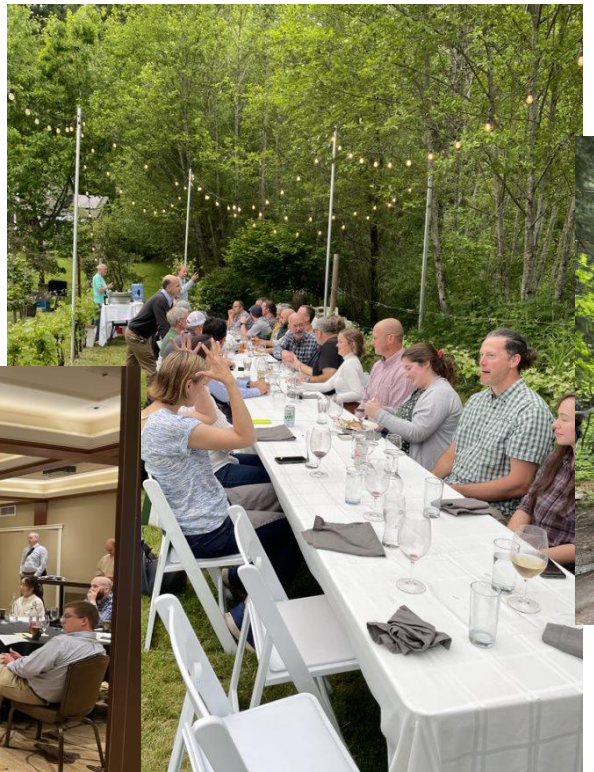
Center for Advanced Forestry Systems Lead Site Updates

Aaron Weiskittel
Director

June 2022 IAB Meeting



Productive 2-day, in-person meeting in Pacific Northwest

Meeting Agenda

Center for Advanced Forestry Systems

Semi-Annual CAFS IAB Meeting
October 25, 2022
Virtual via Zoom
https://maine.zoom.us/j/86517045856
Hosted by the University of Maine,
Center for Research on Sustainable Forests

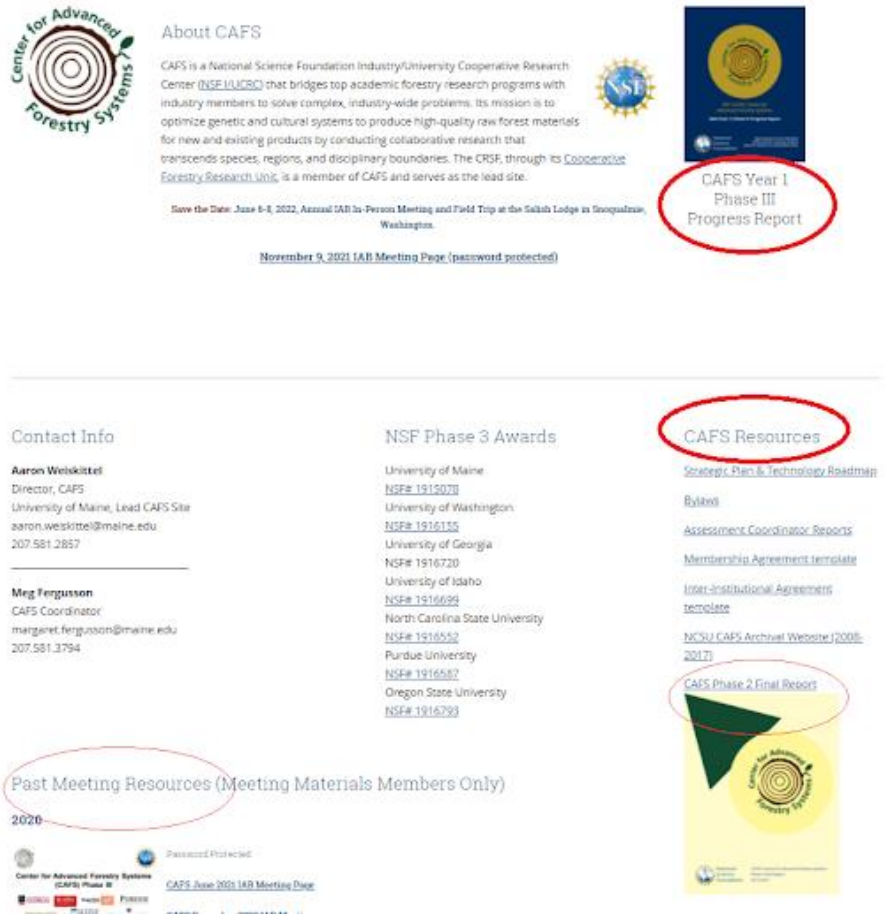
DRAFT AGENDA

2:00 PM	Welcome/Overview	Aaron Weiskittel, UM	
2:05 PM	CAFS Lead Site & Updates	Aaron Weiskittel, UM	
NEW PROJECT PROPOSALS			
2:10 PM	Online GeoSpatial Data Portal	New	Okan Pala, NCSU
2:20 PM	Loblolly pine silviculture	New	Bronson Bullock, UGA
2:30 PM	Open Discussion/Concerns/Comments	All	
PROJECT UPDATES			
2:40 PM	16.69 Stand and Tree Responses to Late Rotation Fertilization	Continuing	Kim Littke, UW
2:45 PM	19.75 Assessing & mapping regional variation in site carrying capacity across the primary forest types in the US	Continuing	Cristian Montes, UGA or Rachel Cook, NCSU
2:50 PM	19.76 Assessing & mapping regional variation in site productivity across the primary forest types in the US	Continuing	Jaslam Poolakkal, UI; Haley Anderson
2:55 PM	20.78 Intraspecific hydraulic responses of commercial tree seedlings to nursery drought conditioning	Continuing	Andrei Toca, PU
3:00 PM	20.79 Multi-regional evaluation of new machine learning algorithms for mapping tree species distribution and abundance	Continuing	Kasey Legaard, UM
3:05 PM	20.80 Using hyperspectral imaging to evaluate forest health risk	Continuing	Sylvia Park, PU
3:10 PM	20.81 Resilience of soil organic matter to harvesting: A global study of long-term soil productivity experiments	Continuing	Hatten? Gonzalez?
3:15 PM	20.82 Stand response to thinning: Enhancing response prediction through modeling	Continuing	Eric Turnblom, UW
3:20 PM	20.83 Using predictive analytics to decompose site index	Continuing	Jason Cross, UW
3:25-3:35	**BREAK**		
3:35 PM	20.84 Physiologic response to commercial fertilization programs in Pacific Northwest forest plantations	Continuing	Kim Littke, UW
3:40 PM	21.85 Variation in productivity, wood quality and soil carbon of nine conifer species across a gradient in water deficit	Continuing	Emily Von Blon, OSU
3:45 PM	21.86 Stem form of nitrogen fertilized Douglas-fir trees	Continuing	Doug Mainwaring, OSU
3:50 PM	21.87 Linking leaf area index and remote sensing across different forest types	Continuing	Andrew Trlica, NCSU
3:55 PM.	21.88 Quantifying silvicultural treatment effect on lumber quantity and quality in loblolly pine	Continuing	Joe Dahlen, UGA
4:00 PM	21.89 Quantifying carbon sequestration as a function of silvicultural treatment in loblolly pine	Continuing	Joe Dahlen, UGA
4:05 PM	21.90 Improving Forest Sample Estimation through UAS Canopy Structure Stratification	Ending	Logan Wimme , UI
4:10 PM	21.91 NCSU START	Continuing	Rachel Cook, NCSU
4:15 PM	21.92 UMaine START	Continuing	Aaron Weiskittel, UM
4:20 PM	22.93 UMaine INTERN The Effect of Common Field Merchandizing Methodologies on Estimates of Sawlog Volume	Ending	Ryan Smith, UM
4:25 PM	22.94 NCSU INTERN New Techniques in Predict Fertilizer Response in Loblolly Pine	Continuing	Rachel Cook, NCSU
4:30 PM	22.95 UIdaho INTERN Improving Tree Seedling Survival with Defense-enhancing Endophytes	Continuing	Abby Ferson, UI
4:35 PM	22.96 SUNY Monroe Community College START	New	Jon Little, MCC
4:30 PM	22.97 UIdaho INTERN Definition of Tree Dominance as Measured by Remote Sensing	New	Noel Dougherty, UI
4:40 PM	IAB/Site Breakouts	All	
4:55 PM	Reconvene/June 2023 IAB/Final Comments	All	
5:00 PM	Adjourn		

3-5 minute project updates followed by IAB/Site Director Breakouts

CAFS Website

- Resources
  - Strategic Plan & Technology Roadmap
  - Bylaws
  - Assessment Coordinator Reports
- Past/Current meeting materials
  - PW = “CAFS3”



https://crsf.umaine.edu/forest-research/cafs/

Revised Center Bylaws

Center for Advanced Forestry Systems Bylaws

Approved: Dec 7, 2021

ARTICLE I – Introduction

The following operating procedures will be used to govern the Center for Advanced Forestry Systems (CAFS), a National Science Foundation (NSF) Industry & University Cooperative Research Center (IUCRC). Currently, CAFS comprises the following affiliated universities/sites: (1) University of Maine (lead institution); (2) University of Georgia; (3) University of Idaho; (4) Oregon State University; (5) Purdue University; (6) University of Washington; and (7) North Carolina State University. Current industry members and their annual contributions by university site are provided in Appendix A – Current CAFS Membership List by Site. Additional universities and members may join CAFS as specified below. Note that IUCRC Membership Agreement has precedence over the Center Bylaws and Memorandum of Understanding (MOU). The terms of these Bylaws shall be subject to the terms set forth in solicitation NSF 17-516.

ARTICLE II – Purpose

The mission of CAFS is to optimize genetic and cultural systems to produce high-quality raw forest materials for new and existing products by conducting collaborative research that transcends species, regions, and disciplinary boundaries. CAFS is a multi-university center that works to solve problems through multi-faceted approaches and questions on multiple scales, including molecular, cellular, and individual tree-, stand-, and ecosystem-levels.

Research focal areas include, but are not limited to: biological sciences (biotechnology, genomics, ecology, physiology, and soils), management (silviculture, planning, and optimization), and data analysis/synthesis (bioinformatics, modeling, remote sensing, and spatial analysis). Specific objectives of CAFS are:

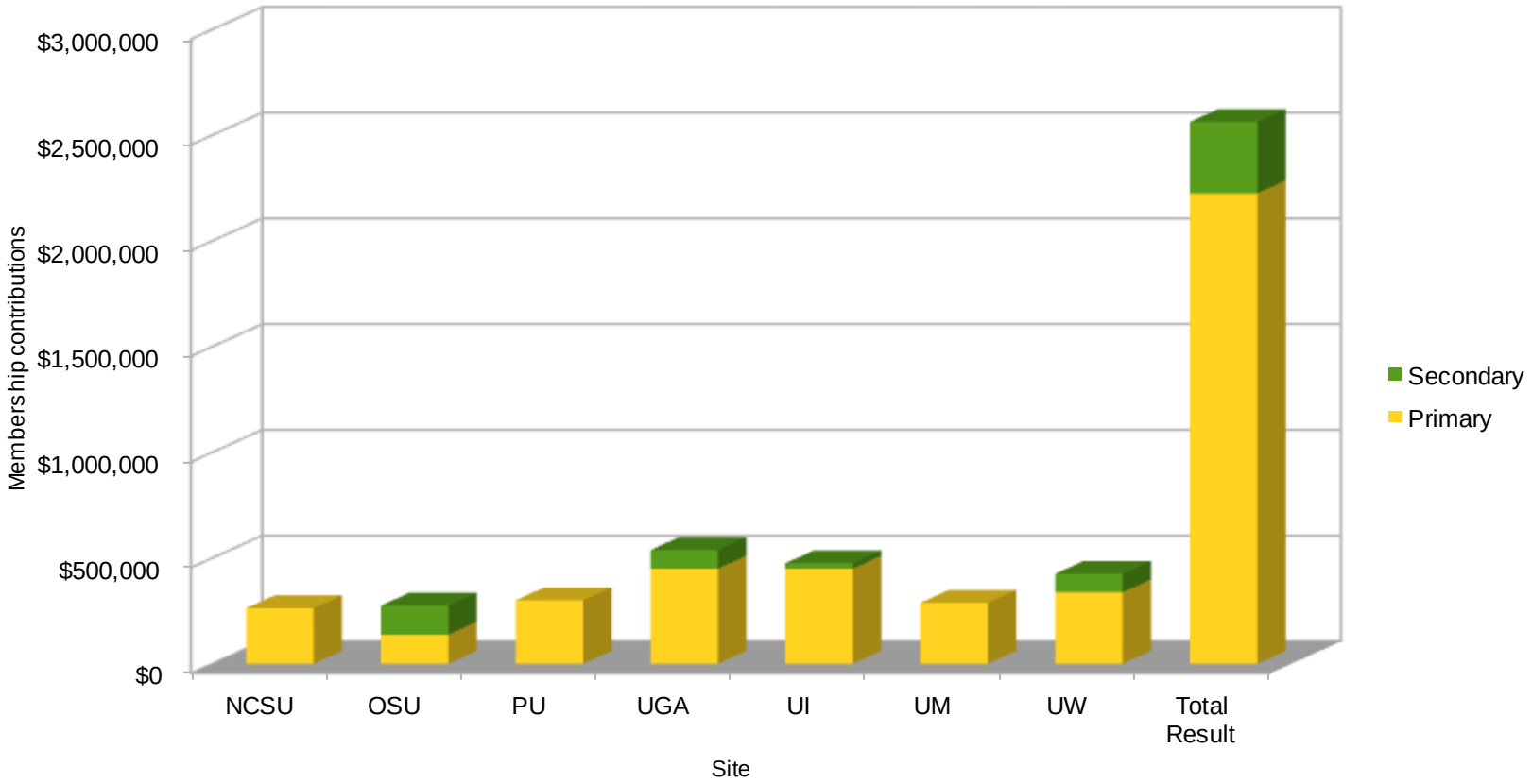
1. Serve as a national organization for R&D relevant to the forest industry;
2. Coordinate and perform national research activities across multiple sites that align with the prioritized needs of forest industry;
3. Document and communicate key research outcomes to relevant stakeholders;
4. Provide a long-term strategic vision for forest industry research needs;
5. Convene leading scientists from academia and industry who are prepared to address new/unforeseen challenges to the forest industry, such as changing markets; and
6. Create national networking opportunities for universities and forest industry.

ARTICLE III – Organization

CAFS consists of a Center Director, Site Directors, Project Scientists (individuals with a CAFS-approved research project), IUCRC Academic Leadership Team (CAFS Director and each Site Director), Industry Advisory Board (IAB; composed of

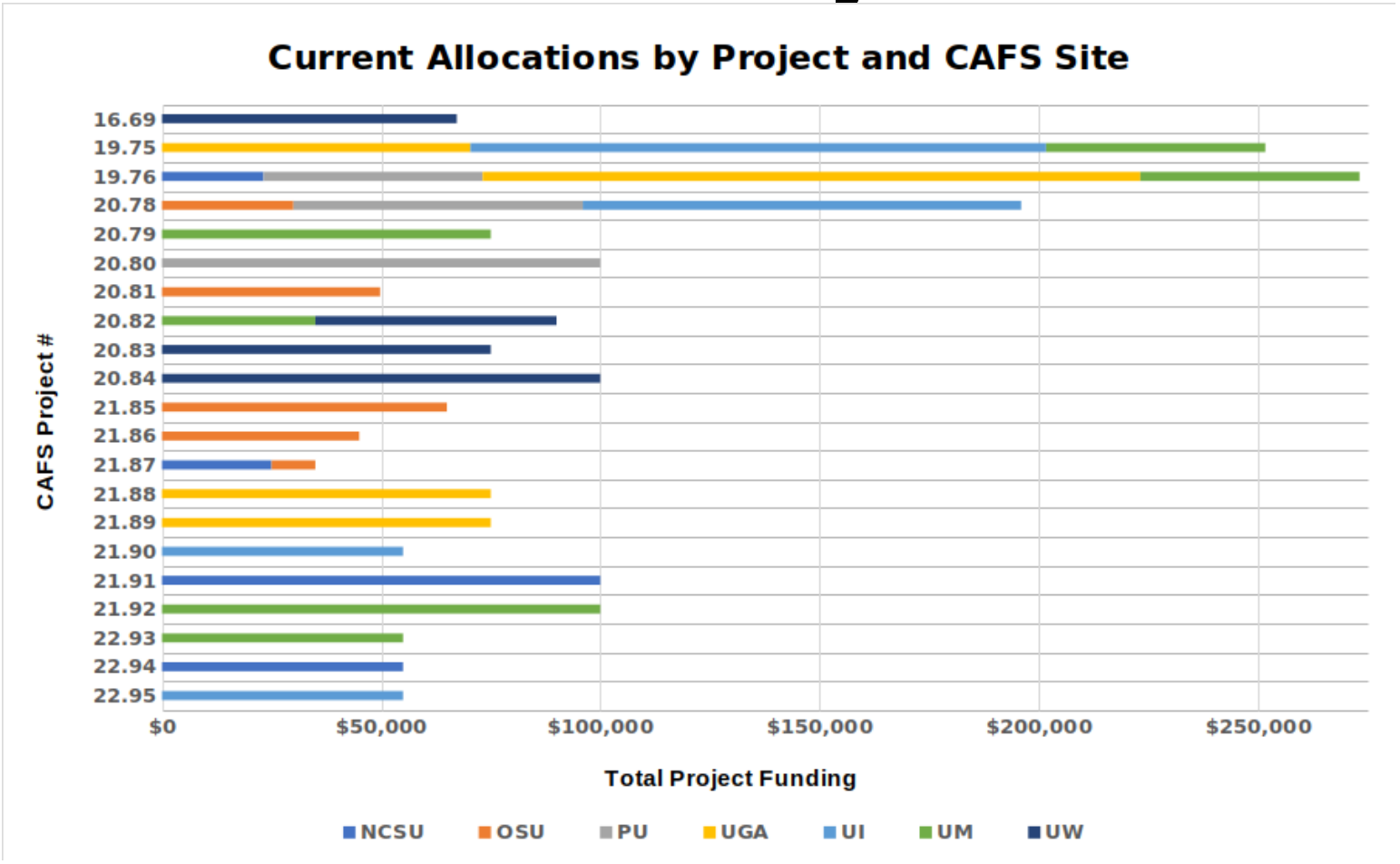
Membership Type	Membership Fee	Vote	IP Property Access
Full	$25,000/yr	10 votes per membership	Yes
Associate	$12,500/yr	5 votes per membership	Upon Approval
Observer	In-kind (<$10,000k)	0	No

Center Funding



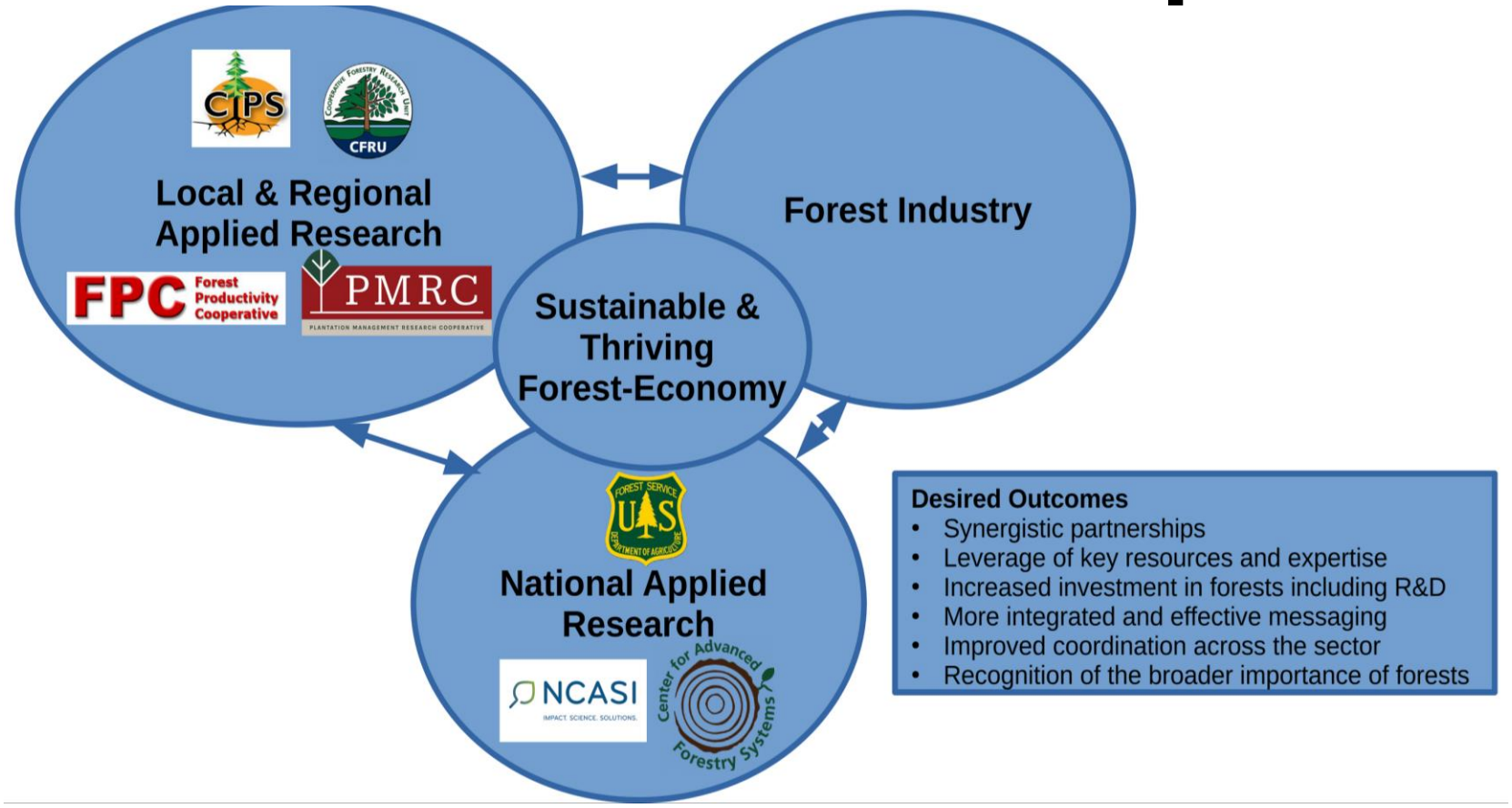
Funding and membership remains stable

Center Projects



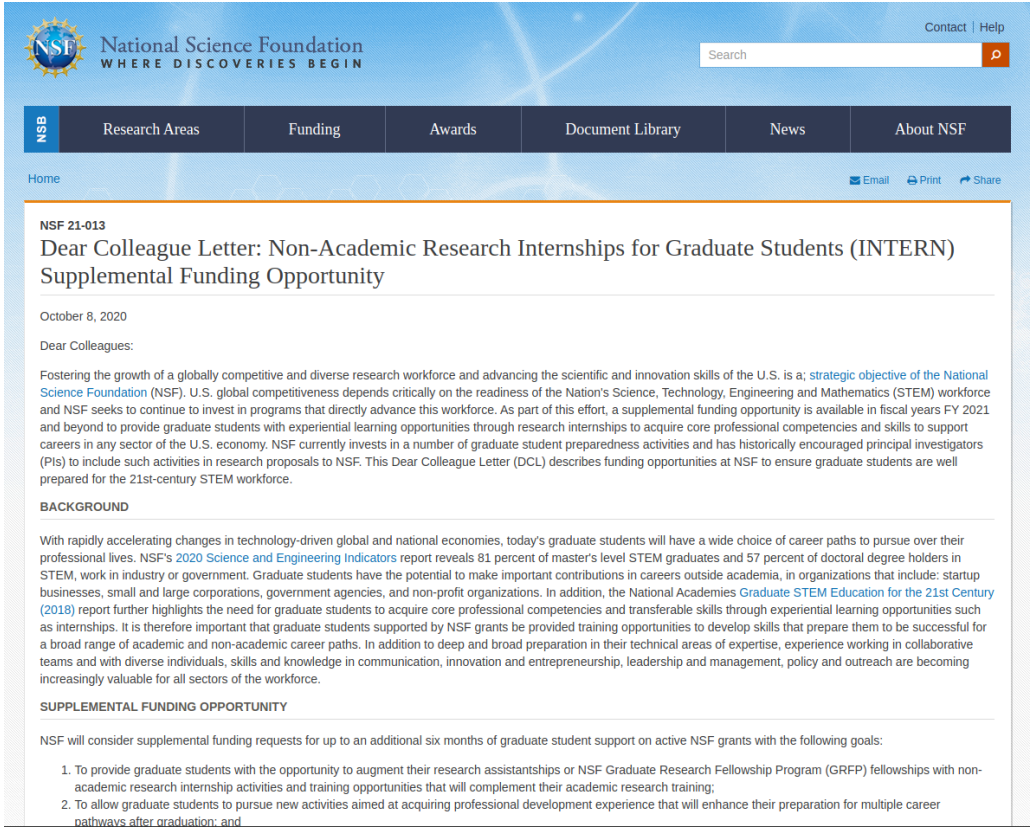
Research projects are primary center expenditure

NCASI Partnership



28% of CAFS members are also NCASI members

NSF Supplemental Opportunities



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NSF 21-013

Dear Colleague Letter: Non-Academic Research Internships for Graduate Students (INTERN) Supplemental Funding Opportunity

October 8, 2020

Dear Colleagues:

Fostering the growth of a globally competitive and diverse research workforce and advancing the scientific and innovation skills of the U.S. is a; strategic objective of the National Science Foundation (NSF). U.S. global competitiveness depends critically on the readiness of the Nation's Science, Technology, Engineering and Mathematics (STEM) workforce and NSF seeks to continue to invest in programs that directly advance this workforce. As part of this effort, a supplemental funding opportunity is available in fiscal years FY 2021 and beyond to provide graduate students with experiential learning opportunities through research internships to acquire core professional competencies and skills to support careers in any sector of the U.S. economy. NSF currently invests in a number of graduate student preparedness activities and has historically encouraged principal investigators (PIs) to include such activities in research proposals to NSF. This Dear Colleague Letter (DCL) describes funding opportunities at NSF to ensure graduate students are well prepared for the 21st-century STEM workforce.

BACKGROUND

With rapidly accelerating changes in technology-driven global and national economies, today's graduate students will have a wide choice of career paths to pursue over their professional lives. NSF's 2020 Science and Engineering Indicators report reveals 81 percent of master's level STEM graduates and 57 percent of doctoral degree holders in STEM, work in industry or government. Graduate students have the potential to make important contributions in careers outside academia, in organizations that include: startup businesses, small and large corporations, government agencies, and non-profit organizations. In addition, the National Academies Graduate STEM Education for the 21st Century (2018) report further highlights the need for graduate students to acquire core professional competencies and transferable skills through experiential learning opportunities such as internships. It is therefore important that graduate students supported by NSF grants be provided training opportunities to develop skills that prepare them to be successful for a broad range of academic and non-academic career paths. In addition to deep and broad preparation in their technical areas of expertise, experience working in collaborative teams and with diverse individuals, skills and knowledge in communication, innovation and entrepreneurship, leadership and management, policy and outreach are becoming increasingly valuable for all sectors of the workforce.

SUPPLEMENTAL FUNDING OPPORTUNITY

NSF will consider supplemental funding requests for up to an additional six months of graduate student support on active NSF grants with the following goals:

1. To provide graduate students with the opportunity to augment their research assistantships or NSF Graduate Research Fellowship Program (GRFP) fellowships with non-academic research internship activities and training opportunities that will complement their academic research training;
2. To allow graduate students to pursue new activities aimed at acquiring professional development experience that will enhance their preparation for multiple career pathways after graduation; and

INTERN DCL-NSF-21-013

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NSF 21-121

Dear Colleague Letter: Opportunity for Active EFRI, ERC and IUCRC Awardees to Apply for Supplemental Funding through the Research Experience and Mentoring (REM) Program

September 24, 2021

Dear Colleagues:

The National Science Foundation Directorate for Engineering (NSF/ENG) continually seeks to advance scientific progress in research and innovation while broadening participation of underrepresented groups in science, technology, engineering, and mathematics (STEM) fields. This Dear Colleague Letter (DCL) seeks to inform the community about an opportunity to pursue both goals through supplements from the Research Experience and Mentoring (REM) Program to active Emerging Frontiers in Research and Innovation (EFRI) research awards, active Engineering Research Center (ERC) awards, and active Industry-University Cooperative Research Center (IUCRC) awards.

Active EFRI, ERC, and IUCRC awardees may apply for supplemental funding from the REM program via FastLane. REM funding will support costs associated with bringing high school students, STEM teachers, undergraduate STEM students, faculty, and veterans to be engaged as Research Participants (RPs) in a research environment. RPs are expected to participate in mentoring and research activities aligned with the EFRI-, ERC-, and IUCRC-supported research goals over the summer. REM supplement recipients are encouraged to extend structured mentoring into the academic year.

INTRODUCTION

NSF encourages EFRI-, ERC-, and IUCRC-supported researchers to create carefully mentored research opportunities for high school students, STEM teachers, undergraduate STEM students, faculty, and veterans RPs who may not otherwise become engaged in a research project, and to utilize the contributions and talents of these participants to make further progress toward research goals. The experience should be mutually beneficial, as research experiences and mentorship have been positively correlated with STEM success. For example:

- Receiving effective mentorship in STEM has been shown to be impactful for all learners and can often strengthen persistence in STEM [1, 2, 3].
- Co-curricular activities which provide both authentic disciplinary experiences and mentoring support influence retention and engagement in STEM [4, 5, 6, 7].
- Mentoring and training reinforce and strengthen the persistence of underrepresented students in STEM courses and majors [5, 6, 8, 9].
- Offering mentoring and experiential opportunities is valuable for engaging K-12 students and teachers [6, 10, 11].

REM DCL-NSF-21-121

Phase III Research Roadmap

	2019	2020	2021	2022	2023	Outcomes
Theme 1: Forest Modeling & Decision-Support Tools **Primary IAB Partners: American Forest Management, Green Diamond, and Campbell Global**						Provide IAB members with improved tools that allow better and more precise forest management and planning
Project 1: Assessing and mapping regional variation in potential site productivity Lead Partners: NCSU, UI, UGA, UW, PU	■	■	■			Better understand how potential site productivity differs across the key forest regions in the US, the most influential factors, and produce high-resolution maps for IAB members to aid planning
Project 2: Assessing and mapping regional variation in site carrying capacity Lead Partners: UI, UM, OSU, VT, UGA, UW	■	■	■			Derive consistent estimates of maximum stand density index, evaluate most influential factors, and provide high-resolution maps to aid management
Project 3: Evaluation and refinement of regional GY models Partners: UM, VT, UGA, OSU, PU			■	■	■	Using the outcomes from Projects 1 and 2, evaluate regional growth and yield behavior and refine as possible
Theme 2: Effective Use of Remote Sensing Technologies **Primary IAB Partners: JD Irving, Rayonier, and Weyerhaeuser**						Evaluate and leverage emerging remote sensing technologies to improve planning
Project 4: Mapping species composition and past disturbance using optical sensors Partners: UI, UM, UGA	■	■	■			Optimal sensors like Landsat and Sentinnel-2 offer the ability to annual map species composition and past disturbance, but have yet to be tests across the US
Project 5: Improving efficiency and accuracy of Enhanced Forest Inventories derived from LiDAR Partners: UW, OSU, UGA, UM	■	■	■	■	■	LiDAR is becoming increasingly used to produce Enhanced Forest Inventories, but uncertainties on ground data, necessary metrics, and modeling method remain.
Project 6: Using hyperspectral imaging to evaluate forest health risk Partners: VT, NCSU, OSU, UM			■	■	■	Forest health risks are extensive and difficult to detect. Hyperspectral imaging from terrestrial and/or airborne sensors can help detection and quantification

Phase III Research Roadmap

	2019	2020	2021	2022	2023	Outcomes
Theme 3: Improved Silvicultural Practices **Primary IAB Partners: Hancock Forest Management, International Forest Company, and Molpus Timberlands**						Forest managers have a variety of silvicultural regimes to select from, but it is often unclear on selecting the best practices for each site
Project 7: Quantifying long-term gains using advanced genetics Lead Partners: PU, UGA, OSU, NCSU	■	■	■			Tree genetics has seen significant advances in recent years due to better breeding practices and cloning, but a synthesis of the long-term potential effects of these practices across multiple species has yet to be presented
Project 8: Modeling forest response to early stand treatments Lead Partners: UW, UI, NCSU, VT	■	■	■			Vegetation management is critical to successful rotations, but its prediction is complicated by a variety of factors such as the type and extent of competing vegetation. Leveraging long-term datasets, the outcomes of contrasting treatments would be assessed and modeled.
Project 9: Identifying type and level of response to forest fertilization Lead Partners: UW, UI, NCSU, PU			■	■	■	Forest fertilization is a widely used silvicultural practice that is difficult to predict. Using long-term and newly available data, methods to improve predictions of forest responsiveness would be evaluated.
Project-wide activities informed by Research Plan	• **Incorporation of advanced and emerging technologies** • **Delivery of multi-platform, decision-support tools** • **Harmonization, and synthesis of available regional datasets to generalize trends** • **Multi-disciplinary, knowledge to action, and stakeholder-drive framework**					

IAB meetings, evaluation, undergraduate education, publications, attendance at national meetings, securing of additional research support

CAFS June 2023 IAB Meeting

- Louisville, KY likely destination

- Week of June 19 or 26
- In-person meeting and field tour

- In conjunction with NCASI BWG meeting

CAFS NSF OIG Audit

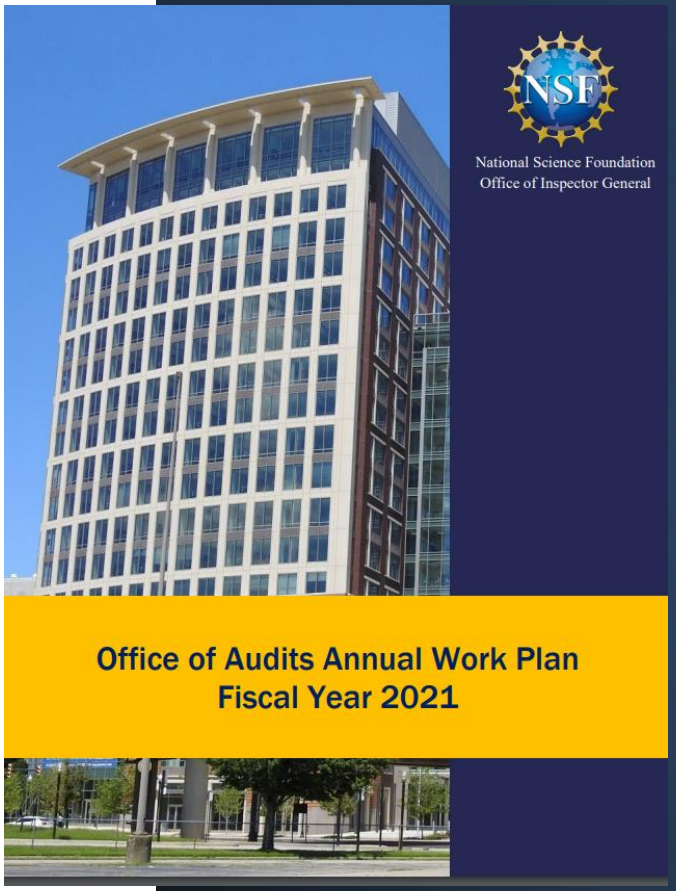
- IUCRCs identified as an audit "priority" in FY22-23

- CAFS and one other IUCRC selected
- Size and long history

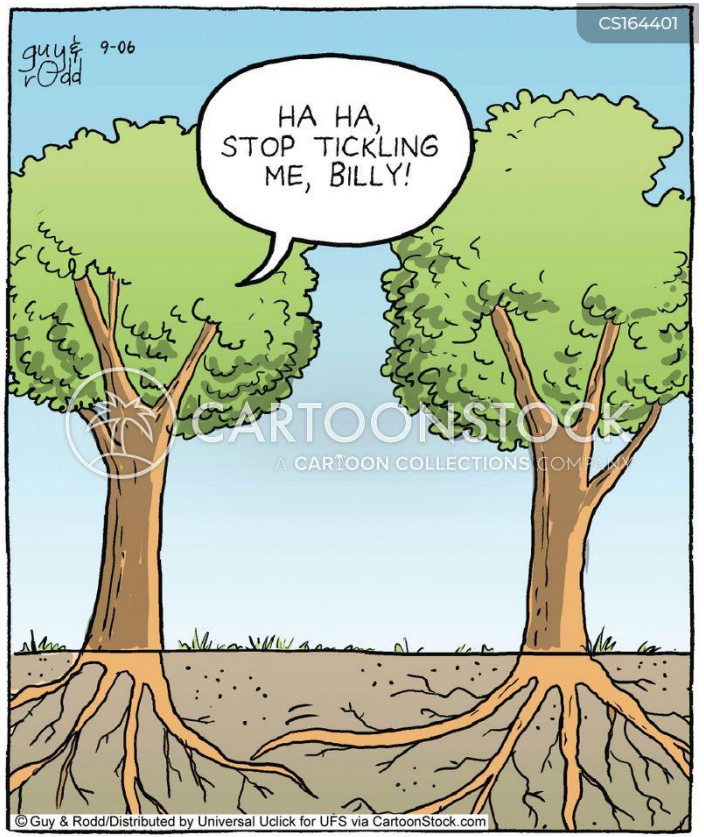
UM and NCSU selected for intensive audits

Audits should be completed by spring 2023

UM receives same funding as all other sites



Questions/Comments?



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