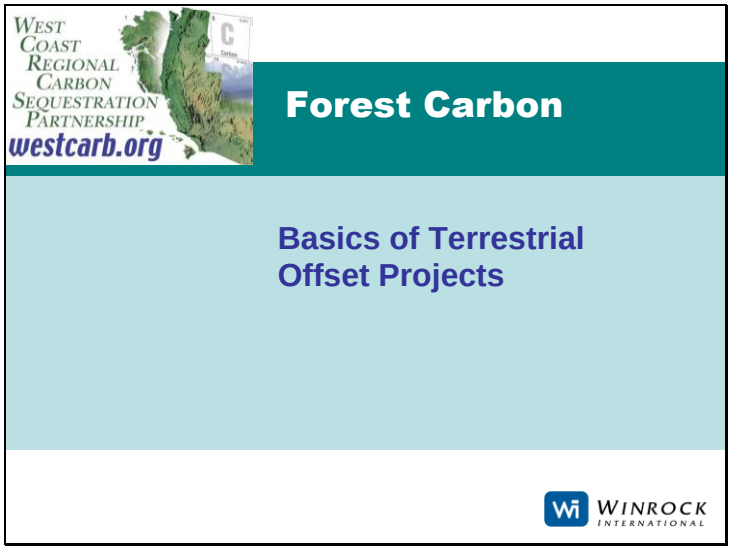
Successful outreach includes open two-way conversations. Significant time should be invested to develop and nurture positive working relationships which are vital for project implementation and sustainability.

Slide 28

Thank you for your interest in educating and involving landowners and community members in terrestrial sequestration. Feel free to contact the Western Shasta Resource Conservation District for more information. 530.365.7332, wsrcd@westernshastarcd.org. Visit the Climate Stewardship page at http://westernshastarcd.org/climate_stewardship.html.

FOREST CARBON: BASICS OF TERRESTRIAL OFFSET PROJECTS

Slide 1



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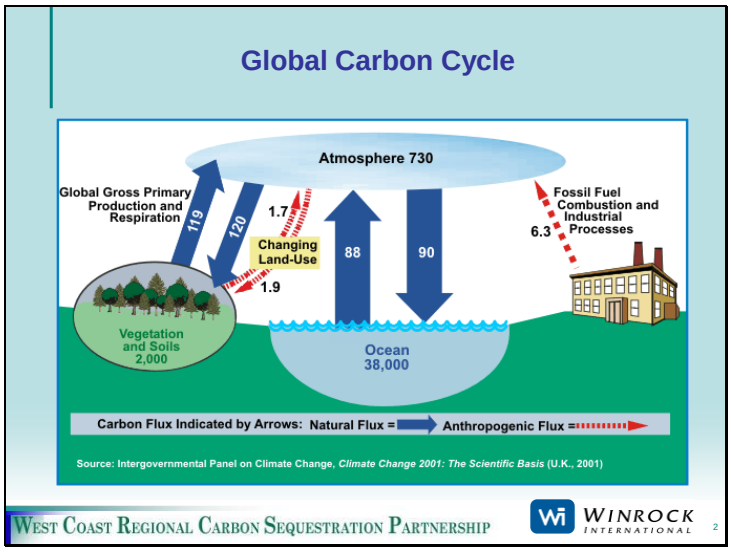
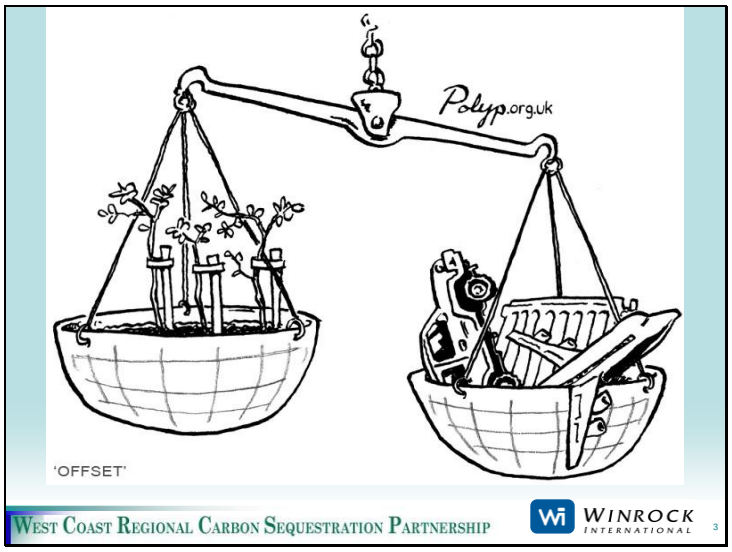


The carbon cycle describes the movement of carbon between different reservoirs or sinks. The main sinks are the atmosphere (where carbon is stored as carbon dioxide); the terrestrial biosphere (including plants, soil, and freshwater); the oceans; and the sediments, including fossil fuels. Carbon is naturally released into the atmosphere in many ways, but human activities such as fossil fuel use and deforestation can accelerate this process.

In the above diagram, blue arrows represent natural movement of carbon between sinks, and red arrows represent movement caused by human activities. The numbers are gigatons of carbon, or billion metric tons.

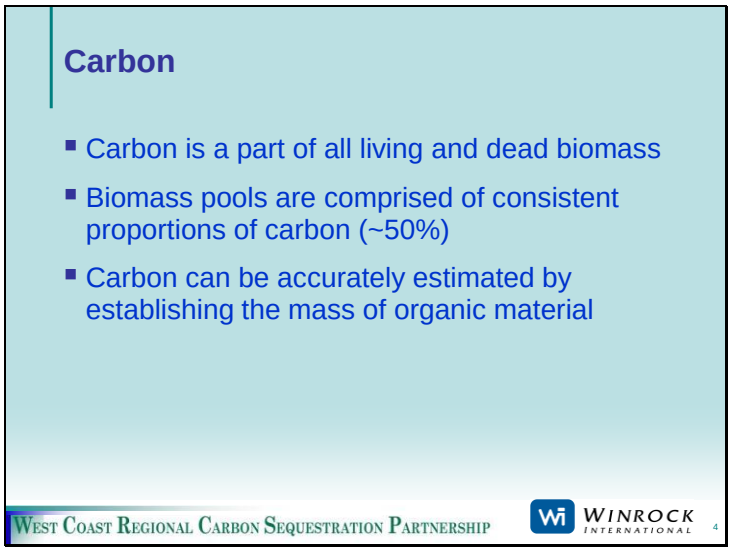
Focus on emission from fossil fuels vs. emissions from changing land use (1.6 vs. 6.3) – changing land use is about 25% of fossil fuel emissions so important to focus on

Slide 3



Changes in land management activities to increase stored carbon (such as tree planting) can help to offset some emissions from fossil fuel use.

Slide 4


Carbon
Carbon is a part of all living and dead biomass
Biomass pools are comprised of consistent proportions of carbon (~50%)
Carbon can be accurately estimated by establishing the mass of organic material
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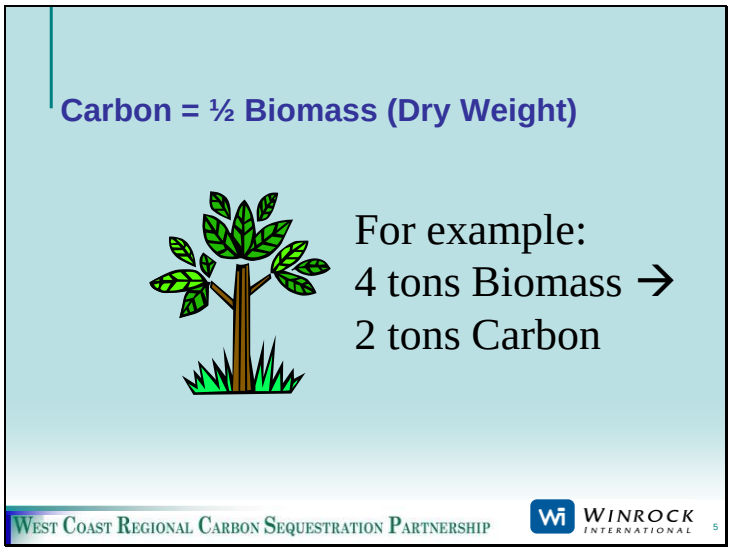
Carbon = ½ Biomass (Dry Weight)
For example:
4 tons Biomass →
2 tons Carbon
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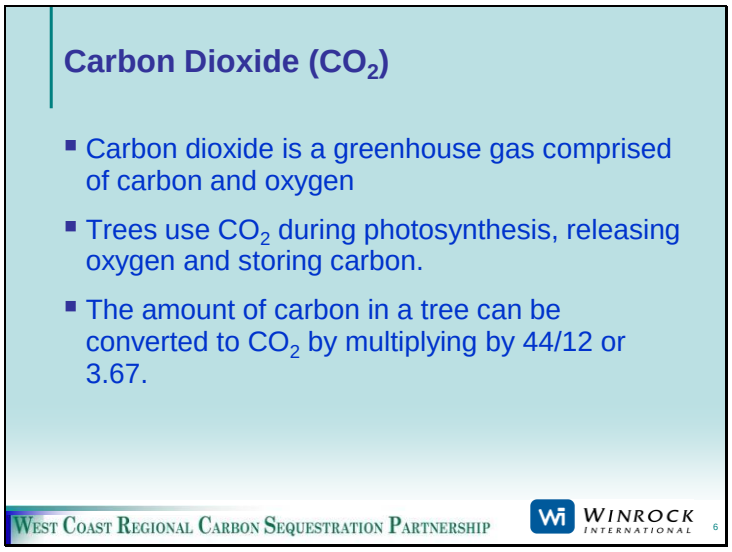
Carbon Dioxide (CO_2)
Carbon dioxide is a greenhouse gas comprised of carbon and oxygen
Trees use CO_2 during photosynthesis, releasing oxygen and storing carbon.
The amount of carbon in a tree can be converted to CO_2 by multiplying by 44/12 or 3.67.
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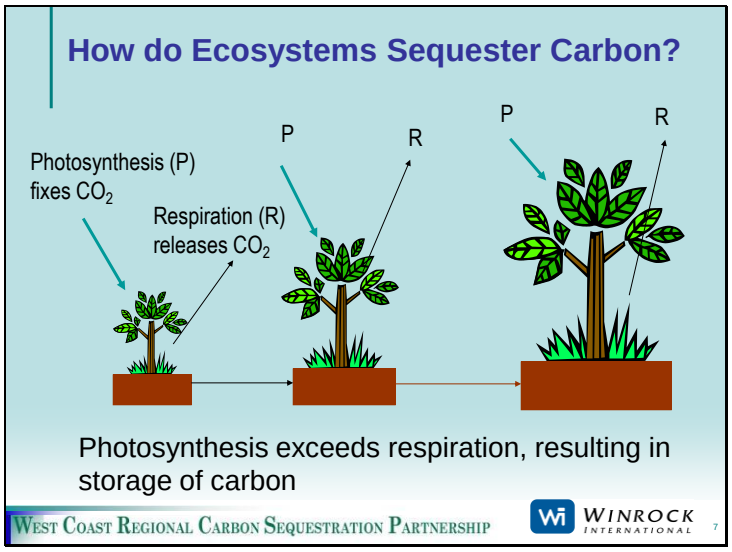
How do Ecosystems Sequester Carbon?
Photosynthesis (P) fixes CO_2
Respiration (R) releases CO_2
P
R
P
R
Photosynthesis exceeds respiration, resulting in storage of carbon
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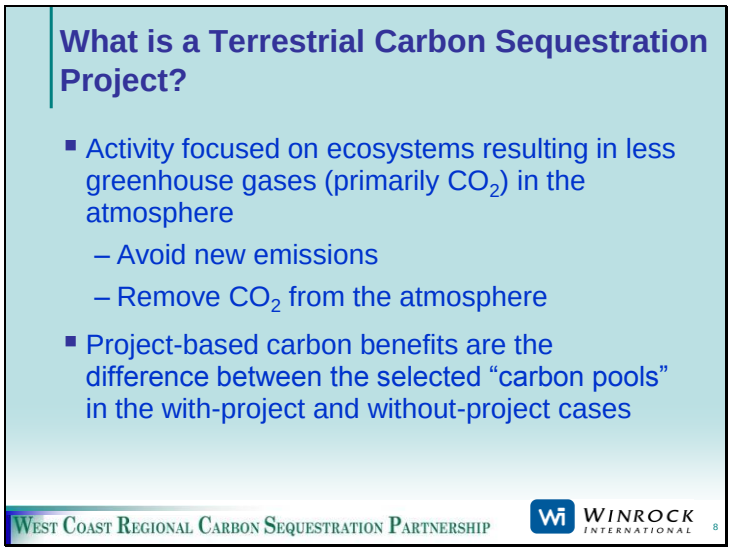
What is a Terrestrial Carbon Sequestration Project?
Activity focused on ecosystems resulting in less greenhouse gases (primarily CO_2) in the atmosphere
– Avoid new emissions
– Remove CO_2 from the atmosphere
Project-based carbon benefits are the difference between the selected "carbon pools" in the with-project and without-project cases
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Forestry Practices that Sequester or Preserve Carbon
Afforestation: tree planting on lands previously not in forest
Reforestation: tree planting on previous forest lands
Forest preservation or avoided deforestation: protection of threatened forest lands
Forest management: modification of management practices
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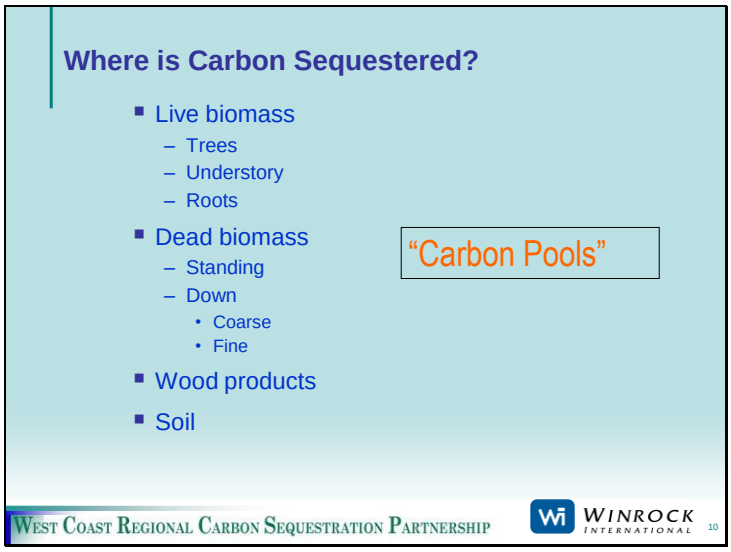
Slide 10


Where is Carbon Sequestered?
Live biomass
Trees
Understory
Roots
Dead biomass
Standing
Down
Coarse
Fine
Wood products
Soil
"Carbon Pools"
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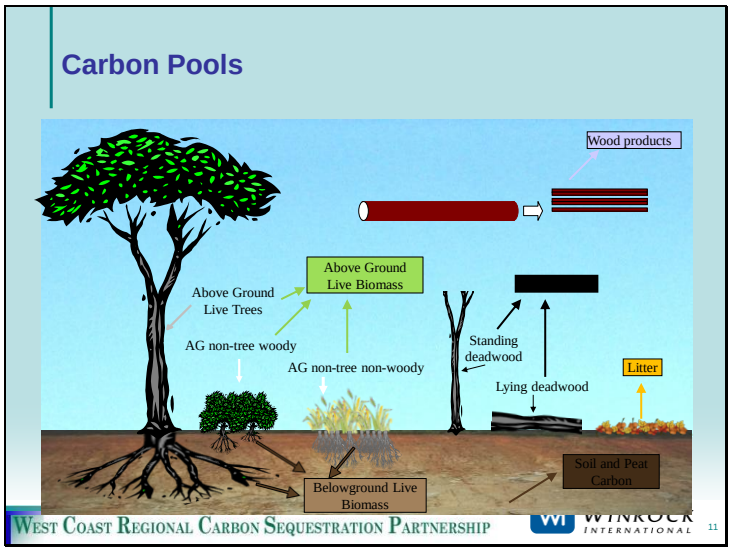
Carbon Pools
Wood products
Above Ground Live Biomass
Above Ground Live Trees
AG non-tree woody
AG non-tree non-woody
Standing deadwood
Lying deadwood
Litter
Soil and Peat Carbon
Belowground Live Biomass
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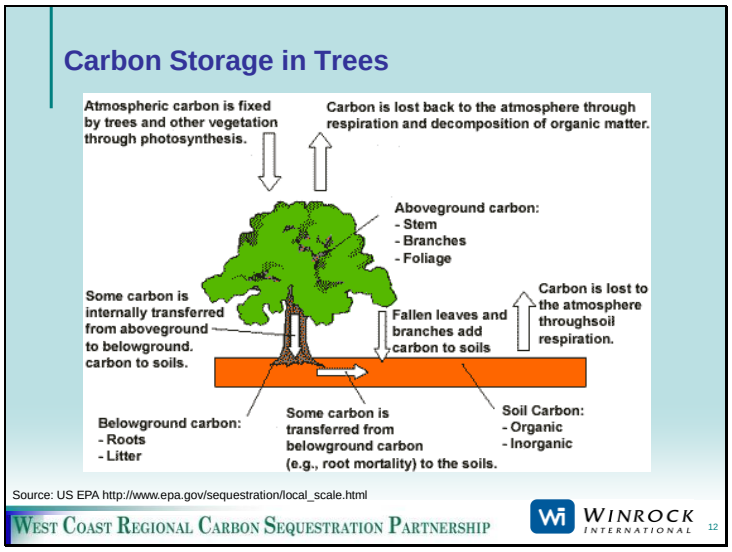
Carbon Storage in Trees
Atmospheric carbon is fixed by trees and other vegetation through photosynthesis.
Carbon is lost back to the atmosphere through respiration and decomposition of organic matter.
Aboveground carbon:
- Stem
- Branches
- Foliage
Some carbon is internally transferred from aboveground to belowground. carbon to soils.
Fallen leaves and branches add carbon to soils
Carbon is lost to the atmosphere throughsoil respiration.
Belowground carbon:
- Roots
- Litter
Some carbon is transferred from belowground carbon (e.g., root mortality) to the soils.
Soil Carbon:
- Organic
- Inorganic
Source: US EPA http://www.epa.gov/sequestration/local_scale.html
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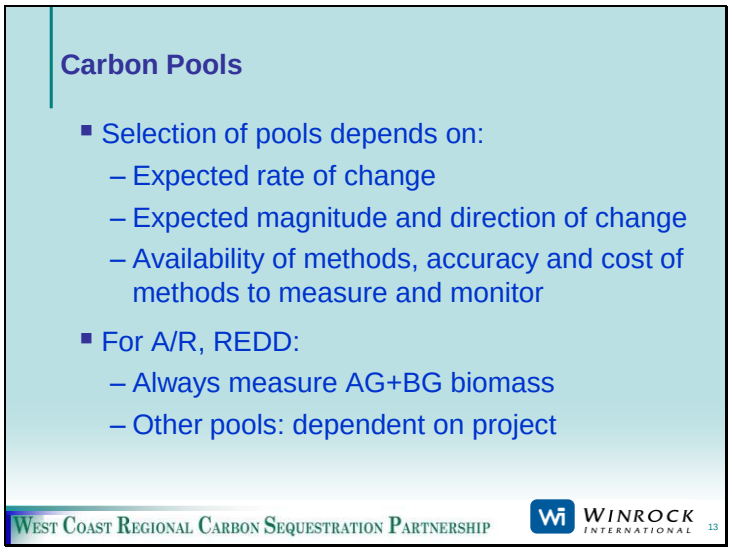
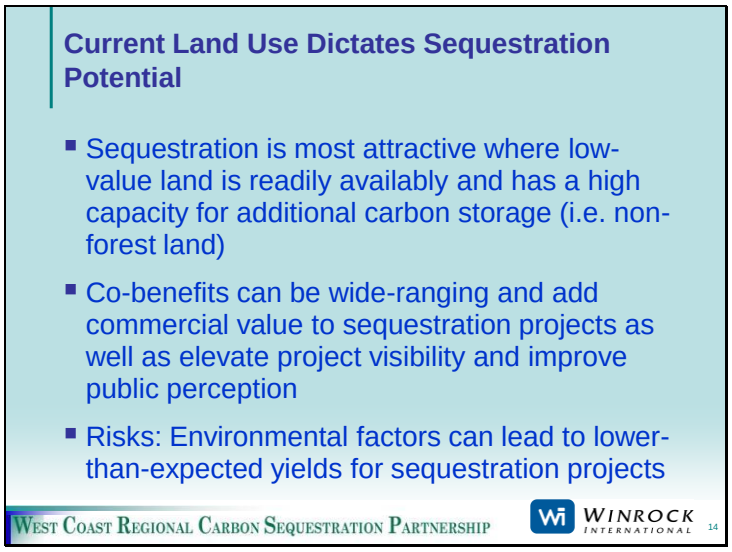


Different carbon pools sequester carbon at different rates. It is not necessary or even desirable to count all pools in a carbon project, though above and below ground live biomass are always counted in a forest carbon project.

Slide 14


Current Land Use Dictates Sequestration Potential
Sequestration is most attractive where low-value land is readily availably and has a high capacity for additional carbon storage (i.e. non-forest land)
Co-benefits can be wide-ranging and add commercial value to sequestration projects as well as elevate project visibility and improve public perception
Risks: Environmental factors can lead to lower-than-expected yields for sequestration projects
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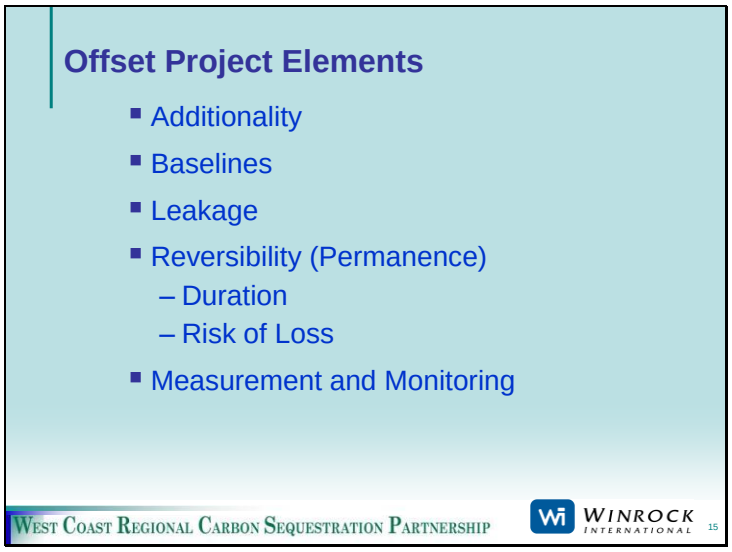

•Additionality refers to the situation where a project results in carbon benefits additional to those that would have taken place in the absence of the carbon project activity.
• The baseline describes what would have happened in the absence of the carbon project, and the resulting emissions that would have occurred.
• Leakage is change in GHG emissions that occur outside a project boundary, but can be attributed to the project activities.
• Reversibility refers to the length of time the project must ensure that carbon stocks are maintained. This is defined differently by different registries.
• Measurement and monitoring are critical to ensuring continued carbon benefits from the project.

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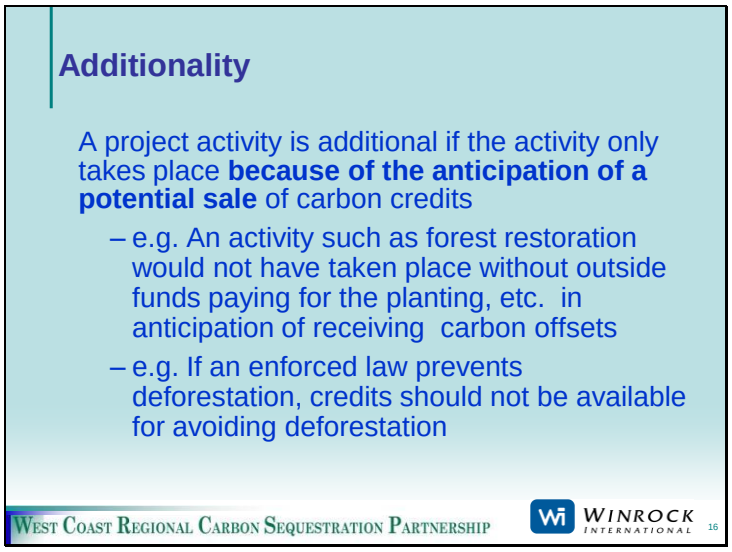
Additionality
A project activity is additional if the activity only takes place because of the anticipation of a potential sale of carbon credits
– e.g. An activity such as forest restoration would not have taken place without outside funds paying for the planting, etc. in anticipation of receiving carbon offsets
– e.g. If an enforced law prevents deforestation, credits should not be available for avoiding deforestation
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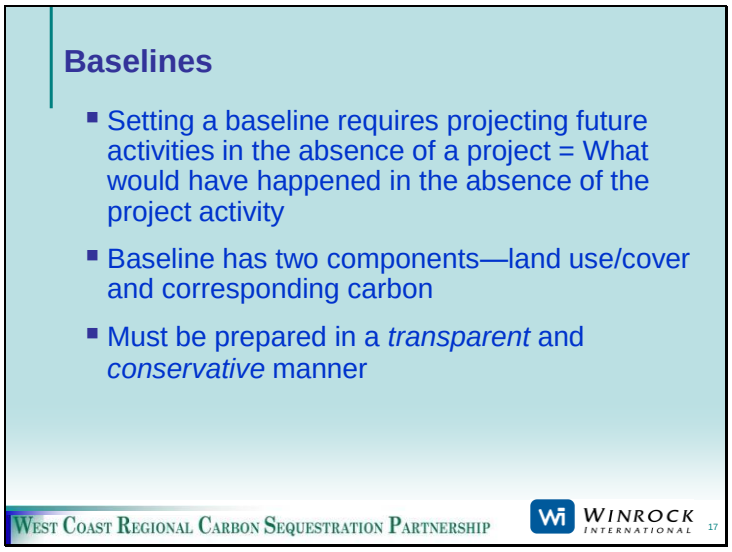
Baselines
Setting a baseline requires projecting future activities in the absence of a project = What would have happened in the absence of the project activity
Baseline has two components—land use/cover and corresponding carbon
Must be prepared in a transparent and conservative manner
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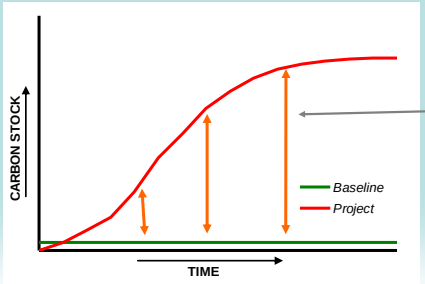
Baselines: Reforestation

- Credits from a project is:

  Difference between C stocks with project and baseline C stocks



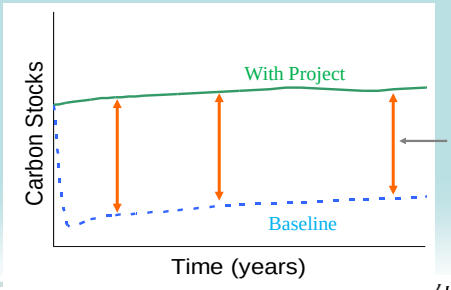
Carbon Credits

Slide 19

Baselines: Forest Management

- Credits from a project is:

  Difference between C stocks with project and baseline C stocks



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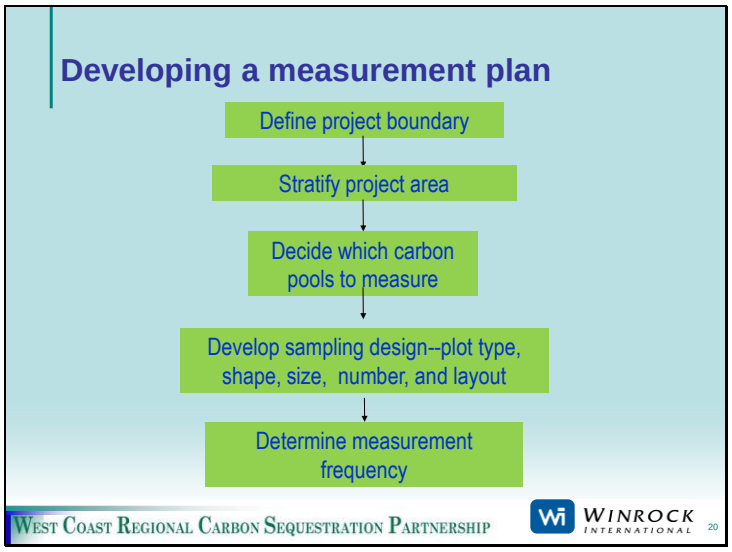
Developing a measurement plan
Define project boundary
Stratify project area
Decide which carbon pools to measure
Develop sampling design--plot type, shape, size, number, and layout
Determine measurement frequency
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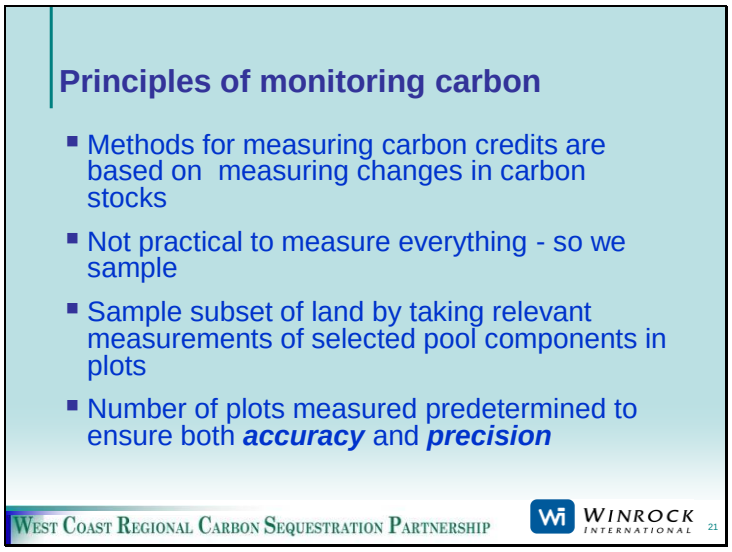
Principles of monitoring carbon
Methods for measuring carbon credits are based on measuring changes in carbon stocks
Not practical to measure everything - so we sample
Sample subset of land by taking relevant measurements of selected pool components in plots
Number of plots measured predetermined to ensure both accuracy and precision
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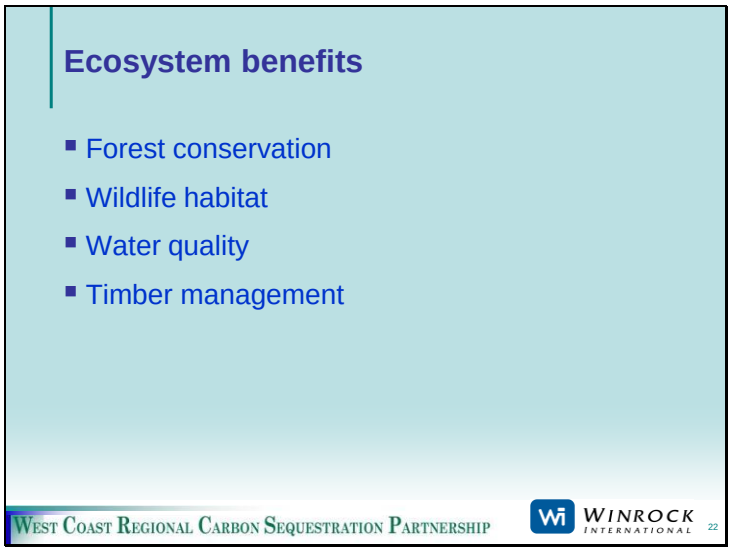
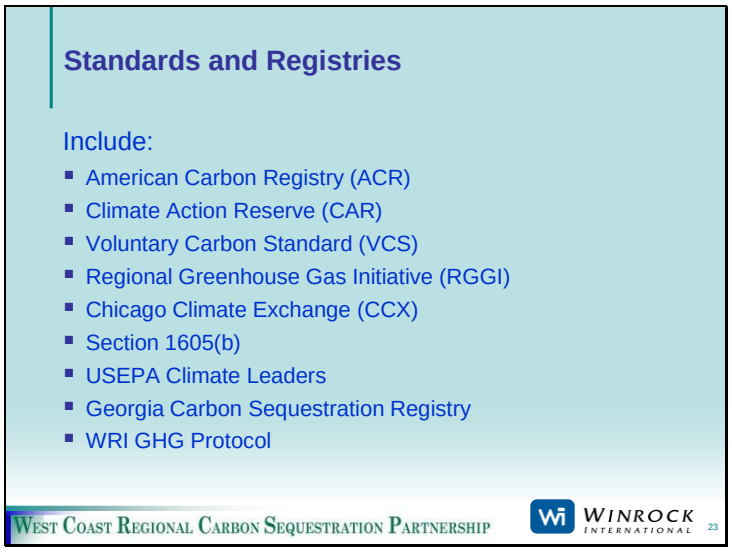
Slide 22



Most projects have benefits in addition to carbon benefits.

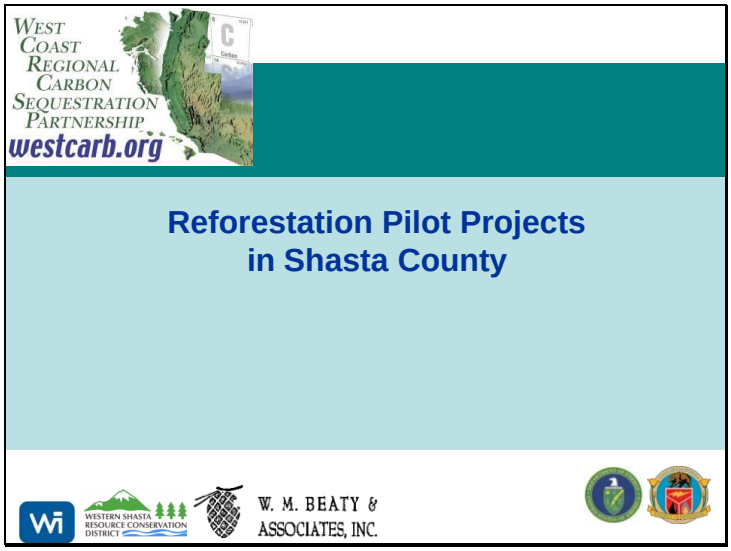
Slide 23



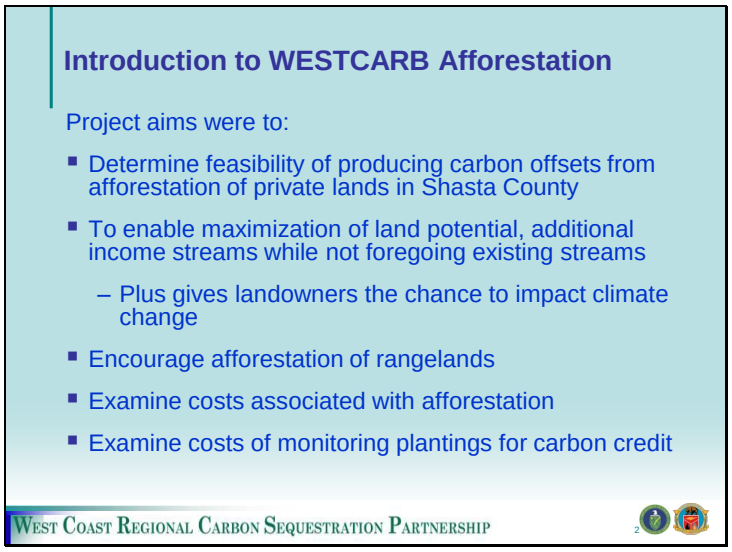
Different registries have different requirements and receive different levels of market recognition. More information is presented in the presentation on developing and registering a forest carbon project.

PROJECT EXAMPLES: PILOT REFORESTATION PROJECTS IN SHASTA COUNTY, CA

Slide 1



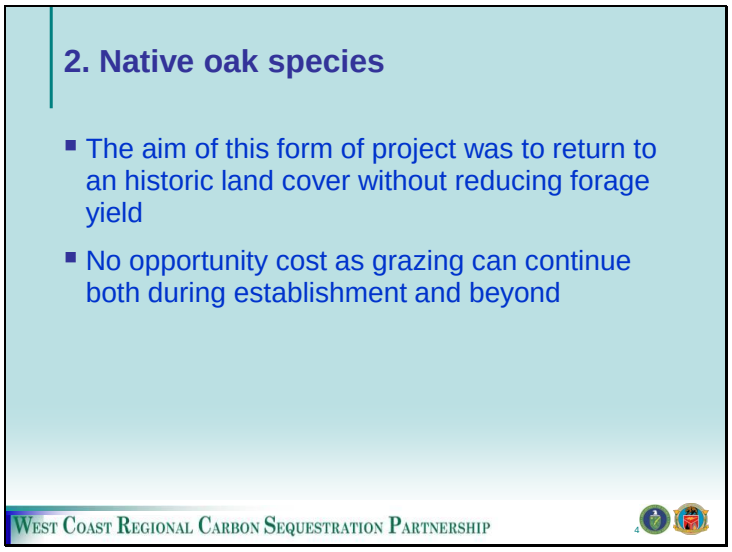
Slide 2


Introduction to WESTCARB Afforestation
Project aims were to:
Determine feasibility of producing carbon offsets from afforestation of private lands in Shasta County
To enable maximization of land potential, additional income streams while not foregoing existing streams
– Plus gives landowners the chance to impact climate change
Encourage afforestation of rangelands
Examine costs associated with afforestation
Examine costs of monitoring plantings for carbon credit
West Coast Regional Carbon Sequestration Partnership
2

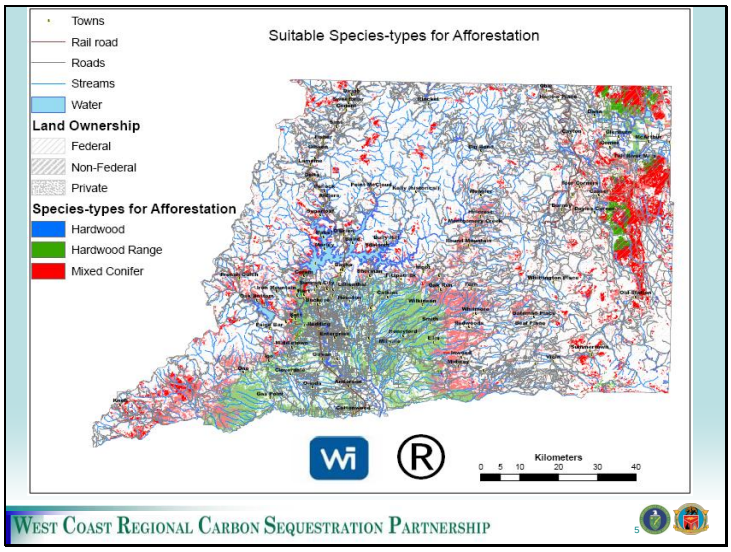
Slide 3


1. Mixed Conifer Forest
On lands currently dominated by shrubs such as manzanita
Shrubs preventing return of forest
Project will involve substantial site preparation: killing and removing shrubs
High carbon yield expected
West Coast Regional Carbon Sequestration Partnership
3

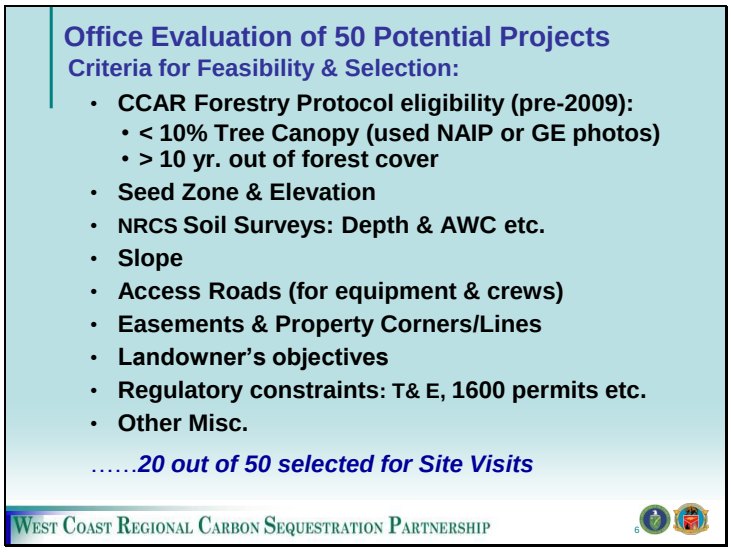
Slide 4


2. Native oak species
The aim of this form of project was to return to an historic land cover without reducing forage yield
No opportunity cost as grazing can continue both during establishment and beyond
West Coast Regional Carbon Sequestration Partnership

Slide 5

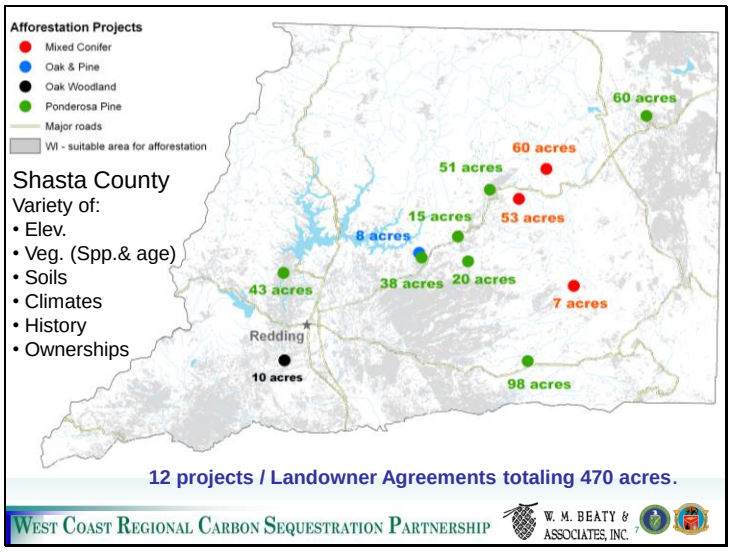

Towns
Rail road
Roads
Streams
Water
Land Ownership
Federal
Non-Federal
Private
Species-types for Afforestation
Hardwood
Hardwood Range
Mixed Conifer
Suitable Species-types for Afforestation
Kilometers
0 5 10 20 30 40
WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
5

Slide 6

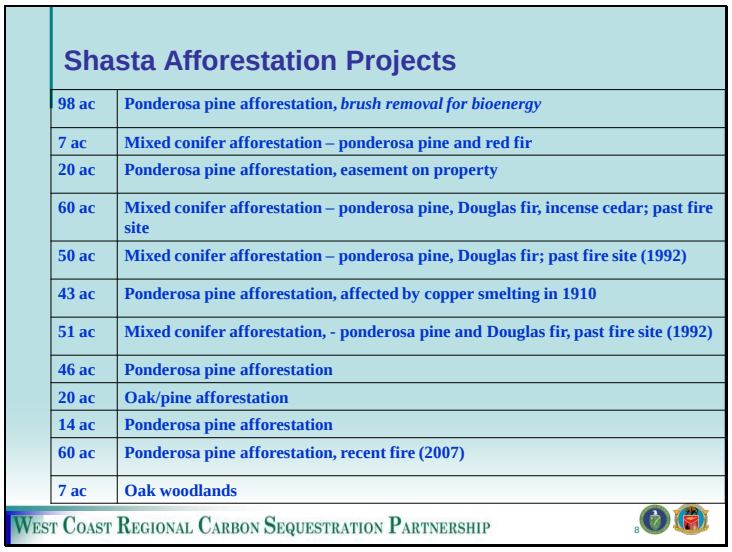


Did not choose projects that needed surveying, 1600 or T&E permits etc since time was already very limited to get projects agreed to and finished within grant time period.

Slide 7

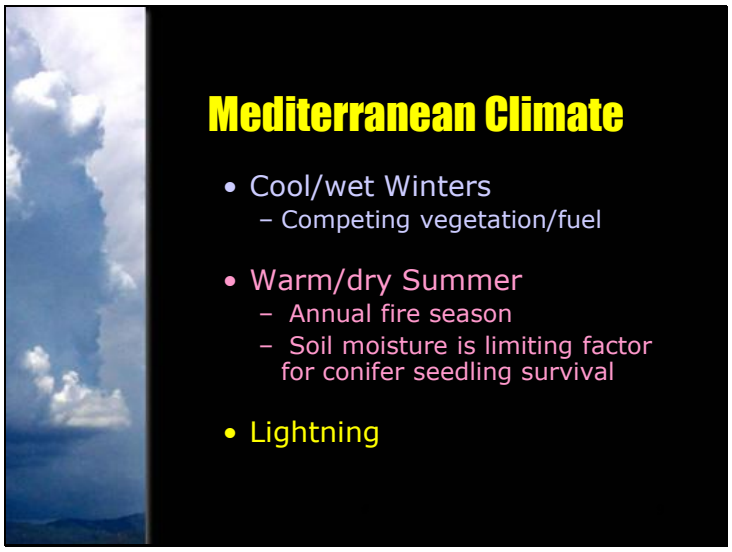

Afforestation Projects
Mixed Conifer
Oak & Pine
Oak Woodland
Ponderosa Pine
Major roads
WI - suitable area for afforestation
Shasta County
Variety of:
• Elev.
• Veg. (Spp.& age)
• Soils
• Climates
• History
• Ownerships
60 acres
60 acres
51 acres
15 acres
53 acres
8 acres
38 acres
20 acres
43 acres
7 acres
Redding
10 acres
98 acres
12 projects / Landowner Agreements totaling 470 acres.
West Coast Regional Carbon Sequestration Partnership
W. M. BEATY & ASSOCIATES, INC.

Slide 8



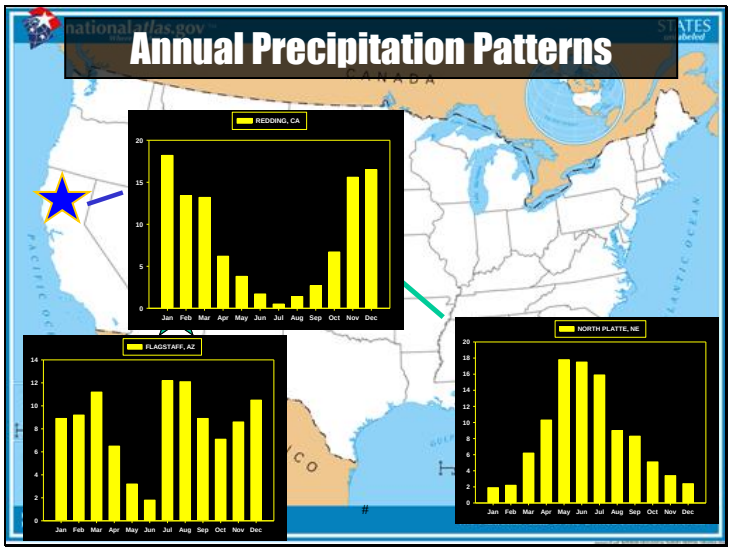
Total of 470 planted acres.

Slide 9



Mediterranean Climate: basic pattern is not expected to change. May be enhanced.

Slide 10



Charts compare the California Mediterranean climate (e.g., Redding) to typical climates from other parts of the continental USA. Emphasizes why our climate promotes frequent fires – least precipitation during the hottest months.

Slide 11

Seed for 2,200’ to 5,000’ ponderosa pine plantings came from CAL FIRE’s share of the North Sierra Tree Improvement Association’s Malin Seed Orchard. Other seed was provided by Beaty & SPI from their seed banks.

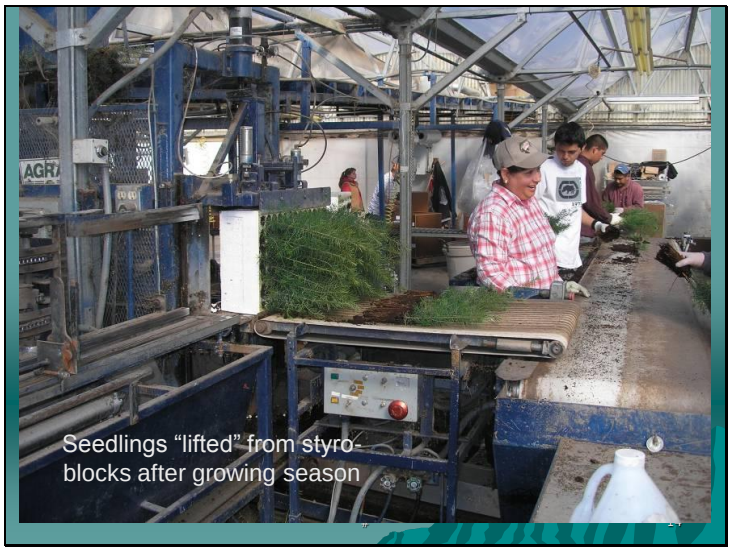
Slide 12


CAL FOREST NURSERY
Sowing seeds into styro-
block containers

Slide 13


Seeds germinate into seedlings & grow
for one season at the nursery

Slide 14



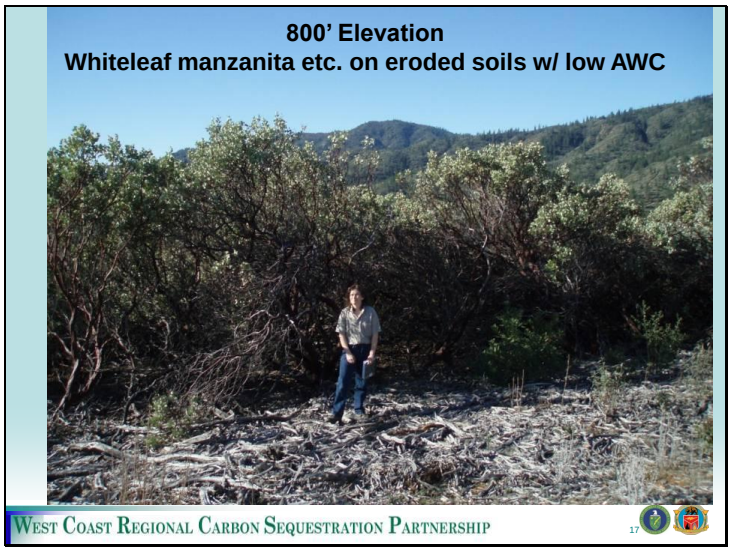
Slide 15


Seedlings packed into boxes by seed lot, elevation, species, project name etc.
140
140
140

Slide 16


Seedlings must be kept in cold storage from
lifting/packing until they are planted in the field

Slide 17



Decadent manzanita brushfield on lands denuded of conifers by early 1900's copper smelting fumes.

Foreground was masticated.

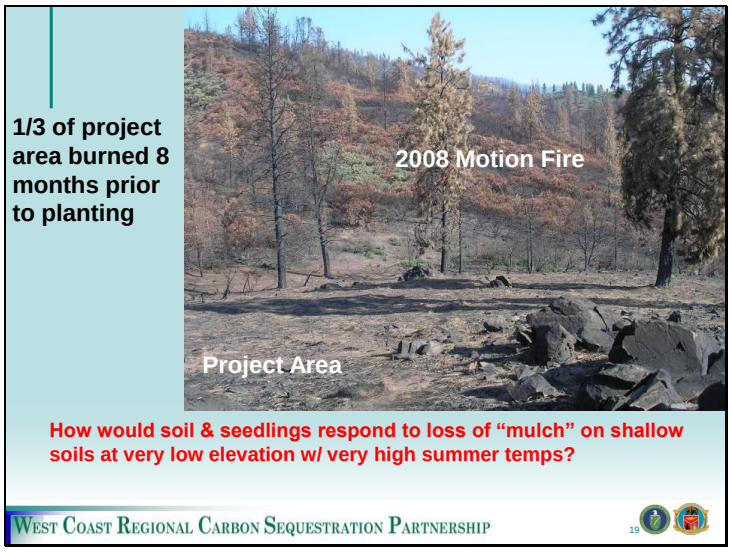
Mastication is preferred site preparation method on this very low elevation (800') and hot, dry site that was subjected to erosion after the early 1900's smelter caused conifer die off. Since the whiteleaf manzanita species does not re-sprout, clearing the brush and root system with a cat was not needed. The masticated material provides an excellent "mulch" to protect the soil from erosion and reduce evaporation to provide more soil moisture for conifer seedling establishment.

However numerous manzanita seeds germinated after the mechanical mastication. These manzanita seedlings need to be treated prior to planting conifers.

Slide 18

Numerous manzanita seeds germinated after the mechanical mastication. These manzanita seedlings need to be treated prior to planting conifers. The dead brush in this picture was treated with a chemical site preparation spray in the spring of 2008. Control of brush that would otherwise soon re-occupy the site is critical on this low elevation, hot, dry site. The young conifer seedlings scheduled for planting in 2009 will need all of the available soil moisture they can get.

Slide 19

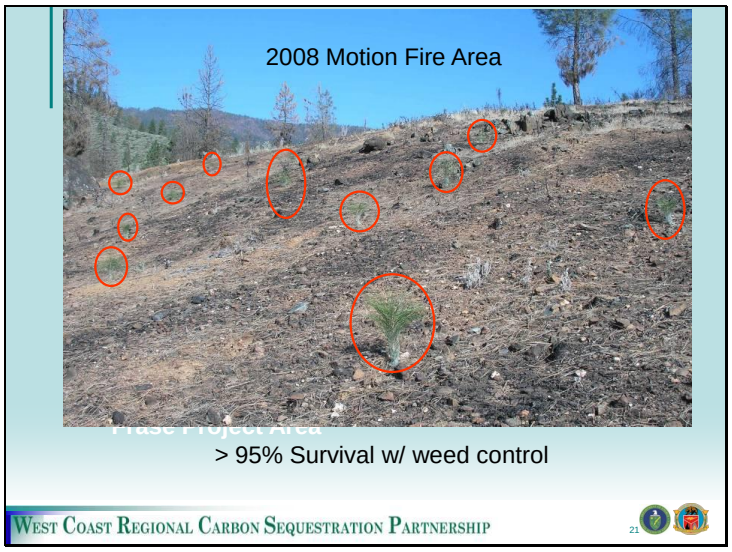


A portion of the Frase Project area was burned by the "Motion Fire" in the Northern California Fire Siege of 2008. This wildfire occurred prior to planting on the project area.

Slide 20

Planted: Feb 2009; picture: Sept 11, 2009
No rain from mid June through mid Sept 2009

Slide 21



A portion of the Frase Project area was burned (prior to planting) by the “Motion Fire” in the Northern California Fire Siege of 2008, yet seedlings still survived well on the burned areas.

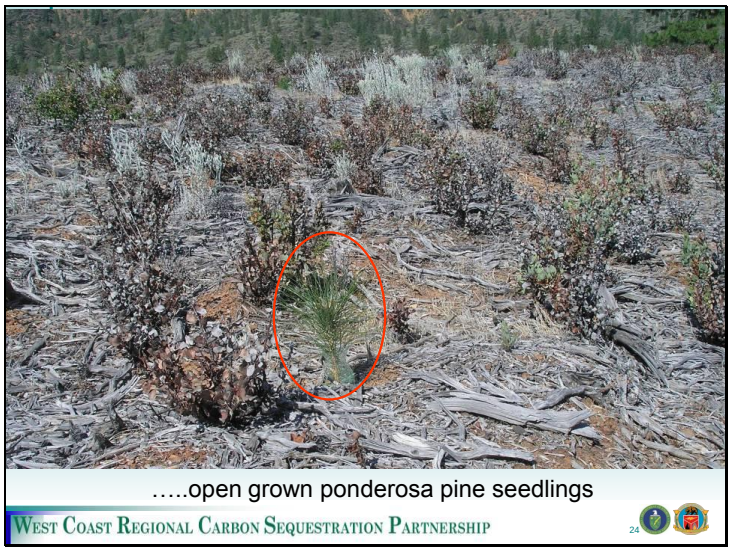
Slide 22

Masticated unburned area > 95% Survival

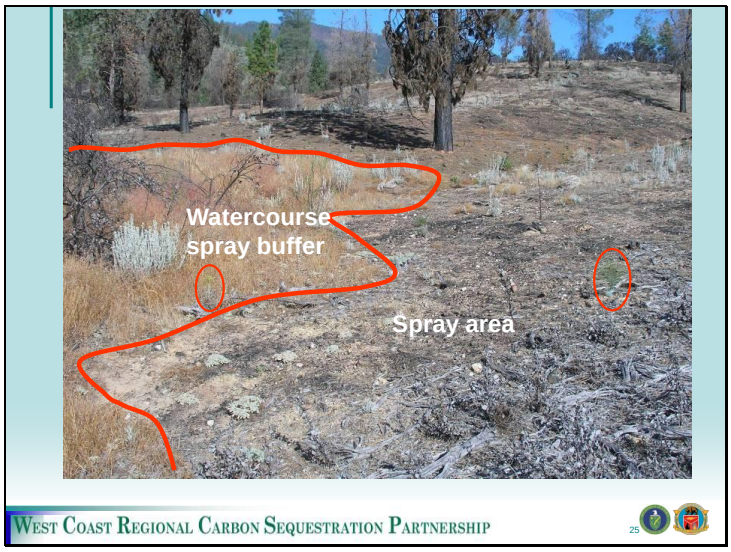
Slide 23


PP seedling under “sparse” canopy are less vigorous than….
West Coast Regional Carbon Sequestration Partnership
23

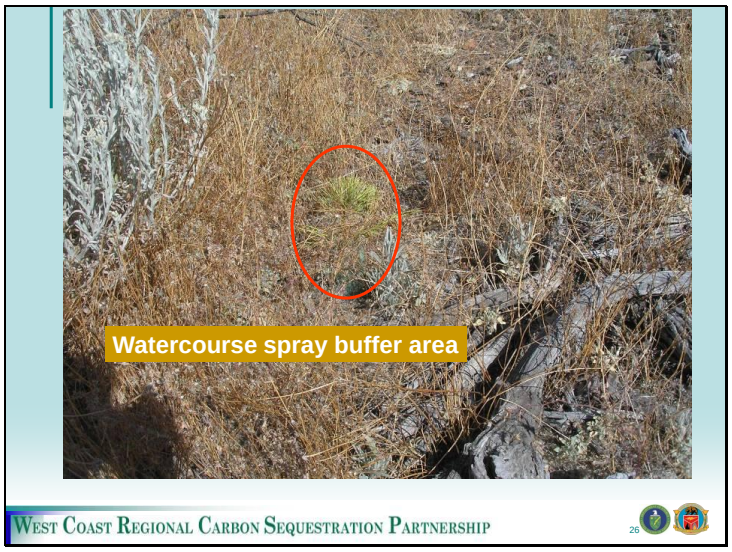
Slide 24


…..open grown ponderosa pine seedlings
West Coast Regional Carbon Sequestration Partnership
24

Slide 25


Watercourse
spray buffer
Spray area
West Coast Regional Carbon Sequestration Partnership
25

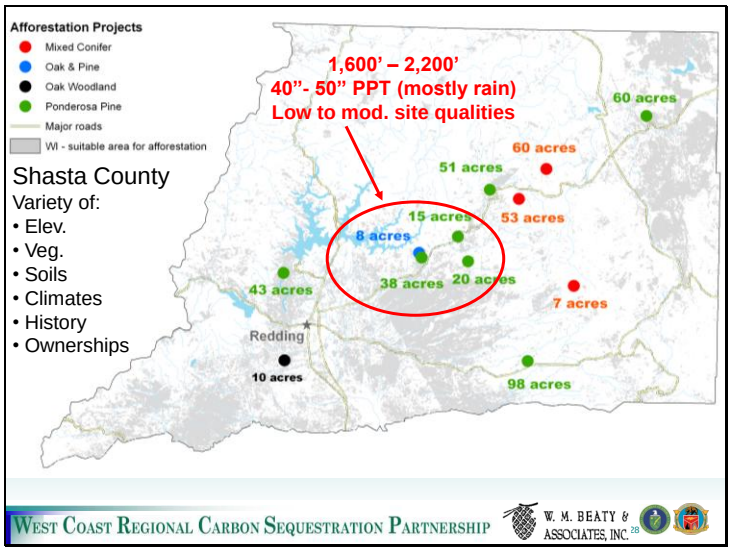
Slide 26


Watercourse spray buffer area
West Coast Regional Carbon Sequestration Partnership
26

Slide 27


Almost all seedlings died within watercourse buffer - no spray areas
West Coast Regional Carbon Sequestration Partnership
27

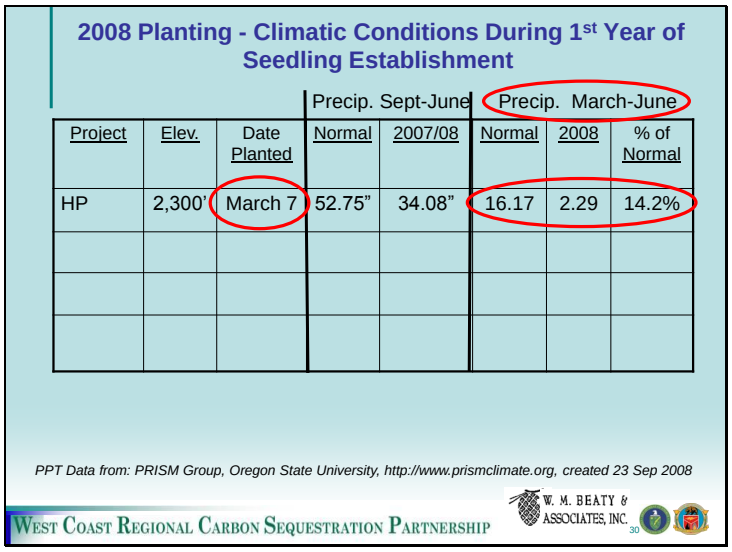
Slide 28


Afforestation Projects
Mixed Conifer
Oak & Pine
Oak Woodland
Ponderosa Pine
Major roads
WI - suitable area for afforestation
Shasta County
Variety of:
• Elev.
• Veg.
• Soils
• Climates
• History
• Ownerships
1,600' – 2,200'
40"- 50" PPT (mostly rain)
Low to mod. site qualities
60 acres
60 acres
51 acres
53 acres
15 acres
8 acres
38 acres
20 acres
43 acres
7 acres
Redding
10 acres
98 acres
West Coast Regional Carbon Sequestration Partnership
W. M. Beaty & Associates, Inc.
28

Slide 29

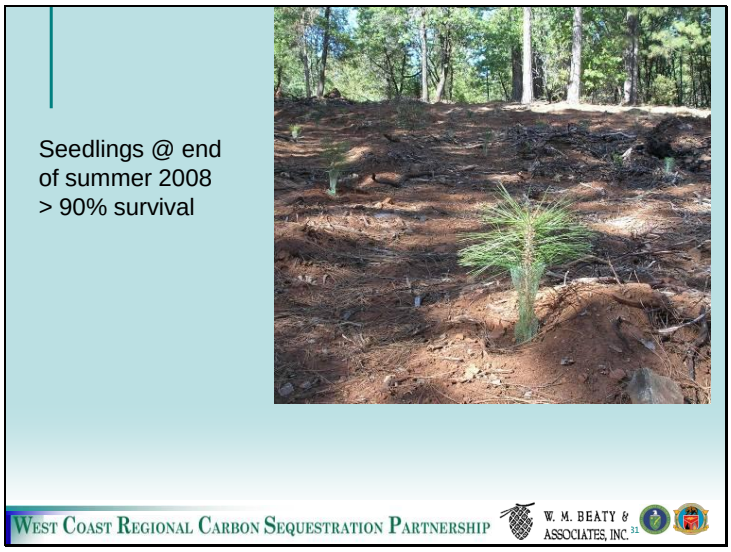
HP Project: Approximately 20 acres of brushfield that is unproductive and presents a high risk to the very productive well developed forest on remainder of the ownership to the east.

Slide 30



Even though we had one of the driest Springs on record (about 20% of normal) and PPT during the March – June period is critical for planted seedlings before the hot dry summer months we had great success!!!!

Slide 31

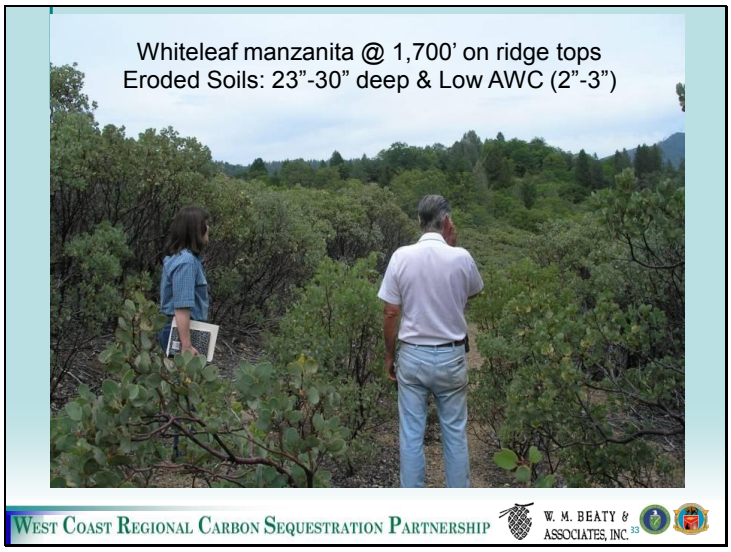


HP Project

Slide 32

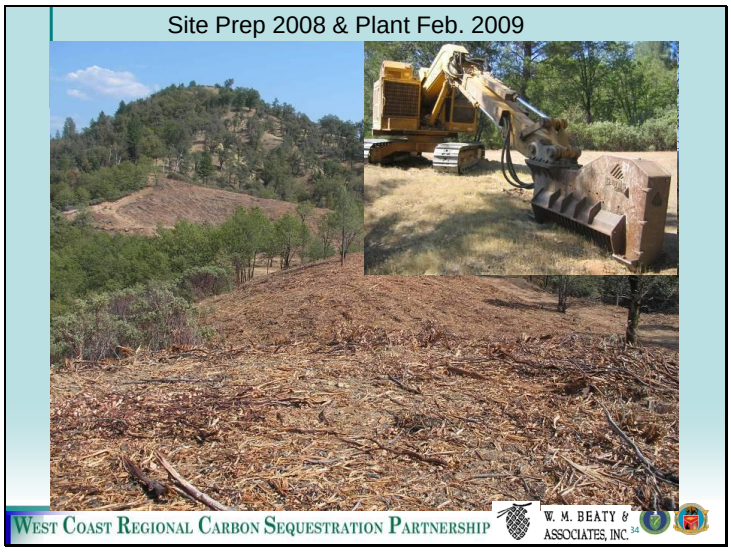
HP Project

Slide 33



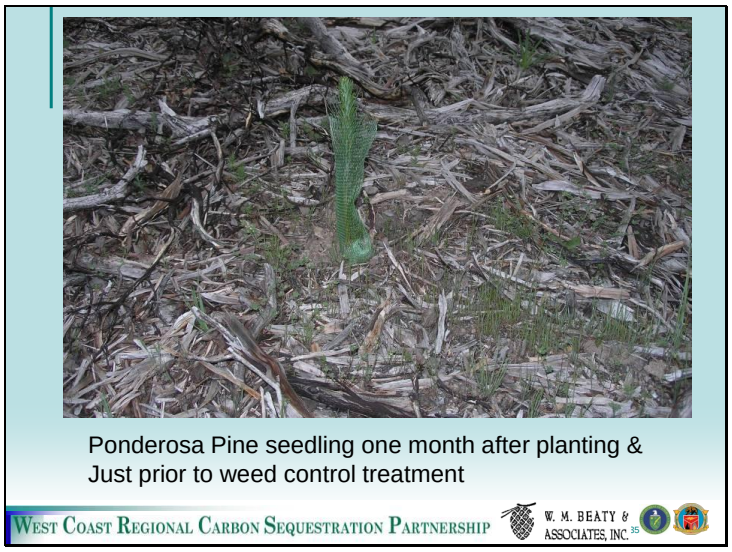
W Project: Unlike most brush species, whiteleaf manzanita which occupied most of this site does re-sprout

Slide 34



W Project: Rather than pile and remove the brush to prepare this site for planting, a masticator attached to an excavator was used in 2008 to prepare the site for planting in 2009.

Slide 35



W Project

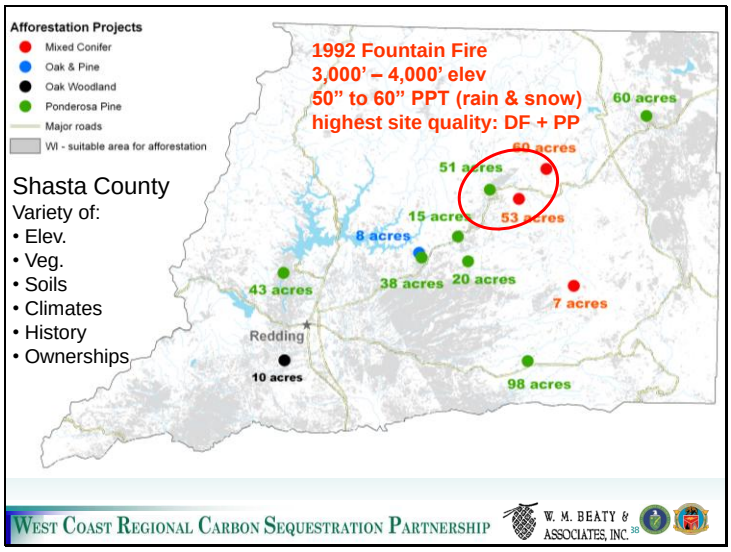
Slide 36

W Project

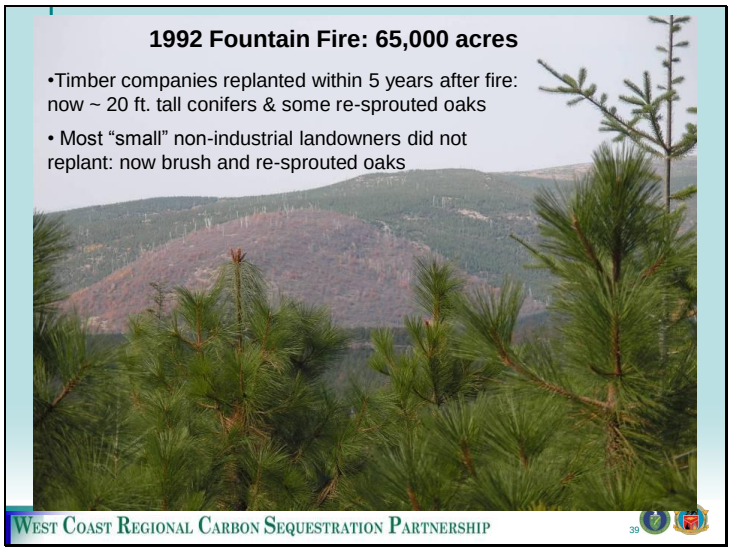
Slide 37

W Project

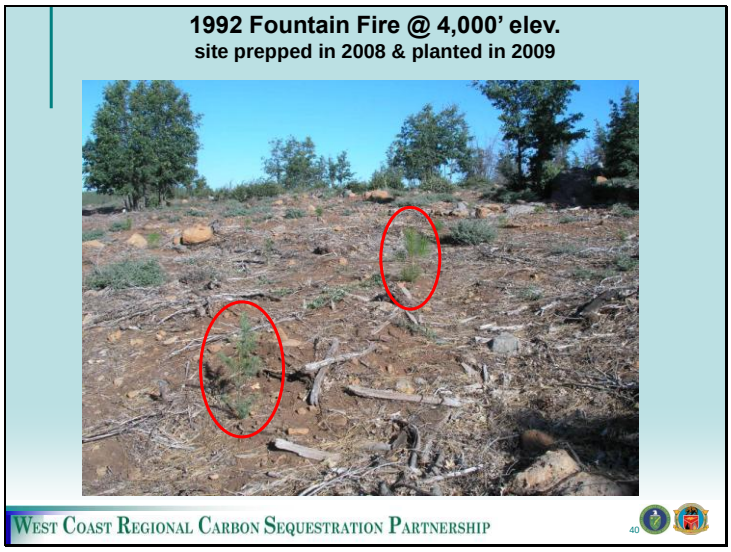
Slide 38


Afforestation Projects
Mixed Conifer
Oak & Pine
Oak Woodland
Ponderosa Pine
Major roads
WI - suitable area for afforestation
1992 Fountain Fire
3,000' – 4,000' elev
50" to 60" PPT (rain & snow)
highest site quality: DF + PP
Shasta County
Variety of:
• Elev.
• Veg.
• Soils
• Climates
• History
• Ownerships
60 acres
60 acres
51 acres
53 acres
15 acres
8 acres
38 acres
20 acres
43 acres
7 acres
Redding
10 acres
98 acres
West Coast Regional Carbon Sequestration Partnership
W. M. Beaty & Associates, Inc.
38

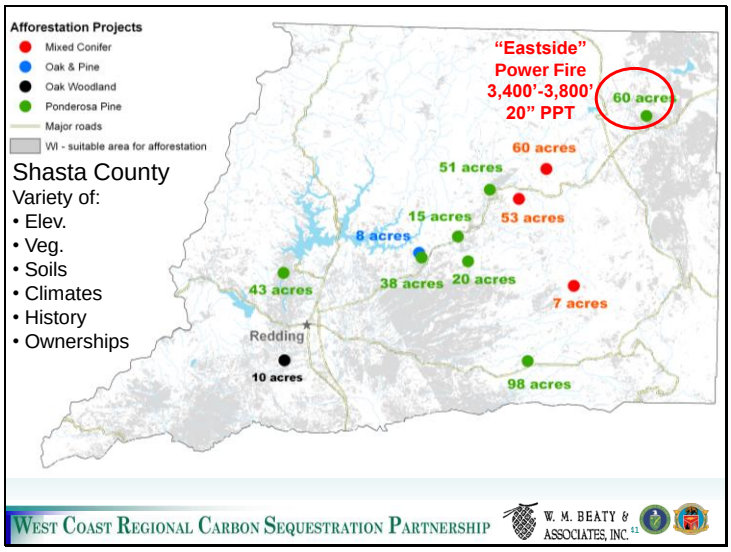
Slide 39


1992 Fountain Fire: 65,000 acres
•Timber companies replanted within 5 years after fire: now ~ 20 ft. tall conifers & some re-sprouted oaks
• Most “small” non-industrial landowners did not replant: now brush and re-sprouted oaks
West Coast Regional Carbon Sequestration Partnership
39

Slide 40


1992 Fountain Fire @ 4,000' elev.
site prepped in 2008 & planted in 2009
West Coast Regional Carbon Sequestration Partnership
40

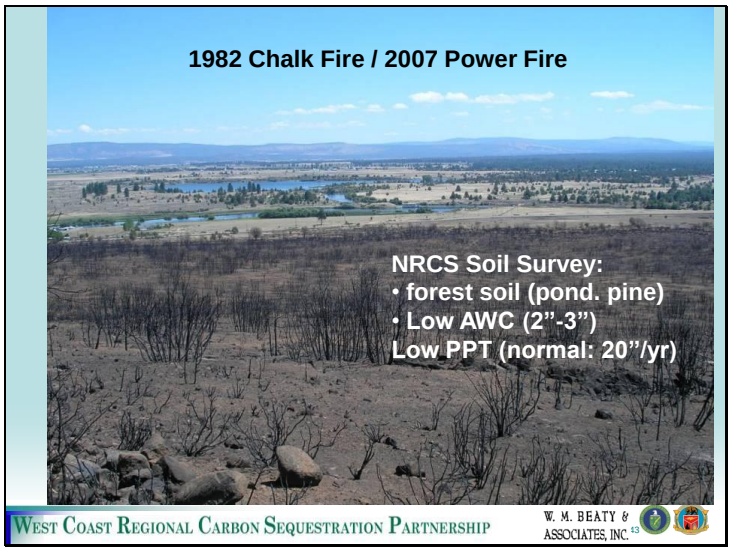
Slide 41


Afforestation Projects
Mixed Conifer
Oak & Pine
Oak Woodland
Ponderosa Pine
Major roads
WI - suitable area for afforestation
Shasta County
Variety of:
• Elev.
• Veg.
• Soils
• Climates
• History
• Ownerships
"Eastside"
Power Fire
3,400'-3,800'
20" PPT
60 acres
60 acres
51 acres
53 acres
15 acres
8 acres
38 acres
20 acres
43 acres
7 acres
Redding
10 acres
98 acres
West Coast Regional Carbon Sequestration Partnership
W. M. BEATY & ASSOCIATES, INC.

Slide 42

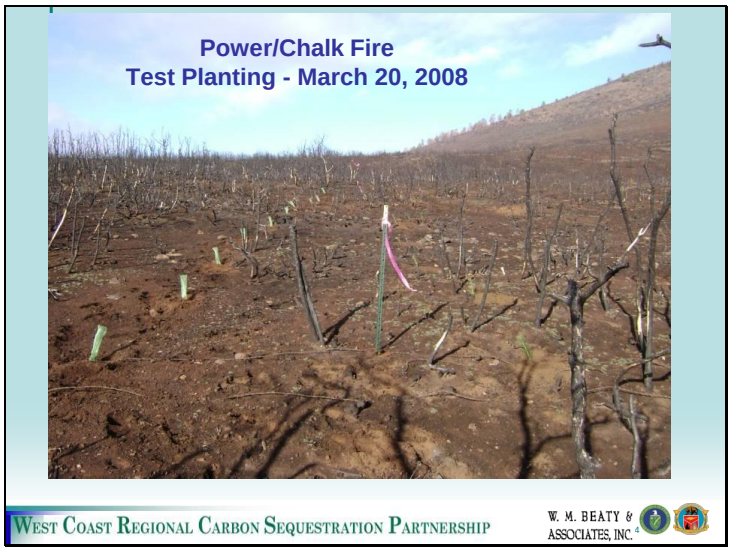

July 2007 *Power Wildfire*
NE Shasta County
Re-burned a portion of
1982 *Chalk Fire* area
END
West Coast Regional Carbon Sequestration Partnership
W. M. BEATY & ASSOCIATES, INC.
42

Slide 43



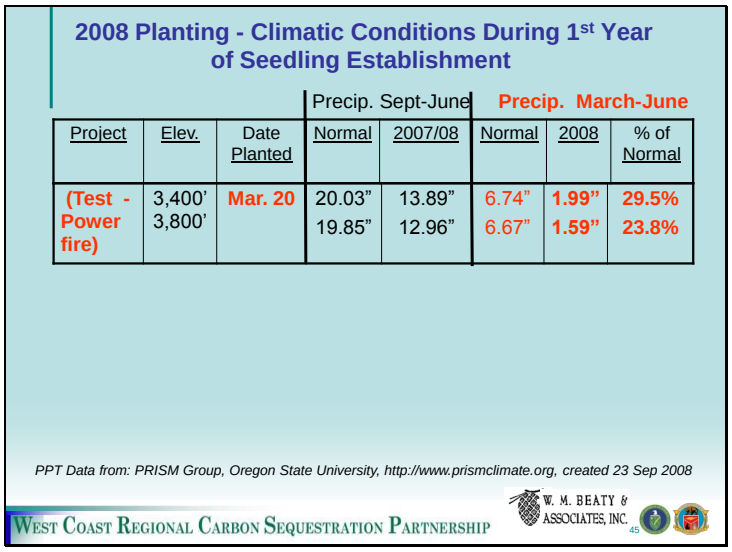
•Afforestation costs for this site will be much less if planted in the next few years before the brush re-sprouts and/or germinate seedlings become well established.
•Also there will be much less disturbance since no mechanical site preparation will be needed if afforestation is done in a timely manner after the wildfire.

Slide 44



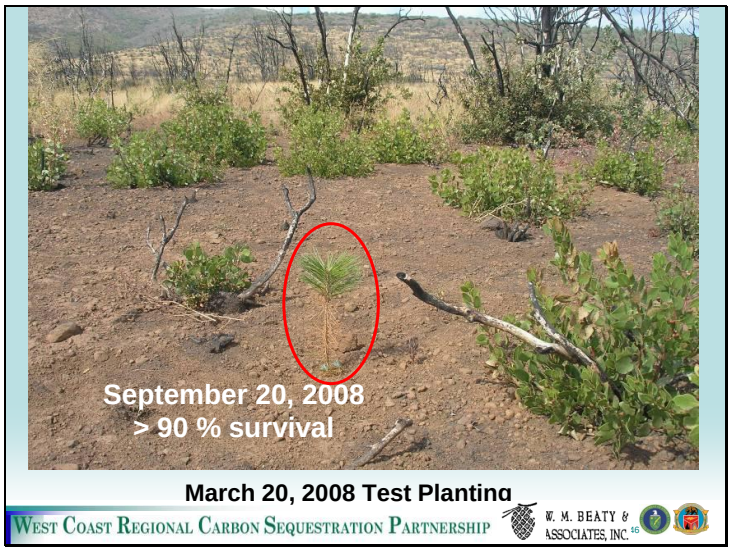
•One year-old Styro 5 containerized ponderosa pine seedlings were test planted on March 20, 2008 at three different elevations on this old brushfield site which burned in 1982 and again in 2007. NRCS describes the soils as capable of growing commercial conifers (ponderosa pine) on this site with average annual PPT of 20".
•Afforestation costs for this site will be much less if planted in the next few years before the brush re-sprouts and/or germinate seedlings become well established.
•Also there will be much less disturbance since no mechanical site preparation will be needed if afforestation is done in a timely manner after the wildfire.

Slide 45



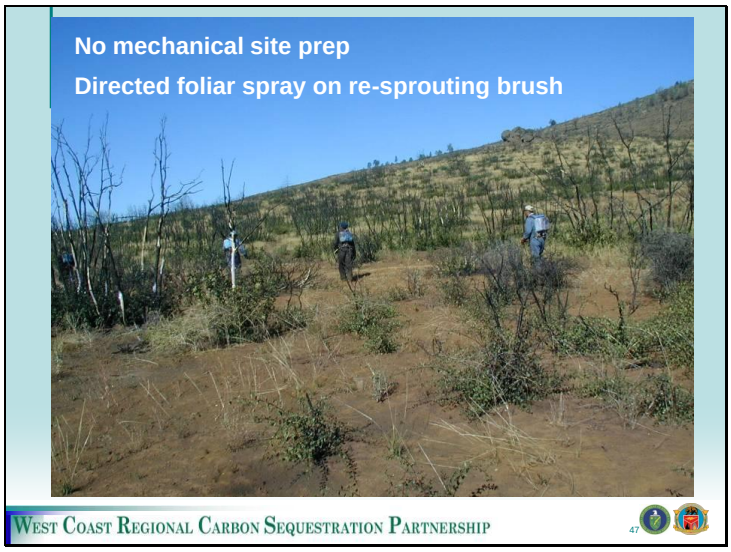
Even though we had one of the driest Springs on record (about 20% of normal) and PPT during the March – June period is critical for planted seedlings before the hot dry summer months we had great success!!!!

Slide 46



Power Fire project

Slide 47



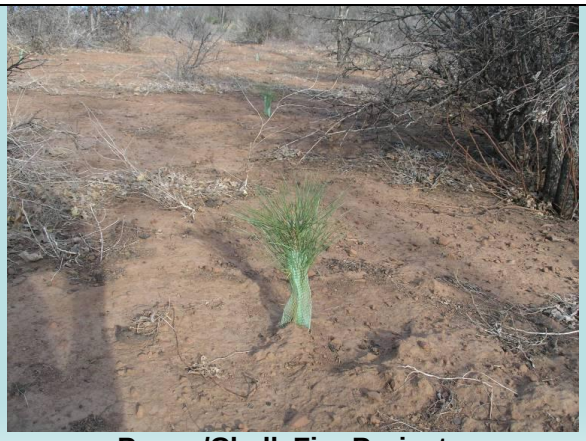
Power fire project

•Although this is a very dry site that has been occupied by brush for many decades, the excellent survival of our test planted ponderosa pine seedlings confirms the NRCS soils descriptions that the site is capable of growing commercial conifers. The planted seedlings were "tested" in an exceptionally dry year with only 24% of the normal spring precipitation falling followed by a long, dry, hot summer.
•Competing weed seedlings were treated in March on the test areas, but the re-sprouting brush was not. To prepare the site for operational planting in 2010 the resprouting brush was treated in September of 2008 on the entire 60 acre project area.
•Afforestation costs for this site will be much less if planted in the next few years before the brush re-sprouts and/or germinate seedlings become well established.
•Also there will be much less disturbance since no mechanical site preparation will be needed if afforestation is done in a timely manner after the wildfire.

Slide 48


March, 2009
Power/Chalk Fire Project
2009 Operational Planting
West Coast Regional Carbon Sequestration Partnership
W. M. BEATY & ASSOCIATES, INC.
48

Slide 49



Power/Chalk Fire Project
Seedling in Sept (3 months after last rain)

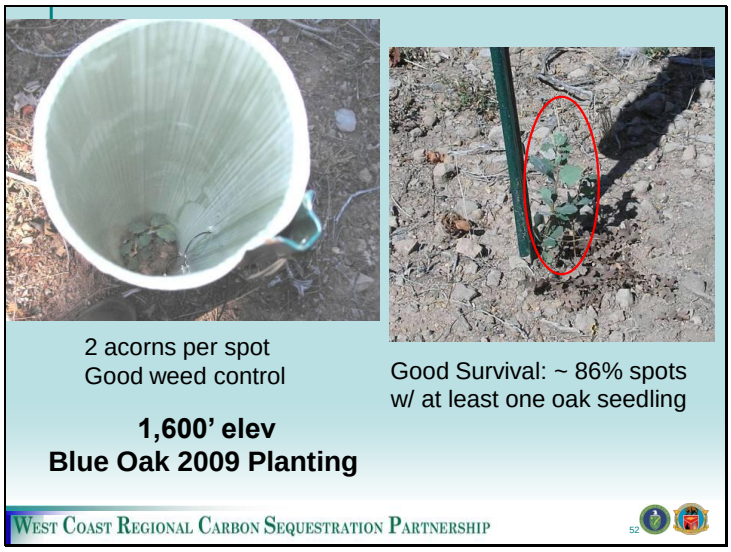
Slide 50

Relied heavily on information in “Regenerating Rangeland Oaks in California,” by Douglas McCreary, University of California, Sierra Foothill Research and Extension Center, Agriculture and Natural Resources Publication 21601

Slide 51

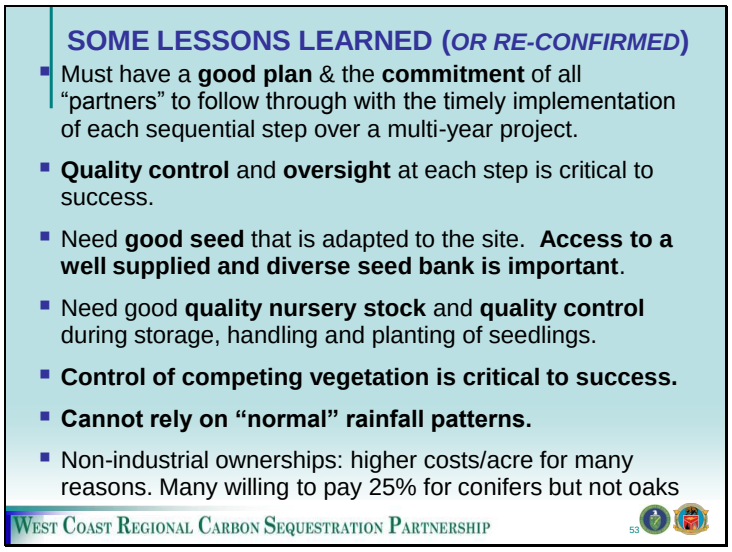
Redding BLM

Slide 52

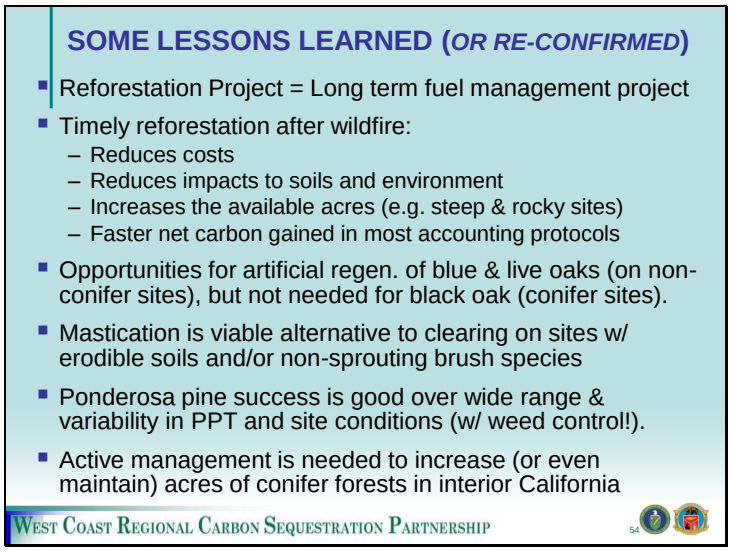


E Project: oak & pine planting

Slide 53


SOME LESSONS LEARNED (OR RE-CONFIRMED)
Must have a good plan & the commitment of all "partners" to follow through with the timely implementation of each sequential step over a multi-year project.
Quality control and oversight at each step is critical to success.
Need good seed that is adapted to the site. Access to a well supplied and diverse seed bank is important.
Need good quality nursery stock and quality control during storage, handling and planting of seedlings.
Control of competing vegetation is critical to success.
Cannot rely on "normal" rainfall patterns.
Non-industrial ownerships: higher costs/acre for many reasons. Many willing to pay 25% for conifers but not oaks
West Coast Regional Carbon Sequestration Partnership
53

Slide 54


SOME LESSONS LEARNED (OR RE-CONFIRMED)
Reforestation Project = Long term fuel management project
Timely reforestation after wildfire:
– Reduces costs
– Reduces impacts to soils and environment
– Increases the available acres (e.g. steep & rocky sites)
– Faster net carbon gained in most accounting protocols
Opportunities for artificial regen. of blue & live oaks (on non-conifer sites), but not needed for black oak (conifer sites).
Mastication is viable alternative to clearing on sites w/ erodible soils and/or non-sprouting brush species
Ponderosa pine success is good over wide range & variability in PPT and site conditions (w/ weed control!).
Active management is needed to increase (or even maintain) acres of conifer forests in interior California
West Coast Regional Carbon Sequestration Partnership
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Slide 55

15 YEAR-OLD PLANTATION
Established after wildfire in Northeastern California

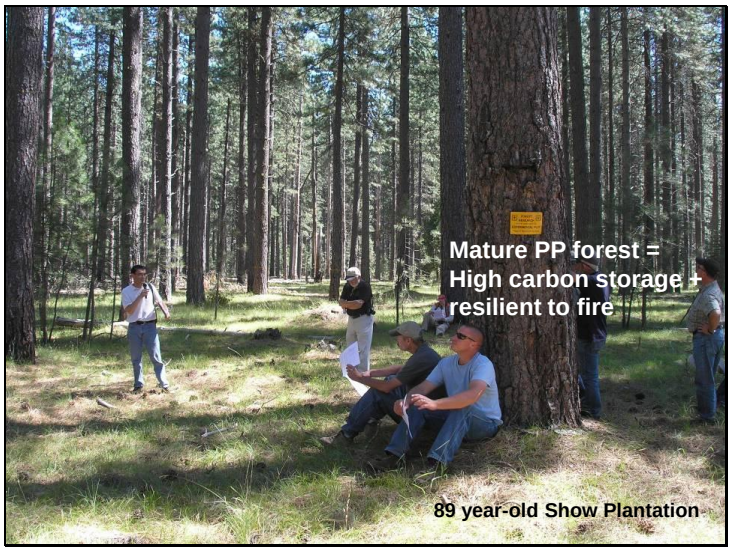
Both areas were planted after the same wildfire but:

NO WEED CONTROL

WEED CONTROL

For the first 10 to 15 years both sites have equal amounts of total carbon, so there is a long wait to re-coup investment even though long term carbon/climate benefits are huge: Brush/burn/brush etc. cycle vs. Fire resilient forest w/ large trees

Slide 56


Mature PP forest =
High carbon storage +
resilient to fire
89 year-old Show Plantation

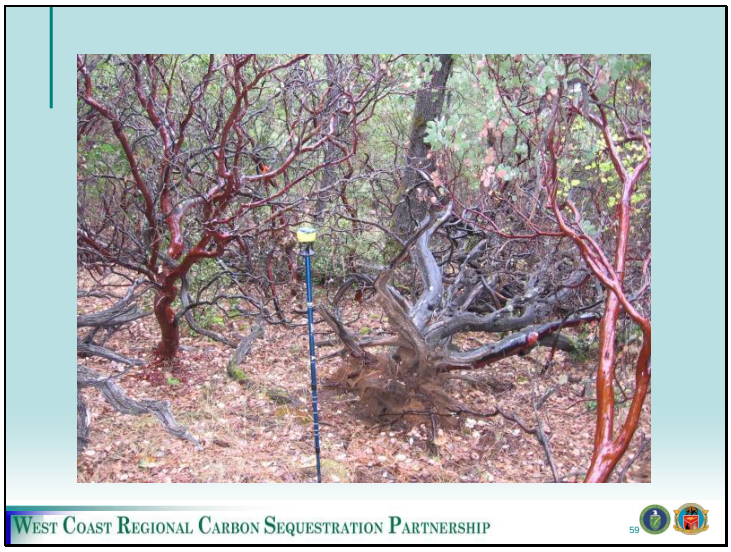
Slide 57

Baseline measurements were required prior to site preparations.
Picture 1: Manzanita brush prior to site preparation.
Picture 2: Mechanical site prep on the same area.

Slide 58

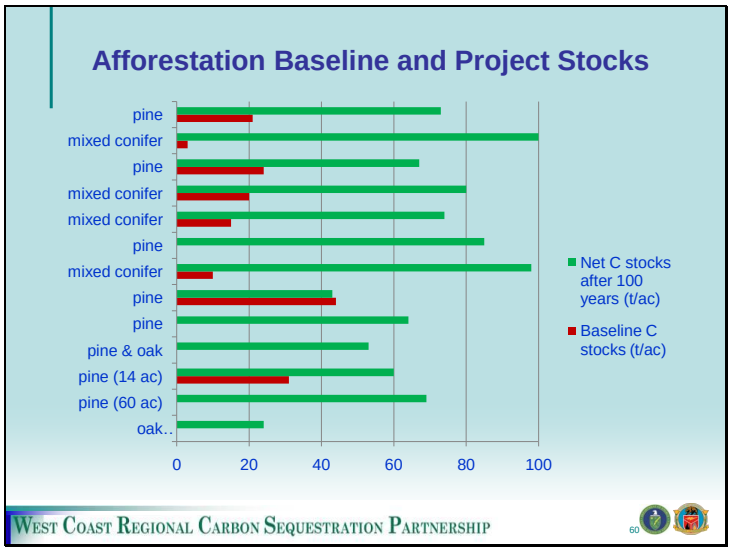
Baseline measurements of existing shrub cover.

Slide 59

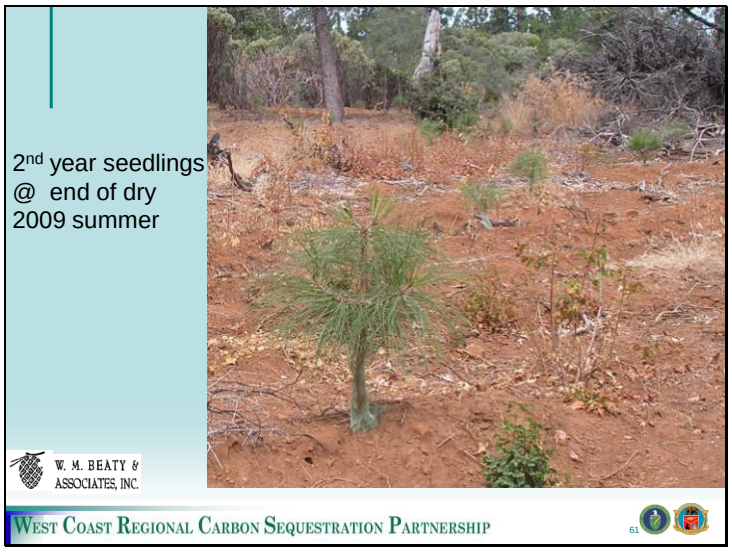


Baseline conditions: Manzanita

Slide 60


Afforestation Baseline and Project Stocks
pine
mixed conifer
pine
mixed conifer
mixed conifer
pine
mixed conifer
pine
pine
pine & oak
pine (14 ac)
pine (60 ac)
oak..
0
20
40
60
80
100
Net C stocks after 100 years (t/ac)
Baseline C stocks (t/ac)
West Coast Regional Carbon Sequestration Partnership
60

Slide 61


2nd year seedlings
@ end of dry
2009 summer
W. M. BEATY &
ASSOCIATES, INC.
WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
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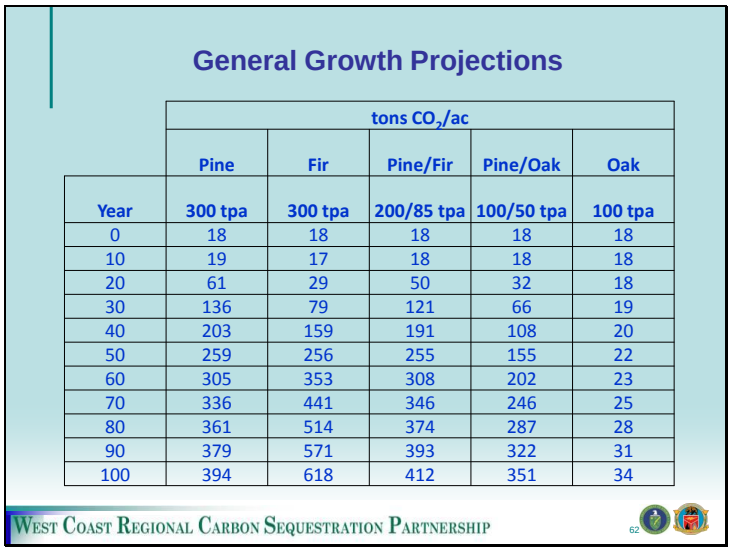
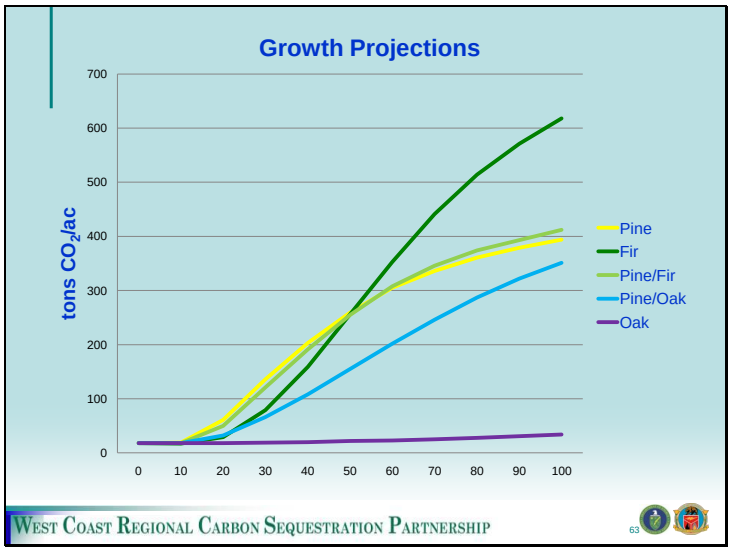
Slide 62



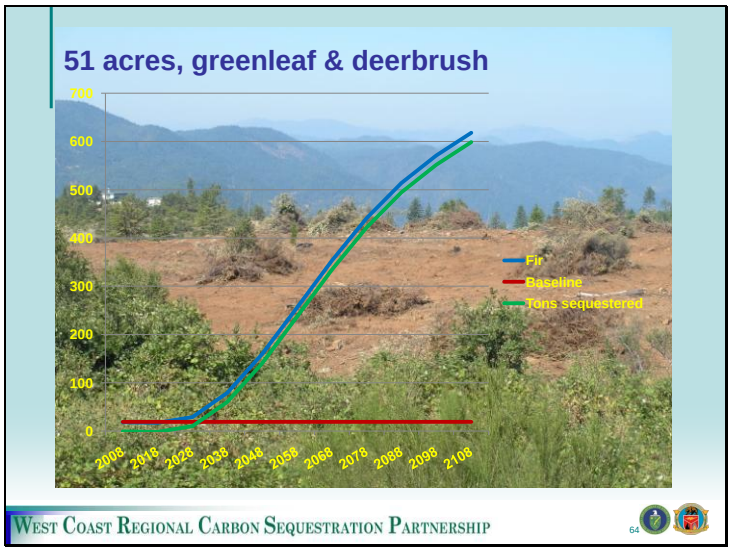
Baseline tons must be subtracted from growth projections to determine offsets produced.

Slide 63



Pine: 300 tpa planted
Fir: 300 tpa
Pine/fir: 200 pine/ac, 85 fir/ac
Pine/oak: 100 pine/ac, 50 oak
Oak: 100 oak/ac planted

Slide 64



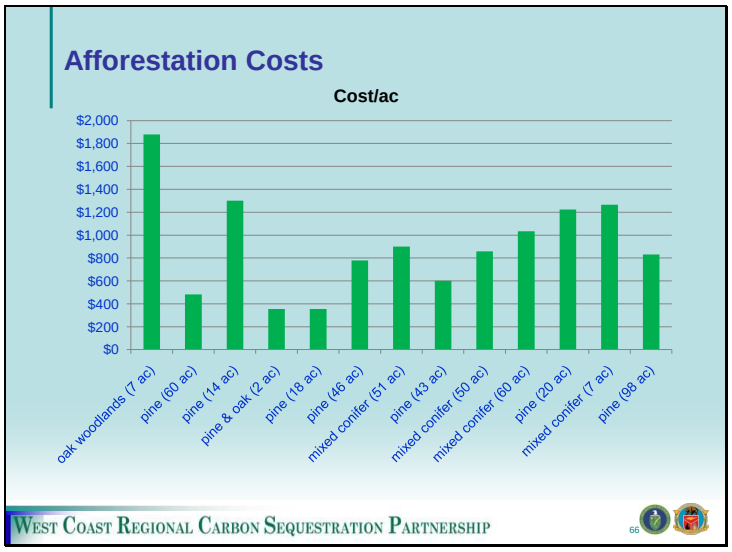
Tons of CO_2/ac on project example, Ponderosa pine planted, 300 trees per acre.

Slide 65

Costs for Carbon Management Projects

- Establishment costs
  - Site preparation
  - Buying and planting seedlings
  - Easements
  - Validation
- Maintenance costs
- Measurement costs
  - Registry
  - Variability
  - Project area
- Opportunity costs
- Carbon alone rarely covers all costs

Slide 66



Costs of forestry work, do not include costs of project design/management plan or carbon measurement and monitoring

Costs vary based on site preparation requirements, ease of access to the site, cost of disposal of removed shrubs, and weed/competition control required after planting.

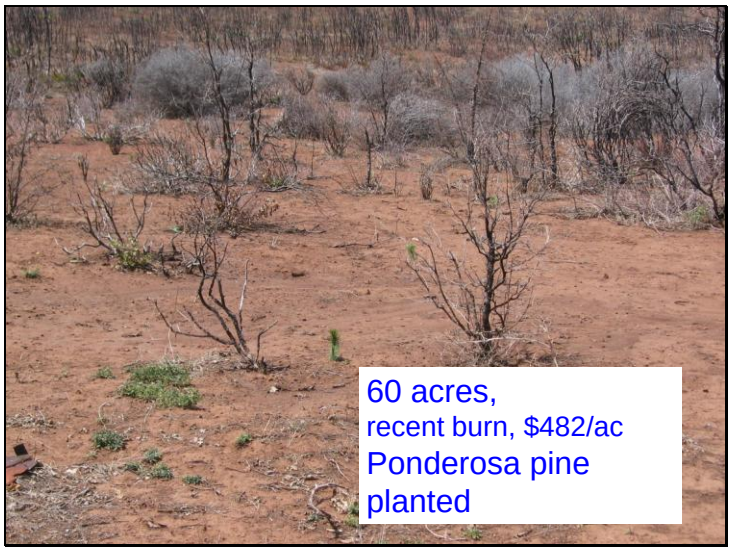
Slide 67

Some examples

Slide 68

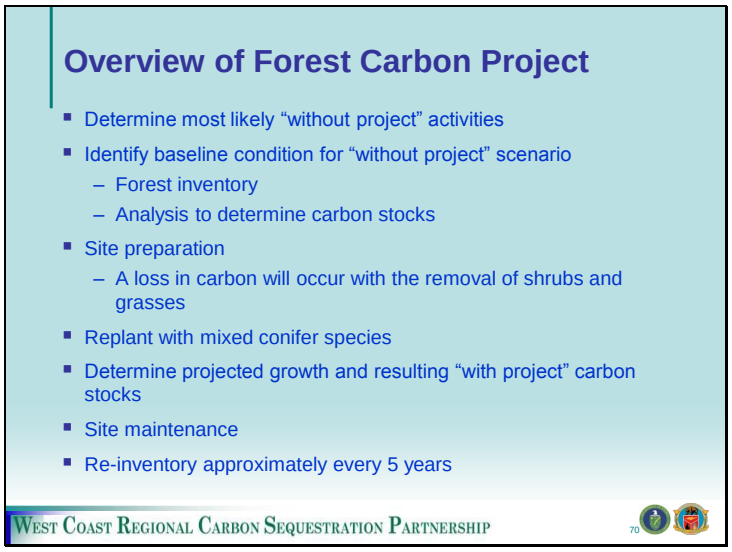
Sivadas

Slide 69



Lakey, 2007 Power wildfire, reburned a portion of 1982 Chalk fire

Slide 70


Overview of Forest Carbon Project
Determine most likely “without project” activities
Identify baseline condition for “without project” scenario
Forest inventory
Analysis to determine carbon stocks
Site preparation
A loss in carbon will occur with the removal of shrubs and grasses
Replant with mixed conifer species
Determine projected growth and resulting “with project” carbon stocks
Site maintenance
Re-inventory approximately every 5 years
West Coast Regional Carbon Sequestration Partnership
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Contact info
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Winrock International
kgoslee@winrock.org
West Coast Regional Carbon Sequestration Partnership
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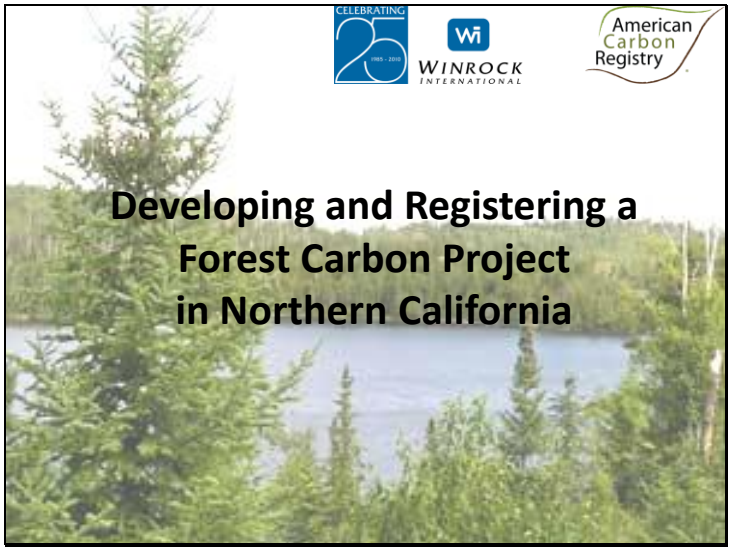
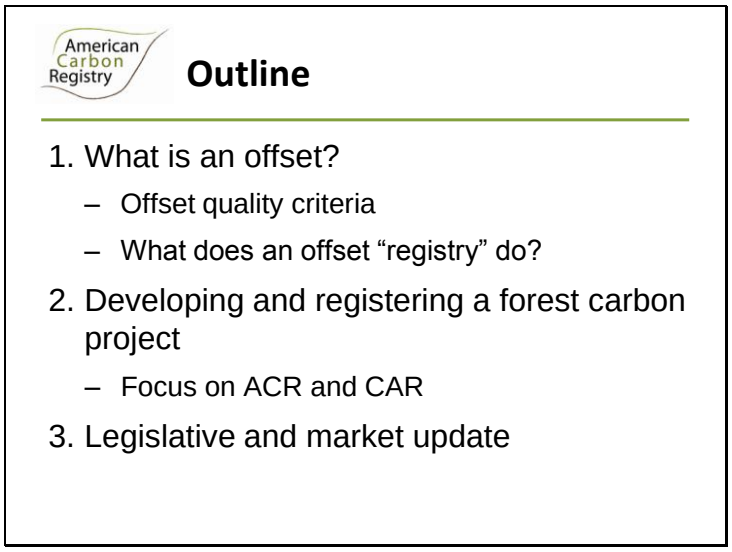
DEVELOPING AND REGISTERING A FOREST CARBON PROJECT IN NORTHERN CALIFORNIA

Slide 1



Slide 2



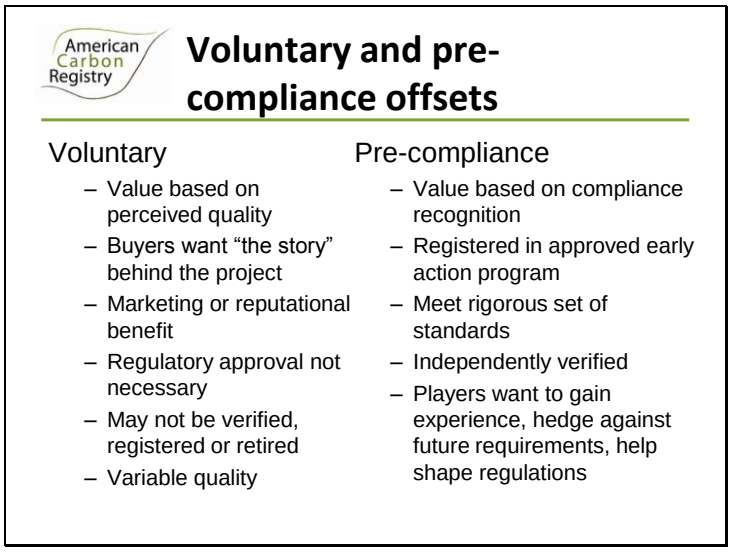
•Westcarb has shown afforestation can be done on small landholdings, practices and costs well understood, carbon measurement and monitoring in place; but how can this be replicated and scaled up by linking landowners to C markets, including through aggregation where needed?
•What assistance is available? What does it cost? What does it require of landowners?
•How can it help California achieve its GHG reduction goals, and provide income to landowners, and improve land management?
•These questions are largely independent of different views whether cap-and-trade is a good idea.

Slide 3

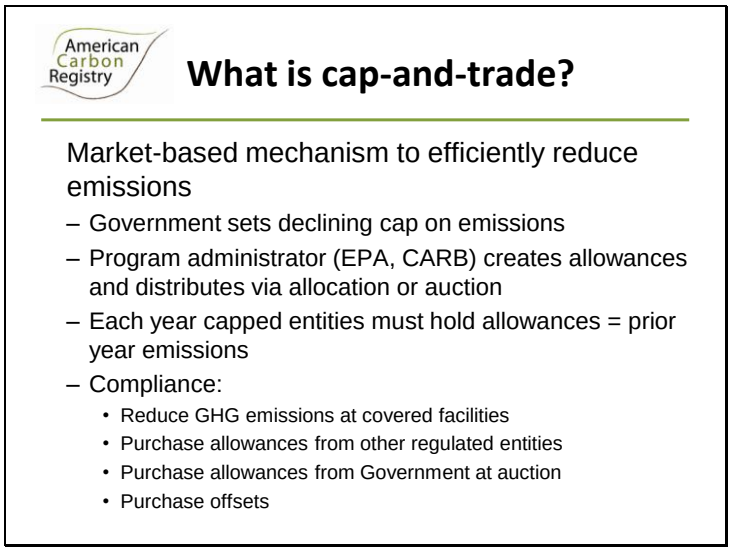
What is an offset?

- Greenhouse gas emission reduction or removal used to compensate for emissions that occur elsewhere
- Project-based GHG reductions occurring in unregulated sectors, used by regulated entity for compliance
- Measured change vs. a baseline scenario
- Specific project type and vintage

Slide 4

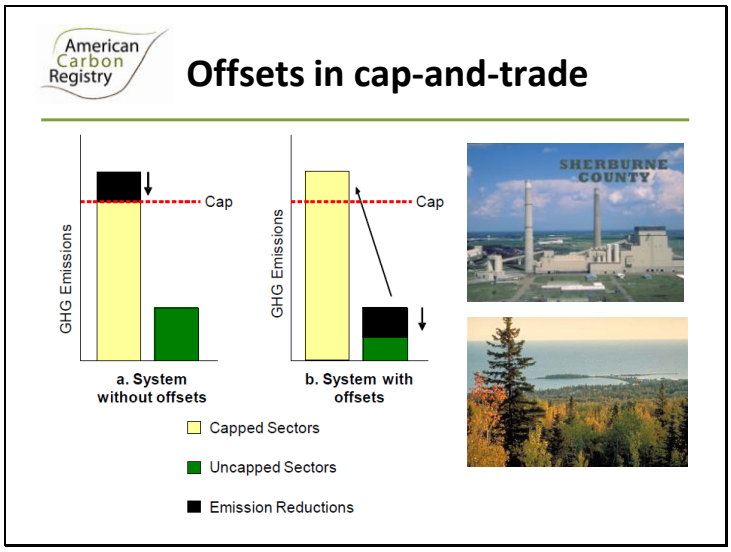

American Carbon Registry
Voluntary and pre-compliance offsets
Voluntary
– Value based on perceived quality
– Buyers want "the story" behind the project
– Marketing or reputational benefit
– Regulatory approval not necessary
– May not be verified, registered or retired
– Variable quality
Pre-compliance
– Value based on compliance recognition
– Registered in approved early action program
– Meet rigorous set of standards
– Independently verified
– Players want to gain experience, hedge against future requirements, help shape regulations

Slide 5



A cap-and-trade system sets an overall limit on emissions, requires entities subject to the system to hold sufficient allowances to cover their emissions, and provides broad flexibility in the means of compliance. Entities can comply by undertaking emission reduction projects at their covered facilities and/or by purchasing emission allowances (or credits) from the government or from other entities that have generated emission reductions in excess of their compliance obligations.

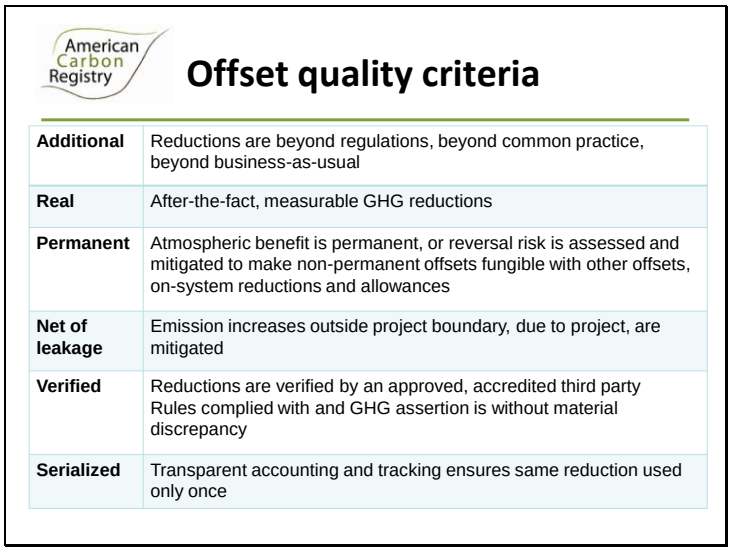
Slide 6



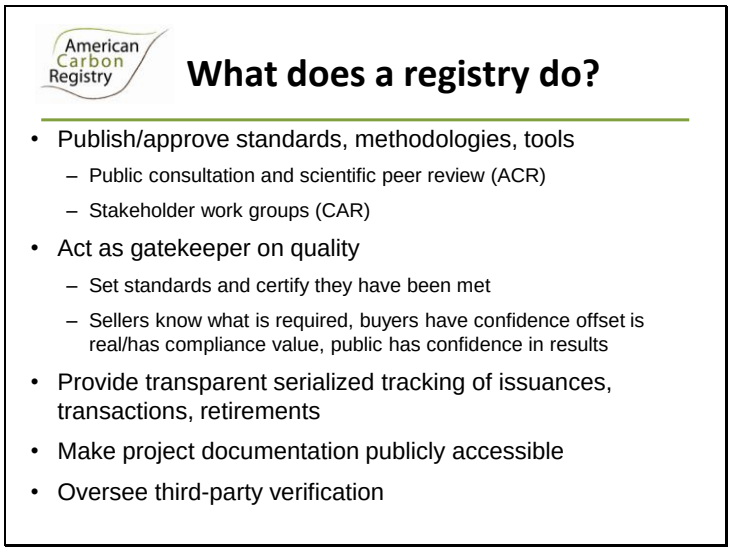
Source:

RGGI, MGGRA, and WCI white paper. *Ensuring Offset Quality: Design and Implementation Criteria for a High-Quality Offset Program*. May 2010.

Slide 7


American Carbon Registry
Offset quality criteria
Additional
Reductions are beyond regulations, beyond common practice, beyond business-as-usual
Real
After-the-fact, measurable GHG reductions
Permanent
Atmospheric benefit is permanent, or reversal risk is assessed and mitigated to make non-permanent offsets fungible with other offsets, on-system reductions and allowances
Net of leakage
Emission increases outside project boundary, due to project, are mitigated
Verified
Reductions are verified by an approved, accredited third party Rules complied with and GHG assertion is without material discrepancy
Serialized
Transparent accounting and tracking ensures same reduction used only once

Slide 8



And not do:

- Develop projects
- Own or transact offsets
- Broker or serve as intermediary in transactions
- Set prices
- Create derivatives, futures, options, etc.
- Verify projects

Slide 9

American Carbon Registry

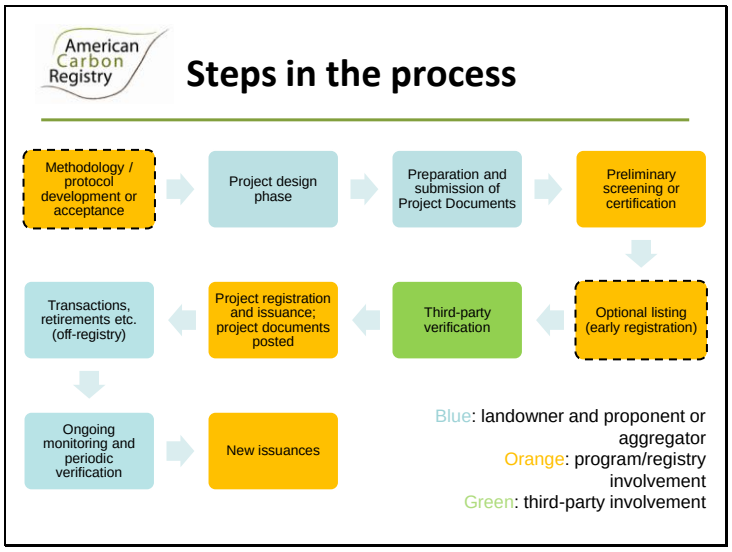
- First U.S. private voluntary GHG registry
  - Founded 1997 by Environmental Defense Fund and Environmental Resources Trust
  - 30 million tons issued
- Pioneered system of transparent on-line reporting and serialization of verified project-based offsets – now the industry standard
- Joined Winrock International in 2007
  - Founded 1984 as a “public benefit corporation” under Arkansas state law

Slide 10

What does developing a forest carbon project mean to you?

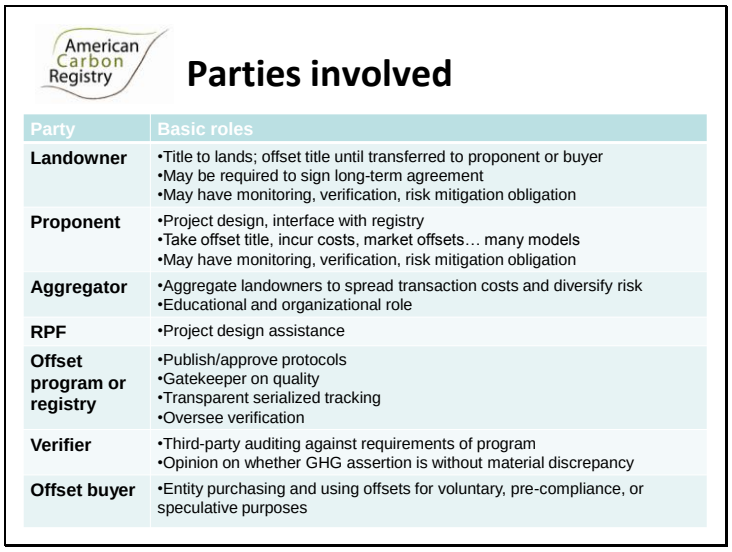
- Steps in the process
- Key players and their roles
- Basics of ACR and CAR forest carbon protocols
- Eligible activities
- Additionality
- Permanence and risk mitigation
- Aggregation

Slide 11

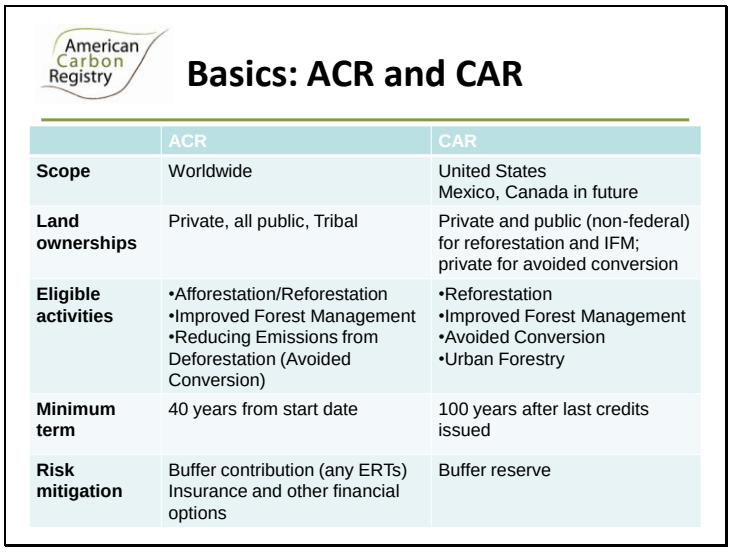


Third-party validation also required by some programs. May happen before submission of project documents, or at same time as verification. Not required by ACR or CAR.

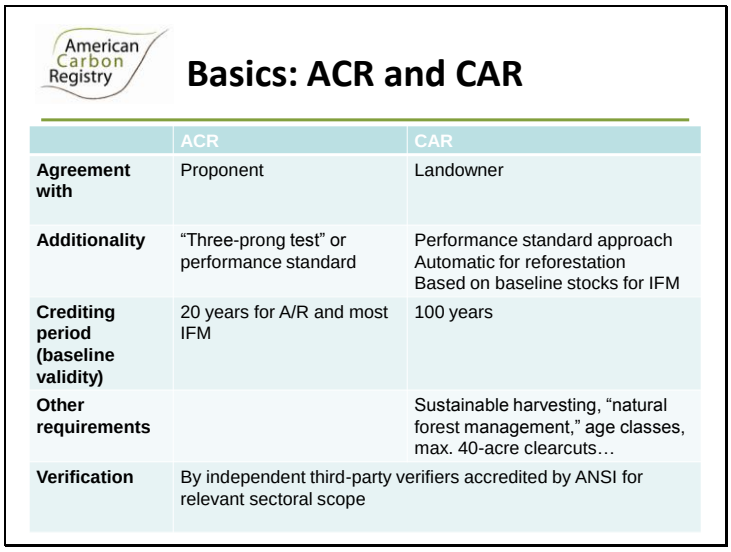
Slide 12


American Carbon Registry
Parties involved
Party
Basic roles
Landowner
•Title to lands; offset title until transferred to proponent or buyer
•May be required to sign long-term agreement
•May have monitoring, verification, risk mitigation obligation
Proponent
•Project design, interface with registry
•Take offset title, incur costs, market offsets… many models
•May have monitoring, verification, risk mitigation obligation
Aggregator
•Aggregate landowners to spread transaction costs and diversify risk
•Educational and organizational role
RPF
•Project design assistance
Offset program or registry
•Publish/approve protocols
•Gatekeeper on quality
•Transparent serialized tracking
•Oversee verification
Verifier
•Third-party auditing against requirements of program
•Opinion on whether GHG assertion is without material discrepancy
Offset buyer
•Entity purchasing and using offsets for voluntary, pre-compliance, or speculative purposes

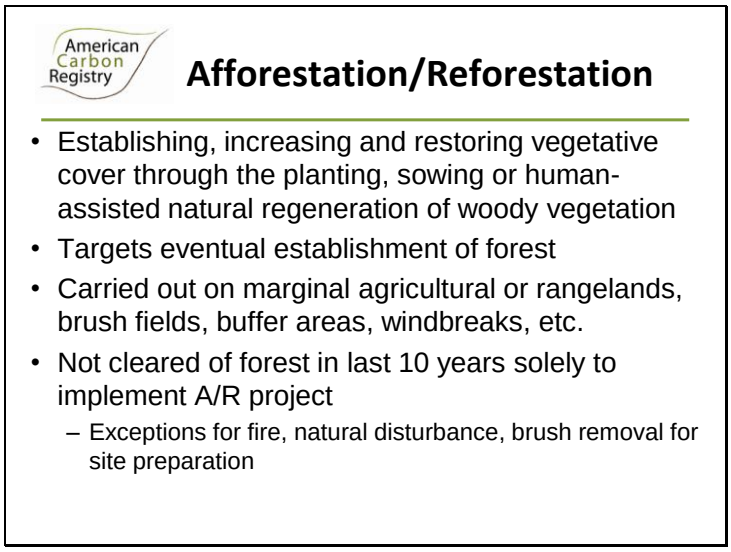
Slide 13


American Carbon Registry
Basics: ACR and CAR
ACR
CAR
Scope
Worldwide
United States
Mexico, Canada in future
Land ownerships
Private, all public, Tribal
Private and public (non-federal) for reforestation and IFM; private for avoided conversion
Eligible activities
•Afforestation/Reforestation
•Improved Forest Management
•Reducing Emissions from Deforestation (Avoided Conversion)
•Reforestation
•Improved Forest Management
•Avoided Conversion
•Urban Forestry
Minimum term
40 years from start date
100 years after last credits issued
Risk mitigation
Buffer contribution (any ERTs)
Insurance and other financial options
Buffer reserve

Slide 14


American Carbon Registry
Basics: ACR and CAR
ACR
CAR
Agreement with
Proponent
Landowner
Additionality
"Three-prong test" or performance standard
Performance standard approach
Automatic for reforestation
Based on baseline stocks for IFM
Crediting period (baseline validity)
20 years for A/R and most IFM
100 years
Other requirements
Sustainable harvesting, "natural forest management," age classes, max. 40-acre clearcuts…
Verification
By independent third-party verifiers accredited by ANSI for relevant sectoral scope

Slide 15



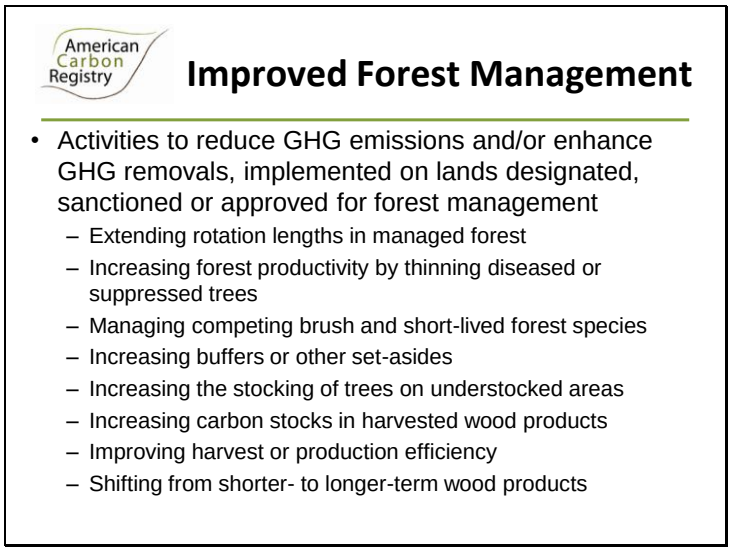
Forest (for projects in U.S.; based on U.S. Forest Service Forest Inventory & Analysis Program definition)

Land with at least 10 percent cover (or equivalent stocking) by live trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. To qualify, the area must be at least 1 acre in size. Forest land includes transition zones, such as areas

between forest and non-forest lands that have at least 10% cover (or equivalent stocking) with live trees and forest areas adjacent to urban and built-up lands.

Not excluded: urban forests, forests <120 feet wide as long as >1 acre.

Slide 16


American Carbon Registry
Improved Forest Management
• Activities to reduce GHG emissions and/or enhance GHG removals, implemented on lands designated, sanctioned or approved for forest management
– Extending rotation lengths in managed forest
– Increasing forest productivity by thinning diseased or suppressed trees
– Managing competing brush and short-lived forest species
– Increasing buffers or other set-asides
– Increasing the stocking of trees on understocked areas
– Increasing carbon stocks in harvested wood products
– Improving harvest or production efficiency
– Shifting from shorter- to longer-term wood products

Slide 17

Additionality

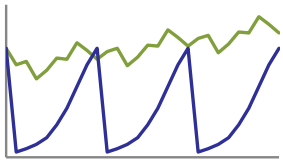
- GHG reductions and removals exceed those that would have occurred under current forestry laws and regulations, current forest industry practices, and under a business-as-usual scenario
  - Regulatory surplus and exceeds performance standard
  - Three-prong test:
    - Regulatory surplus
    - Exceeds common practice for area, forest type, similar landowners
    - Faces at least one implementation barrier: financial, technological, institutional

Slide 18

Baselines and additionality

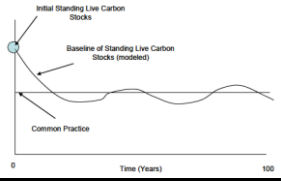
Project-specific

- More subjective, open to gaming
- Less efficient project approval process
- Rigorous tools available
- Less danger of over-crediting

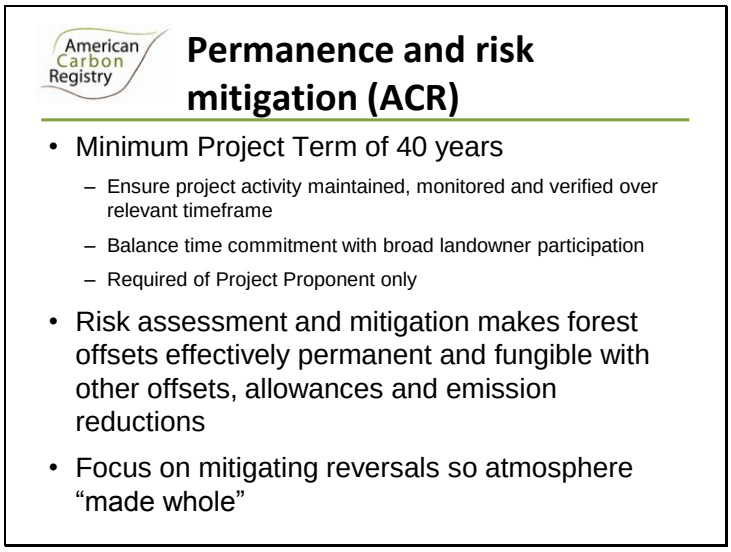


Performance standard

- Less subjective
- Efficient to apply
- Heavy up-front data requirements
- Potential for over-crediting without under-crediting to balance



Slide 19



No scientific basis or international standard for a given number of years

Minimum term is about striking a balance:

Commitment is credible

Timeframe meaningful in terms of climate change mitigation

Market participation is broad

Avoid limiting participation; provide flexibility mechanisms

Risk is manageable for proponent and landowner

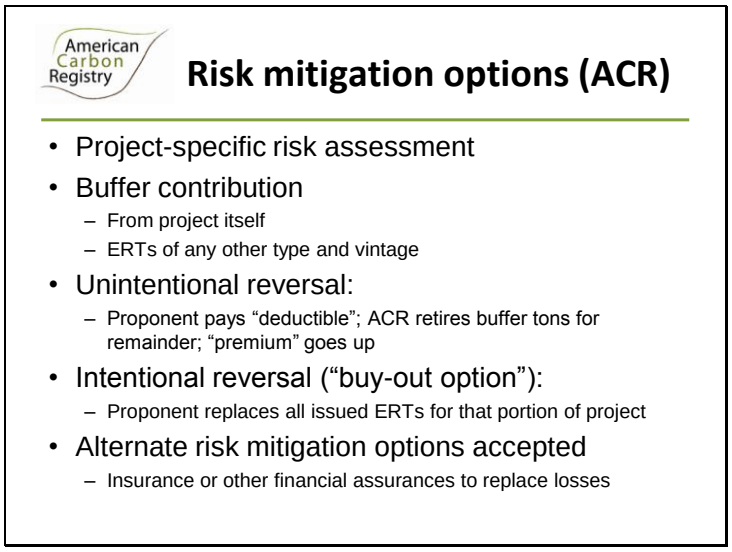
- Treat like insurance

Offsets are fungible

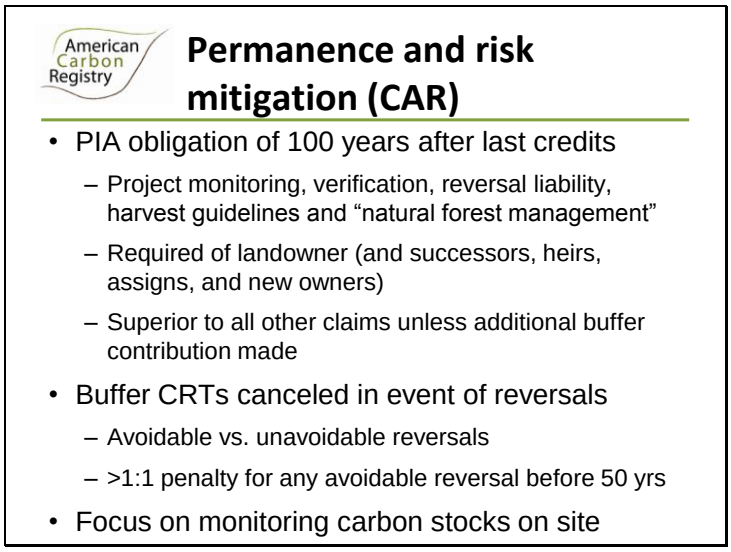
- No temporary credits, term credits, discounting
- No assigning liability to buyer/compliance entity

Atmosphere always “made whole”

Slide 20


American Carbon Registry
Risk mitigation options (ACR)
• Project-specific risk assessment
• Buffer contribution
– From project itself
– ERTs of any other type and vintage
• Unintentional reversal:
– Proponent pays “deductible”; ACR retires buffer tons for remainder; “premium” goes up
• Intentional reversal (“buy-out option”):
– Proponent replaces all issued ERTs for that portion of project
• Alternate risk mitigation options accepted
– Insurance or other financial assurances to replace losses

Slide 21



But…

•A Forest Project automatically terminates if a Significant Disturbance occurs, leading to an Unavoidable Reversal that reduces the project's standing live tree carbon stocks below the project's baseline standing live tree carbon stocks. Once a Forest Project terminates in this manner, the Forest Owner has no further obligations to the Reserve.

•A Forest Project may be voluntarily terminated prior to the end of its minimum time commitment if the Forest Owner retires a quantity of CRTs, as specified under 'Retiring CRTs Following Project Termination,' below. ("buy-out" of all issued CRTs, only from project or other forest CRTs)

Slide 22

Aggregation guidance (ACR)

- Key for transaction cost efficiencies (inventory, monitoring, verification) and risk diversification
- Agreement is still with Proponent (here aggregator)
  - Proponent commits to reversal risk mitigation, including exit of participating landowners
- For inventory and monitoring, precision targets applied at overall project level
  - ±10% of the mean at 90% confidence
  - Use stratification; does not require plots on every landholding
- Verification (reasonable assurance; ±5% materiality) also at project level
  - Risk-based approach and not all properties necessarily visited

Slide 23

Aggregation guidelines (CAR)

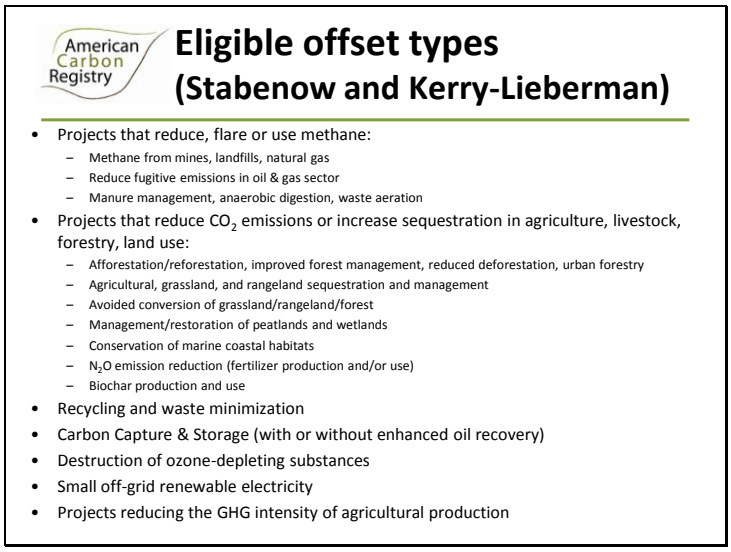
- "Aggregate" capped at 5,000 acres, 2 or more Forest Owners
- Each Forest Owner still has own PIA, liability for reversals, CAR account, baseline inventory, annual reports, etc.
- Aggregator provides services; *may* act as agent in transactions
- Goals:
  - Fewer plots to achieve 5% at 90% confidence sampling error
  - Only half of properties verified each 6-year interval
- Constraints on leaving aggregate

Slide 24

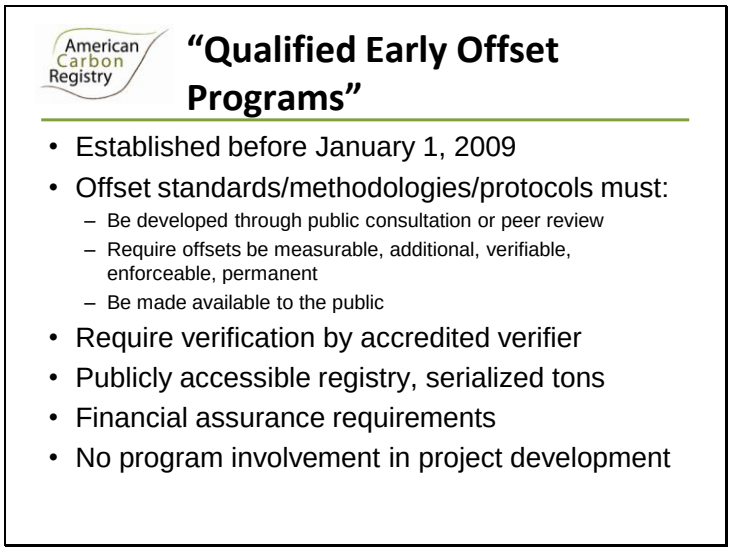
Legislative and regulatory landscape

- No U.S. federal climate legislation
  - Scaling back from economy-wide cap-and-trade, to power sector cap-and-trade, to RES, to offshore oil etc., to nothing
  - Bills generally friendly to offsets, recognize cost containment and political value… but no bill
- EPA proceeds with regulation under Clean Air Act
  - Endangerment finding, mobile sources, stationary sources
  - Offsets and other market mechanisms unclear

Slide 25


American Carbon Registry
Eligible offset types
(Stabenow and Kerry-Lieberman)
Projects that reduce, flare or use methane:
Methane from mines, landfills, natural gas
Reduce fugitive emissions in oil & gas sector
Manure management, anaerobic digestion, waste aeration
Projects that reduce CO_2 emissions or increase sequestration in agriculture, livestock, forestry, land use:
Afforestation/reforestation, improved forest management, reduced deforestation, urban forestry
Agricultural, grassland, and rangeland sequestration and management
Avoided conversion of grassland/rangeland/forest
Management/restoration of peatlands and wetlands
Conservation of marine coastal habitats
N_2O emission reduction (fertilizer production and/or use)
Biochar production and use
Recycling and waste minimization
Carbon Capture & Storage (with or without enhanced oil recovery)
Destruction of ozone-depleting substances
Small off-grid renewable electricity
Projects reducing the GHG intensity of agricultural production

Slide 26



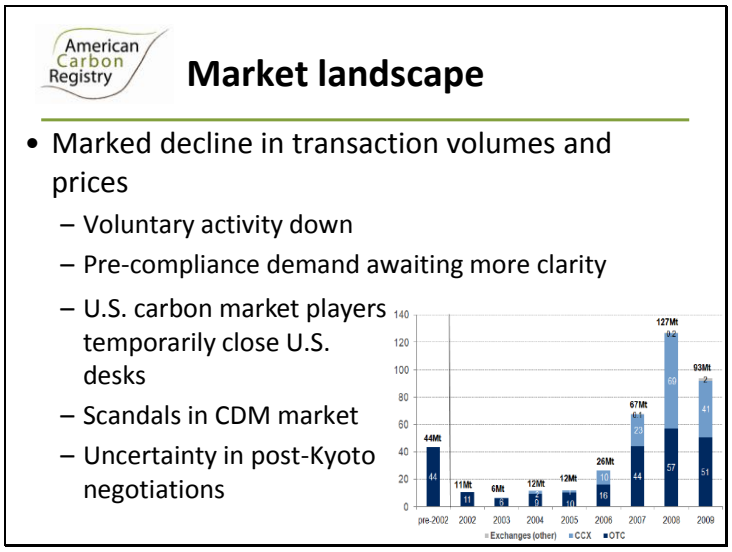
Roughly same as Stabenow language.

Slide 27

Legislative and regulatory landscape

- Focus shifts (back) to states and regional programs
- California AB32 cap-and-trade rule by end 2010
  - Proposition 23
- WCI released final cap-and-trade design
  - Not all original members participating
- Offsets seen as key
  - No clarity yet on which protocols will be recognized
  - Forestry a safe bet

Slide 28



Source: Bloomberg New Energy Finance / Ecosystem Marketplace. Building Bridges: State of the Voluntary Carbon Markets 2010.

Total transaction volumes: from 127 MMT in 2008 to 93 MMT in 2009

Further declines in 2010

Slide 29

Still… forest carbon remains a relatively safe bet

- Protocols are well established
- Generally cost-effective → offsets at an attractive cost per ton
  - Large potential supply
  - Attractive to both voluntary and pre-compliance buyers
- State and regional programs likely to recognize
  - Key to register on an established program
  - ACR, CAR, possibly VCS, possibly others
- Has become central to federal discussions

➢ Project development timeframe may be a year, more or less… pays to start now

Slide 30

Further Information

Nicholas Martin
Chief Technical Officer, American Carbon Registry

nmartin@winrock.org
www.americancarbonregistry.org

(703) 842-9500

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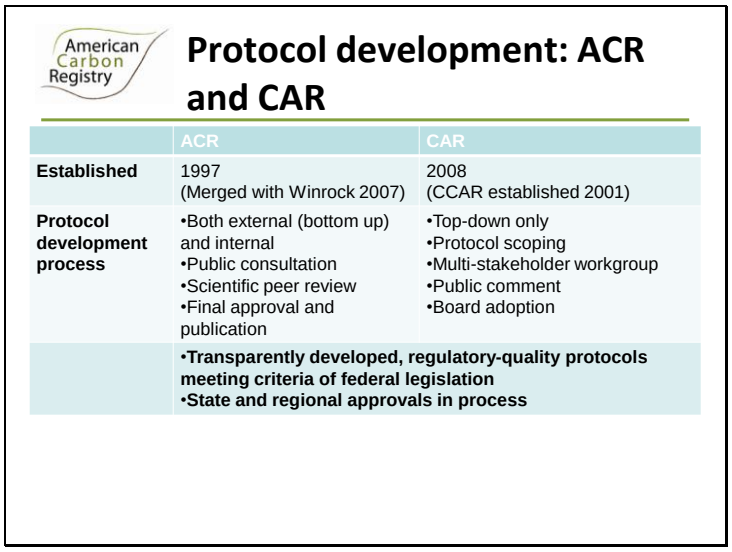

American Carbon Registry
Protocol development: ACR and CAR
ACR
CAR
Established
1997
(Merged with Winrock 2007)
2008
(CCAR established 2001)
Protocol development process
•Both external (bottom up) and internal
•Public consultation
•Scientific peer review
•Final approval and publication
•Top-down only
•Protocol scoping
•Multi-stakeholder workgroup
•Public comment
•Board adoption
•Transparently developed, regulatory-quality protocols meeting criteria of federal legislation
•State and regional approvals in process

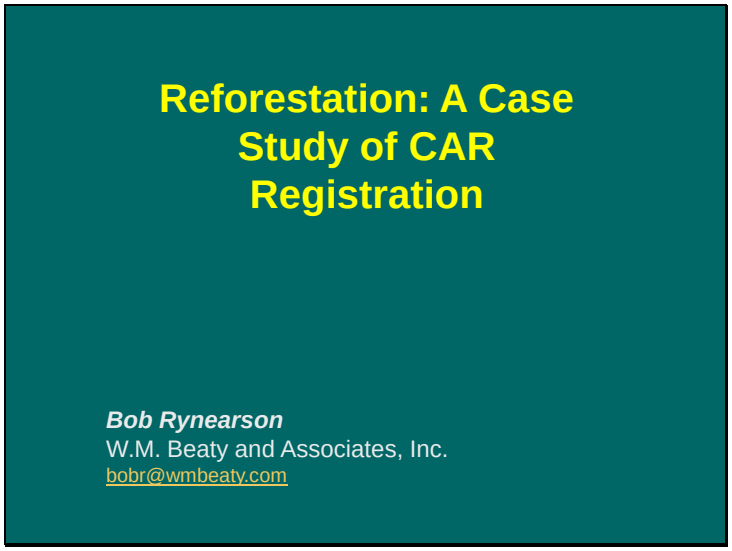
Slide 32

Protocols (existing and in progress)

ACR	CAR
•Forestry •AR •IFM •REDD •N_2O from fertilizer •Livestock methane •Landfill methane •Fugitive methane in oil & gas sector •Improved grazing land management •Wetland restoration and avoided loss	•Forestry •Reforestation •IFM •Avoided conversion •Urban forestry •Landfill methane •Livestock methane •Coal mine methane •Organic waste digestion •Ozone-depleting substances •Agriculture sector protocols under consideration

REFORESTATION: A CASE STUDY OF REGISTRATION UNDER THE CLIMATE ACTION RESERVE (CAR)

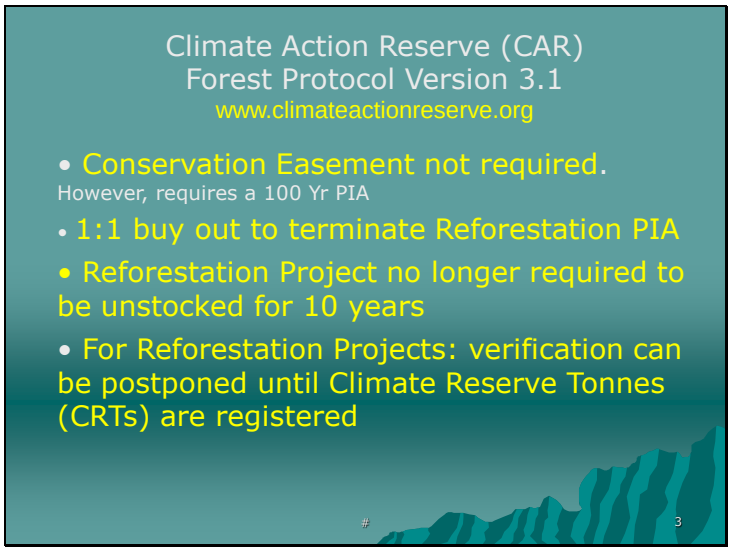
Slide 1



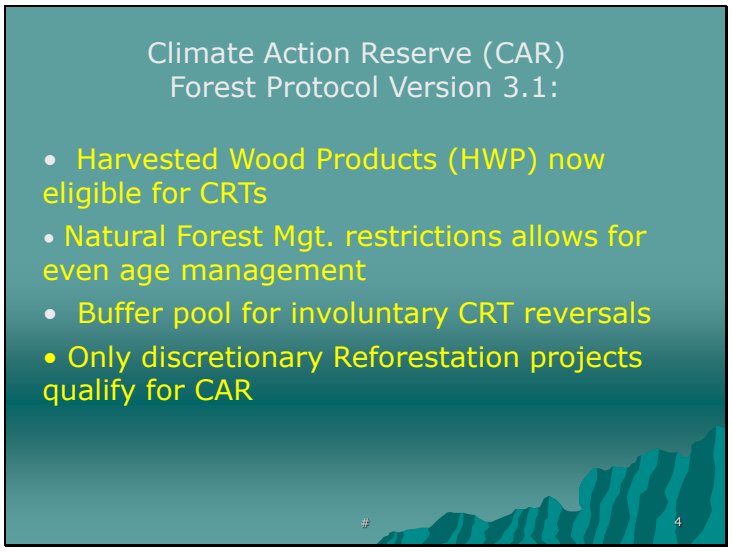
Slide 2


W.M. Beaty & Associates, Inc.
Climate Action Registry (CAR)
Reforestation Projects
• 4 Reforestation Projects totaling 16,470 acres
• sizes: 191 acres to 11,637 acres
• 191 acres reforestation after clearing old brushfield
• 16,279 acres reforestation after wildfire
• Very early stages of registration w/ CAR
• Also exploring other registries e.g. ACR
• Maybe a 5th project for a 2008 wildfire on > 2,100 acres?
#
2

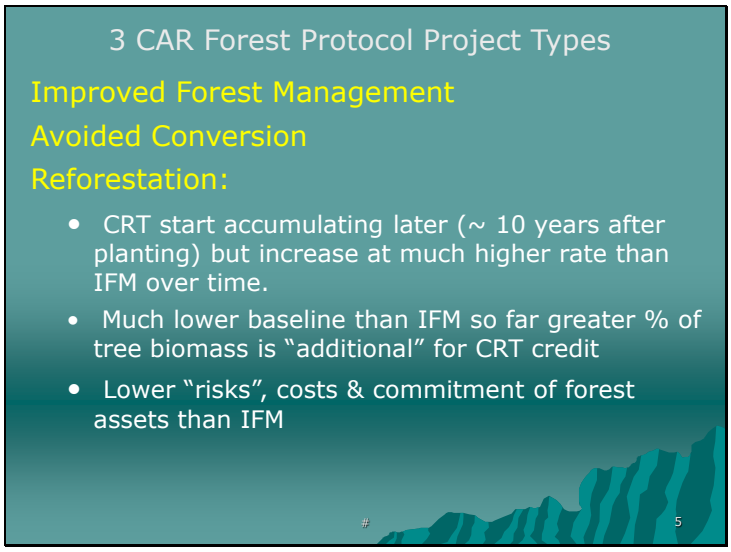
Slide 3


Climate Action Reserve (CAR)
Forest Protocol Version 3.1
www.climateactionreserve.org
• Conservation Easement not required.
However, requires a 100 Yr PIA
• 1:1 buy out to terminate Reforestation PIA
• Reforestation Project no longer required to be unstocked for 10 years
• For Reforestation Projects: verification can be postponed until Climate Reserve Tonnes (CRTs) are registered
#
3

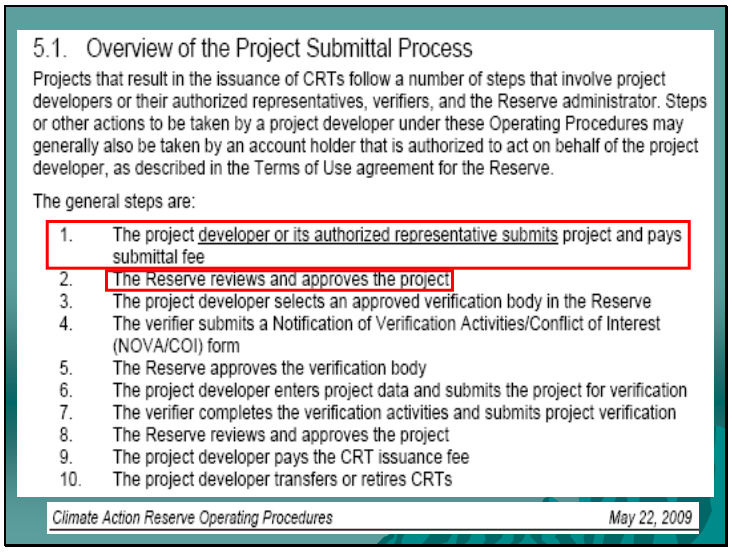
Slide 4


Climate Action Reserve (CAR)
Forest Protocol Version 3.1:
• Harvested Wood Products (HWP) now eligible for CRTs
• Natural Forest Mgt. restrictions allows for even age management
• Buffer pool for involuntary CRT reversals
• Only discretionary Reforestation projects qualify for CAR
#
4

Slide 5


3 CAR Forest Protocol Project Types
Improved Forest Management
Avoided Conversion
Reforestation:
• CRT start accumulating later (~ 10 years after planting) but increase at much higher rate than IFM over time.
• Much lower baseline than IFM so far greater % of tree biomass is "additional" for CRT credit
• Lower "risks", costs & commitment of forest assets than IFM
#
5

Slide 6



5.1. Overview of the Project Submittal Process

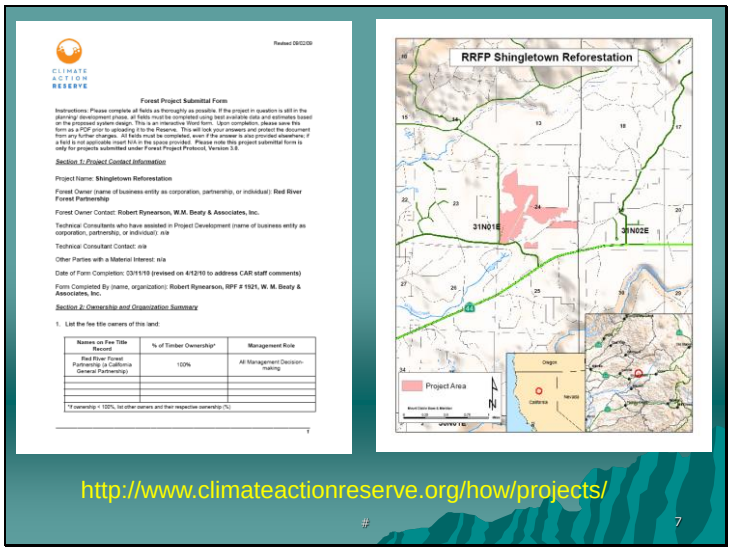
Projects that result in the issuance of CRTs follow a number of steps that involve project developers or their authorized representatives, verifiers, and the Reserve administrator. Steps or other actions to be taken by a project developer under these Operating Procedures may generally also be taken by an account holder that is authorized to act on behalf of the project developer, as described in the Terms of Use agreement for the Reserve.

The general steps are:

1. The project developer or its authorized representative submits project and pays submittal fee
2. The Reserve reviews and approves the project
3. The project developer selects an approved verification body in the Reserve
4. The verifier submits a Notification of Verification Activities/Conflict of Interest (NOVA/COI) form
5. The Reserve approves the verification body
6. The project developer enters project data and submits the project for verification
7. The verifier completes the verification activities and submits project verification
8. The Reserve reviews and approves the project
9. The project developer pays the CRT issuance fee
10. The project developer transfers or retires CRTs

Climate Action Reserve Operating Procedures *May 22, 2009*

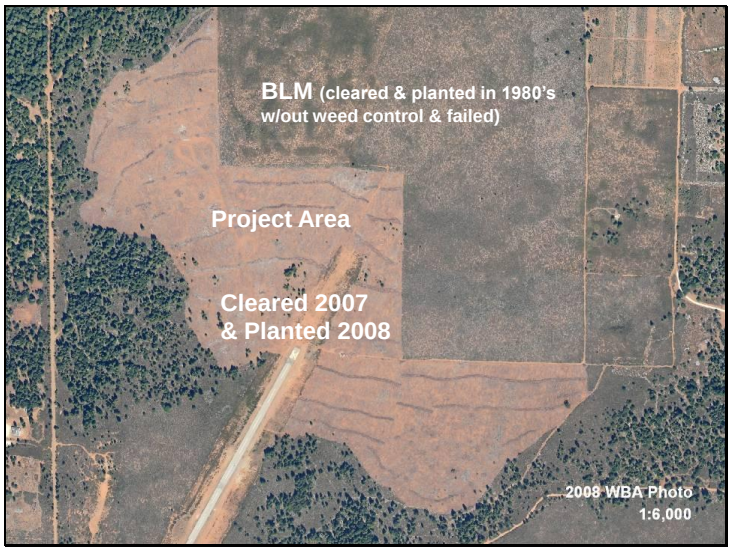
Slide 7


Forest Project Submittal Form
RRFP Shingletown Reforestation
31N01E
31N02E
Project Area
http://www.climateactionreserve.org/how/projects/
#
7

Slide 8

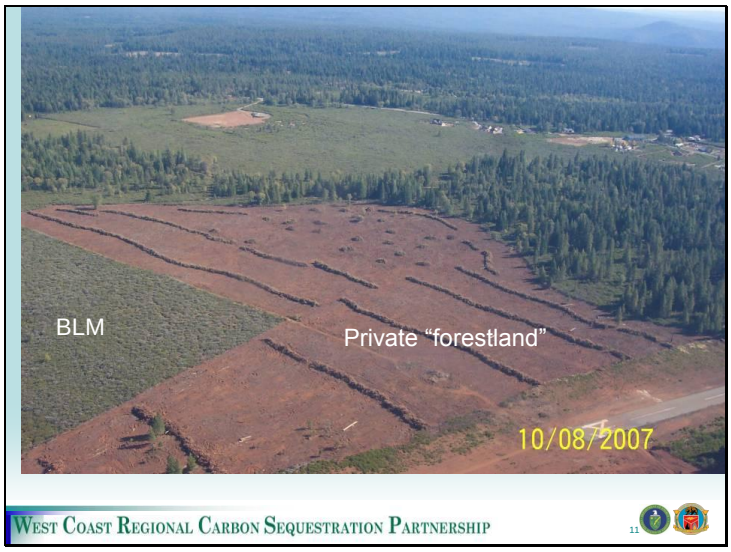

➢140 year-old brush site
➢Forest soils, deep but low AWC
2006 NAIP Photo
1:6,000

Slide 9


BLM (cleared & planted in 1980's w/out weed control & failed)
Project Area
Cleared 2007 & Planted 2008
2008 WBA Photo 1:6,000

Slide 10

Slide 11


BLM
Private “forestland”
10/08/2007
West Coast Regional Carbon Sequestration Partnership
11

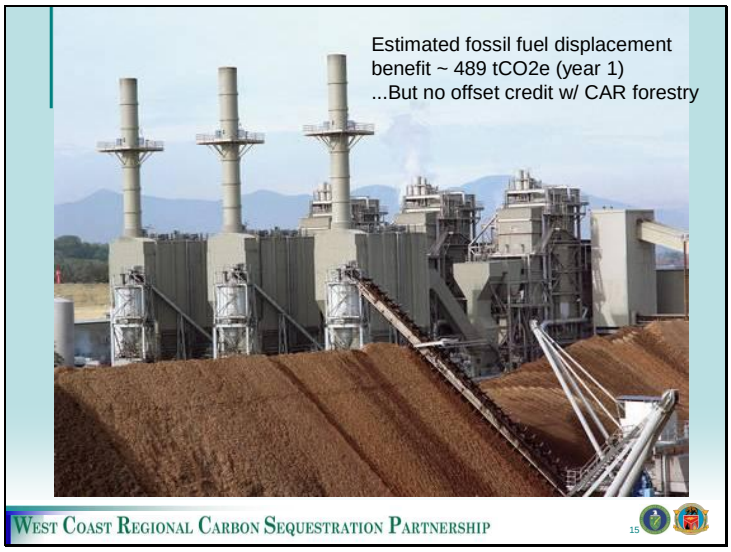
Slide 12


20 acres of brush ground into wood-fuel
West Coast Regional Carbon Sequestration Partnership
12

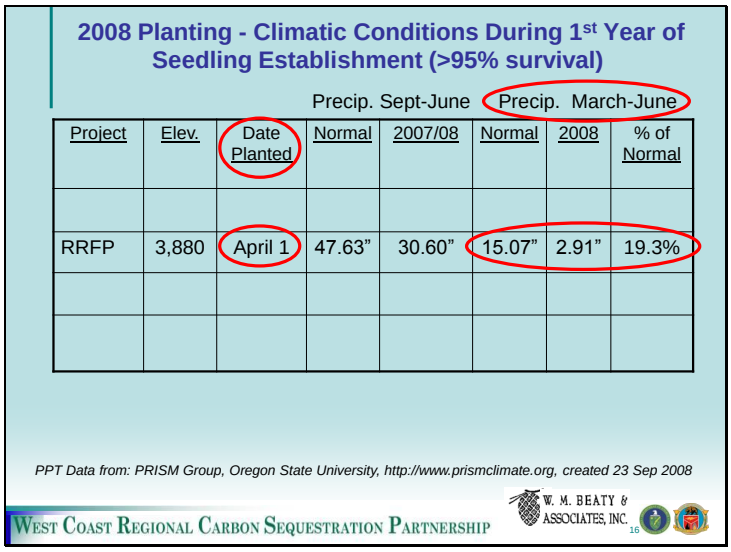
Slide 13

Slide 14

Slide 15

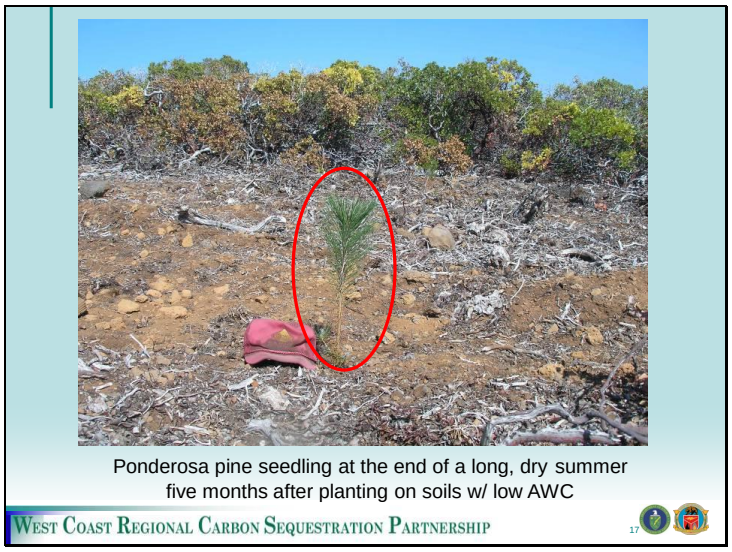

Estimated fossil fuel displacement
benefit ~ 489 tCO2e (year 1)
...But no offset credit w/ CAR forestry
West Coast Regional Carbon Sequestration Partnership
15

Slide 16



Even though we had one of the driest Springs on record (about 20% of normal) and PPT during the March – June period is critical for planted seedlings before the hot dry summer months we had great success!!!!

Slide 17


Ponderosa pine seedling at the end of a long, dry summer
five months after planting on soils w/ low AWC
West Coast Regional Carbon Sequestration Partnership
17

Slide 18

2½ years after planting. At this stage there is less carbon than brushfield, but will result in significantly more long term, stable carbon storage

W. M. BEATY & ASSOCIATES, INC.

Slide 19

15 YEAR-OLD PLANTATION
Established after wildfire in Northeastern California

Both areas were planted after the same wildfire but:

NO WEED CONTROL

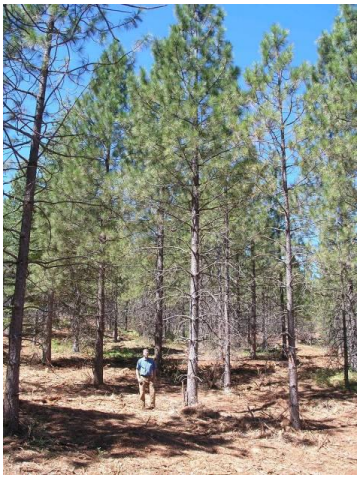
WEED CONTROL

For the first 10 to 15 years both sites have equal amounts of total carbon, so there is a long wait to re-coup investment even though long term carbon/climate benefits are huge: Brush/burn/brush etc. cycle vs. Fire resilient forest w/ large trees

Slide 20

28 year old pine plantation north of Shingletown

After pre-commercial thin



W. M. BEATY & ASSOCIATES, INC.

Slide 21

42 year old USFS pine plantation – 135 trees / acre
Challenge Experimental Forest

Slide 22

42 year old USFS pine plantation @ 1,210 trees / acre
Challenge Experimental Forest

Slide 23

Slide 24


89 year-old USFS
Plantation near McCloud
Managed mature pine forest
= High carbon storage +
resilient to fire

Slide 25

Very Rough Estimates based on modeling, CRTs sold on actual

Shasta Co. **Project 191 Acres**

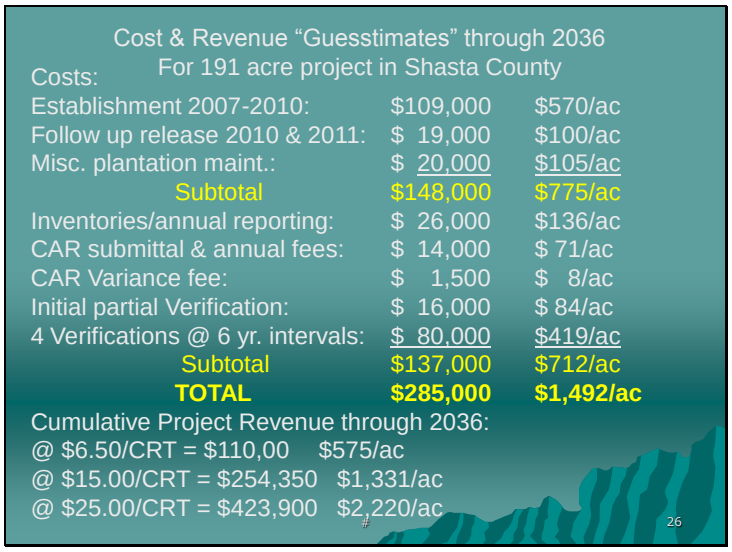
Planted 2008-09	Est. standing @ end of 5 yr period:			Assume	Estimated	(avg. for preceding 5 yr period)	(avg. for preceding 5 yr period)
Period	tree+roots tCO2m/ac.	baseline** tCO2m/ac.	net tCO2m/ac.	buffer*** %	net CRTs/ac	Annual Net CRT/ac/yr	**Annual Total net CRTs/yr**
2011	2.8	11	-8.2	25%		0.00	0.00
2012-2016	5.3	11	-5.7	25%		0.00	0
2016-2021	16.3	11	5.3	25%	4.0	2.19	419
2022-2026	30.6	11	19.6	25%	14.7	2.87	548
2027-2031	61.8	11	50.8	25%	38.1	6.23	1,190
2032-2036	94.1	11	83.1	25%	62.3	6.47	1,235
3037-2041	143.7	11	132.7	25%	99.5	9.92	1,894
2042-2046	185.3	11	174.3	25%	130.7	8.31	1,588
2047-2051*	195.0	11	184.0	25%	138.0	1.95	372
2052-2056	208.3	11	197.3	25%	148.0	2.65	507
2057-2061	238.5	11	227.5	25%	170.6	6.04	1,154
2076	320.5	11	309.5				
2106	437.6	11	426.6				

** includes tCO2m from HWP generated from thinnings along with "tree+roots"*

*** baseline based upon Winrock measurements prior to clearing*

**** buffer contribution can range from 18% to 30+%*

Slide 26


Cost & Revenue "Guesstimates" through 2036
For 191 acre project in Shasta County
Costs:
Establishment 2007-2010: $109,000 $570/ac
Follow up release 2010 & 2011: $ 19,000 $100/ac
Misc. plantation maint.: $ 20,000 $105/ac
Subtotal $148,000 $775/ac
Inventories/annual reporting: $ 26,000 $136/ac
CAR submittal & annual fees: $ 14,000 $ 71/ac
CAR Variance fee: $ 1,500 $ 8/ac
Initial partial Verification: $ 16,000 $ 84/ac
4 Verifications @ 6 yr. intervals: $ 80,000 $419/ac
Subtotal $137,000 $712/ac
TOTAL $285,000 $1,492/ac
Cumulative Project Revenue through 2036:
@ $6.50/CRT = $110,00 $575/ac
@ $15.00/CRT = $254,350 $1,331/ac
@ $25.00/CRT = $423,900 $2,220/ac
#
26

Slide 27

Slide 28

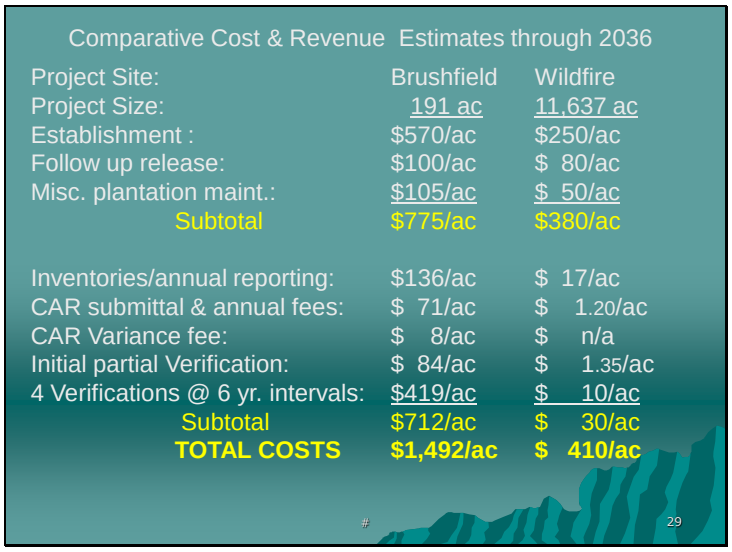
2006 & 2007 Wildfires

11,637 acres

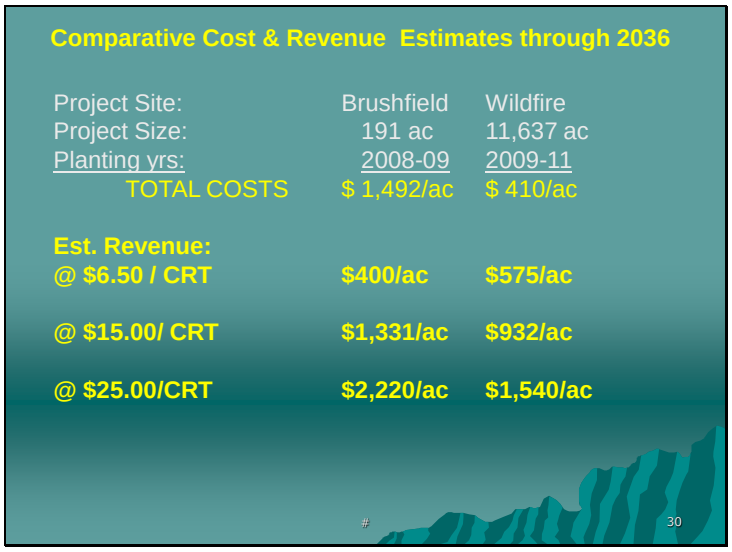
Planting: 2008-2011

- Pond Pine
- Jeff Pine
- Doug fir
- White fir
- Red fir
- Sugar pine
- Incense Cedar

Slide 29


Comparative Cost & Revenue Estimates through 2036
Project Site: Brushfield Wildfire
Project Size: 191 ac 11,637 ac
Establishment : $570/ac $250/ac
Follow up release: $100/ac $ 80/ac
Misc. plantation maint.: $105/ac $ 50/ac
Subtotal $775/ac $380/ac
Inventories/annual reporting: $136/ac $ 17/ac
CAR submittal & annual fees: $ 71/ac $ 1.20/ac
CAR Variance fee: $ 8/ac $ n/a
Initial partial Verification: $ 84/ac $ 1.35/ac
4 Verifications @ 6 yr. intervals: $419/ac $ 10/ac
Subtotal $712/ac $ 30/ac
TOTAL COSTS $1,492/ac $ 410/ac
#
29

Slide 30


Comparative Cost & Revenue Estimates through 2036
Project Site: Brushfield Wildfire
Project Size: 191 ac 11,637 ac
Planting yrs: 2008-09 2009-11
TOTAL COSTS $ 1,492/ac $ 410/ac
Est. Revenue:
@ $6.50 / CRT $400/ac $575/ac
@ $15.00/ CRT $1,331/ac $932/ac
@ $25.00/CRT $2,220/ac $1,540/ac
#
30

Slide 31

CONCLUSIONS

- Reforesting brush-fields and/or wildfire damaged areas provide significant long term carbon sequestration benefits
- Financial attractiveness for landowners is limited by:
  - High upfront reforestation costs
  - Revenue stream starts much later (10 to 30 years into the future)
  - High uncertainty in future market value of CRTs
  - Uncertainties in CAR protocol interpretation & verification costs
  - Very long term PIA (> 100 years)

Slide 32

Obstacles for small landowner CAR Reforestation Project

- No annual income from timber to support Project development costs which cannot be recouped for a decade or two for revenue from CRTs
- Higher per acre fixed costs for reforestation activities
- Very high per acre fixed costs for CAR registration & verification
- Uncertainties in CAR protocol interpretation & verification
- Obligations of PIA very cumbersome
- Limited availability to a seed bank, reforestation expertise etc.
- CAR's "one size fits all" species diversity requirements disqualify most projects or require an expensive "variance"
- Uncertainty in market value when CRTs accrue (10 to 30 years into future)

Slide 33