

May 2020 Monthly Meeting - FAIR data, grassland productivity forecast, and animal movement visualization

CDI's May monthly meeting included updates on CDI projects focusing on FAIR data, a grassland productivity forecast, and animal movement visualization.

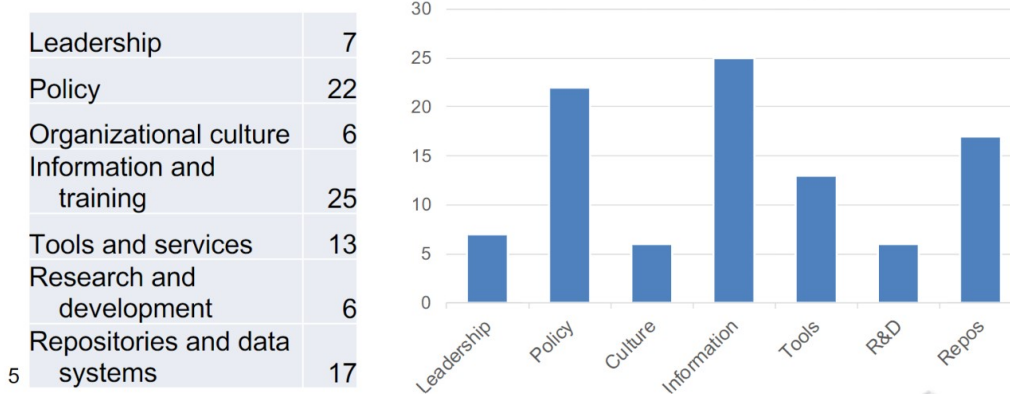
For more information, questions and answers from the presentation, and a recording of the meeting, please visit the [CDI wiki](#).

Building a Roadmap for Making Data FAIR in the U.S. Geological Survey, Fran Lightsom, USGS

Fran Lightsom presented on the process of **building a roadmap for making USGS data FAIR**. FAIR stands for **Findable, Accessible, Interoperable and Reusable** and has become a popular way for organizations to improve the value and usefulness of data products.

To begin building a roadmap for FAIR data, the project team conducted a survey of data producers, collected use cases of projects that integrate data, hosted a workshop on September 9th-11th, 2019, and drafted a report & list of recommendations. The workshop produced **about 100 discrete recommendations, with 14 being deemed essential, 38 important, and 44 useful**.

Recommendations address multiple ways USGS can enable us to use FAIR principles



Some broad thoughts that came out of the workshop included the assertion that **open science requires extension of FAIR beyond data to samples, methods, software, and tools**; a less-explored application of FAIR. Implementing recommendations would be the responsibility of many groups, and would require input from representatives of these groups. There may be a place for CDI to step in and coordinate in the future, as this effort continues.

Further objectives coming out of this effort include **increasing use of globally unique persistent identifiers (especially with physical samples and software)**, developing policy, researching best practices, creating support tools, enabling creation of digital products that are interoperable and usable by making use of existing standards, and **improving interoperability through coordinated creation of shared vocab and ontology**.

An opportunity for CDI to view and provide feedback for the FAIR roadmap is upcoming.

Implementing a Grassland Productivity Forecast Tool for the U.S. Southwest, Sasha Reed, USGS

Grass-Cast is a CDI-funded project that is focused on producing near-term forecasts of grassland productivity for the U.S. southwest. The goal of the project is to bring together different kinds of data in order to provide upcoming growing season forecasts, updated every 2 weeks. This work started in the Great Plains to provide information about seasonal outlooks to ranchers.

So, why are grasslands important? Grasslands provide a critical amount of ecosystem services. **They are one of the largest single providers of agro-ecological services in the U.S., and they supply important habitat and food provision for wildlife**. Productivity of grasslands helps to determine fire routines and how much carbon is coming from the atmosphere into the grass and soil. Dust reduction and problems associated with air quality can also be thought about from a grassland productivity perspective.

Near-term productivity forecasts for grasslands can **provide information to stakeholders on cattle stocking rates, where and how to allocate resources towards fire management, and rates of carbon sequestration**. Grasslands are notably responsive to subtle changes in the environment and climate, and thus, they vary from year to year, making productivity predictions difficult.

Overview of Grass-Cast Great Plains

Observed weather + Forecasted weather



The diagram above outlines the process that informs Grass-Cast for the Great Plains, but the project team wants to expand to include the Southwest region. The Southwest region differs from the Great Plains in that it does not have **the same homogeneous coverage of grasses, meaning that bare ground is often exposed, complicating the interpretation of remotely sensed data**. The Southwest also has a more varied mix of vegetation types, including cacti and shrubs, which needs to be differentiated from grass cover.

The Grass-Cast team aimed to take the same overarching process used in the Great Plains Grass-Cast, but adjust the methods to effectively use Grass-Cast in the Southwest. **First, the team looked at different satellite indices for estimating grassland productivity in the hopes they might better address the challenges of the Southwest.** They found that the previously utilized NDVI (normalized difference vegetation index) greenness index did not work well in a lot of places in the Southwest, but not as well in others. These results supported the idea to try newer remote sensing platforms that don't rely on a greenness index, such as SIF (solar induced fluorescence). SIF is a different way of looking at plant activity that uses plant physiology to monitor how electrons are moving through the photosynthetic chain. The Southwest is different from the Great Plains in that the dry environment means that you can have plants that are green but not very active, making the relationship between greenness and productivity more challenging. Additionally, many Southwestern grasslands have two growing seasons - spring and summer, representing a temporal challenge. Other remote sensing methods examined here were NIRv (near-infrared reflectance of vegetation), a greenness index that hones in specifically on green parts of remotely sensed pixels in images, and SATVI (Soil-Adjusted Total Vegetation Index), which takes into account soil brightness.

The team compared results from these different indices using eddy covariance data, and found that **neither SIF or NDVI provided good results. However, NIRv and SATVI did a good job of predicting grassland productivity for the Southwest, and there is some promise in SIF as a proxy for capturing the timing of the growing season.**

Grass-Cast now plans to incorporate data for the Southwest (Arizona and New Mexico) into the current tool. Ultimately, the team wants to integrate across these different methods and go beyond Arizona and New Mexico. There is a lot of room for collaboration; stay tuned for upcoming workshops and seminars.

GrassCast is available [here](#).

A generic web application to visualize and understand movements of tagged animals, Ben Letcher, USGS

Tracking and tagging data on individual animals provides key information about movements, habitat use, interactions and population dynamics, and there is a lot of this type of data currently available. For example, the [Movebank](#) database currently has 2 billion observations. Tracking data is expensive and requires time and effort to collect; TAME (tagged animal movement explorer) aims to help **maximize the value of this data and make it easier to interact with these complex data.**


TAME is a data exploration tool in the form of a web application, based on open source libraries. The TAME team's goal is to make TAME as easy to use as possible, and to allow for interaction and exploration of tagging data. Currently, TAME features include:

1. Four introduction videos
2. A user account system where users can upload their own data, with an option to publish and/or share
3. Ability to map observations to color, size, or outline

4. Ability to select individuals or select by area, with multiple area selections available
5. Ability to cross filter where users can filter any one variable, or multiple variables, and output a movie/time series of the data.

Features

- Intro videos
- User account system
 - Data upload
 - Save/publish
- Map observations to:
 - Color, size, outline
- Selecting
 - Individual
 - Area
- Filtering
 - Any variable
 - Multiple variables



See the monthly [meeting recording](#) on the wiki page for a live demonstration of TAME, or explore for yourself on the TAME [website](#).

Ben Letcher (bletcher@usgs.gov) is excited to explore a podcast or video series centered on animal movement stories – **please reach out to him if you have experience in this area!**

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