

## **Global Warming and Agriculture: 2009 Agenda Proposal**

*Overarching principle:* Farming is a vital part of Oregon and Oregon's economy and it is a part of the economy that should remain robust and competitive. In order to address the impacts of climate change, and position Oregon's agriculturalists to withstand the negative consequences of climate change and participate in the benefits, it is important that the state pro-actively do the research, analysis and due diligence necessary to provide farmers and ranchers with useful information about carbon mitigation, adaptation and market opportunities. Without scientifically backed data about valid and verifiable carbon sequestration methods, it will be difficult for the agricultural sector to participate in voluntary offset and reduction programs.

Agriculture's continued ability to export and sell product nationally and globally is another essential issue, especially as consumers pay more attention to lifecycle carbon emissions and miles traveled by agricultural products.

The priority in 2009 with regard to climate and agriculture will be to gather the information and conduct the research necessary to ensure that Oregon's agricultural sector is resilient and better positioned to address the challenges and opportunities posed by climate change. We have identified four main areas of research and assistance needs to help Oregon agriculture address climate change:

1. Fund research on best carbon management and mitigation tools for Oregon agriculture
2. Provide technical assistance to agricultural producers to reduce emissions and sequester carbon
3. Fund research and assistance to help agricultural producers adapt to more frequent invasive species problems, decreasing water supply, and more variability in temperature averages and extremes
4. Coordinate with the Dairy Air Task Force to evaluate how recommended air quality improvement practices on dairies can reduce greenhouse gas emissions

Attached are more detailed descriptions of each recommendation, and estimated costs to implement these recommendations.

## **1: FUND RESEARCH ON BEST CARBON MANAGEMENT AND MITIGATION TOOLS FOR OREGON AGRICULTURE**

**Recommendation:** Research into best carbon management practices and carbon markets applied to Oregon's soils and crops should be undertaken which addresses the regional and species/varietal differences, and the costs of changing production practices in a changing climate regime.

**Description:** Although most of the increase in greenhouse gas (GHG) concentrations is due to carbon dioxide emissions from fossil fuels, agricultural emissions account for approximately 8 percent of total US GHG emissions when weighted by their relative contribution to global warming and are estimated to represent about 7 percent of the total emissions from Oregon. The agricultural sector has the potential not only to reduce these emissions but also to significantly reduce net U.S. GHG emissions from other sectors through better carbon management technologies and carbon sequestration in soils and biomass. The agricultural sector's contribution to achieving GHG reduction goals will depend on economics as well as available technology and the biological and physical capacity of soils to sequester carbon. Policies are needed to provide incentives for farmers to adopt GHG-mitigation practices and to support needed research. Oregon agriculture has much to offer in helping to reduce net GHG emissions, while at the same time improving the environment and the viability and sustainability of the agricultural sector.

The outcomes of the Oregon-based program will be a better understanding of the opportunities and protocols for participating in carbon markets, the potential levels of additional carbon that can be sequestered (and marketed) from alternative carbon management practices, how soil carbon rates vary spatially due to soil, climate and management history, and the implications of carbon management on the sustainability and viability of Oregon's agricultural products and markets.

### **Needs:**

Research into best carbon management practices and carbon markets applied to Oregon's soils and crops needs to recognize the regional and species/varietal differences, and the costs of changing production practices in a changing climate regime. It is critical that the research on the technical capacity of Oregon agricultural sector to sequester additional carbon be integrated with economic estimates of the costs of adopting these practices and marketing the carbon credits.

To this end the research should focus on:

- a. Assessing the most cost effective methods to reduce GHG emissions and increase carbon sequestration. The spatial variability of both carbon management practices and the carbon rates and the costs to adopt alternative practices and land use management needs to be quantified.
- b. Establishing a baseline for carbon sequestration rates based on cropping/land use system, and ensure consistency with other baseline protocols and acceptability by carbon market entities.
- c. Working with producers to determine the incentives needed to adopt carbon management practices and participate in carbon markets, and assess the extent of the market.

- d. Quantifying the GHG emissions reductions from different practices in a way that allows farmers to effectively and efficiently participate in carbon reduction markets.
- e. Addressing the continued viability of Oregon agricultural products in global warming era and means to keep Oregon agricultural products competitive in the face of concerns about “food miles” or “product miles.”
- f. Developing marketing tools to calculate the emissions associated with the production of different agricultural products.

**Funding Requests: OSU biennium**

- 1.0 FTE Biophysical Researcher to focus on the most promising spatially varying carbon management techniques and carbon rates and work with existing OSU faculty and researchers (\$300,000)
- 0.50 FTE Economic Research who will develop the framework and analysis for quantifying the opportunity costs of alternative management practices in Oregon and work with existing OSU and ODA researchers (\$150,000)
- 1.0 FTE Economic Research/Extension faculty to address protocols, regulations for carbon markets and the design of effective and efficient carbon policies (\$300,000)
- Technical assistance: database management and communication venues, web-reporting tools for carbon accounting; collaborate with extension efforts (\$200,000)

**Total request: \$950,000 for biennium**

*Note: for each research 1.0 FTE, the cost of \$150,000 per year (salary, OPE, plus operating costs)*

## **2. PROVIDE TECHNICAL ASSISTANCE TO AGRICULTURAL PRODUCERS**

**Background:** Agricultural producers will need technical assistance and educational information to implement practices that reduce their greenhouse gas emissions and sequester carbon. They will also need assistance to access incentive programs for emissions reductions and carbon sequestration. Oregon's Soil and Water Conservation Districts, Oregon State University Extension Service, and Oregon Department of Agriculture are already providing technical and educational assistance to agricultural producers to address other natural resource issues, including soil erosion, fertilizer management, manure management, streamside area restoration, and renewable energy. These organizations are the logical place to house technical assistance to agricultural producers related to climate change mitigation and adaptation.

**Recommendation:** Provide technical assistance to farmers and ranchers about ways to reduce greenhouse gas (GHG) emissions, sequester carbon, and participate in greenhouse gas offset programs.

**Description:** Develop technical expertise within the main state and local organizations that work with farmers and ranchers on natural resource issues: Oregon State University Extension Service, Soil and Water Conservation Districts, and Oregon Department of Agriculture. Establish a web site that will provide information about GHG reduction and carbon sequestration strategies to Oregon's diverse agricultural community.

### **Needs:**

- Establish an energy efficiency extension program with the Oregon State University Extension Service. The extension specialist would provide leadership for education programs on ways to save energy and implement renewable energy projects and seek input about implementing carbon management and carbon markets.
- Maintain existing funding for Oregon's Soil and Water Conservation Districts to provide technical assistance to agricultural producers on practices such as nutrient management, no-till farming, and manure management. Districts are already providing these services and it is important to maintain the current level of technical assistance.
- Provide technical assistance grants to Soil and Water Conservation Districts specifically earmarked for (1) receiving training on energy and climate change issues in agriculture; (2) assisting agricultural producers with reducing GHG emissions, implementing energy efficiency and renewable energy projects, and sequestering carbon. Districts would provide one-on-one assistance to producers to manage fertilizer and manure applications, tillage and crop rotations, and energy use to reduce their greenhouse gas emissions and sequester carbon, and would also assist producers with accessing incentives for GHG emissions reductions and carbon sequestration. This funding could be administered through the Oregon Department of Agriculture.
- Establish a climate change specialist position at the Oregon Department of Agriculture. The specialist would assist the industry in understanding climate change issues, collaborate with OSU and other institutions on climate change research, and help growers and technical service providers access incentive programs for emissions reductions and carbon sequestration.

## **Funding Requests**

- \$ 350,000 for OSU Extension program (Includes 1 FTE Extension faculty budgeted at \$300,000 salary and benefits plus \$50,000 for educational programs to agricultural community)
- \$300,000 additional funds for technical assistance grants to Soil and Water Conservation Districts to assist agricultural producers with reducing their emissions and sequestering carbon.
- \$375,000 to fund a climate change specialist at ODA and provide funds for research.

**Total request: \$1,025,000 for biennium**

### **3. ADAPTATION PLANNING FOR AGRICULTURAL SECTOR**

#### **a. Adaptation planning to address invasive species**

**Background:** The introduction, spread and establishment of invasive species is a historically significant challenge to Oregon's native flora and fauna, and dramatic increases in the past 25 years of the movement of people, plants, animals and manufactured goods has increased the frequency of new invasive plant and animal species introductions to Oregon. Climate change threatens to worsen the significant negative consequences of current and future invasive species in Oregon. According to the University of Washington's Climate Impacts Group, the Pacific Northwest is expected to warm at an average of 0.2-1.0°F per decade over the next 100 years. A major anticipated consequence of this change is the increased spread and dominance of invasive non-native species – including weeds, pests, animals, and disease outbreaks – that will threaten Oregon's agricultural and natural resource base.

This document presents recommendations to prevent introductions, minimize economic damage to our industries, and confront outbreaks of invasive species predicted to increase as a result of climate change.

**Recommendations:** The following three recommendations comprise a cost-effective 'Adaptation Strategy' by encompassing three stages of battling invasive species – Exclusion, Early Detection/Rapid Response, and Containment.

#### **1) Increase Research Resources to Conduct 'Risk Assessments' for Invasiveness**

Currently, the Oregon Department of Agriculture's (ODA) noxious weed control program's risk assessment process does not address climate change as a risk factor when assessing the invasive potential of plants. ODA should develop and adopt a climate change model as part of its plant risk assessment protocol. In addition, as biofuels become an attractive alternative energy, mechanisms should be in place to assess and stop the introduction of new biofuel crops into Oregon that have a great risk of becoming invasive: two potential approaches include expanding Oregon State University's research efforts and 'Risk Assessments.'

Needs:

- Evaluation of 'Invasiveness' for 10 – 20 species per year - \$100,000 (estimate)
- Development of a Climate Change Model to predict Invasiveness – \$100,000 (estimate)

#### **2) Establish Early Detection & Rapid Response System with Emergency Response Fund**

Currently, Oregon has limited capacity to quickly respond to new invasive species introductions and to stop the spread of existing invasive species with monitoring, trapping, delimitation and eradication programs. Climate change will expose Oregon to greater invasive plant pest and disease pressure, and it threatens to allow the spread and establishment of invasive plants and pests (i.e., Imported Fire Ant and Glassy Winged Sharpshooter) that are presently limited by Oregon's cool, temperate climate. Consequently, Oregon must establish a more robust system of surveillance and response, to include: initiating a public dialog to engage stakeholders in the development of public and private funding sources and strategies, providing for the addition of one full time

equivalent (FTE) program coordinator, and establishing an 'Emergency Response Fund' to ensure the availability of necessary resources.

Needs:

- Coordinator to build a statewide 'Early Detection & Rapid Response System' - 1.0 FTE
- Establishment of an 'Emergency Response Fund' to tackle 2 – 3 new invasions/biennium - \$1.5 to \$2 MM

**Total request for 3(a): \$1.9 to \$2.3 million for biennium**

We also support funding the following short and long-term basic needs. To stop a surge of invasive species triggered by climate change, Oregon needs to augment its basic infrastructure. The needs below incorporate a strong set of tools to protect Oregon now and in the future.

- Resources for a pilot 'Systems Approach' to Manage Pest and Disease Risks - \$250,000
- Additional Biocontrol Tools to contain and control invasive species - 3.0 FTE
- A 'Data Management System' of invasive species that is web-based and easily adaptable - 1.0 FTE
- Policy Option Package for Border Inspection Stations - \$2.9 MM
- Policy Option Package for the Invasive Pest and Plant Management Program - \$500,000
- Policy Option Package for the Oregon Invasive Species Council - \$750,000
- Policy Option Package for County Weed Program Funding- \$3 – 5 MM
- Funding to the Oregon University System to Find Alternatives to Methyl Bromide

## **b. WATER SUPPLY ADAPTATION PLANNING FOR AGRICULTURAL SECTOR**

**Background:** Climate change poses several threats to agriculture, and it is critical to provide growers the resources to adapt to climate change in order to maintain Oregon's agricultural economy.

**Recommendations:** Maintain, and in some cases, increase capacity at state agencies and institutions to help agricultural adapt to changing irrigation water supplies, lower soil moisture levels, increases in temperature extremes, and increased populations and invasions of invasive species.

### **Needs:**

- Continue to have an irrigation extension specialist at OSU to work with farmers. The irrigation specialist will provide technical assistance to agricultural producers to implement efficient irrigation technologies, conduct workshops in partnership with other organizations to promote water conservation, and work with other agencies to help producers access funding sources to implement water saving technologies.
- Conduct a long-term assessment to analyze the changes expected in the hydrology system as a result of climate change and a plan to provide water during drier seasons for agriculture and other instream and out-of-stream needs. This should be coordinated with WRD's statewide water supply and conservation assessment.
- Create a new position at ODA focused on water quantity issues. The specialist will work with Extension, NRCS, Soil and Water Conservation Districts, and other agencies to conduct outreach to agricultural producers about water conservation and efficient irrigation technologies, assist producers with accessing funding. The specialist will also work with WRD to conduct assessments to assess long-term water supply and develop plans to ensure an adequate long-term water supply for Oregon agriculture and other in-stream and out-of-stream needs.
- Ensure that the capital funds within WRD's bonding request are available and accessible for small private users. Make requirements simpler for projects under a certain dollar amount, or for conservation projects.
- Increase existing funding for Soil and Water Conservation Districts and watershed councils by \$1 million, for a total of \$7 million for the 2009-2011 biennium. Both organizations work closely with agricultural producers and other landowners to build soil quality, use efficient irrigation technology, restore streamside areas, and implement other practices that help save water. They also work with landowners to access funding to help implement these practices.
- Create a water efficiency tax credit. This program would be administered by the Oregon Water Resources Department and could be structured similar to the Business Energy Tax Credit administered by the Oregon Department of Energy.

### **Total request for 3(b):**

**\$190,846** for a water quantity position at Oregon Department of Agriculture.

**\$1 million** in additional funding for SWCDs and watershed councils.

### **c. ADAPTATION RESEARCH FOR CLIMATE CHANGE IN THE AGRICULTURAL SECTOR: CROP RESILIENCY RESEARCH**

**Recommendation:** Provide research to inform ODA and the agricultural sector on best options to build resiliency to climate change. These options may include increased crop diversity, use of drought tolerant crops, increased use of perennials, and increased organic matter in soils.

**Description:** Because of the interplay of temperature, water availability and physiologically active gases, the specific effects of climate change on crop plants across Oregon and the Pacific Northwest are difficult to predict. The outcome of the efforts on adaptation is to establish a targeted crop resiliency and adaptation research and extension effort that results in more drought resistant varieties of currently grown crops, understanding the effects of deficit irrigation on crops, and designing new cropping systems that would be successful with warmer temperatures and reduced water availability. Public policy will be better informed by economic assessments of the costs of adaptation of new technologies and crops. Producers will be assisted in transition to production systems under increased variability in weather related events, temperature and drought.

**Needs:** Research capability in many of these areas already exists across the OSU research community. The needs request is to supplement and leverage existing capability with specific expertise in crop-soil-water physiology, in cropping systems analysis and in quantifying the costs of adaptation or changing production practices. Funds are also requested for technical or graduate student support that can be shared with existing plant breeding and crop management scientists and economists to do research and outreach related to adaptation opportunities necessitated by a changing climate.

#### **Funding Requests: OSU per biennium**

- 0.5 FTE crop physiologist research to work on crop-soil-water relations in an array of crops across both dryland and irrigated environments (\$150,000 biennium, salary and benefits)
- 1.0 FTE cropping/plant systems research/Extension faculty scientist to assess deficit irrigation, relay cropping and other strategies for production of food, feed and bioproduct crops in irrigated production environments (\$300,000 biennium, salary and benefits)
- 1.0 FTE agricultural economist/Extension faculty to collaborate with the crop scientists and assess the opportunity costs of adapting to new production management, water and land use changes, and predicting distributional impacts on Oregon agriculture. (\$300,000 biennium, salary and benefits)
- Technical assistance funds for collaborative research managed to allow for funded collaborative work with other faculty (\$150,000)

**Total request for 3(c): \$900,000 for biennium**

#### **4. COORDINATION WITH DAIRY AIR TASK FORCE**

**Recommendation:** Evaluate how the air quality improvement program recommended by the Dairy Air Quality Task Force for Oregon's dairies will affect GHG emissions, including methane, and work together with program coordinators to evaluate how recommended strategies can reduce GHG emissions.

**Description:** Coordinate with the technical committee developing best management practices for dairies to address ammonia, methanol, and odor (the parameters of concern that will be addressed through the DATF process), to identify practices that also provide GHG reductions. Separately from the DATF technical committee process, identify other practices that dairies can also use to reduce GHG emissions, and develop information to quantify the benefits of these practices. Identify incentives, including offset incentive payments, to help encourage practices to reduce greenhouse gas emissions.

#### **Needs:**

- Provide funding for OSU research and development of management practices that reduce emissions and are specific to Oregon's needs.
- Create air quality positions at ODA and DEQ to work with dairies to reduce emissions, including greenhouse gas emissions. These positions will conduct outreach, provide technical assistance to dairy operators, conduct a baseline survey, develop rules, and implement tax credits.
- Create tax credits for dairies that implement best management practices to reduce emissions, including greenhouse gas emissions.
- The coordination with the Dairy Air Task Force technical committee can be completed by existing ODA staff during the fall of 2008. ODA is requesting funding in the 2009 session for a climate change specialist at ODA as well as funding for climate change-related research.

#### **Funding Requests**

- \$1 million in the Oregon Department of Agriculture budget to provide funding to Oregon State University for research on management practices to reduce emissions from dairies.
- \$219,300 each for ODA and DEQ for a dairy air quality positions.

**Total request: \$1,438,600 for biennium**