Evaluator's Report Cover Sheet
Stephen McGregor August 31, 2016

Period Covered by this report: July 2015 - August 2016

Center Name: Center for Advanced Forestry Systems (CAFS) Center Director: Barry Goldfarb

Site	Director	Award Period[1]	Funding Phase (I, II, or III)
North Carolina State University	Rachel Cook	10/1/12 - 9/30/17	II
Oregon State University	Glenn Howe	10/1/12 - 9/30/17	II
Purdue University	Michael Saunders	10/1/12 - 9/30/17	II
Virginia Tech	Thomas Fox	10/1/12 - 9/30/17	II
University of Maine	Aaron Weiskittel	4/15/14 - 3/31/19	II
University of Georgia	Michael Kane	4/15/14 - 3/31/19	II
University of Washington	Gregory Ettl	9/1/14 - 8/31/19	II
University of Idaho	Mark Coleman	8/1/15 - 7/31/20	II
Auburn University	Scott Enebak	3/1/14 - 2/28/19	I

[1] Please list the award period as it applies to each site; this information is available on the NSF website.

Significant Personnel Changes: Stephanie Jeffries, Deputy Center Director has departed

IAB Meetings	Meeting 1	Members Participating via Video/Phone Conference?	Meeting 2	Members Participating via Video/Phone Conference?
Date	April 26-28, 2016	☐	(CAFS has a 1 meeting per year exemption)	☐
Location	Pensacola Beach, FL			
Attendance: IAB/Total[2]	13 member org.s 16 representatives 54 total attendees			

[2] Please list total dues-paid members (not people) in attendance over total number of attendees.
*Please attach the Semi-Annual Meeting Best Practices Checklist as an Appendix to your Evaluator Report.

Membership Activity Table (as of July 2016)

Member/Sponsor Name	University Site NCSU - North Carolina State Univ. OSU - Oregon State University PU - Purdue University UGA - University of Georgia UI - University of Idaho UMaine - University of Maine UW - Univ. of Washington VT - Virginia Tech AU – Auburn University	Membership Fee Level (Full, Associate, etc.)	Status (New, Left, Continuing, Terminated, etc.)
Agrium (Crop Production Services - Timberland Div.)	VT	Associate	Continuing
Agropical	NCSU	Associate	Terminated
AgXplore	VT	Associate	Terminated
American Chestnut Foundation	AU	Associate	New
American Forest Management	NCSU, VT, UW	Full	Continuing
APRIL Asia	NCSU	Full	Continuing

ArborAmerica	PU	Associate	Continuing
ArborGen	NCSU, VT, UGA, AU	Full	Continuing
Arkansas Forestry Commission	AU	Associate	Continuing
Atherton Foundation	PU	Full	Continuing
Baskahegan Corporation	UMaine	Associate	Continuing
Bayer CropScience	VT	Associate	New
BBC	UMaine	Full	Continuing
Beasley Timber Management, LLC	UGA	Associate	Continuing
Boise, Inc	NCSU		Terminated
BTG Pactual (formerly RMK Timberland Fund)	NCSU	Full	Continuing
Buckeye Technologies	NCSU		Terminated
Campbell Global (formerly named Campbell Group)	VT, OSU, UGA, UW, AU	Full	Continuing
Canopy	UMaine	Associate	Continuing
Carolina Soil	NCSU		Terminated
Cascade Timber Consulting, Inc.	OSU, UW	Full	Continuing
CBD Technologies, Ltd./FuturaGene	NCSU, OSU	Full	Continuing
CHS	VT	Associate	New
Claritas / Campo / C3	NCSU		Terminated
Clayton Lake	UMaine	Full	Continuing
CMPC Forestry - Forestal Mininco/Forestal Bosques del Plata	VT	Associate	Continuing
Deforsa	NCSU	Associate	Continuing
Delaney Development	AU	Associate	Continuing
Deltic Timber Company	VT	Associate	Continuing
Dougherty & Dougherty Forestry	VT	Associate	Continuing
Dow AgroSciences LLC	UGA		Terminated
Du Campo	NCSU	Associate	Continuing
DuPont Agricultural Products	NCSU		Terminated
Eldorado	NCSU		Terminated
Evans Properties	NCSU	Associate	Continuing
Fazenda Campo Bom (FCB)	NCSU	Associate	Terminated
F&W Forestry Services, Inc	UGA, AU	Full	Continuing
Fibria	NCSU	Full	Continuing
Florida Grown	NCSU	Associate	Continuing
Four Rivers Land & Timber LLC (purchased by Foley Timber and Land, Inc)	UGA	Associate	Continuing
Forest Investment Associates	UGA, VT	Full	Continuing
Forest Resource Consultants Inc.	UGA	Associate	Continuing
Forestaciones Operativas de México (FOMEX)	NCSU		Terminated
Forestry & Land Resource Consultants, Inc.	VT	Associate	Continuing
Gavilon Fertilizer, LLC	VT		Terminated
Georgia Forestry Commission	AU	Associate	Continuing
Global Forest Partners	VT	Associate	Continuing

GMO Threshold Timber Corp	VT, UGA, PU	Full	Continuing
University of Pretoria, South Africa (formerly listed as Govt. of South Africa)	OSU	Full	Continuing
Green Crow	UW	Associate	New
Green Diamond Resource Company	OSU, UW	Full	Continuing
Green Edge	VT		Terminated
Greenwood Resources	VT, OSU, UW	Full	Continuing
Hampton Affiliates	UW	Associate	New
Hancock Forest Management	VT, OSU, UGA, UI, UW, AU	Full	Continuing
Idaho Dept of Lands	UI	Full	Continuing
IFOM	NCSU		Terminated
Inland Empire Paper Co	UI	Associate	Continuing
Innovatech	NCSU		Terminated
International Forest Company	NCSU, UGA, AU	Full	Continuing
International Paper	NCSU, UGA	Full	Continuing
International Plant Nutrition Institute	VT	Associate	Continuing
J.D. Irving (Irving Woodlands)	UMaine	Full	Continuing
James W. Sewell Co.	VT, UMaine	Associate	Continuing
Jordan Lumber Company	NCSU	Associate	Continuing
Katahdin Forest Management, LLC	UMaine	Associate	Continuing
Kingwood Forestry	VT	Associate	Continuing
Klabin	NCSU	Full	Continuing
Koch	NCSU	Associate	Continuing
Larson and McGowin, Inc.	VT	Associate	Continuing
Lone Rock Timber Management Co.	OSU, UW	Full	Continuing
Louisiana Department of Agriculture & Forestry	AU	Associate	New
Lykes Brothers	NCSU		Terminated
Milliken Forestry Company, Inc.	NCSU	Associate	Continuing
Molpus Timberlands Management, LLC	NCSU, VT, UGA, UI	Full	Continuing
Montana Dept of Natural Resources and Conservation	UI	Associate	Continuing
Native Forest Nursery	AU	Associate	Continuing
Nelson Irrigation	PU	Associate	New
North Carolina Forest Service	AU, NCSU	Associate	Continuing
Oklahoma Forestry Services	AU	Associate	Continuing
Olympic Resource Management	OSU, UW	Full	Continuing
Oregon Department of Forestry	OSU, UW	Full	Continuing
Pacific Denkman Co.	UW	Associate	Continuing
Payne's Flying Service	VT		Terminated
Plum Creek Timber Company (Acquired by another CAFS member, Weyerhaeuser)	VT, OSU, UGA, UMaine, UW, AU		Terminated
Port Blakely Tree Farms	OSU, UW	Full	Continuing
Potlatch Forest Holdings	UGA, UI	Full	Continuing

Prentiss and Carlisle Company, Inc.	UMaine	Full	Continuing
Purdue Research Foundation	PU	Full	Continuing
Purdue Univ. Forestry & Natural Resources	PU	Full	Continuing
PreStage AgEnergy	VT	Associate	New
Quinault Indian Nation (formerly Quinault Dept. Natural Res.s)	UW	Associate	Continuing
Rayonier, Inc.	VT, OSU, UGA, AU	Full	Continuing
Renewable Resources (Acquired by another CAFS member, GMO)	VT		Terminated
Resource Management Service, LLC	NCSU, VT, UGA	Full	Continuing
Roseburg Forest Products	OSU, UW	Full	Continuing
SAPPI (Fine Papers & South Africa)	OSU, UMaine	Full	Continuing
Scotch Lumber Company	AU	Associate	Continuing
Seneca Jones Timber Company	OSU	Associate	Continuing
Seven Islands Land Company	UMaine	Full	Continuing
Sierra Pacific	UW		Terminated
Snowshoe Timberlands, LLC	UMaine	Associate	Continuing
South Carolina Forestry Commission	AU	Associate	Continuing
Starker Forests, Inc.	OSU	Associate	Continuing
Steelcase	PU	Associate	Continuing
Stimson Lumber Company	OSU, UI, UW	Full	Continuing
Superior Pine Products Company	UGA, VT	Full	Continuing
Suzano Pulp and Paper	NCSU	Full	Continuing
SweTree Technologies AB	OSU	Full	Continuing
Sylvan Timberlands, LLC	UMaine	Associate	Continuing
Syngenta	NCSU	Associate	Continuing
Tennessee Division of Forestry	AU	Associate	Continuing
TerraSource Valuation	VT		Terminated
The Forestland Group, LLC	UMaine		Terminated
The Nature Conservancy	UMaine	Associate	Continuing
The Westervelt Company	NCSU, VT, AU	Full	Continuing
Thrash Aviation, Inc.	NCSU	Associate	Continuing
Timberland Investment Resources	NCSU, UGA	Full	Continuing
Timbervest, LLC	UGA	Associate	Continuing
TimberWest-Coast Timberlands	UW	Associate	Continuing
University of Hawaii - Manoa	PU	Full	Continuing
USDA Forest Service Research	UI, AU, NCSU	Full	Continuing
USDA Forest Service State and Private	PU, AU	Full	Continuing
USDI Bureau of Land Management	OSU, UI, UW	Full	Continuing
Valor Florestal	NCSU		Terminated
Van Eck Foundation	PU	Full	Continuing
Varn Wood Products, LLC	UGA	Associate	Continuing
Virginia Department of Forestry	VT, AU	Associate	Continuing

Wagner Forest Management	UMaine	Full	Continuing
Washington State Dept. of Natural Resources	OSU, UI, UW	Full	Continuing
West Fork Timber Co., LLC	UW		Terminated
WestRock	NCSU	Associate	Continuing
Weyerhaeuser	VT, OSU, UGA, UW, AU	Full	Continuing

	Estimated Budget This Year	**Estimated Budget Last Year**
North Carolina State University	$410,000	$350,500
Oregon State University	$443,885	$445,914
Purdue University	$360,000	$355,000
Virginia Tech	$416,508	$500,720
University of Maine	$446,350	$444,562
University of Georgia	$408,950	$427,740
University of Washington	$616,516	$563,238
University of Idaho	$354,074	$311,389
Auburn University	$256,700	$262,800
Total Center Support (All Sources):	**$3,712,983**	**$3,661,863**

Research Breakthroughs: 1 - Using LANDSAT imagery to detect Leaf Area Index and predict growth response to fertilization, and 2 - Using climatic and growth modeling for predicting lands suitable for forest plantations. These may be included in Craig Scott's most recent I/UCRC Technology Compendium.

Concerns & Cautions: Not a concern or caution; the Center is considering applying for a Phase III award.

Supplemental IUCRC Awards

NSF Industry/University Cooperative Research Centers

Center for Advanced Forest Systems (CAFS)

http://cnr.ncsu.edu/fer/cafs/

North Carolina State University (Lead site)

Oregon State University
Purdue University
Virginia Tech
University of Maine
University of Georgia
University of Washington
University of Idaho
Auburn University

Evaluator's Annual Report
Year 9
July 2015 to August 2016

Director: Dr. Barry Goldfarb (NCSU)

Submitted by: Stephen McGregor
CAFS Evaluator
August 31 2016

Center for Advanced Forest Systems (CAFS)

Evaluator's Annual Report: Year 9
July 2015 to August 2016

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1. OVERVIEW

The Center for Advanced Forestry Systems (CAFS) bridges 9 leading universities' forestry research programs with representatives of forest industry sponsors for the purpose of solving complex, industry-wide problems. In 2016, CAFS will complete its 9th year of operation as an I/UCRC with North Carolina State University as the lead institution.

The Center for Advanced Forestry Systems is vitally important to the US and international forestry industry. It is a productive collaborative enterprise that has become a national resource within academia and industry because of strong center leadership and organization, a geographically representative set of universities and a wide base of industry and governmental sponsors. The Center also has exceptionally strong, experienced and supportive support staff. A genuine strength of the Center is the interest in and willingness of the industry participants to focus on a wide variety of research with various species of plants and trees.

CAFS works to solve problems via multi-faceted approaches to basic problems in molecular, cellular, individual-tree, stand, and ecosystems research. This collaborative consortium involves scientists with expertise in biological sciences including biotechnology, genomics, ecology, ecophysiology, and soils science. It encompasses a broad spectrum of research areas related to forestry management and processing including: growth and yield, stand and plantation management, wood quality, soils and nutrition, genetics and biotechnology, modeling, and remote sensing. CAFS research thrusts combine traditional genetics, biotechnology and silviculture into integrated systems with quantitative models to support decision-making and value enhancement.

2. MISSION

The CAFS mission 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 traditional species and disciplinary boundaries.

Its major goal remains to increase the economic value and utility of plantation forests; thereby enabling foresters to more efficiently produce greater volumes of high-quality wood materials and wood products.

3. CENTER PERSONNEL

CAFS has a significant leadership, administrative, research and student team. It consists of the Center Director, 9 Site Directors, 7 administrative staff, over 25 faculty and 29 research staff, 9 post-docs, 23 doctoral students, 23 masters students and 33 undergraduate students. And the Center has a strong Industrial Advisory Board (IAB) membership and IAB Chairperson.

CAFS directors and key administrative personnel:

Barry Goldfarb - Center Director, NCSU (Lead University)

Glenn Howe - Site Director, Oregon State University
Mike Saunders - Co-Site Director, Purdue University
Doug Jacobs - Co-Site Director, Purdue University
Tom Fox - Site Director, Virginia Tech
Michael Kane - Site Director, University of Georgia
Robert Wagner - Site Director, University of Maine
Gregory Ettl - Site Director, University of Washington
Mark Coleman - Site Director, University of Idaho
Scott Enebak - Site Director, Auburn University

Lisa Schabenberger - Operations Coordinator (NCSU)
Liz Jackson - Outreach Coordinator (Purdue University)

CAFS IAB chairperson:

Julio Rojas - IAB and Executive Committee Chairperson, Weyerhaeuser Corporation

Executive Committee:

An Executive Committee made up of the IAB Chairperson, the Center Director and the Site Directors manages and directs the Center's research and administration issues. The Executive Committee provides timely input outside of regularly scheduled annual meetings on CAFS issues including final review of project selections, budget adjustments and location and organization of annual meetings.

Center Evaluator:

Stephen McGregor (as of September 1, 2015)
Craig Scott (former Evaluator through August 31, 2015)

4. MEMBERSHIP

CAFS has two levels of membership. Full members pay an annual fee of $25,000. Associate member fees range from $5,000 to $25,000 dictated by each site and generally based on the size of the organization. These fees have remained stable since the Center was established. As reported by the Director Barry Goldfarb at the April 2016 Annual Meeting, CAFS was

supported this year by over $625,000 of NSF funding leveraged by $3.98 million in Member/Coop support. CAFS continues to have substantial membership as follows:

132 Total Members:

- 17 large industry companies (>500 employees)
- 91 small industry companies
- 16 government agencies (state/local/federal)
- 1 non-US governmental agency
- 7 non-profit or foundation organizations

Membership Level:

- 46 full members ($25,000 annual dues)
- 85 associate members (between $5,000 and $25,000)
- 1 in-kind member

5. COMPLIANCE WITH IUCRC MODEL

In all but one respect CAFS is compliant with the I/UCRC requirements dictated under the solicitations at the time of award. The one exception is that when the Center was founded it was granted a meeting frequency waiver that enables it to convene just one meeting annually and remain in good standing. The argument was based on the nature and pace of the technical field of forestry research, wherein research proceeds at a somewhat slower and more deliberate pace than research in the typical I/UCRC. Also, the various Center Sites' co-op members typically meet separately one or two times per year.

6. ANNUAL CENTER MEETING

On April 26-28, 2016 Auburn University hosted the 9th annual meeting of the Center for Advanced Forestry Systems in Pensacola Beach, Florida. This was another in a series of successful annual 2-day meetings followed by the traditional 1-day field trip. The Center Director Barry Goldfarb, Deputy Director Stephanie Jeffries, and administrative staff Lisa Schabenberger and Liz Jackson should all be commended for an extremely effective meeting. Evaluator Stephen McGregor represented the NSF. Attendance was very good and all 9 sites were represented with a total of 54 attendees.

	Member Firms Attending	Member Representatives Attending	Students Attending	Faculty and Postdocs Attending	Total Attendance (Including admin. staff and evaluator)
TOTAL:	13	16	9	23	54

Some of the Evaluator's impressions of the annual meeting:

Meeting logistics and execution

- Excellent pre-meeting preparation; registration with nametags, handouts and web-site information and links. Handout materials included a binder with LIFE instructions, student/post-doc profiles, project and proposal summaries, meeting agenda, IAB meeting topics and attendee list.
- "Online Notebook" provided with executive summary and complete presentation slide set for each project and proposal presentation. An excellent resource available to attendees during meeting and for members not attending.
- Packed agenda; a busy 2 full days of 12 ongoing project technical presentations and 5 proposal presentations.
- Very good venue; comfortable and spacious classroom setting for meeting with good audio/visual and Wi-Fi.
- The student researchers and PI's made presentations. They were well prepared and delivered good presentations.
- Overall organization, preparation and execution of meeting were excellent.

Stakeholder relationships

- This group works well together and socializes well together. Excellent rapport between members, Site Directors and Barry Goldfarb, Center Director.
- Plenty of discussion and interaction during the meeting, both after presentations and during the breaks.
- Many opportunities for networking and socializing built into the agenda.
- It is apparent that trust and respect between the stakeholders has developed over the years.
- Substantive Closed IAB Meeting. Members engaged and candid in discussion of Center operations and direction. A report-out was given to the Center Director following the IAB Meeting. Some key issues discussed to improve CAFS' value to members included:
    - The IAB members agreed that there should be more proposals than funds available, i.e. a larger pool of proposals so they are competing for available funds.
    - Accommodate more member inputs for proposal ideas. This will help focus the research on topics of impact to the forestry industry at large such as the implementation of remote sensing technology in forest applications.
    - Explore the possibility of a two-stage system to review research projects. First to identify top research project as viewed by the IAB and second review and validate those projects with regards to future funding.
    - Better multi-university projects and sites working together as a team.
    - Consider a mechanism in the Center for purchase of capital equipment (such as LiDAR) that could be shared by members?

- IAB members believe that the next phase for CAFS should be concentrated in establishing the mechanisms and a research platform such to keep this Center viable beyond 2022. This Center is unique because it gathers the brightest people in forestry research in the USA, and probably the world, to come together and work on complex problems.

Overall Spring 2016 meeting impression by the evaluator:

- Excellent meeting preparation and execution. Very well directed and coordinated.
- Very good technical presentations with members' interactions and LIFE discussions.
- Proposals presented, LIFE submitted and discussed. LIFE remains open a couple weeks for members who were not able to attend to add LIFE comments prior to future project selection. Proposal voting occurred after the meeting to include more members.
- Committee formed and met to discuss the future of CAFS and the prospect of preparing and submitting a Phase III I/UCRC proposal. Meeting was scheduled for August 16, 2016 with I/UCRC Director Raffaella Montelli. [See Section 8 for a summary of this meeting.]

An optional Field Tour hosted by Auburn University on April 28, 2016 followed the regular meeting. The tour included the US Forest Service Southern Research Station's Escambia Experimental Forest to visit the longleaf pine pole production and studies area. And a tour of the TR Miller Mill Company of Brewton, Alabama, one of the South's oldest and largest forest products companies.

7. CENTER ACCOMPLISHMENTS

In 2015-2016 CAFS supported 62 projects across the 9 sites with almost $4 million of IAB support from its 132 members. Based on center-supported research, center faculty and students accrued a total of 64 publications and made scores of scholarly and industry-related presentations. Much of this activity was reported at the Annual Spring Meeting where 20 presentations were made; 12 continuing projects, 3 final reports and 5 new project proposals:

Continuing Projects

- Development of Genetic Markers for Western White Pine and Douglas-fir, OSU, 12.36
- Linking Growth Modeling to Product Quality for Loblolly Pine, UGA, 13.46
- Do Below Ground Processes Such as Soil Nutrient Dynamics, Root Nutrient Uptake and Carbon Allocation Patterns Explain Differences in Growth, Productivity, and Carrying Capacity of Loblolly Pine Plantation in the Southern United States and Brazil and Black Walnut Plantations in Indiana, VT/NCSU, 14.49
- Exploring Internal and External Controls of Plantation Black Walnut Growth and Allocation Patterns, Purdue, 14.49
- Production and Analysis of Flowering-Modified Eucalypts, OSU, 14.51
- Root Development and Morphological Comparisons of Container-Grown Loblolly Pine and Subsequent Productivity after Establishment, AU, 14.54
- Developing a Region-wide Modeling System for Estimating Future Productivity of Loblolly Pine Plantations, VT, 14.58

- Classification, Projection, and Financial Impact of Beech-Dominated Understories in Mid-Rotation Stands in Maine, UMaine, 15.59
- Assessing Stand Characteristics of Enhanced Genetics in Loblolly Pine Plantations in the Southeast, UGA, 15.60
- Appraising Rotation-age Tree and Stand Characteristics in a 1970's Decadal Cohort of Douglas-fir Plantations in the Pacific Northwest, UW, 15.61
- Quantifying the Impact of Pine Decline in the Southeastern United States, AU, 15.62
- Does Commercial Thinning Improve the Growth Response and Upper Diameter Distribution Potential of Forest Stands?, UMaine, 15.64

Final Reports

- Understanding Site-Specific Factors Affecting the Nutrient Demands and Response to Fertilizer by Douglas-fir, UW, 09.19
- Determining Phases of Growth and Relative Stand Densities for Optimal Response to Thinning, UI, 12.37
- UPDATE - Use of Stable Isotopes to Trace the Fate of Applied Nitrogen in Forest Plantations to Evaluate Fertilizer Efficiency and Ecosystems Impacts, VT, 10.33

New Project Proposals

- Understanding and Modeling Competition Effects on Tree Growth and Stand Development Across Varying Forest Types and Management Intensities, VT, 16.65
- Genomic Selection for Douglas-fir Tree Improvement, OSU, 16.66
- Improving White Pine Seedling Survival By Combining Blister Rust Resistance With Defense-Enhancing Endophytes, UI, 16.67
- Response of Superior Western Larch Families to Site Quality and Competition Control, UI, 16.68
- Stand and Tree Responses to Late Rotation Fertilization, UW, 16.69

Regarding member value in the CAFS, members reported in the annual Process/Outcome Questionnaire how they benefited commercially from participation in the center. Responses included:

- Moved our silviculture regimes and genetics programs forward.
- Fine tune forest fertilization priorities; better understanding of nitrogen cycling in forest systems to help justify investment; better understanding of stand dynamics in response to thinning in order to increase NPV.
- Developed forest growth and yield response functions for control of competing vegetation

The directors actively work to respond to members' suggestions to improve the Center and its research program. Recent member suggestions as reported in the annual Process/Outcome Questionnaire included:

- Universities should work on the "building blocks" (rather than the final solutions) so companies can integrate those into theirs respective systems. There must be flexibility built into them so that they can be seemingly integrated.
- Our (industry) comments are rarely incorporated into revised study plans. On two occasions, I have been rebuffed by the PI from participating in a research project.

This is NOT the intent of CAFS! Let's maintain an applied focus for relevant forest species of the US.
- The Center can do better by screening projects so that projects not funded at the individual university level are not reintroduced and funded by the center.

When asked in the Process/Outcome Questionnaire for suggestions to improve administrative and organizational practices, as well as member retention, some of the responses included:

- IAB Meeting Follow-up - Flawed study plans should be revised. The co-investigators must be requested to revise their proposals after receiving constructive criticism during the IAB.
- Technology Transfer - Can be better. Practical implementation guidelines and summaries would work well.
- Project Development and Management - The administrative staff could work to better facilitate and foster inter-university relationships and projects. Projects funded across universities should be funded at higher levels than others.
- I am very distressed to encounter opposition from university co-investigators from including industrial research scientists in the project. This has been my experience on two occasions.
- The Center has done a very good job at coordinating and facilitating work between coops and universities; this is the number-one strength of the coop.

8. ANALYSIS

This Evaluator's assessment of the Center for Advanced Forestry Systems is very favorable overall. The Evaluator is new to the Center and although CAFS has just completed its 9th year, the Evaluator has only experienced the most recent Annual Meeting this past April. The Center has 132 member/coop organizations from industry and government as of the end of year 9 that generate nearly $4 million in membership revenue. These funds support numerous "regional" projects at the 9 university sites in CAFS and a portfolio of "national" projects that bridge all the sites.

The Center currently has 12 national projects ongoing and has completed several projects this year. At the April Annual Meeting, members were presented with 5 new project proposals. New project selections have not yet been made. Members are benefiting from the results and outcomes of the many mature and completed projects over the past years. Members are reporting economic benefits in new wood products and forest systems resulting in tangible returns to the organizations.

Research Breakthroughs:
Some recent research breakthroughs at CAFS include:

- Using LANDSAT imagery to detect Leaf Area Index and predict growth response to fertilization.
- Using climatic and growth modeling for predicting lands suitable for forest plantations.

With the conclusion of its 9th year as an I/UCRC, CAFS is beginning serious discussions on continuing as a viable and self-sustaining center after the NSF Phase II award concludes September 30, 2017. One option is to submit a proposal for I/UCRC Phase III funding. A meeting was held at the NSF offices in Arlington Virginia on August 16, 2016 with I/UCRC Director Raffaella Montelli and some of the CAFS Executive Committee including CAFS Director Barry Goldfarb and Site Directors Tom Fox, Robert Wagner, and Mike Saunders, along with the IAB Chairperson Julio Rojas and Evaluator Stephen McGregor. The purpose of the meeting was to discuss with NSF the option of applying for Phase III funding and reviewing CAFS' questions, obligations and impacts as a Phase III Center under the most recent I/UCRC solicitation. The meeting was very informative and instructive to the group as they plan future funding of CAFS as it approaches its 10-year anniversary and beyond.

The Center is working hard to fulfill its concept, vision and mission. The members are engaged and committed to the Center. They see value in the Center for their organizations. The member value is a consequence of the ongoing and consistent research output of Center projects, networking with other members and faculty from across the country, and access to quality students. This assessment is based on the evaluator's observations at the recent meeting and discussions with some of the members.

In addition to the strong academic foundation provided by the 9 sites, CAFS has a robust membership and IAB represented by 46 full members that include 17 large corporations, each with over 500 employees, and 16 government agencies including several state forestry services.

The response to the Annual Process-Outcome Survey was poor this year with a participation of only 5 member companies. This may be due in part to the transition of Evaluators and lack of a personal relationship between the new Evaluator and the members. However the 5 organizations that did participate are active, large companies that are full members, so their opinions provide valuable feedback.

Four of the 5 respondents indicated that 60-79% of Center projects are relevant to their organizations, and the other respondent indicated that 40-59% are relevant to his organization.

The table below indicates the generally good level of satisfaction with the Center's research program. Most responses were in the "quite satisfied" category with some "very satisfied".

During the past year, how satisfied were you with the following features of the Center's research program	Not Satisfied	Slightly Satisfied	Somewhat Satisfied	Quite Satisfied	Very Satisfied
Capabilities of the researchers & quality of the research program				**4**	**1**
Breadth of the research topics covered				**4**	**1**
Focus of the research			**1**	**3**	**1**
Relevance of research to my organization's needs			**1**	**3**	**1**

The next four tables shows a mixed range of opinions from the respondents regarding the impact their organizations' reported by their participation in CAFS with regards to professional networking, student recruitment, R&D benefits, and commercialization impact. Three of the 5 reported that the Center's research help them accelerated their internal R&D projects and all 5 reported the research findings helped them avoid new R&D costs.

During the past year, what impact has participating in the Center had on your organization's scientific capability via enhanced cooperation and networking with industry and university scientists outside your organization?

No Impact	Slight Impact	Moderate Impact	High Impact	Very High Impact	N/A
		2	**1**	**2**	

During the past year, what impact has participation in the Center had on your organization's ability to identify and recruit well-qualified graduate students?

No Impact	Slight Impact	Moderate Impact	High Impact	Very High Impact	N/A
	1	**1**	**2**	**1**	

During the past year, has your organization realized any of the following, specific benefits?

- Accelerated internal R&D: Has access to Center research findings and outputs helped accelerate the pace and/or completion of some R&D projects now underway at (or contracted by) your organization? 3-Yes; 2-No
- Avoided new R&D costs: Has access to Center research findings and outputs helped your organization decide against starting one or more new R&D projects that otherwise would have been initiated? 5-Yes; 0-No

During the past year, what impact has participating in the Center had toward enhancing your organization's commercialization efforts via: new technical knowledge; intellectual property resources; improved or new products, processes, services, improved sales; and/or new or retained jobs?

No Impact	Slight Impact	Moderate Impact	High Impact	Very High Impact	N/A
	2		**2**		**1**

The Center's administrative operations were rated well and reflect the members respect for and satisfaction with the Center directors and administration.

	Not Satisfied	Slightly Satisfied	Somewhat Satisfied	Quite Satisfied	Very Satisfied
During the past year, how satisfied were you with the Center's administrative operations?			**2**	**2**	**1**

Center membership has been relatively stable this past year and the majority of current members feel they are getting value in their membership and they plan to stay with the Center. The 5 respondents to the annual P/O questionnaire responded as follows:

	Definitely Not	Probably No	Uncertain	Probably Yes	Definitely Yes
Will your organization renew its membership?				**2**	**3**

Overall, CAFS has made significant accomplishments in its nine years of operation and has great potential going forward to contribute to the field of forest products and systems. The Center is postured to be a significant asset and contributor to the industrial and government members, the faculty and students of the universities involved, and to society at large through the advanced commercial products that potentially will be developed by the joint initiatives of the industry and university partners.

9. TIMELINE

CAFS Annual IAB Meetings since inception:

February 20-21, 2008 - Portland, Oregon (Kick-off meeting)
February 10-12, 2009 - Charleston, South Carolina
April 27-29, 2010 - Indianapolis, Indiana
June 14-16, 2011 - Seattle, Washington
June 26-28, 2012 - Bangor, Maine
April 9-11, 2013 - St. Simons Island, Georgia
May 20-22, 2014 - Coeur d'Alene, Idaho
May 19-21, 2015 - Asheville, North Carolina
April 26-28, 2016 - Pensacola Beach, Florida

Planned future CAFS Annual IAB Meetings:

May 2-4, 2017 - Portland, Oregon

Appendix A – NSF Best Practice Checklist - Spring 2016

Appendix B – CAFS 2016 Annual IAB Meeting Agenda

Stephen McGregor
CAFS Evaluator
August 31, 2016

Industry-University Cooperative Research Center (I/UCRC)
Semi-annual Meeting Best Practice Checklist

Center for Advnaced Forest Systems (CAFS) April 26-28, 2016
Hosted by Auburn University Pensacola Beach, FL

What type of face-to-face meetings of IAB, Center scientists & students was held:
- ☒One primarily dedicated to proposal presentations w/ LIFE feedback (+ closed IAB Meeting).
- ☒One primarily dedicated to a technical review of progress w/ LIFE feedback (+ closed IAB Meeting).

Comments: NOTE: CAFS holds one comprehensive meeting per year with technical reviews and proposal presentations w/ LIFE feedback, and open and closed IAB Meetings.

☐ At Point of Registration, "Non-Disclosure Form" is signed by each non-member industrial attendee.
Comments: No non-member attendees participated in this meeting.

☒ A "List of Attendees" (industry, university) is contained in each attendee's registration packet.

☒ A Center Update Report that includes:
- ☒ A review of the center's vision and research roadmap and/or priorities
- ☒ A membership status report (including MIPRs and/or government agency commitment involvement)
- ☒ An annual financial statement x site (w/ member fees collected & amount available for projects)
- ☒ Some discussion of center-related technology advances & economic impact
- ☒ An up-to-date listing of publications list plus PI awards & research highlights (OK if online)

Comments: Website provides publications, research highlights and other Center information.

☒ A common presentation template is used and adhered to by most presenters (w/deliverables, milestones, timetable, budget & time limits).
Comments:

☒ 1-page executive summaries are available to all attendees at each bi-annual IAB meeting.
Comments:

☒ LIFE forms are completed following each presentation.
Comments: Agenda time for LIFE and Center Director facilitated time for LIFE during meeting.

☒ LIFE feedback is discussed by industrial attendees in session(s) scheduled for that purpose.
Comments: LIFE review following each meeting session with very good member participation.

☒ There is a closed IAB session (members can make it open) that includes an opportunity for IAB representatives to raise and discuss issues about center policies, procedures and research direction.
Comments:

☒ A "state-of-the center" discussion by IAB members.
Comments: An additional meeting was scheduled to discuss and plan the future of CAFS as a Phase III I/UCRC.

☐ Clear procedures (voting/ranking) are used for project continuation/selection.
Comments: Proposals not voted on at the meeting. This is done later to include more members.

☒ Meeting activities are included that support industry/ university networking; such poster sessions, evening hors d'oeuvres or dinner, and industry-driven mentoring sessions.
Comments: Many opportunities for networking and socializing built into the agenda. This group works well together and socializes well together. Excellent rapport between members, site directors and Barry Goldfarb, Center Director

☒ A discussion of and preferably a decision on the date and location of the next meeting.

☐ Center facilitates opportunities for project related communication (e.g., newsletters, regularly scheduled project conference calls) with the IAB between meetings.
Comments: The IAB plans future phone meetings.

Stephen McGregor
Evaluator, CAFS
May 5, 2016 Rev. 1

Center for Advanced Forestry Systems Annual Meeting

April 26-28, 2016

Holiday Inn Resort, Pensacola Beach, Florida

TENTATIVE AGENDA

Day 1 - Tuesday, April 26, 2016			
6:45-7:45 AM	**Continental Breakfast & Check-in** (St. Barts & St. Croix Hall, Second Floor)		
Session 1 - Plenary (Guadeloupe) Start 7:45 AM	**Welcome, Updates & Introductions** (Guadeloupe, Second Floor) CAFS Updates: **Barry Goldfarb**, Director, and **Steph Jeffries**, Deputy Director **Presentations of new projects** – after each presentation we will complete LIFE Form and discuss		
8:20-8:55	**16.65 - New** Lead Site: VT, UMaine, UW	Understanding and Modeling Competition Effects on Tree Growth and Stand Development Across Varying Forest Types and Management Intensities: Burkhart, et al. Presentation, **Harold Burkhart** (VT)	
8:55-9:30	**16.66 - New** Lead Site: OSU	Genomic Selection for Douglas-fir Tree Improvement: Howe & Jayawickrama Presentation, **Glenn Howe** (OSU)	
9:30-10:05	**16.67 - New** Lead Site: UI	Improving White Pine Seedling Survival by Combining Blister Rust Resistance with Defense-enhancing Endophytes: Coleman et al. Presentation, **Marc Rust** (UI)	
10.05-10:35	**Break & Volunteer Posters** (St. Barts & St. Croix Hall); Make your way toward breakout rooms		
Session 2 - e-Poster Session for Continuing Projects (Nevis A & B and Antilles B) Each presentation will be 15 minutes, including time for questions and answers; audience has 5 minutes to rotate to next e-Poster in next room, until you have participated in all three presentations.			
	Nevis A	**Nevis B**	**Antilles B**
10:35-11:35	**12.36 - Cont.** Lead Sites: OSU/UI Development of Genetic Markers for Western White Pine and Douglas-fir: Rust et al. ***Oguz Urhan & Glenn Howe** (OSU)	**15.59 - Cont.** Lead Sites: UMaine Classification, Projection, and Financial Impact of Beech-dominated Understories in Mid-rotation Stands in Maine: Wagner et al. ***Arun Bose** (UMaine)	**15.60 - Cont.** Lead Sites: UGA Assessing Stand Characteristics of Enhanced Genetics in Loblolly Pine Plantations in the Southeast: Bullock et al. ***Melissa Shockey & Bronson Bullock** (UGA)
11:35-12:00 PM	**Return to Guadeloupe - complete LIFE for 12.36, 15.59, 15.60 – LIFE Results & Discussion**		
12:00-1:00	**Working Lunch** (St. Barts)		

Key:
* graduate student or post-doctoral scientist

LIFE = IUCRC.com

CAFS University Partners

AU - Auburn University
NCSU - North Carolina State University
OSU - Oregon State University
PU - Purdue University
UGA - University of Georgia
UI - University of Idaho
UMaine - University of Maine
UW - University of Washington
VT - Virginia Tech

2016 CAFS Annual Meeting - Tuesday, continued

Session 3 - e-Poster Session for Continuing Projects
Each e-Poster will be 15 minutes, including time for questions and answers; 5 minutes to rotate to next e-Poster in another room, until you have participated in all three presentations.

	Nevis A	Nevis B	Antilles B
1:00-2:00	**13.46 - Cont.** Lead Sites: UGA Linking Growth Modeling to Product Quality for Loblolly Pine: Dahlen et al. **Joseph Dalen** (UGA)	**14.58 - Cont.** Lead Sites: VT Developing a Region-wide Modeling System for Estimating Future Productivity of Loblolly Pine Plantations: Burkhart et al. **Harold Burkhart** (VT)	**15.62 - Cont.** Lead Sites: AU Quantifying the Impact of Pine Decline in the Southeastern United States: Eckhardt et al. ***Ryan Nadel** (AU)
2:00-2:25	**Return to Guadeloupe - complete LIFE for 13.46, 14.58, 15.62 – LIFE Results & Discussion**		
2:25-2:55	**Break & Volunteer Posters** (St. Barts & St. Croix Hall); Make your way toward breakout rooms		

Session 4 - e-Poster Session for Continuing Projects
Each e-Poster will be 15 minutes, including time for questions and answers; 5 minutes to rotate to next e-Poster in next room, participating in 3 presentations before returning to Guadeloupe for 4th e-Poster.

	Nevis A	Nevis B	Antilles B
2:55-3:55	**14.51 - Cont.** Lead Sites: OSU Production and Analysis of Flowering-modified Eucalypts: Strauss ***Oguz Urhan & Glenn Howe** (OSU)	**14.54 - Cont.** Lead Sites: AU Root development and Morphological Comparisons of Container-grown Loblolly Pine and Subsequent Productivity after Establishment: Enebak and Starkey **Tom Starkey** (AU)	**15.61 - Cont.** Lead Sites: UW Appraising Rotation-age Tree and Stand Characteristics in a 1970's Decadal Cohort of Douglas-fir Plantations in the PNW: Turnblom et al. **Eric Turnblom** (UW)
3:55	**All to return to Guadeloupe for 4th e-Poster**		
4:00-4:15	**Guadeloupe** **15.64 - Cont.** Lead Sites: UMaine Does commercial thinning improve the growth response and upper diameter distribution potential of forest stands?: Weiskittel et al. ***Arun Bose** (UMaine)		
4:15-4:45	**Stay in Guadeloupe - complete LIFE for 14.51, 14.54, 15.61, 15.64 – LIFE Results & Discussion**		
4:45-5:30	*Free Time*		
5:30-8:30	**Tuesday Evening Networking Social and Dinner** (St. Barts / St. Croix / Balcony)		

Day 2 - Wednesday, April 27, 2016			
7:45-8:30 AM	**Continental Breakfast** (St. Barts & St. Croix Hall)		
Session 5 - Plenary (Guadeloupe) Start 8:30 AM	Review of Day 1, Overview of Day 2: **Barry Goldfarb** **Presentations of projects** – after new presentations we will complete LIFE Form and discuss		
8:35-9:05	**10.33 - Ended Results Update** Lead Sites: VT	Use of Stable Isotopes to Trace the Fate of Applied Nitrogen in Forest Plantations to Evaluate Fertilizer Efficiency and Ecosystem Impacts: Fox et al. - ended as CAFS project in 2014 - presenting results from Jay's dissertation. Presentation: ***Jay Raymond** (VT)	
9:05-9:40	**16.68 - New** Lead Site: UI	Response of Superior Western Larch Families to Site Quality and Competition Control: Nelson et al. Presentation, **Andrew Nelson** (UI)	
9:40-10:15	**16.69 - New** Lead Site: UW	Stand and Tree Responses to Late Rotation Fertilization: Turnblom et al. Presentation, **Eric Turnblom** (UW)	
10.15-10:45	**Break & Volunteer Posters** (St. Barts & St. Croix Hall); Make your way toward breakout rooms		
Session 6 - e-Poster Session for Continuing Project 14.49 Each e-Poster will be 15 minutes, including time for questions and answers; 5 minutes to rotate to next e-poster in another room, until you have participated in all three presentations.			
10:45-11:45	**Nevis A**	**Nevis B**	**Antilles B**
	14.49 - VT	**14.49 - NCSU**	**14.49 - PU**
	Do Below Ground Processes Such as Soil Nutrient Dynamics, Root Nutrient Uptake and Carbon Allocation Patterns Explain Differences in Growth, Productivity, and Carrying Capacity of Loblolly Pine Plantation in the Southern United States and Brazil and Black Walnut Plantations in Indiana?: Fox et al.		Exploring Internal and External Controls of Plantation Black Walnut Growth and Allocation Patterns: Szuter et al.
	Tom Fox (VT)	***Yuan Fang & Barry Goldfarb** (NCSU)	***Michael Szuter** (PU)
11:45-12:10 PM	**Return to Guadeloupe - complete LIFE for 14.49 VT/NCSU, 14.49 PU – LIFE Results & Discussion**		
12:10- 1:10	**Working Lunch** (St. Barts)		
Session 7 - Plenary for Final Presentations of Ending Projects (Guadeloupe) – No LIFE form needed			
1:10-1:35	**09.19- Final** Lead Site: UW	Understanding Site-Specific Factors Affecting the Nutrient Demands and Response to Fertilizer by Douglas-fir: Harrison et al. Presentation, **Rob Harrison** (UW)	
1:35-2:00	**12.37 - Final** Lead Site: UI	Determining Phases of Growth and Relative Stand Densities for Optimal Response to Thinning: Coleman et al. Presentation, ***Christopher Chase** (UI)	
2:00-2:45	**Open IAB Business Meeting** (continuing in Guadeloupe)		
2:45-3:15	**Break & Volunteer Posters** (St. Barts & St. Croix Hall);		
3:15-5:15	**Closed IAB Business Meeting** (Guadeloupe)		
	Dinner on your own		

Thursday, April 28, 2016 – Optional Field Tour:	
6:00-6:45 AM	**Boxed Continental Breakfast** (St. Barts & St. Croix Hall)
7:00 AM	**Load Vans**
7:00 AM – 5:30 PM	The Auburn University Site of CAFS is our host for this educational field tour within the longleaf pine belt of the United States. We will tour long-term longleaf pine studies in the US Forest Service Southern Research Station's Escambia Experimental Forest, explore sites at the Solon Dixon Forestry Education Center, and visit TR Miller Mill Company of Brewton, Alabama, one of the South's oldest and largest forest product companies. Breakfast, lunch, transportation and handouts are covered in the meeting registration cost. We will depart from the hotel early in the morning and **return to the hotel by 5:30pm** Central Time.

CAFS 2016 Field Tour - Hosted by Auburn University
LONGLEAF POLE PRODUCTION & SOLON DIXON FORESTRY EDUCATION CENTER

ESCAMBIA EXPERIMENTAL FOREST: A 3,000-acre field laboratory, located 7 miles south of Brewton, Alabama, was established in 1947 by the U.S. Forest Service to study problems associated with the ecology and management of longleaf pine forests. The U.S. Forest Service Restoring and Managing Longleaf Pine Ecosystems Research Project located on the campus of Auburn University handles research operations and general administration of the Forest. Due to its central location in the longleaf pine belt that extends from the Carolinas to eastern Texas, the Experimental Forest is well situated for the study of this species. Over 20 percent of the remaining longleaf pine forests in the Southeast are within 75 miles of this location.

TR MILLER MILL COMPANY. The T. R. Miller Mill Company of Brewton, Alabama, provided land for the Escambia Experimental Forest, at no cost, under a 99-year lease to the government. Products derived from operations on the Escambia go to the company. Through 1996, 4.03 million cubic feet of pine, 65 percent in poles and logs, plus 231 thousand cubic feet of hardwood have been harvested. T. R. Miller Mill Company, Inc. is one of the oldest, privately held, forest product companies in business today. Built in 1848, the original mill was one of the first permanent sawmills in the South. Little is known of the original mill except that it was a small water-driven mill, but the choice of location still commands admiration as it transported logs from the vast pine forest along its upper reaches and floated the sawn timbers to Pensacola, Florida for export. This sawmill has operated continuously since 1872, and today is one of the 150 largest sawmills in the United States. TR Miller has been in land and timber management for over 100 years and its sister company, Cedar Creek Land & Timber, Inc., currently own and manage over 215,000 acres of timberland.

SOLON DIXON FORESTRY EDUATION CENTER. The Solon Dixon Forestry Education Center was a gift to Auburn University from Solon and Martha Dixon. Solon Dixon's love of natural resources, Auburn University and young people created a vision that became reality in 1978 with his donation of 5350 acres, the Dixon family home-site and funds for the creation of the Solon Dixon Forestry Education Center. Mr. Dixon wanted a place where young people could experience nature, while learning about forestry, wildlife and the many other aspects of natural resources management. Since its dedication in 1980, the Solon Dixon Forestry Education Center has managed its natural resources and programs to meet the objectives of: (1) providing quality natural resource education to a variety of user groups, particularly Auburn University students; (2) providing a base for and support of research efforts in natural resource fields; (3) serving as a source of information and technology transfer from the scientific community to the general public; and (4) managing its own natural resources wisely and economically to provide income for the Center's programs. At the time, this gift was the largest ever made to Auburn University by a living donor.