

## USDA-ARS Northern Great Plains Research Laboratory Research Network Involvement - 2017

### **Drought-Net** - Fields S13, S14, SIS.

Drought-Net is a global network focused on assessing terrestrial ecosystem sensitivity to drought. To effectively forecast terrestrial ecosystem responses to drought, ecologists must determine the mechanisms underlying ecosystem sensitivity to drought across a range of different ecosystem types, and then improve existing modeling frameworks by incorporating such variation within the context of broader environmental gradients.

Drought-Net will advance understanding of the determinants of terrestrial ecosystem sensitivity to drought by bringing together an international cadre of scientists with expertise that spans a wide range of terrestrial ecosystems, but with a common interest in drought, to design and coordinate three complementary research coordination activities: 1) Planning and coordinating new research utilizing standardized measurements to leverage the value of existing drought experiments across the globe, 2) Finalizing the design and facilitating the establishment of a new international network of coordinated drought experiments, and 3) Training highly motivated graduate students to conduct synthetic and network-level research through Distributed Graduate Seminars focused on drought. <http://wp.natsci.colostate.edu/droughtnet/>

### **RISK** (Rain Intercept Shelters for Kentucky bluegrass) - Fields S13, S14, SIS.

There is concern over Kentucky bluegrass (*Poa pratensis*) cover increase throughout the northern Great Plains of the USA and little information is available regarding effects of drought on this species and potential bluegrass control treatments. The RISK project will test the response of Kentucky bluegrass to three different levels of precipitation (ambient, 30% interception, and 60% interception). Three hypotheses guide the project: 1) Decreased precipitation will reduce the relative abundance of Kentucky bluegrass in comparison to associated native grasses, 2) Burning will decrease the relative abundance of Kentucky bluegrass under all precipitation regimes, and 3) Increased stress through burning and simulated drought will decrease Kentucky bluegrass abundance and increase native species richness while wetter unburnt plots will remain dominated by Kentucky bluegrass.

### **NEON** (National Ecological Observatory Network) - Field S66 and peripheral sites on NGPRL land.

NEON is a continental-scale ecological observation facility, sponsored by the National Science Foundation and operated by Battelle, that gathers and synthesizes data on the impacts of climate change, land use change and invasive species on natural resources and biodiversity.

The NEON observatory is designed to collect high-quality, standardized data from 81 field sites (47 terrestrial and 34 aquatic) across the U.S. (including Alaska, Hawaii and Puerto Rico). Data collection methods are standardized across sites and include in situ instrument measurements, field sampling and airborne remote sensing. Field sites are strategically selected to represent different regions of vegetation, landforms, climate, and ecosystem performance. NEON data and resources are freely available to enable users to tackle scientific questions at scales not accessible to previous generations of ecologists. [www.neonscience.org](http://www.neonscience.org)

### **IPICL** (Improving Production with Integrated Crop Livestock Systems) - Fields S6, S12, S13, S14.

IPICL is a USDA-funded research and extension project focused on increasing the diversity of farm production systems that conserve soil resources, increase resilience of farm operations, moderate risk against a changing climate, and improve nutrient cycling, thereby enhancing sustainable food production and maintenance of farm-based communities and livelihoods of the region. The project involves a team of 26 scientists across three states (ND, SD, NE) with research expertise in crop performance, livestock health, soil quality, greenhouse gas flux, and nutrient management. <http://www.ipicl.org/>

### **LTAR** (Long-Term Agroecosystem Research Network)- Fields HS, 12, 13.

The Long-Term Agroecosystem Research (LTAR) Network is a partnership among 18 premier long-term research sites across the United States. LTAR was established to build the knowledge required for sustainable intensification of agriculture, increasing yields from the current agricultural land base while minimizing

or reversing agriculture's adverse environmental impacts. Network research is organized around topics of sustainability of regional or national consequence, relying upon long-term databases, cross-site experiments, and computational modeling to tie experimental and monitoring conclusions from diverse locations to a broader vision of agriculture for the United States. <https://ltar.nal.usda.gov/>

**NWERN** (National Wind Erosion Research Network) - Field HS.

The National Wind Erosion Research Network was established in 2014 as a collaborative effort led by the US Department of Agriculture Long Term Agro-Ecosystem Research network and the Bureau of Land Management to address the need for a long-term research program to meet critical challenges in wind erosion research and management in the United States. The Network has three aims: (1) provide data to support understanding of basic aeolian processes across land use types, land cover types, and management practices, (2) support development and application of models to assess wind erosion and dust emission and their impacts on human and environmental systems, and (3) encourage collaboration among the aeolian research community and resource managers for the transfer of wind erosion technologies. The Network currently consists of thirteen intensively instrumented sites providing measurements of aeolian sediment transport rates, meteorological conditions, and soil and vegetation properties that influence wind erosion. Network sites are located across rangelands, croplands, and deserts of the western US. The Network provides a mechanism for engaging national and international partners in a wind erosion research program that addresses the need for improved understanding and prediction of aeolian processes across complex and diverse land use types and management practices. <https://winderosionnetwork.org/>

**GRACEnet** (Greenhouse gas Reduction through Agricultural Carbon Enhancement network) - Multiple fields.

The objective of GRACE net is to identify and further develop agricultural practices that will enhance carbon sequestration in soils, promote sustainability and provide a sound scientific basis for carbon credits and trading programs. This program will generate information concerning carbon storage in agricultural systems that is needed by producers, program managers and policy makers. Agricultural lands to be studied by GRACEnet scientists include both grazing lands (range and pasture) and crop lands (irrigated and dryland). Coordinated multi-location field studies will follow standardized protocols to compare net GHG emissions (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O), carbon sequestration, and broad environmental benefits under different management systems. [www.ars.usda.gov/anrds/gracenet/](http://www.ars.usda.gov/anrds/gracenet/)

**REAP** (Resilient Economic Agricultural Practices) - Multiple fields.

REAP is a cross-location research project involving ARS units nationwide that recognizes and strives to enhance diverse and precious soil resources through trans-disciplinary, multi-location research and technology transfer. Project goals include, 1) Identify physical, chemical, or biological parameters and index tools that quantify management effects on carbon sequestration and soil health, and 2) Conduct multi-location comparisons of business as usual (BAU) versus management practices designed to enhance soil health. Efforts within REAP provided critical data to meet the ARS Grand Challenge of transforming agriculture to deliver a 20% increase in Quality Production with 20% lower environmental impact by 2025. [www.ars.usda.gov/natural-resources-and-sustainable-agricultural-systems/soil-and-air/docs/reap-2/](http://www.ars.usda.gov/natural-resources-and-sustainable-agricultural-systems/soil-and-air/docs/reap-2/)

**CEAP** (Conservation Effects Assessment Project) - Multiple fields.

CEAP is a multi-agency effort to quantify the environmental effects of conservation practices and programs and develop the science base for managing the agricultural landscape for environmental quality. Project findings will be used to guide USDA conservation policy and program development and help conservationists, farmers and ranchers make more informed conservation decisions. Assessments in CEAP are carried out at national, regional and watershed scales on cropland, grazing lands, wetlands and for wildlife. The three principal components of CEAP-the national assessments, the watershed assessment studies, and the bibliographies and literature reviews- contribute to building the science base for conservation. That process includes research, modeling, assessment, monitoring and data collection, outreach, and extension education. Focus is being given to translating CEAP science into practice. [www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/)