



AUTHENTIC RESEARCH EXPERIENCE FOR TEACHERS AT LONG-TERM ECOLOGICAL RESEARCH SITES

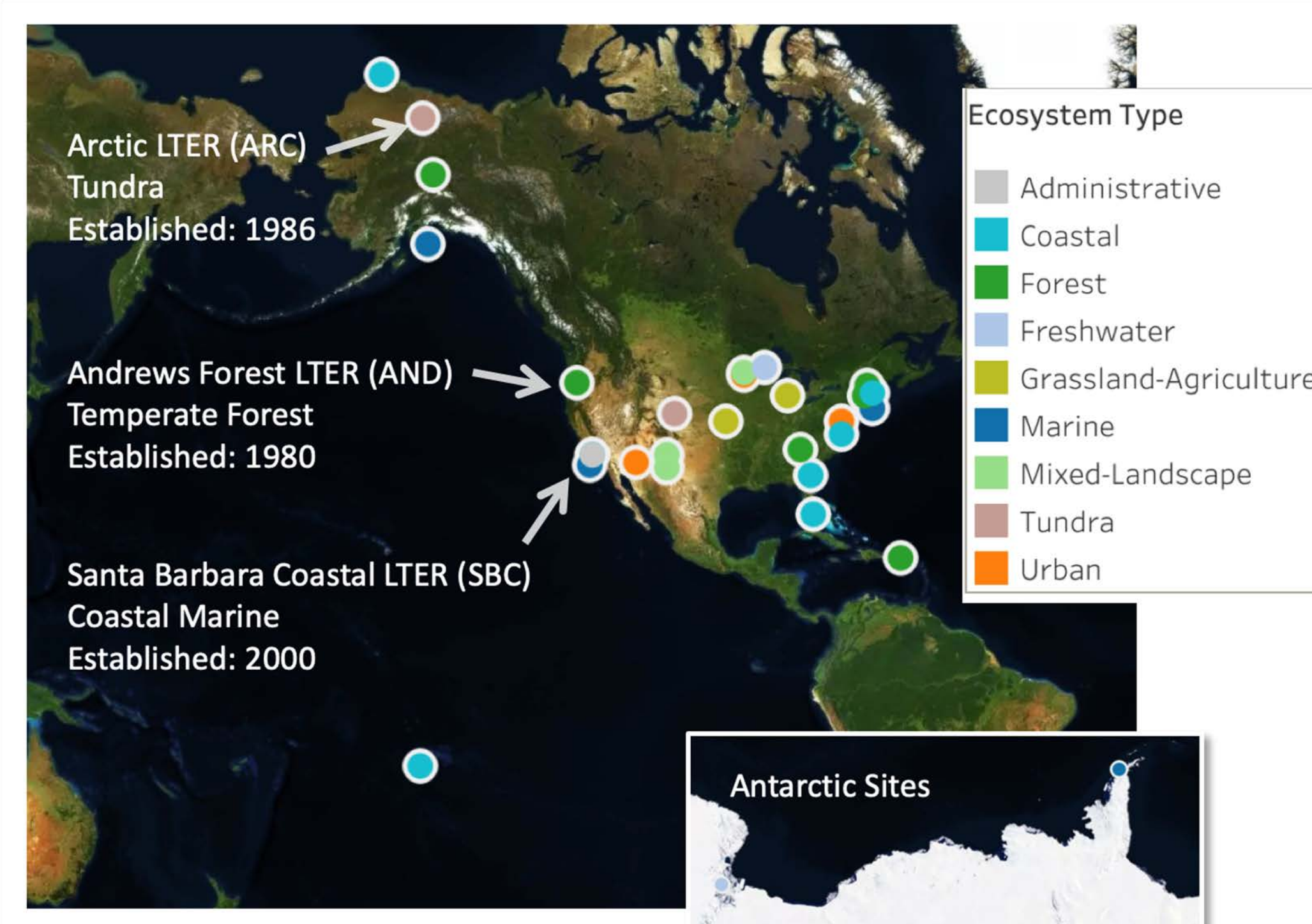


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Abstract

In partnership with science education professional development (PD) providers and scientists, we developed a Data Literacy Using LTER Data workshop series in which 21 STEM teachers participated prior to multi-week field research experiences at an LTER site. In 2023, a post-workshop survey showed 92% of teachers expected to integrate data knowledge and practices they had learned. In 2024, we provided additional data literacy support through Data Nuggets PD.



Introduction

The Authentic Research Experience for Teachers at NSF's Long Term Ecological Research sites (ARET@LTER) project engages middle/high school teachers in conducting field and laboratory research focused on how environmental stressors affect biodiversity. These paid research experiences are open to teachers at schools with large populations of students from marginalized groups in Alaska, California (Santa Barbara, Santa Maria, Ventura), Oregon, and Wisconsin (Milwaukee).

Participating **teachers** spend 2-4 weeks over two summers embedded in active

research at one of three LTER research locations spanning diverse critical habitat types: Arctic (Arctic LTER), temperate montane forests (Andrews LTER), and marine coastal ecosystems (Santa Barbara Coastal LTER). All teachers engage or 2 years in the ARETS professional learning community which provides data literacy PD to help teachers develop data-focused classroom activities.

Partnerships

Teachers are engaged in research alongside **scientists** to understand:

1. How do drivers of biodiversity differ across terrestrial, freshwater aquatic, and saltwater aquatic environments?
2. How do biodiversity and climate combine to influence ecosystem function (e.g. net primary productivity, natural carbon sequestration by ecosystems)?
3. How do marine and terrestrial heat waves, drought, or other extreme climate-related events influence species populations and ultimately biodiversity?

To support this learning, we collaborate with our **data literacy partners** to provide data literacy training focused on the NGSS SEPs:

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

DATA *Nuggets*



Data Nuggets (DN) are free classroom activities, co-designed by scientists and teachers, designed to bring contemporary research and authentic data into the classroom. Featuring a scientist role model and the story of what inspired their research, in a DN activity, students are guided through the entire process of science. DNs can be used across grades K-16, as students grow in their quantitative abilities and gain confidence.

To date, 40 Data Nuggets using LTER data have been created. Datasets from these DNs were used in the design of data literacy PD for this project. In addition, new Data Nuggets are being co-created by ARET@LTER project teachers and scientists with support from the Kellogg Biological Station LTER.



Dataspire defines Data Literacy as an ability to collect, organize, visualize, interpret, analyze, and share data for yourself and other people to use and understand. They define Science Literacy as an approach to building out awareness, enjoyment, interest, opinion-forming, and/or understanding of natural and social sciences as well as the process of science. *Dataspire* seeks to increase confidence and competence in using data among grade 3-16 students/youth through PD for formal and informal educators, and school administrators by:

- Enhancing the ability to explore, read, and interpret data.
- Building confidence in manipulating data in models and visualizations.
- Inspiring critical thinking and ability to ask questions from data.

Dataspire developed the 12-hour Data Literacy Using LTER Data workshop for all teachers participating in our project.

Shared data literacy goals among all partners allows for a strong collaboration through which increasing data literacy knowledge of K-12 educators and their students can be successful. We believe that building strong partnerships between teachers, scientists, project education coordinators, and data literacy PD providers will provide the needed support for teachers as they transform their new and existing data knowledge to their classroom teaching practices.

Research

In 2024, research began on teachers' use of real data and data literacy skills in lesson plans curated as part of their involvement in the ARET@LTER project. This qualitative study will evaluate lesson plan drafts and final data products co-developed by researchers and participating teachers. Data collection will take place in 2024-2025 with results expected in 2026.



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