

Audit of Industry-University Cooperative Research Center: Center for Advanced Forestry Systems – North Carolina State University





At a Glance

Audit of Industry-University Cooperative Research Center: Center for Advanced Forestry Systems – North Carolina State University
OIG 24-1-014 | September 30, 2024

WHY WE DID THIS AUDIT

NSF created the Industry-University Cooperative Research Center (IUCRC) program in 1973 to foster long-term partnerships among academia, industry, and government. The IUCRC program provides a structure for academic researchers to conduct fundamental, pre-competitive research of shared interest to industry and government organizations. The Center for Advanced Forestry Systems (CAFS) is one of NSF's more than 80 active IUCRCs. CAFS addresses challenges facing the wood products industry, landowners, and managers of the nation's forestland.

We conducted an audit of NSF's CAFS awards to North Carolina State University (NC State) to determine if NC State mitigated potential conflicts of interest; properly managed and accounted for program income; and claimed costs that were allowable, allocable, reasonable, and in conformity with NSF award terms and conditions and applicable federal requirements.

WHAT WE FOUND

NC State's policy on conflicts of interest met award requirements and NC State followed that policy for the CAFS awards. NC State's expenditures of NSF award funds were allowable, allocable, and reasonable. However, NC State did not fully comply with CAFS award terms and conditions. Specifically, NC State did not always (1) execute membership agreements with its CAFS industry members; 2) properly track receipt of CAFS membership dues and expenditures; or (3) report its CAFS program income and expenditures to NSF, as required.

WHAT WE RECOMMEND

We made two recommendations for NSF to direct NC State to strengthen controls to ensure compliance with IUCRC award requirements.

AUDITEE RESPONSE

NC State agreed with the recommendations. We included NC State's response to this report, in its entirety, in Appendix C.

CONTACT US

For congressional, media, and general inquiries, email OIGPublicAffairs@nsf.gov.



U.S. NATIONAL SCIENCE FOUNDATION
Office of Inspector General

MEMORANDUM

TO: Quadira Dantro
Director
Division of Institution and Award Support
U.S. National Science Foundation

Jamie French
Director
Division of Grants and Agreements
U.S. National Science Foundation

FROM: Theresa S. Hull [REDACTED]
Assistant Inspector General
Office of Audits, Inspections, and Evaluations

SUBJECT: Final Report No. 24-1-014, *Audit of Industry-University Cooperative Research Center: Center for Advanced Forestry Systems – North Carolina State University*

Attached is the final report on the subject audit. We have included North Carolina State University's response to the draft report as an appendix.

Please coordinate with our office during the 6-month resolution period, as specified by OMB Circular A-50, to develop a mutually agreeable resolution of the audit findings. The recommendation should not be closed until NSF determines that the recommendation has been adequately addressed and the proposed corrective actions have been satisfactorily implemented.

We appreciate the courtesies and assistance NSF staff provided during the audit. If you have any questions, please contact Philip Emswiler, Audit Manager, at 703-292-7100 or OIGPublicAffairs@nsf.gov.

CC: Christina Sarris, Behrooz Shirazi, Prakash Balan, Rochelle Ray, Charlotte Grant-Cobb, Darío Gil, Victor McCrary, Wanda Ward, Scott Stanley, John Veysey, Ann Bushmiller, Micah Cheatham, Karen Marrongelle, Janis Coughlin-Piester, Judy Hayden, Alex Wynnnyk

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Abbreviations

CAFS	Center for Advanced Forestry Systems
COI	Conflict of Interest
FPC	Forest Productivity Cooperative
IAB	Industry Advisory Board
IUCRC	Industry-University Cooperative Research Center
NC State	North Carolina State University
PAPPG	Proposal & Award Policies and Procedures Guide
RTC	Research Terms and Conditions

Background

The National Science Foundation is an independent federal agency created by Congress in 1950 “[t]o promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes” (Pub. L. No. 81-507). With a budget of about \$9.06 billion (FY 2024), NSF is the funding source for about 25 percent of all federally supported basic research conducted at America’s colleges and universities. In FY 2023, NSF directly supported about 353,000 researchers, postdoctoral fellows, trainees, educators, and students.

Industry-University Cooperative Research Center (IUCRC) Program

NSF created the Industry-University Cooperative Research Center (IUCRC) program in 1973 to foster long-term partnerships among industry, academia, and government. These partnerships support research programs of mutual interest, contribute to the nation’s research infrastructure base, promote workforce development, and facilitate technology transfer. In its fiscal year 2025 budget request to Congress, NSF proposed \$22.66 million to fund the IUCRC program.

The IUCRC program provides a structure for academic researchers to conduct fundamental, pre-competitive research of shared interest to industry and government organizations. Universities identify a research topic of interest to industry and apply for support from NSF. If approved, the university uses NSF funds to plan and operate the IUCRC, or Center, or to join an existing Center. Industry members, such as large and small businesses, startups, non-profit organizations, and government agencies, pay membership fees to support the Center’s research costs and activities. NSF provides funding for administrative costs and a governance framework to manage membership, operations, and evaluation.

New IUCRCs typically start with a planning award and proceed to a Phase I award that lasts 5 years. At the time of the awards under audit, IUCRC awardees could request support for two subsequent 5-year awards (Phase II and Phase III).¹ IUCRCs are expected to grow and be independently sustainable by the end of NSF support.

According to the IUCRC Program Solicitation,² membership fees received by the center are considered program income. Awardees must use at least 90 percent of the IUCRC program income to support direct costs of the research and may use up to 10 percent to support

¹ NSF 20-570, *Industry-University Cooperative Research Centers Program (IUCRC) Program Solicitation*, dated May 7, 2020, moved IUCRC to a two-phase model and replaced NSF 17-516, dated November 7, 2016.

² NSF 17-516, dated November 7, 2016. The program solicitation specifies additional award conditions and reporting requirements and is incorporated by reference into the award.

indirect costs.³ Each center has an Industry Advisory Board (IAB), composed of representatives of the center's members, which recommends research projects to fund using member fees.

IUCRC awardees must provide annual reports to NSF that include an annual certification of membership fees collected and their sources, which are credited to each awardee as evidence of meeting their awards' terms and conditions. Additionally, all NSF awardees are required to annually submit a Program Income Reporting Worksheet to NSF that either reports program income earned and expended for the institution's grants or validates that the institution did not earn and expend program income during the year.

Center for Advanced Forestry Systems Awards to NC State

The Center for Advanced Forestry Systems (CAFS) is one of NSF's more than 80 active IUCRCs. Launched in 2007, CAFS addresses challenges facing the wood products industry, landowners, and managers of the nation's forestland. In addition to CAFS, North Carolina State University (NC State) has five other IUCRC awards.

We reviewed NC State's Phase II CAFS award, which began in 2012 and ended in 2019, and its Phase III CAFS award, which began in 2019 and was active at the time of our audit. According to NC State's CAFS Phase III proposal, forest science research has taken place over the past 50 years in university-based, industry-supported cooperative research programs. The cooperative at NC State, established in 1969, is called the Forest Productivity Cooperative (FPC). CAFS provides the structure and resources for scientific collaboration among the regional forestry cooperatives.

At NC State, the Office of Contracts and Grants is responsible for all matters related to post-award financial for contracts, grants, cooperative agreements and other award mechanisms that fund research and other sponsored activity performed by NC State faculty.

Audit Objective

The objectives of this audit were to determine if NC State mitigated potential conflicts of interest; properly managed and accounted for program income; and claimed costs that were allowable, allocable, reasonable, and in conformity with NSF award terms and conditions and applicable federal requirements. See Appendix C for more information about our objectives, scope, and methodology.

³ Per 2 CFR Pt. 200.1, "Indirect (facilities & administrative (F&A)) costs means those costs incurred for a common or joint purpose benefitting more than one cost objective, and not readily assignable to the cost objectives specifically benefitted, without effort disproportionate to the results achieved"

Results of Audit

NC State's policy on conflicts of interest met award requirements and NC State followed that policy for the CAFS awards. NC State's sampled expenditures of NSF award funds were allowable, allocable, and reasonable. However, NC State did not fully comply with CAFS award terms and conditions. Specifically, NC State did not always (1) execute membership agreements with its CAFS industry members; 2) properly track receipt of CAFS membership dues and expenditures; or (3) report its CAFS program income and expenditures to NSF, as required.

NC State Complied with Conflict of Interest Requirements

Chapter IX.A of NSF's *Proposal & Award Policies & Procedures Guide* (PAPPG),⁴ which is incorporated by reference into NC State's CAFS awards, requires each grantee organization employing more than 50 persons to maintain an appropriate written and enforced policy on conflict of interest (COI) and that the organization manage, reduce, or eliminate any conflicts of interest prior to the expenditure of award funds. Among other things, the organizational policy should require that each investigator disclose all significant financial interests that would be affected by the research or activities funded or proposed for funding by NSF.

NC State's COI policy covered all NSF requirements and required investigators to disclose significant financial interest annually and at the time of the submission of the research proposal. We tested NC State's compliance with its COI policy and found applicable staff submitted the required certifications. There were no conflicts disclosed, so no mitigation was required.

NC State's Award Costs Claimed in Our Sample Were Allowable, Allocable, and Reasonable

Based on our sample, NC State's award costs claimed were allowable, allocable, reasonable. Award costs claimed refer to expenditures that NC State filed with NSF for cost reimbursement on payment requests.

We selected two NSF awards (Award numbers 1238324 and 1916552), totaling \$1,438,508 in costs claimed by NC State as of November 7, 2022, for testing. From these awards, we judgmentally selected a total of 15 transactions, totaling \$37,816, and evaluated supporting documentation to determine if NC State spent NSF award funds on allowable, allocable,

⁴ The PAPPG, in conjunction with the applicable standard award conditions incorporated by reference in the award, serve as NSF's implementation of 2 CFR Part 200, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards*.

reasonable costs. Transactions we tested included the largest air travel expense reported by NC State, the second and third largest hotel charges, and payroll expenditures. NC State provided receipts from vendors, travel authorizations, and effort certifications supporting the expenditures and their allocability to the CAFS awards.

NC State Did Not Fully Comply with CAFS Award Terms and Conditions

Although NC State claimed award costs were allowable, reasonable, and allocable, NC State did not fully comply with award terms and conditions. Specifically, NC State did not obtain signed membership agreements in Phase II; properly track membership dues and expenditures; or report its CAFS program income and expenditures to NSF, as required.

NC State Did Not Provide Signed Membership Agreements in Phase II

NSF IUCRC solicitations, which NSF incorporated by reference into the award terms and conditions, require universities to annually certify their IUCRC membership to NSF and affirm that they obtained signed membership agreements from each industry member. Each IUCRC site must submit a "Certification of Membership" form (certification) signed by an authorized university official, which attests that the IUCRC site met the minimum requirements for dues and members.⁵ The certification also details the receipts of annual cash and in-kind membership fees or commitments from its industry members.

We found NC State did not obtain signed membership agreements between 2012 and 2016. Membership agreements are important because they provide evidence of the member's commitment to join the IUCRC and support the center through membership dues in a specific dollar amount. The payment of dues also entitles members to voting rights in determining the projects the center will fund.

NC State began obtaining CAFS membership agreements in 2016. However, in 2017, more than half of the members listed on the annual certification did not have executed agreements. In Phase III, NC State executed membership agreements for all seven industry members it certified on its Phase III certifications.

⁵ The requirements were a minimum of \$175,000 total annual membership fees, including in-kind contributions if approved by the Industrial Advisory Board (IAB) and three full members in Phase II and \$250,000 in-cash total annual membership fees and five distinct full members in Phase III for NC State, respectively.

NC State Did Not Properly Track CAFS Membership Dues

In Phase II and the first year of Phase III,⁶ NC State did not have a separate account for CAFS membership dues. Instead, it deposited the dues in an existing account of the FPC, which is a separate cooperative. (CAFS members could also be members of the FPC.) The FPC account did not contain specific accounting codes to allocate income and expenditures to CAFS research projects or administration of the projects.

According to 2 CFR 200.302(b)(3), as implemented by the Research Terms and Conditions, the financial management system of a non-federal entity must provide for records that adequately identify the source (including income) and application of funds for federally-funded activities.⁷ Because IUCRC membership dues meet the definition of program income, NC State should have tracked them separately from FPC dues.

Separate from NSF award funds, NC State certified it received over \$1.2 million in CAFS member dues in Phase II.⁸ We tested a judgmental sample of 14 expenditures from NC State's FPC account in Phase II. NC State provided documentation that 3 of the 14 transactions supported CAFS IAB recommended projects or administration of those projects. Some of the remaining 11 expenditures in our sample, such as soil sample processing or fertilization, did not contain sufficient detail to determine whether the purchase was for a CAFS project, FPC project, or both. Others were FPC expenses, such as travel for the FPC's annual meeting or upkeep of FPC's web domain.

NC State could not consistently distinguish which income and expenditures were for CAFS and which were for FPC, as required. Additionally, NC State did not maintain support that the expenditures of income it paid from the FPC account were for costs allocable to CAFS nor that it complied with IUCRC award terms and conditions to limit indirect costs to 10 percent of program income expenses.

NC State's Accounting of CAFS Membership Dues and Expenditures Improved in Phase III

In 2021 (Year 2 of Phase III), NC State began using a new account exclusively for CAFS, which allows it to track receipt and expenditure of CAFS membership dues separately from the FPC.

⁶ NC State stated it "did not accept the Phase III award until the second year of the award." OIG agrees NC State did not draw down any NSF award funds until 2021. However, NC State certified to NSF it began collecting Phase III membership dues starting in 2020 and did not have separate accounting until the next year to track the receipt and expenditure of these funds.

⁷ Per 2 CFR 200.1, program income is "gross income earned by the non-Federal entity that is directly generated by a supported activity or earned as a result of the Federal award during the period of performance"

⁸ In this section, we tested member dues, which universities receive from industry members who join an IUCRC. This money is separate from award funds received from NSF.

We reconciled the amount of CAFS member dues in this new account with the amount NC State reported on its membership certification for the second year of Phase III.

We also tested expenditures selected from NC State's new CAFS account. NC State provided a copy of transaction details totaling \$292,761. We tested a judgmental sample of 15 expenditures totaling \$155,898 from this account to determine allowability, reasonableness, and allocability to the CAFS award. We found that 13 of the 15 transactions were allowable, reasonable, and allocable to the CAFS award. NC State did not adequately support that the two remaining transactions, totaling almost \$55,000 for fertilization work and tree measurements, were allocable to CAFS. Specifically, the transaction documentation did not include enough detail to determine whether the expenditure was for a CAFS IAB-approved project, an FPC project, or both, as the documentation referenced FPC studies. When asked about these transactions, the NC State principal investigator said some of the expenditures were for a project that the IAB had not approved. However, due to our audit, the principal investigator told us that she planned to put that project up for an IAB vote.

NC State Did Not Report CAFS Program Income to NSF as Required

NSF's Research Terms & Conditions Agency Specific Requirements, which are incorporated in the award terms and conditions of both NC State's Phase II and Phase III CAFS awards, require grantees to submit annually a Program Income Reporting Worksheet to NSF⁹. The worksheet reports program income earned and expended for any of the institution's grants or certifies that the institution has no program income to report. (The worksheet is separate from the membership certification, which is specific to the IUCRC award and part of the annual report that is sent to the NSF program officer.)

NC State annually submitted Program Income Reporting Worksheets to NSF during its CAFS Phase II and III awards but did not report any program income on the CAFS awards. According to NC State, it was not aware membership dues were considered program income in Phase II.

Recommendations

We recommend that the NSF Director of the Division of Institution and Award Support:

1. Direct NC State to demonstrate to NSF that its policies, procedures, and systems applicable to IUCRC awards ensure compliance with award requirements, including timely and accurate certification and tracking of program income receipts and expenditures.
2. Direct NC State to strengthen controls to ensure it spends CAFS membership dues only on CAFS IAB-approved projects or administration.

⁹ Within NSF, the Division of Financial Management is responsible for the collection and custodianship of program income reporting worksheets.

OIG Evaluation of Auditee Response

Overall, NC State agreed with the NSF OIG findings and recommendations. As noted in our report, NC State implemented separate accounting for CAFS membership dues during its Phase III award. Although separate accounting started in 2021, as noted in our report, additional improvements are still needed to ensure NC State uses program income only for IAB-approved projects.

NC State's response stated that it did not accept the Phase III award until the second year of the award. OIG agrees NC State did not draw down any NSF award funds until 2021. However, NC State certified to NSF it began collecting Phase III membership dues starting in 2020 and did not have separate accounting until the next year to track the receipt and expenditure of these funds. Thus, we did not modify our findings.

Appendix A: Objective, Scope, and Methodology

Objectives

The objectives of this audit were to determine if NC State mitigated potential conflicts of interest; properly managed and accounted for program income; and claimed costs on awards that were allowable, allocable, reasonable, and in conformity with NSF award terms and conditions and applicable federal requirements.

Scope and Methodology

We conducted this audit between September 2022 and July 2024, in accordance with *Generally Accepted Government Auditing Standards*. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions, based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions.


To accomplish our objectives, we selected NC State's two most recent IUCRC CAFS awards for review. Specifically, we analyzed the requirements in NSF's IUCRC program solicitations, research terms and conditions (RTC), the RTC Agency-specific Requirements, 2 CFR Part 200 as implemented by the RTC and RTC Agency-specific requirements, and PAPPG applicable to the two awards. We tested compliance with these requirements, including NC State's conflict of interest policy. We interviewed the awards' principal investigator and Office of Contracts and Grants staff.

We tested judgmentally selected samples of NC State's award cost transactions to determine if costs claimed by NC State were allowable, allocable, reasonable, and in conformity with NSF award terms and conditions and applicable federal requirements. Specifically:

- NSF awarded, and NC State spent, \$1,175,190 for Phase II. We tested 12 award cost transactions, totaling \$25,850.
- NSF has awarded NC State \$601,311 for Phase III; as of March 29, 2024, NC State claimed to have expended \$476,885 of this amount. We tested 3 award cost transactions, totaling \$11,966.

We judgmentally tested samples of NC State's member dues transactions to determine if costs claimed by NC State were allowable, allocable, reasonable, and in conformity with NSF award terms and conditions and applicable federal requirements. Specifically:

- NC State certified at least \$1,273,431 in membership fees for Phase II. The Year 1 certification did not include a specific amount; thus, a full calculation could not be made. We tested 14 member dues expenditures, totaling \$8,991.
- NC State certified \$519,169 in membership fees for Phase III over the first 2 years of the grant. We tested 15 member dues expenditures, totaling \$155,898.



We obtained computer-processed data from NC State and NSF during our audit. NC State provided detailed transaction data for costs charged to the NSF awards, and we obtained NSF award data by directly accessing NSF's data systems. We assessed the reliability of the data by (1) interviewing NC State staff knowledgeable about the data, (2) reviewing information about the data and the system that produced them, and (3) performing reconciliations and testing of various data elements.

Internal Control Assessment

In assessing the allowability of NC State's costs claimed, we gained an understanding of the internal control structure applicable to the scope of this audit through interviewing NC State staff, reviewing policies and procedures, reviewing general ledger transactions and accounting system documentation, and conducting transaction testing. We assessed all five components of internal control: control environment, risk assessment, information and communication, monitoring activities, and existing control activities.

Appendix B: Definitions of Allocable, Allowable, and Reasonable Costs

Allocable Cost: According to 2 CFR § 200.405, a cost is allocable to a particular federal award or other cost objective if the goods or services involved are chargeable or assignable to that federal award or cost objective in accordance with relative benefits received. This standard is met if the cost:

- Is incurred specifically for the federal award.
- Benefits both the federal award and other work of the non-federal entity and can be distributed in proportions that may be approximated using reasonable methods.
- Is necessary to the overall operation of the non-federal entity and is assignable in part to the federal award in accordance with the principles in this subpart.

Allowable Cost: According to 2 CFR § 200.403, except where otherwise authorized by statute, costs must meet general criteria in order to be allowable under federal awards, including the following three criteria:

- Be necessary and reasonable for the performance of the federal award and be allocable thereto under these principles.
- Conform to any limitations or exclusions set forth in these principles or in the federal award as to types or amount of cost items.
- Be consistent with policies and procedures that apply uniformly to both federally-financed and other activities of the non-federal entity.

Reasonable Cost: According to 2 CFR § 200.404, a reasonable cost is a cost that, in its nature and amount, does not exceed that which would have been incurred by a prudent person under the circumstances prevailing at the time the decision to incur the cost was made.

Appendix C: Auditee Response



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29 August 2024

Theresa S. Hull
Assistant Inspector General for Audits
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VIA EMAIL

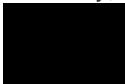
Dear Ms. Hull,

North Carolina State University is in receipt of the draft audit report of the Center for Advanced Forestry (CAFS). NC State concurs with the findings and recommendations, with the following clarifications:

- With regard to "In Phase II and the first year of Phase III, NC State did not have a separate account for CAFS membership dues", NC State did not accept the Phase III award until its second year. This was due to the uncertainty during the COVID pandemic.
- Prior to the commencement of this audit, NC State had already implemented separate accounting for membership dues as is recommended in this audit.

We thank the National Science Foundation for their continued support of CAFS and look forward to our continued partnership.

Sincerely,



Justo Torres
Director

National Defense Authorization Act

General Notification

Pursuant to Pub. L. No. 117-263 § 5274, business entities and non-governmental organizations specifically identified in this report have 30 days from the date of report publication to review this report and submit a written response to NSF OIG that clarifies or provides additional context for each instance within the report in which the business entity or non-governmental organizations is specifically identified. Responses that conform to the requirements set forth in the statute will be attached to the final, published report.

If you find your business entity or non-governmental organization was specifically identified in this report and wish to submit comments under the above-referenced statute, please send your response within 30 days of the publication date of this report to OIGPL117-263@nsf.gov, no later than November 2, 2024. We request that comments be in .pdf format, be free from any proprietary or otherwise sensitive information, and not exceed two pages. Please note, a response that does not satisfy the purpose set forth by the statute will not be attached to the final report.

About Us

NSF OIG was established in 1989, in compliance with the *Inspector General Act of 1978* (5 USC 401-24). Our mission is to provide independent oversight of NSF to improve the effectiveness, efficiency, and economy of its programs and operations and to prevent and detect fraud, waste, and abuse.

Contact Us

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