FUTURE OPPORTUNITIES FOR NSF'S CENTER FOR ADVANCED FORESTRY SYSTEMS

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National Science Foundation's **Center for Advanced Forestry Systems** (**CAFS**; https://crsf.umaine.edu/forest-research/cafs/) has been an Industry-University Collaborative Research Center (IUCRC) since 2008. CAFS is a national organization that has brought together key university and industry partners to prioritize, approve, fund, and implement research relevant to its Industry Advisory Board (IAB). CAFS currently maintains a portfolio of over 20 individual research projects spanning the US with a focus ranging from growth and yield modeling, improved silviculture, and remote sensing. Since its inception, CAFS has generated over $15M in leveraged funding from NSF, helped train graduate and undergraduate students, and created a national network of relevant organizations, which has facilitated numerous collaborative efforts.

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Currently, the CAFS program is led by the University of Maine, in partnership with Purdue University, North Carolina State University, Oregon State University, and the Universities of Georgia, Idaho, and Washington along with over 50 IAB members. CAFS has progressed through three 5-year tiered phases of support from NSF and is set to become one of the first graduated NSF IUCRC centers in 2025. Becoming a graduated center would allow CAFS to retain its identity as an NSF IUCRC, providing the potential for future NSF funding

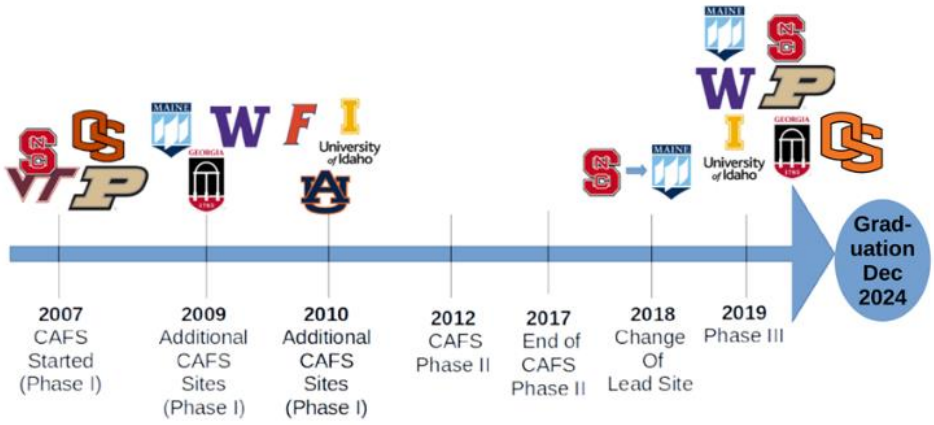

Figure 1. Timeline and evolution of CAFS over the three 5-year phases with graduation in 2024.

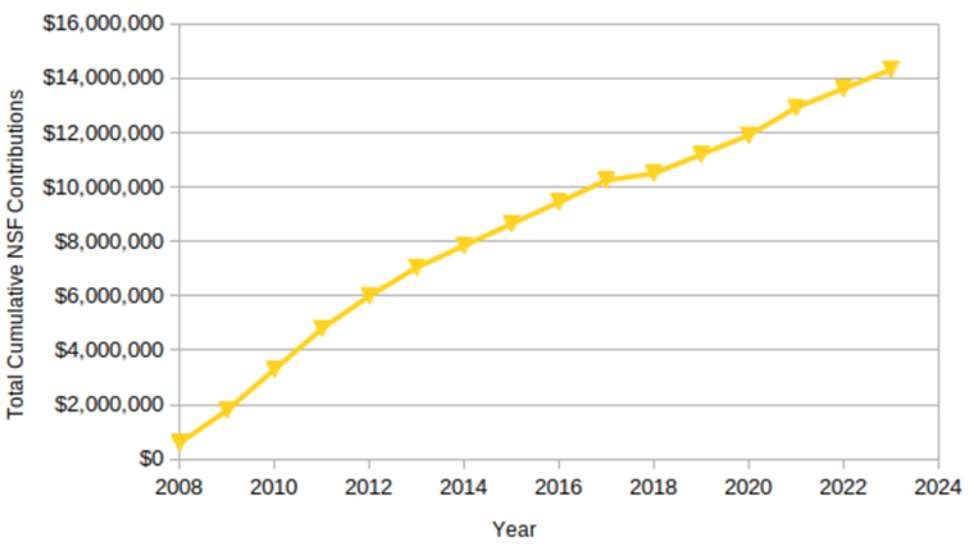

Figure 2. Total cumulative contributions for CAFS by the National Science Foundation since its inception in 2008.

opportunities. However, unlike the phases coming to an end in 2024, CAFS will no longer be supported by any direct annual funding from NSF. This means a future strategy is needed to sustain CAFS and effectively leverage this prior investment.

Under the University of Maine's leadership in Phase III, CAFS took a strategic approach to facilitating collaborative research efforts and building a recognized identity. Unlike prior phases, approved research projects in Phase III must involve at least two other sites, have national applicability, and align with CAFS's strategic plan as well as its technology roadmap. The focus of recent research projects includes emerging digital technologies like LiDAR and other remote sensing platforms. CAFS sites are now sharing data and bringing together effective collaborations that extend beyond regional boundaries; for example, by building the infrastructure and capacity to develop and better share spatial data products that will be made available to both affiliated researchers and IAB members.

Given the growing need in forests for carbon offsets and natural climate solutions along with a synergistic interest in emerging technologies, the need for a national IUCRC for the forest sector like CAFS has never been greater. However, to sustain CAFS, a new model of collaboration is necessary to replace the NSF funding and provide potential for organizational growth. To accomplish this, ***CAFS leadership has developed and implemented a multi-tier strategy to help sustain CAFS after 2024***; this strategy is outlined briefly below.

CAFS Strategy: 2024 and Beyond

The primary challenges that this strategy addresses are a mechanism to centralize center funding, facilitate and encourage

Figure 3. Total number of IAB-approved CAFS research projects and the percentage of those being multi-site collaborative efforts over time highlighting the evolution over time, particularly the start of Phase III in 2020 under the leadership of the University of Maine.

university participation, secure and significantly leverage IAB member contributions, and retain critical benefits of being an NSF IUCRC (e.g., fixed university indirect rates of 10%).

In 2020, the National Council of Air and Stream Improvement (NCASI) became an in-kind member of CAFS by providing financial and contracting support that allowed IAB members to make contributions in support of CAFS, while allowing those funds to be provided to the universities in the form of service contracts. As an in-kind member of CAFS, NCASI has been able to maintain a 10% indirect rate for these university contracts. In addition, this arrangement has expanded potential CAFS membership for both industry and universities as IAB members no longer need to be directly aligned with a specific university and universities do not have to meet certain requirements dictated by NSF. This arrangement allows CAFS the potential for growth.

To maintain involvement in CAFS and to support a portion of the administrative costs of the organization, university sites were asked to implement a MOA with NCASI and contribute $15,000 annually to them. The goal of generating approximately $100,000 in annual contributions is to partially support the NCASI Foundation Director, a CAFS Director, an administrative support person, annual meeting costs, and the maintenance of certain items such as the CAFS Spatial Data Portal, which is currently being developed by the NCSU site. Partial support could also be

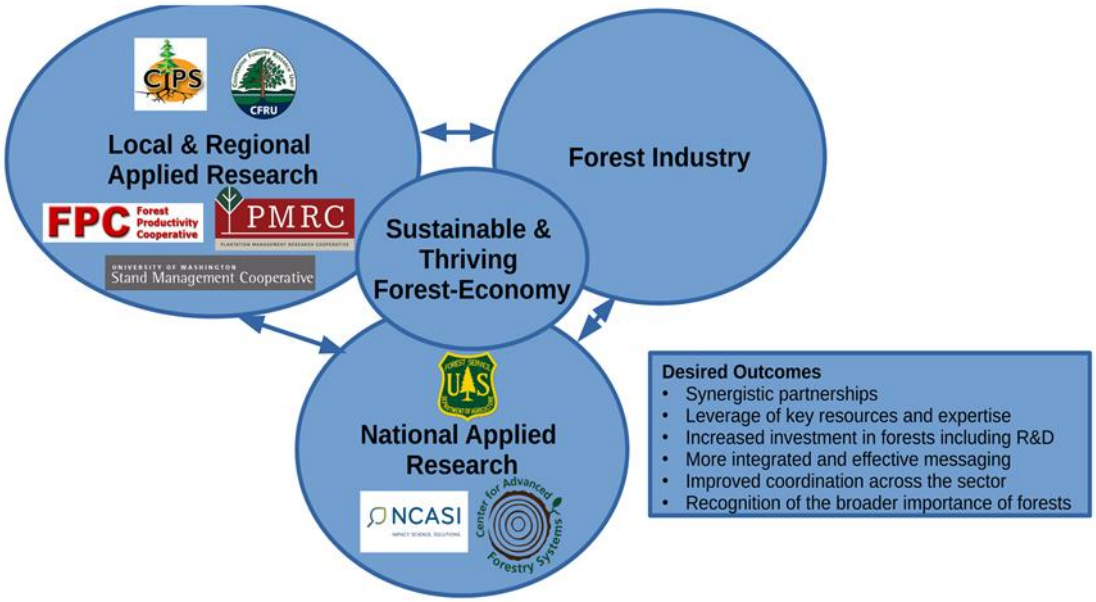

Figure 4. Potential need and role of various organizations including CAFS to support a thriving forest economy in the US.

fund key program needs such as graduate students, data analysts, or outreach specialists who could work across the regional cooperatives and support broader CAFS initiatives. As a CAFS university site, the universities and their IAB members would remain engaged with current research, have access to collaborative data or materials, be invited to attend annual meetings, and be able to secure directed funding; voting rights would be retained by paying IAB members.

To address the broad array of potential future funding opportunities, **CAFS would primarily serve as the umbrella organization tasked with developing strategic partnerships, convening a national and representative network of participants from across academia and the forest broader sector, and helping to set national research priorities** or opportunities based on IAB feedback. This means that CAFS could address and support a broad range of topics that evolve over time based on IAB needs and interests beyond the current specific focal areas. Several ongoing or emerging public-private initiatives such as the Partnership for Small Area Estimation (PSAE), the Forest Carbon Modeling Group (FCMG), digital forestry, and the future of applied forest science have the potential for CAFS to play a key role. In addition, several of these initiatives have significant federal funding that could support CAFS research activities through directed requests for proposals, for which CAFS-affiliated universities or even IAB members could apply. Ultimately, federal funding in the form of a USDA Center of Excellence or similar efforts could sustain CAFS research.

To support CAFS research and meet federal cost-share requirements, the goal will be to

keep IAB annual membership contributions modest ($5-15k/yr) and potentially tiered based on the number of employees. This methodology would encourage broader participation from a diverse set of entities, reduce competition with regional co-operatives, and maintain equity across organizations rather than traditionally highly skewed memberships with acreage-based dues. As described earlier, membership contributions would be made directly as a gift to the NCASI Foundation and be allocated based on IAB approval. Beyond the membership contribution levels, the current CAFS Bylaws will serve as the basis going forward and routinely reviewed/updated to guide administrative roles, the voting process, and other organizational procedures. This would include the policy of a capped 10% indirect rate for any future allocated CAFS funding.

In short, CAFS has demonstrated the importance and need of a national research consortium that facilitates cross-regional collaboration of universities and IAB members. The support provided by NSF over the last 15 years has helped to initiate this collaboration, construct the organizational framework to help it function effectively, and support specific research efforts that can be leveraged in the future.

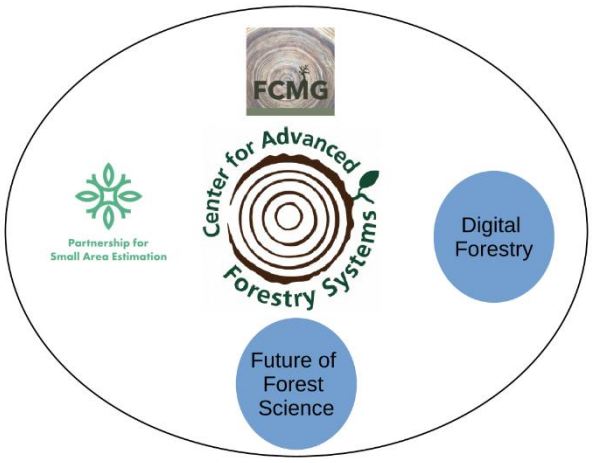

Figure 5. Potential of CAFS to serve as a national consortium that can house or facilitate a variety of current or future initiatives with relevance to the forest industry.

After December 2024, a new funding model is needed. Fortunately, opportunities exist to maintain the current organizational structure and leverage IAB membership contributions with federal funding that could propel CAFS into the future at a capacity never fully achieved under NSF.

To learn more about current research related to NSF's Center for Advanced Forestry Systems, visit the CAFS website.

Interested in learning more about the potential benefits of being part of the next phase of CAFS? Contact Aaron Weiskittel aaron.weiskittel@maine.edu