Opportunity Title: USDA-FS Forest Transpiration Modeling
Opportunity Reference Code: USDA-FS-SRS-2025-0008

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-FS-SRS-2025-0008

How to Apply ***To submit your application, scroll to the bottom of this opportunity and click APPLY.***

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted.
  Click here for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations. At least one recommendation must be submitted in order for the mentor to view your application.

All documents must be in English or include an official English translation.

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Application Deadline 3/14/2025 3:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis.**

USDA Forest Service Office/Lab and Location: Several location options are available within U.S. Department of Agriculture (USDA) Forest Service's (FS) Southern Research Station (SRS) offices. These include the Forest Inventory and Analysis (FIA) in Knoxville, TN and/or the Coweeta Hydrologic Laboratory in Otto, NC. **Remote participation may be negotiable, but the ORISE fellow will be expected to make periodic to frequent visits to one or several of USDA-FS offices listed.**

At the heart of the USDA Forest Service's mission is their purpose. Everything they do is intended to help sustain forests and grasslands for present and future generations. Why? Because their stewardship work supports nature in sustaining life. This is the purpose that drives the agency's mission and motivates their work across the agency. It's been there from the agency's very beginning, and it still drives them. To advance the mission and serve their purpose, the USDA Forest Service balances the short and long-term needs of people and nature by: working in collaboration with communities and our partners; providing access to resources and experiences that promote economic, ecological, and social vitality; connecting people to the land and one another; and delivering world-class science, technology and land management.

Research Project: Understanding the cycling of water is fundamental to

human infrastructure, ecosystem services, and predictions of future water security. The role of forest the water cycle is via evapotranspiration– the sum of tree transpiration, canopy rainfall interception, and soil evaporation. Significant advances have been made in evapotranspiration estimation over the last decade, such as a move from traditional 'black box' watershed studies to process based endeavors. Still evapotranspiration science remains imprecise because of uncertainty related transpiration. At the individual level, transpiration is estimated using sap flow sensors. These rates can be highly variable and can be difficult to scale up from tree-level to larger and regionally relevant scales forest inventory data. This project will leverage FIA data and existing sap flux data to improve ET estimation, upscaling, and modeling. The project leverages expertise and data from university partners and multiple SRS units (FIA RWU 4801, EFETAC RWU 4854, and the Center for Forest Watershed Research RWU-4353) which includes ongoing projects on Experimental Forests (Coweeta, Santee, Hill).

The objective of this project is to leverage FIA data, local meteorological data, and existing sap flux data to improve ET estimation, upscaling, and modeling. The scope of this project may entail:

- Efforts to wrangle, compile, and synthesize data and parameters necessary to run and validate a machine learning model at the regional scale.
- Conducting research on how sap flux data scales with relevant FIA forest parameters.
- Develop, calibrate, evaluate and if feasible, make modifications to improve model performance.
- Prepare and submit at least one journal paper and present findings at the FIA Science Symposium or other scientific conference.
- Prepare and appropriately store all documents regarding input data, metadata, programming scripts, and simulation outputs.
- Prepare a model documentation manual and a final report.

Learning Objectives: The ORISE fellow will have the unique opportunity to collaborate with several USFS units, utilizing long-term and large-scale datasets in a highly interdisciplinary setting. Important learning and experience benefits include:

- Develop advanced data science skills related to database structures, wrangling, and modeling. These can include the utilization and improvement of various languages, such as SQL, R, and Python.
- Develop knowledge and skills in using the FIA database.
- Ability to focus on innovative machine learning data analysis, modeling, and high-impact scientific writing.
- Improved understanding of the importance of forest composition and tree responses to large-scale models and forecasting.
- Opportunities to collaborate closely with several scientists at SRS and partnering universities.

Mentor: The primary mentor for this opportunity is Dr. Cynthia Wright (FIA)

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(cynthia.wright@usda.gov). Opportunities exist to be co-mentored and hosted by Dr. Chris Oishi (Coweeta) (andrew.c.oishi@usda.gov), depending on the fellow's interests and career objectives. If you have questions about the nature of the research, please contact the mentors.

Anticipated Appointment Start Date: June 2025. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year but may be extended upon recommendation of USDA Forest Service and is contingent on the availability of funds.

Level of Participation: The appointment is full time.

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience. **The annual full-time stipend can range from $55,000-$72,000.** Other benefits may include allowance for health insurance and conference travel.

Citizenship Requirements: This opportunity is available to U.S. citizens and Lawful Permanent Residents (LPR) only.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and USDA Forest Service. Participants do not become employees of USDA, USDA Forest Service, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our Program Website. After reading, if you have additional questions about the application process please email ORISE.USFS.SRS@orau.org and include the reference code for this opportunity.

Qualifications

The qualified candidate should be currently pursuing or have received a bachelor's, master's or doctoral degree in the one of the relevant fields (e.g. engineering, computer science, data science, hydrology, geology, physical geography, quantitative ecology, forestry, plant ecology, biostatistics, or related field). Degree must have been received within the past five years, or anticipated to be received by 08/31/2025.

Preferred skills:

- The ability and willingness to collaborate with and learn from an interdisciplinary team of scientists.
- Strong quantitative skills and knowledge of fundamental concepts in forestry, ecology and hydrology.
- The ability to wrangle, manage, and analyze large environmental datasets from various sources using programming and/or statistical software (e.g., Python, R)

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- Established writing and presentation skills as evidenced by published research or technical reports and scientific presentations.
- Experience with GIS/spatial analyses is preferred.
- Experience with the Forest Inventory and Analysis database is preferred.

Point of Contact Justina

Eligibility Requirements

- **Citizenship:** LPR or U.S. Citizen
- **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree received within the last 60 months or anticipated to be received by 8/31/2025 12:00:00 AM.
- **Discipline(s):**
  - **Earth and Geosciences** (7 👁)
  - **Engineering** (3 👁)
  - **Environmental and Marine Sciences** (7 👁)
  - **Life Health and Medical Sciences** (11 👁)
  - **Mathematics and Statistics** (2 👁)
  - **Physics** (1 👁)