ARS CEAP Watershed Assessment Study Overview

Communications

- Meetings
  - Managing Ag Landscapes I
    - Kansas City 2006
  - Science 2 Solutions
    - Des Moines 2009
  - Managing Ag Landscapes II
    - Denver 2010
- Bibliographies
- Publications

CEAP Effects on ARS National Program

- Many individual watershed accomplishments
- A number of important cross-watershed thrusts
- Cooperation increased between NRCS and ARS at the national level, with greater visibility
- The ARS Watershed Research Program has been re-focused
  - Can address important NRCS mission objectives
  - May be the most important CEAP accomplishment
  - A change with enduring impact

ARS CEAP Watershed Assessment Study

Specific Objectives:

1. Develop and implement a data system.
2. **Measure effects of conservation practices at the watershed scale.**
3. **Validate models and quantify uncertainty of model predictions.**
4. Develop policy-planning tools to optimize profits and program efficiency.
5. Develop regional watershed models.

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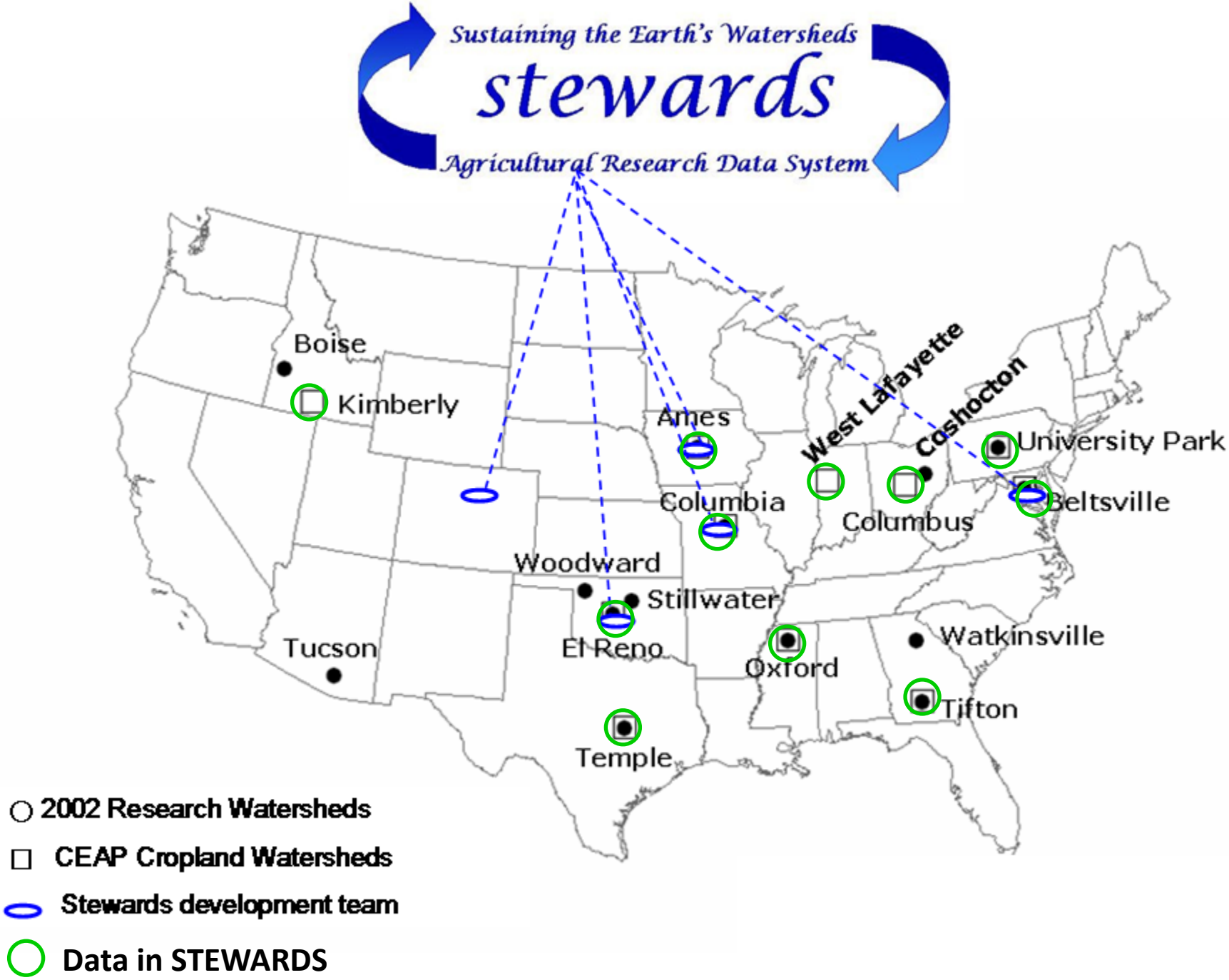
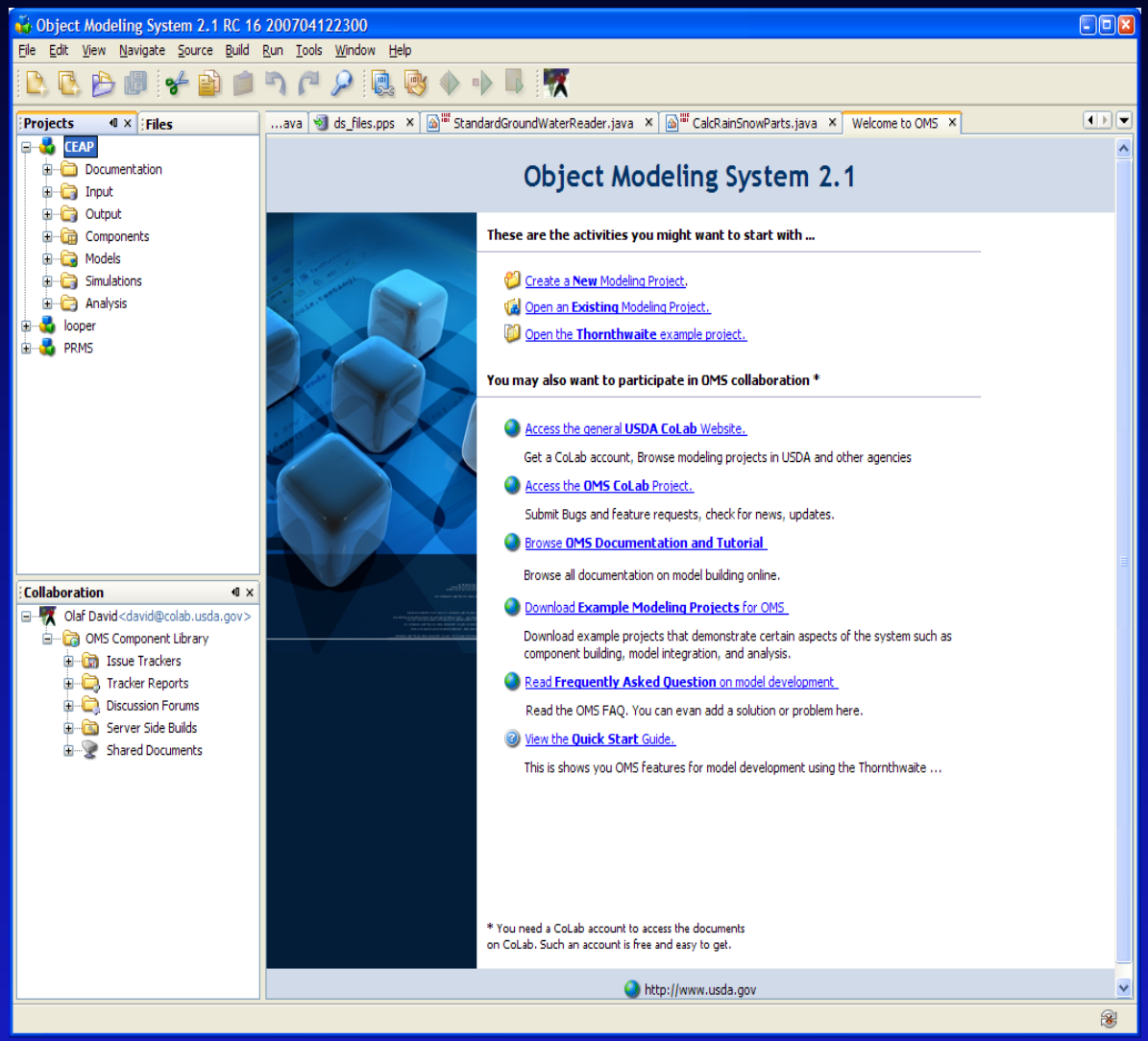

Sustaining the Earth's Watersheds
stewards
Agricultural Research Data System
Boise
Kimberly
Ames
West Lafayette
Cashocton
University Park
Columbia
Columbus
Beltsville
Woodward
Stillwater
El Reno
Tucson
Oxford
Watkinsville
Tifton
Temple
2002 Research Watersheds
CEAP Cropland Watersheds
Stewards development team
Data in STEWARDS

Object Modeling System (OMS) 2.1

- Delivered to NRCS February 26, 2008
- Modeling platform for CEAP Objective 5 - Develop and verify regional watershed models that quantify environmental outcomes of conservation practices
- Will save time and money spent on model development, and facilitate development of models customized for specific NRCS problems



Economic Biophysical Optimization Model

- Policy-planning tool that optimizes profits and program efficiency
- Integrates SWAT with economic models to evaluate trade-offs among multiple, conflicting objectives, identifying optimum choices among ecosystem services
- Each objective is specified by either an economic model, physical model, or statistical function

Linking Economic and Environmental Models

Models: point vs. spatially distributed

Whittaker, G. and Scott, D.W. 1999. Nonparametric regression for analysis of complex surveys and geographic visualization. *Sankhya, Series B*, special issue on small-area sampling. 61: 202-227.

Parallel Monte Carlo estimation of uncertainty

Whittaker, G. Use of a Beowulf cluster for estimation of risk using SWAT. *Agronomy J*. 2004. 96: 1495-1497.

Static Link: Run economic (optimization) model, use results in environmental model

Whittaker, G., 2005. Application of SWAT in the evaluation of salmon habitat remediation policy. *Hydrological Processes*. 19: 839-348.

Dynamic Link: Information passed between environmental model and economic model during optimization.

Whittaker, G., et al. 2009. A hybrid genetic algorithm for multiobjective problems with activity analysis-based local search. *European J. Operational Research* 193: 195-203.

External recognition

- CEAP was chosen as an “EXEMPLARY COLLABORATIVE CASE STUDY” presented at the Agriculture, Food, Nutrition, and Natural Resources R&D Roundtable, March 15, 2011, American Association for the Advancement of Science in Washington DC
- STEWARDS development team received 2011 SWCS Conservation Research Award