

SECTION 1. PROJECT ADMINISTRATIVE INFORMATION

Elements of CDI Science Support Framework: Data information/assets; Computational tools/services

Project title: Integration of Phenological Forecast Maps for Assessment of Biodiversity: An Enterprise Workflow

Name of lead USGS cost center requesting funding: USA National Phenology Network (USA-NPN)

Name of USGS Principal Investigator: Jake Weltzin, 1311 E. 4th Street, Tucson, AZ 85721; Phone: (520) 626-3821;

Fax: (520) 621-7834; jweltzin@usgs.gov

Collaborators: Alyssa Rosemartin alyssa@usanpn.org, 520-419-2585, Lee Marsh, lee@usanpn.org, 520-621-1636, Sky Bristol, sbristol@usgs.gov, 303-241-4122, Tim Kern, kernt@usgs.gov, 970-226-9366, Don Brown, 970-226-9155, brownd@usgs.gov

Short description - We aim to pilot and share a workflow for developing, integrating and contextualizing novel gridded data products in service to national assessments of biodiversity. Our effort will address questions related to the efficient data processing and delivery of OGC-compliant web services, as well as to contextualization of gridded ecological forecast products with other data resources for natural resource decision-making.

List of anticipated deliverables from the project

- Technical documentation and open source code, enabling others to reuse infrastructure for data processing, delivery and reporting on data usage
- “Story map” as an example of how to contextualize and combine datasets for natural resource decision-making

SECTION 2. ESTIMATED BUDGET

Budget Category	Federal Funding “Requested”	Matching Funds “Proposed”
1. PERSONNEL (SALARIES including benefits):		
Federal Personnel Total:	\$20,000	\$22,000 (\$7,000 for Weltzin, \$5,000 for Bristol, \$5,000 for Kern, \$5,000 for Brown)
Collaborator Personnel Total:	\$20,000 (incl. IDC to UA)	\$0
Total Salaries:	\$40,000	\$22,000
2. TRAVEL EXPENSES:		
Travel Total	\$1,000	\$1,000
Total Travel Expenses:	\$1,000	\$1,000
3. OTHER DIRECT COSTS: (itemize)		
Publication Costs:	\$2,000	\$0
Total Other Direct Costs:	\$2,000	\$0
Total Direct Costs:	\$43,000	\$23,000
Indirect Costs (%):	\$0	\$0
GRAND TOTAL:	\$43,000	\$23,000

SECTION 3. PROJECT SUMMARY

Scope - Projects within and beyond USGS produce valuable geospatial data resources. When web services are made available, they are often tuned for one application or portal and not built for generalized use, limiting our ability to integrate complementary datasets for decision-making. We propose to pilot an integration effort, resulting in shared infrastructure, documentation and lessons learned, to significantly advance the delivery and translation of critical ecological information for a variety of stakeholders within Department of Interior (DOI) and beyond. The work addresses areas across the CDI Science Support Framework: we will develop new software, data products, and workflows that will enhance synthesis and assessment efforts through integration of data to create new information. Our proof of concept will focus on delivery of modeled leafing and flowering dates of lilacs as a pilot for deciduous tree species of economic importance. These models and associated climatology data can be linked to processes such as fire ecology, invasive species, and drought.

Technical Approach - We will run existing Python code to produce Spring Indices on PRISM temperature data for the period 1980-present. The resultant products will be retrospective gridded values and anomalies (relative to 30-year mean) of SI leaf and bloom at daily timesteps, with 4-km resolution, for CONUS. We will also run scripts on daily NOAA National Centers for Environmental Prediction (NCEP) Real-Time Mesoscale Analysis (RTMA) temperature data, which was developed to support weather forecasting, to produce 10-day forecasts of SI leaf and bloom values and anomalies, at 2.5-km resolution, for CONUS. This gridded data will be made available via OGC-compliant web services, and distributed via the ScienceBase repository. ScienceBase will host the gridded datasets uploaded as GeoTIFF files and serve them via Geoserver to produce Web Map Service (WMS) for visualization and Web Coverage Service (WCS) for query and computation capability. We will document this workflow for application to other species by USA-NPN, and for other similar databases (e.g., Breeding Bird Survey, Landsat Land Surface Phenology).

Project Experience and Collaboration - **Jake Weltzin** directs the USA National Phenology Network, which produces national-scale phenological information and associated data to facilitate continental-scale investigations of environmental variation and climate change on biodiversity. **Sky Bristol** leads the Biogeographic Characterization Branch in Core Science Analytics, Synthesis and Libraries and directs the research and development of biodiversity assessment products and capabilities. **Tim Kern** and **Don Brown** work with the Information Science Branch at the Fort Collins Science Center and are helping to develop the next generation of biogeographic information products. **Lee Marsh** and **Alyssa Rosemartin**, U Arizona, develop and deliver national scale phenology data products.

Sustainability - Through use of existing, well-developed, maintained and shared architecture (USA-NPN cyberinfrastructure, ScienceBase, and the Biogeographic Information System), as well as base funding to USA-NPN from Ecosystems Mission area, sustainability and replicability of the project is ensured. All partners are fully committed to open data, code, infrastructure and provenance information.

Budget Justification - Jake Weltzin (10%) will contribute to translation and interpretation of gridded phenology maps. Tim Kern and Don Brown (5% in-kind each) will integrate products into National Biogeographic infrastructure, and Sky Bristol (5% in-kind) will advise web standards and services, and integrate data into ScienceBase. Lee Marsh and Alyssa Rosemartin (U Arizona, 15% and 5%, respectively) will develop and document data processing workflow for gridded phenology products, and consult on integration and interpretation of the products.

Timeline

April - Use case and scoping completed.

May-June - Production of gridded retrospective and forecast maps; OGC-compliant web services to ScienceBase; WCS and WMS implemented.

July - Documentation of workflow, draft of Techniques and Methods Report, and mid-year report, Presentation to CDI meeting (TBD).

August - Integration into Biogeographic Information System and National Biodiversity Assessment, and implementation of story maps. Review and modification of documentation.

September - Final delivery of all documentation, products and lessons learned; submit manuscript as USGS Open File Report.