# FACTSHEET FOR PARTNERSHIP FIELD VALIDATION TEST

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| **Partnership Name** | West Coast Regional Carbon Sequestration Partnership (**WESTCARB**) |
| **Contacts:** DOE/NETL Project Mgr. | **Name** Dawn Deel **Organization** Carbon Sequestration Program **E-Mail** Dawn.Deel@NETL.DOE.gov |
| Principal Investigator | John Kadyszewski, Winrock International – Ecosystem Services, JKadyszewski@winrock.org |
| **Field Test Information:** Field Test Name | WESTCARB Lake County Terrestrial Sequestration Pilot |
| Test Location | Lake County, Oregon |
| Amount and Source of $CO_2$ | Tons Source<br>TBD. Includes fuels/fire management and biomass energy |
| Field Test Partners (Primary Sponsors) | Lake County Resources Initiative, GreenWood Resources, The Collins Companies, Jeld-Wen Timber & Ranch, Oregon Department of Forestry, USDA Forest Service – Pacific Southwest Research Station, Oregon State University, USDA Forest Service – Pacific Northwest Research Station, The Climate Trust, USDA Forest Service – Fremont National Forest, USDI Bureau of Land Management, Winrock International. |

**Summary of Field Test Site and Operations:**

Terrestrial pilot activities will take place on federal and private lands throughout Lake County, Oregon. Lake County includes a broad spectrum of elevation, topography, forest, range, and agricultural land types, and land ownerships, making it an excellent site for field validation of the improved fuels/fire management and biomass energy opportunities identified in WESTCARB Phase I. Sequestration approaches demonstrated in Lake County can be replicated on similar land types elsewhere in the WESTCARB region.

Terrestrial activities in Lake County will include:

- Development of a new methodology to quantify GHG emissions from wildfires and determine potential carbon credits from improved management of forest fuels, including reduced emissions from less severe wildfires and the emissions benefits of displaced fossil-fuel use when fuel removed from the forest is burned in a biomass energy facility.
- Pilot activities for forest fuel treatments and “before” and “after” carbon stock measurements to quantify potential (and in some cases, actual) biomass energy generation.
- Outreach to decision-makers and the public through web-accessible, GIS-based carbon project reporting.
- Project review with emissions credit market protocol developers to assess market recognition potential.
- A study of the feasibility, costs, and sequestration benefits of afforestation using hybrid poplar and other fast-growing species.

**Research Objectives:**

The overall objectives of WESTCARB Phase II terrestrial field work activities are to:

- Validate and demonstrate the terrestrial carbon sequestration opportunities identified in WESTCARB Phase I through pilot projects, methodology development, field measurements, reporting, and project review with emissions credit market protocol developers.

- Conduct research to help policymakers, communities, and businesses to make informed decisions on how to invest in CCS technology development and deployment to achieve climate change mitigation objectives.

Research objectives for improved fuels/fire management and biomass energy include:

- Develop methodologies, reflecting the consensus of the scientific and policy communities, for quantifying GHG emissions from wildfires and net sequestration benefits and emissions reductions attributable to improved fuels management combined with biomass energy production.
- Compile field data and/or imagery to assist in validating the methodology.
- Design measurement, monitoring, and verification (MMV) protocols for fuel treatments.
- Collect data on treatment costs and potential revenues (biomass fuel sales).
- Estimate carbon benefits from biomass energy production.
- Work with The Climate Trust to evaluate potential for new accounting and reporting protocols for this activity type.

Research objectives for hybrid poplar afforestation and biomass feedstock include:

- Refine the Phase I economic analysis for afforestation using hybrid poplar and other fast-growing species, including feasibility, site selection criteria, costs and benefits, net sequestration potential.
- Explore potential of hybrid poplar as a biomass energy crop.
- Review field data (produced independently of WESTCARB) to validate assumptions on growth potential of hybrid poplar.
- Estimate soil and water requirements, site preparation, planting methods, treatments for competition.
- Develop MMV methods.

**Summary of Modeling and MMV Efforts: (Use the table provided for MMV)**

| Activity | Baseline scenario determination | With-project scenario | Techniques used |
|---|---|---|---|
| Hybrid poplar afforestation and biomass feedstock | Review site history; document existing land use and trends in land use using ground-based and remotely sensed data. Quantify baseline carbon stocks through standard field measurements. | Model carbon accumulation in planted forests using standard growth models, for comparison to baseline scenario. | MMV guidance from California Climate Action Registry Forest Project Protocols, Chicago Climate Exchange, and USDOE 1605b Guidelines for Voluntary Reporting of Greenhouse Gases. |
| Improved fuels/ fire management and biomass energy | Estimate baseline GHG emissions from wildfires, building on existing fire models, including area and spatial distribution and the corresponding changes in carbon stocks due to fire, emissions of non-$CO_2$ greenhouse gases, and forest recovery after fire. Use fire data to validate and calibrate models. Estimate baseline GHG emissions from fossil fuel-based energy generation. | Choose fuel reduction prescriptions to be analyzed for net sequestration benefits and emissions reduction. Model net benefits including reduced emissions from wildfire, sequestration benefits post-treatment, differences in GHG emissions from burning biomass on-site vs. at power plants, emissions reductions from fossil fuel substitution or displacement, initial carbon removals from treatments, and direct emissions from treatments. Quantify pre- and post-treatment carbon stocks using standard field measurements. | New baseline and crediting methodology to be developed in cooperation with fire scientists, policymakers, and market validation entities. Will build on existing fire modeling approaches. Landscape modeling of the Drews Creek Watershed using ArcFuels Geographic Information Systems Modeling Platform. |

**Accomplishments to Date:**

Improved fuels/fire management and biomass energy:

- Assembled WESTCARB Fire Panel fire scientists and fuels experts to work on fire methodology development. Panel includes California Department of Forestry and Fire Protection, California Air Resources Board, Lake County Resources Initiative, Oregon Department of Forestry, Oregon State University, Spatial Informatics Group, TSS Consultants, University of California at Berkeley – Center for Fire Research and Outreach, USDA Forest Service – Pacific Northwest Research Station – Pacific Wildland Fire

Sciences Laboratory, USDA Forest Service – Pacific Southwest Research Station – Redding Silviculture Laboratory, USDA Forest Service – Pacific Southwest Research Station – Sierra Nevada Research Center, USDI National Park Service – Whiskeytown NRA, W.M. Beaty & Associates, Western Shasta Resource Conservation District, and Winrock International. Conducted three Fire Panel meetings, October 2006, May 2007, and March 2008.

- Developed *Protocol for monitoring and estimating greenhouse gas benefits from hazardous fuels management in Western U.S. forests*, a "straw man" methodology for discussion.
- UC Berkeley – Center for Fire Research and Outreach developed alternate approaches to quantify baseline fire risk across the regions of northern California where WESTCARB fuel reduction pilot activities are being monitored.
- USDA Forest Service – Pacific Northwest Research Station developed estimates of emissions to be paired with the baseline rate of fire; emissions estimation relies on USFS fire models and in particular the Fuel Characteristic Classification System (FCCS).
- Oregon State University completed literature review and analysis of data on rates of decomposition of woody debris and conducted long-term modeling using STANDCARB.
- Pre-treatment carbon stock measurements were conducted on three fuels projects on National Forest and private industrial forest lands in Lake County, following a Standard Operating Procedures manual developed by Winrock. The purpose of the measurements was to identify, in real as opposed to modeled forests, the carbon stocks available to be burned before and after treatment, the direct impacts of fuel treatments on carbon stocks in different carbon pools (e.g., increases in dead wood, decreases in dense growth), and the fuel removed from the forest for biomass energy during treatment. Measurements will also provide input data for fire models used to simulate fire behavior and emissions in the baseline (without-treatment) and with-treatment scenarios. Post-treatment measurements have been completed and analysis is in progress.
- Submitted *Progress Report on WESTCARB Fuels Management Pilot Activities in Lake County, Oregon.*
- Lake County partners negotiated 20-year Biomass Supply MOU to provide a framework for planning and implementing forest and rangeland restoration and fuels reduction projects that address identified resource needs while being supportive of the Lakeview Biomass Project. The parties to the MOU include Lake County Resources Initiative, Lake County, Town of Lakeview, City of Paisley, DG Energy LLC, DG Investors LLC, The Collins Companies, Oregon Department of Forestry, USDA Forest Service Fremont-Winema National Forest, and Bureau of Land Management- Lakeview District.
- Lake County partners negotiated the first 10-year Stewardship Contract in USFS Region 6, to provide a long-term supply of material necessary for the recent investments in a biomass power plant and small log mill.
- Lake County partners continue to provide input on the Lakeview Biomass development rights pertaining to the construction of a new 22 MW biomass plant (as opposed to the previously proposed 13 MW biomass plant).The project is designed to use biomass from overstocked forests, helping to reduce wildfire severity (and associated emissions), improve forest health, and create jobs.
- Collins has expanded its Fremont Sawmill operation in Lakeview by building a new $6.6 million "small log" sawmill. The small log sawmill is the direct result of the 20-year Interagency Biomass Supply MOU and 10-year Stewardship Contract effort spearheaded by LCRI, and provides an added tool for improving management of forests and hazardous fuels in Lake County.
- Gathered, reviewed, edited, and loaded the Drews Creek data layers for the ArcFuels Model.

- Conducted the initial applications of the ArcFuels Model to the Drews Creek analysis area to evaluate the carbon losses from various treatment planning scenarios for the Drews Creek watershed.
- Developed carbon loss functions in the ArcFuels modeling platform (for avoided $CO_2$ emissions from reducing the severity and extent of wildfire as a result of landscape forest wild land fire fuels treatment projects).

Hybrid poplar afforestation:

- GreenWood Resources completed a feasibility study to assess use of hybrid poplar for biomass energy in Lake County, OR.
- GreenWood Resources was a partner on three grant solicitations to U.S. DOE to develop poplar feedstock for cellulosic ethanol conversion.
- GreenWood Resources established a network of nine varietal test sites in western states (funded independently of WESTCARB). These test sites will be managed for a minimum of three years and will be assessed for variety performance and suitability for direct combustion and ethanol conversion.
- GreenWood Resources reorganized land management and initiated fund management for a timber investment fund that purchased 30,000 planted acres of hybrid poplar in Oregon and Washington and began construction of a mill to process logs into lumber.
- Winrock produced a draft report identifying potential for hybrid poplar afforestation projects in California, Oregon, and Washington, based in part on the GreenWood Resources Lake County feasibility study. The report is currently being reviewed and will be submitted by year-end 2009.

**Summarize Target Sink Storage Opportunities and Benefits to the Region:**

Afforestation of rangelands:

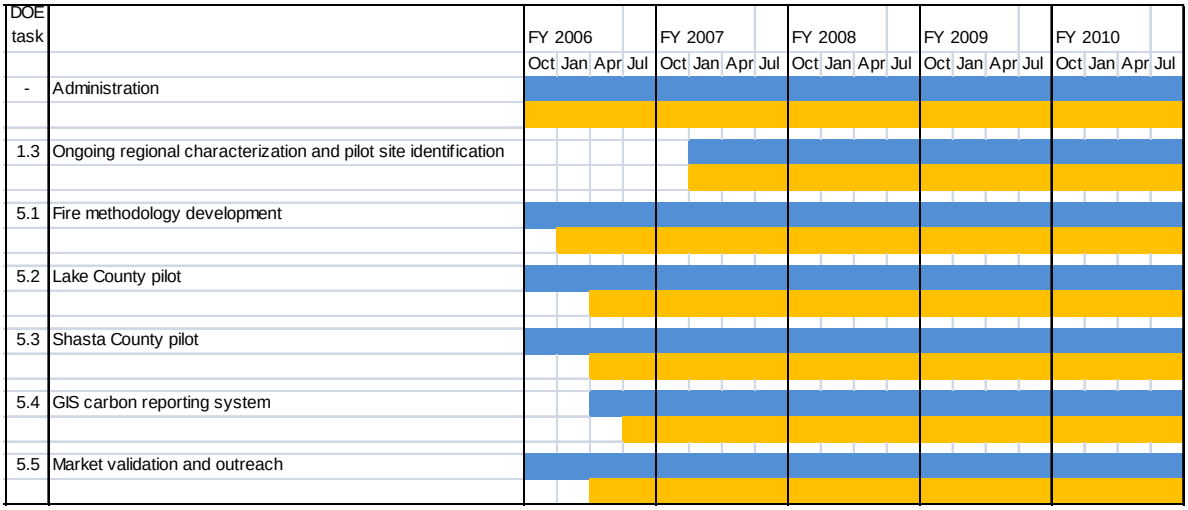
| | **California** | **Oregon** | **Washington** |
|---|---|---|---|
| Area of rangelands (acres) | 56.5 million | 26.9 million | 11.9 million |
| Rangelands suitable for afforestation (acres) | 23.1 million | 19.1 million | 9.1 million |
| Estimated sequestration potential at 40 years at <$5.50/t-$CO_2$ (MMT $CO_2$) | 3,017 | 403 | 335 |

Improved fuels/fire management and biomass energy:
Net sequestration benefits and emissions reductions of reducing forest fuels have yet to be quantified. However, the following is a summary of estimated baseline emissions from fire that could be reduced (not eliminated) though improved management of forest fuels and biomass energy generation.

| **Area** | **Estimated yearly baseline emissions from fires** |
|---|---|
| California | 1.46 $MMTCO_2e/yr$ |
| Oregon | 1.03 $MMTCO_2e/yr$ |
| Washington | 0.18 $MMTCO_2e/yr$ |
| Arizona | 0.47 $MMTCO_2e/yr$ |

| Cost: | Field Project Key Dates: |
|---|---|
| **Total Field Project Cost: $1,722,611** | **Baseline Carbon Stock Completed:** 2007 |
| **DOE Share: $1,162,500 (67.5%)** | **Fuel Treatments Begin:** 2006 |
| **Non-DOE Share: $560,111 (32.5%)** | **Fuel Treatments Complete:** 2009 |
| | **Post-Treatment Measurements Complete:** 2009 |

**Field Test Schedule and Milestones (Gantt Chart):**




Note: Shasta County pilot is a separate field validation test with similar methodology and reporting.

## Additional Information

**Figure 1. Lake County hazardous fuels projects measured thus far: U.S. Forest Service – Burnt Willow Stewardship Project (yellow), U.S. Forest Service – Bull Stewardship Project (blue), and The Collins Companies fuel treatments (purple and orange).**