Conservation Technology Information Center

CTIC connects, champions and provides information on sustainable agricultural systems and technologies that are productive, profitable and preserve natural resources.

August 28, 2023

National Buildout of OpTIS and Related Products

Request for Proposals

Promoting and tracking the adoption of reduced tillage practices is the premise upon which the CTIC was founded in 1982. Ever since this time, CTIC has been a widely-trusted source for Crop Residue Management (CRM) tillage survey data, collected nationally through the year 2004 with funding from USDA/NRCS. In subsequent years, CTIC began to engage in what is now a 12-year partnership with The Nature Conservancy (TNC) and Regrow (including Regrow's predecessors, Applied GeoSolutions and Dagan) on the development of the Operational Tillage Information System (OpTIS), which uses publicly available remote sensing data to track the adoption of conservation tillage and cover crops.

The initial OpTIS dataset covered the years 2005-2018, with subsequent annual updates and slight expansion in coverage area to include all 16 states comprising the "extended Corn Belt." However, a new research agreement with the Foundation for Food and Agriculture Research and the Walton Family Foundation is now providing funding for the release of such data for croplands in all lower 48 states (CONUS) for the years 2015-2021, as well as vegetation health metrics in perennial grasslands that are of direct relevance to animal agriculture for all of CONUS across this same time period. All of these data will be made available to the public free of charge through the CTIC website, and CTIC is now seeking qualified contractors interested in helping us deliver these data in a compelling, accessible way (see enclosed RFP). CTIC will host a virtual (Zoom) information session at noon EDT on Monday, September 11, 2023, for any vendors wishing to learn more about this opportunity.

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Background & Budget

As noted above, a new research agreement with the Foundation for Food and Agriculture Research and the Walton Family Foundation is now providing funding for the release of OpTIS and related data for all lower 48 states (CONUS) for the years 2015-2021. These data will be made available to the public free of charge through the CTIC website, and CTIC is now seeking qualified contractors to help deliver these data in a compelling, accessible way. CTIC's estimate for the cost of this work is $20-25K, but bids will be evaluated on the basis of both cost and quality.

Timeline

CTIC will accept bids on this RFP through September 22, 2023. We intend to select the vendor by October 6, 2023 and have work initiated as soon as possible thereafter. If feasible (and cost-effective), it is our desire to demo an initial version (not near-final, just a "beta" prototype) of the new website visualization tool at the Sustainable Ag Summit in Charlotte (December 6-7, 2023) and have all development work by the vendor to be concluded no later than April 30, 2024.

Current Website Visualization Tool

The current website visualization tool was built using Tableau, but we are open to considering alternative tools proposed by vendors. As shown in the example screenshot below, a "four-panel" display is currently utilized for displaying OpTIS and related data on our website.

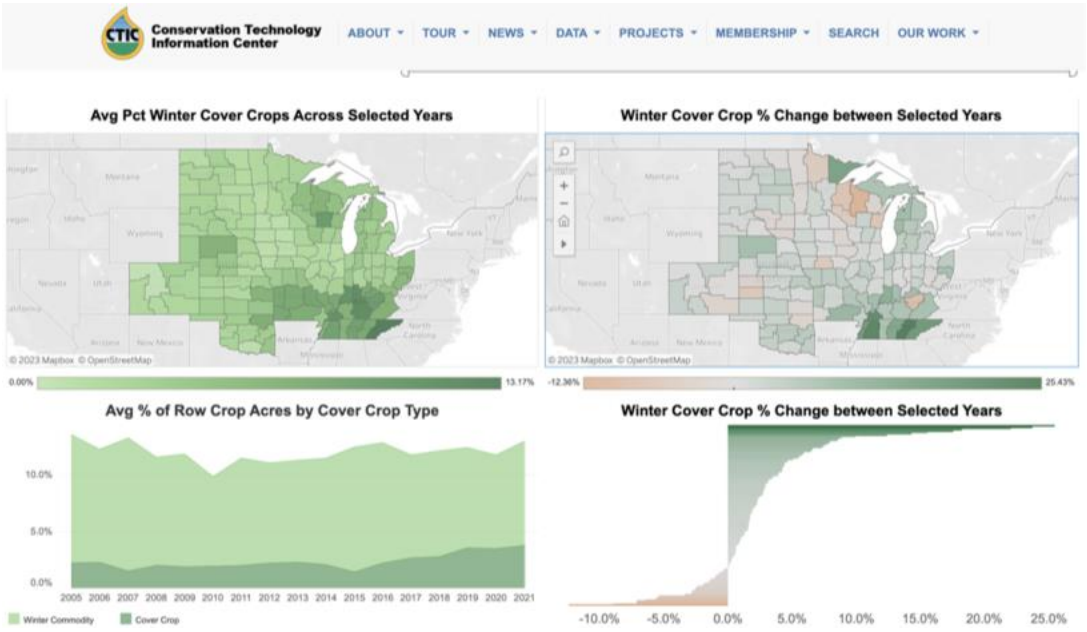

Figure 1. Example screenshot of current OpTIS website visualization tool.

We are not necessarily "wedded" to any of the current website visualization approach and welcome new ideas from vendors that they believe would be compelling and accessible to users. This includes any new ideas for how the various datasets would be selected from the main menu on the CTIC website (i.e., via a new, icon-based graphical interface vs. the current dropdown approach).

Datasets to be Displayed

The CONUS datasets to be displayed in the new website visualization tool are listed in the table below, with additional details for the new Grazing Lands Vegetation Metrics provided in Attachment 1. The OpTIS and DNDC Croplands datasets are unchanged from current website definitions. The time period covered by each dataset is 2015-2021 (seven years). Existing OpTIS/DNDC Cropland data for the period 2005-2014 will be archived by CTIC.

Dataset Name	Data to Display	Spatial Resolution
OpTIS (on croplands)	Tillage categories Winter cover categories	HUC8 Crop Reporting District (CRD)
DNDC Croplands	Soil organic carbon Methane Direct N_2O Indirect N_2O	HUC8 Crop Reporting District (CRD)
Grazing Lands Vegetation Metrics[1] (on perennial grasslands)	NPP NPP deviation from weather Cover categories	US EPA Level 3 Ecoregion
DNDC Perennial Grasslands	Soil organic carbon Methane Direct N_2O Indirect N_2O	US EPA Level 3 Ecoregion

Written Bidding Process

Vendors interested in performing this work are asked to submit a bid (lump sum total) to CTIC no later than 5 p.m. CDT on September 22, 2023. Bids should be submitted by email to Ryan Heiniger (heiniger@ctic.org) using the attached form (Attachment 2). Examples of previous work would be helpful to include. Questions about this RFP should be addressed to Dave Gustafson (gustafson@ctic.org). CTIC intends to select and inform the vendor on approximately October 9, 2023. CTIC reserves the right to not select a vendor from among the submitted bids.

[1] See Attachment 1 for a more detailed description of this new dataset.

Attachment 1. Grazing Lands Vegetation Metrics

Remote Sensing

Grassland Net Primary Productivity 2015-2021
NPP in Deviation from Climate Driven Expected NPP using 2003-2021 data
Forbs/Grasses, Trees, Bare Ground % cover 2015-2021
Spatial scale: HUC8 and CRD

Pixel scale metrics to translate to region-wide statistics for visualization
(Non-grassland pixels masked prior to calculations)

NPP 2015-2021

- 7-year Trend (Significantly Positive, Stable, or Negative)
- 7-year Average NPP
- Annual NPP

NPP deviation from weather using 2003-2021 data

- Status in 2021 - positive deviation, no deviation, negative deviation

Cover

- 7-year Trend (Positive, Stable, Negative)
- 7-year Average cover (Forb/Grass, Tree, Bare Ground)
- Annual 2015-2021 Forb/Grass, Tree, Bare Ground cover

Summary statistics by region (HUC8, CRD)

Metric: **Herbaceous (Forbs/Grasses) NPP 2015-2021 -** 7-year **Trend** (Positive, Stable, Negative. $p<0.10$)
Summary Stats:

- Percent of grasslands in each category
- Acres of grassland in each category

Metric: **NPP 2015-2021** - 7-year **Average** NPP, Annual NPP (gC/m2/yr) (gC/acre/yr)
Summary Stats:

- Region wide grassland average NPP
- Annual region wide average grassland NPP
    - allows times series view
    - allows absolute change (e.g. difference between 2015 region-wide avg NPP and 2021 region-wide avg NPP)

Metric: **NPP 2021 deviation from weather -** Trend in residuals from 2003-2021 and 2015-2021
Summary Stats:

- Percent of grasslands in each category (positive, none, negative deviation)
- Acres of grasslands in each category (positive, none, negative deviation)

Metric: **Cover -** 7-year 2015-2021 **Trend** (Positive, Stable, Negative)
Summary Stats:

- Percent in each category by Plant Functional Type (Annual Forb/Grass, Perennial Forb/Grass, Tree, Bare Ground)
- Acres in each category by Plant Functional Type (Forb/Grass, Tree, Bare Ground)

Metric: **Cover -** 7-year **Average** cover; Annual 2015-2021 % cover
Summary Stats:

- Region wide average cover
- Annual region wide average cover
    - allows times series view
    - allows absolute change (e.g. difference between 2015 region-wide cover and 2021 region-wide cover)

DNDC (Version 11.0.0)

Output Details:

- Delivery Method: Mean values of DNDC parameters per ecoregion per year (CSV file)
- Aggregation level: USEPA Level 3 Ecoregions
- DNDC Products: SOC, CH4, Direct N2O, Indirect N2O - all with units of [kg CO2 eq. / ha / yr]
- Temporal scale: Annual
- Years: 2015-2021

Methodology:
The simulations were run at locations with representative soil properties within USEPA Level 3 Ecoregions, with 85 ecoregions across CONUS.
There are 180 DNDC simulations per ecoregion - more simulations within the same ecoregion yielded a similar distribution of DNDC outputs, and so this number was considered sufficient for a global picture. There are ~15k total simulations across CONUS.
When selecting representative sample locations within each ecoregion, two masking layers were used to ensure that locations grew perennial grasses. The inner join was taken of these masks to be conservative.

- National Land Cover Database (NLCD) data layer, where included all locations (pixels) labeled as Grassland/herbaceous, Pasture/hay, Shrub/scrub, Barren land and Dwarf scrub.
- Regrow data layers of Net Primary Production (NPP) for four classes of plant functional group: perennial grasses, annual grasses, trees, and shrubs. Locations (pixels) were only included if perennial grasses dominated all other plant functional groups during the peak of the growing season over the last 10 years.
- Maybe helpful to show these pixels on a map

Simulations were run with a spin up of 40 years, with outputs for 2015-2021. No management was applied.

Attachment 2. Bid Sheet

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Bid Deadline: 5 p.m. CDT, September 22nd, 2023

Email bids with completed form below to: heiniger@ctic.org

Bid Price:

$_____

Submit written bid to: heiniger@ctic.org no later than 5 p.m. CDT, Friday, September 22nd, 2023

CTIC reserves the right to accept or reject all bids.

Bid Submitted by:

Name:_____

Company Name:_____

Address:_____

City/State/Zip:_____

Signature:_____

Date:_____