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The SFI Conservation Impact Project: Supporting Forest-Based Solutions for Climate-Change Mitigation and Biodiversity Conservation

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Abstract

SFI has provided certification standards for sustainable forest practices and forest fiber procurement since 1995, and has experienced tremendous growth, such that SFI's Forest Management Standard is the most widely applied single forest management standard in the world, with over 365 million certified acres (147 million hectares). Seeing the need for better understanding of the conservation related outcomes from decades of sustainable management, SFI initiated the Conservation Impact Project in 2016 to enumerate outcomes across the critical themes of climate change, biodiversity, and water. Findings of these collaborative research projects reveal the critical role of these certified forests toward landscape-scale biodiversity, wide ranging bird species in decline, and carbon capture and storage. These findings make clear that SFI Certified forests contribute significantly and uniquely to forest conservation outcomes in the United States and Canada and suggest the potential importance of sustainably managed certified forests in meeting global conservation objectives.

Keywords: sustainable forest management, climate, carbon, conservation

Introduction, scope and main objectives

The Sustainable Forestry Initiative (SFI) is an independent, non-profit organization, with a mission to advance sustainability through forest-focused collaboration (SFI 2021a). SFI collaborates with our diverse network of forestland owners, forest sector businesses, brand owners, conservation groups, resource professionals, educators, local communities, Indigenous Peoples, governments, and universities, to provide solutions to local and global sustainability challenges.

Active and engaged conservation research has been a critical element of SFI's work since its inception in 1995, as an organization focused on certification and labeling of sustainable forest management practices and forest fiber procurement. Though SFI's mission has broadened, forest management certification, including a requirement to engage in relevant research, remains a critical work area to drive innovation in forest conservation. With more than 365 million acres/147 million hectares certified to the SFI Forest Management Standard in the United States and Canada, and tens of millions more influenced by SFI's unique Fiber Sourcing Standard (SFI 2021b), SFI-supported research provides opportunity to apply results toward improved conservation outcomes from sustainably managed forests at a continental scale.

To aid in better decision-making, and to demonstrate the value of sustainably managed forests, SFI sought to quantify the conservation benefits of SFI Forest Management certification and Fiber Sourcing, and the connection between sustainable supply chains and important conservation outcomes. By clarifying these conservation attributes, SFI will clarify the link between well-managed forests affected by the SFI program standards, and the public benefits that those forests provide.

To meet this objective, SFI initiated its "Conservation Impact Project" (SFI 2021c) through formal announcement at the World Conservation Congress in September of 2016. The Conservation Impact Project focuses its work on three thematic areas – climate change/carbon, biodiversity, and water – to build understanding of the critical conservation value of forests managed to the SFI standards and to facilitate continual improvement of SFI Certified Organizations and the management practices they employ. Conservation Impact enables Certified Organizations to convey and leverage conservation outcomes knowledgably, help conservationists have a deeper insight into the value of sustainable forest management, and help consumers make better choices for the planet. The Conservation Impact project supports research to identify best practices in pursuit of sustainability outcomes, and generates new partnerships throughout the research, academic and conservation communities. In turn, the results help inform the SFI Standards, and help make the case for the value of sustainably managed forests toward conservation. This paper will focus on Conservation Impact outcomes in the areas of climate change and biodiversity, and how those outcomes can inform conservation and sustainable forest management efforts.

Methodology/approach

In order to ensure drive research in Conservation Impact, SFI refocused its Conservation Grants program (SFI 2021d) to engender partnerships in support of enumerating conservation outcomes across the SFI Certified footprint. SFI also established a Conservation Impact "Sounding Board" to harness and focus the community of partners engaged in or seeking to inform SFI's Conservation Impact Project work. The Sounding Board has an "open-door" policy with an informal structure to facilitate the broadest engagement; in this way, it helps shape SFI's Conservation Impact Project work and promote interaction directly between project leaders and experts from a diversity of backgrounds. The Sounding Board helps to ensure credibility of the science and resonance of results with key audiences.

At the first Sounding Board meeting in June of 2015, the group recommended a refocus of the SFI Conservation Grants Program to help drive research relative to Conservation Impact. Further, the group recommended that the Conservation Impact Program should focus its efforts on three primary themes: climate change and carbon, biodiversity, and water, reflecting conservation themes which resonate across both conservation interests and the sustainable forest products value chain. SFI developed new guidance for the grants program and attracted several projects in 2016 to build understanding around these key themes. Additionally, SFI initiated "Direct Engagement" projects with several uniquely qualified partners, positioned to help us take some key projects to a large scale.

Results

As of October 2021, SFI has directly engaged in 37 projects which have taken place since 2015 at the initiation of the Conservation Impact Project (Table 1).

Table 1: Summary table of the number of projects completed through SFI's collaborative project (Conservation Grants and Direct Engagements). "Conservation Projects" are those specifically initiated under the auspices of the SFI Conservation Impact Project.

	Climate	Biodiversity	Water	Other	Total
Since the start of Conservation Impact (2015)	7	18	6	1	**32**
"Direct Engagement" projects	3	0	2	0	**5**
Total "Conservation Impact" projects	**10**	**18**	**8**	**1**	**37**

Taken together, these projects represent a significant investment toward understanding conservation outcomes and significant transfer of knowledge to the SFI network of partners and beyond (Table 2).

Table 2: Summary table of research dollars and outputs resulting from the Conservation Impact Project to date. Funds invested are separated by USD and CAD, depending on the country in which the organization that received the funds operated.

Conservation Impact Funding and Results (as of July 2021)		
SFI funds invested	$4,486,826 CAD	$4,196.134 USD
Total project funding costs	$14,214,366 CAD	$12,375,584 USD
Number of resulting peer-reviewed publications	25	
Number of technical reports	26	

Peer-reviewed publications covered a range of topics under the themes of climate change and carbon (3), biodiversity and animal ecology (9), and water quality and quantity (8), as well as covering various topics related to forest management (4), such as market influences, risk assessments, forest restoration and biomass harvesting. A full list of published papers is found at the end of this paper.

Discussion

SFI-sponsored projects toward the theme of "Climate Change and Carbon" suggest markedly different outcomes between SFI Certified forests in the United States versus Canada. In total, the SFI footprint in the U.S. stores a little over 20,000 MMT (million metric tonnes) of CO_2e (carbon dioxide equivalents) in the above ground forest biomass (trees, shrubs) and in the underlying soils. In contrast, in Canada where shorter growing seasons and substantially deeper soils are common, the SFI footprint stores over 22,000 MMT of CO_2e (based on only 18.3% of SFI Certified area in Canada sampled), suggesting the actual stored amount may be up to 5 times greater.

In contrast, carbon sequestration (or the annual rate of carbon accumulation in forests) shows the reverse trend of being much higher in the U.S. in contrast to Canada. The SFI footprint in the U.S. sequesters over 235 MMT of CO_2e annually, whereas in Canada the SFI footprint in the sequesters a much smaller 4.5 MMT of CO_2e. However, this is also based on 18.3% of SFI Certified area in Canada sampled, thus the actual amount may be up to 5 times that amount annually. All told, the North American SFI footprint stores at least over 44,000 MMT of CO_2e, enough to hold the emissions of over 9.5 billion cars annually. Further, the SFI footprint and sequesters annually well over an additional 240 MMT of CO2e (including on the entire U.S. footprint and 18.3% of the Canadian footprint combined). This is enough carbon capture to offset the emissions of over 52 million passenger vehicles annually.

Owing to the nature of forest management and forests in Canada and the United States, two separate projects were completed to generate the carbon results. The Canadian assessment included a sample of 18.3% of the SFI landbase in Canada spread across 5 provinces, using the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3). The GCBM is built on the Full Lands Integration Tool (FLINT), an open-source platform developed by an international team of experts, including the Carbon Accounting Team of the Canadian Forest Service. The moja global initiative (http://moja.global) formed as a project under the Linux Foundation to develop and support open-source scientific software for the improvement of GHG emission and removal estimates in the land sector.

For the U.S., forest carbon estimates came from data collected by the us Forest Service's Forest Inventory and Analysis (FIA) program (http//fia.fs.fed.us). Estimates of carbon per acre across all private and state/local (public) ownerships were applied to acres of SFI Forest Management certified lands. FIA data are collected from field plots across all ownerships. A portion of plots are measured in each state every year. In general, states in the eastern U.S. take S-8 years for a complete measurement, and states in the western US take 10 years.

Additional climate- and carbon-related collaborations under the SFI Conservation Impact Project also addressed elements of Best Management Practices (BMP) implementation for carbon values (Nave et al 2019), which contributed to the development of tools and models to help better manage carbon on SFI Certified forests (unpublished report - Manomet 2020, Ontl et al. 2019). These studies collectively revealed some important findings about the contributory value of SFI Certified forestlands toward mitigating climate change impacts:

- Conserving forested landscapes as managed forests is equally or more effective at maintaining landscape connectivity under future climate change scenarios than landscape restoration efforts, while continuing to generate economic and community benefits. Working with partners at North Carolina State University, this work demonstrated the value of maintaining forests for connecting landscapes in a changing climate (Mozelewski 2021).
- SFI collaborated with partners to develop checklists, recommendations on tools and techniques for monitoring climate change and forest response, and a structure for the integration of climate factors into forest management plans which help provide a stepwise approach to the evaluation of forest management vulnerabilities to changes in climate, disturbance regimes and vegetation (unpublished report - Manomet 2020, Ontl et al. 2019).
- SFI certification provides a good framework for landowners wishing to enter carbon markets, with significant tools and metrics in place to provide assurances to carbon market regulators of carbon being stored in SFI Certified forests, although some additional requirements are needed to enter markets (unpublished report - Keeping Maine’s Forests 2017, unpublished report – COCO 2019).
- SFI collaborated with partners to develop a methodology for sampling peat in forested wetlands. On the one boreal landscape where it was tested, over 250 million Tonnes of soil organic carbon was stored within wetlands. Wetlands on SFI Certified forests are conserved and protected, and often make up a small fraction of the landscape but contain most of the

soil carbon (unpublished report - SRC 2019).

Learnings from this work have also contributed to SFI's inclusion of a new Climate Smart Forestry objective within the newly adopted 2022 SFI Standards and Rules (SFI 2021e).

It is worth noting that biodiversity as a concept is challenging to define and to measure (NCASI 2011). Biodiversity has been variously defined, with over 100 published definitions (Bunnell 1998; DeLong 1996). Most definitions are broad, owing to the breadth and variety of biodiversity, depending on the ecological scale and level within the biological hierarchy examined (Cairns and Lackey 1992). For example, McNeely (1988) defined biodiversity as "the degree of nature's variety", whereas Hughes and Noss (1992) defined it as "the variety of life and its processes". Generally, biodiversity is recognized at four primary scales: 1) genetic diversity within a species; 2) species diversity in a given area; 3) ecosystem diversity, accounting for the diversity of ecological processes and habitats in a region; and 4) landscape diversity, or the spatial heterogeneity within a larger region (Noss 1989; Norse et al. 1986; OTA 1987).

The SFI Conservation Impact Project has made specific efforts to support projects that focus on quantifying biodiversity at a landscape scale and exploring the linkage between the types and attributes of SFI Certified forests that support and maintain biodiversity. Collaborations with NatureServe have endeavored to develop biodiversity metrics for application to SFI Certified forests in North America, with results ultimately tested on 4 different study areas, with remarkably consistent results. SFI Certified forests (on all study areas) contain suitable areas and predicted suitable areas for critically imperiled or other species of concern. Furthermore, SFI Certified forests overlap significantly with local, regional, and national conservation priorities, and serve to support conservation outcomes in those areas. Finally, SFI Certified forests provide a mix of ecosystems within their boundaries, providing a diversity of forest cover types that support a wide range of forest-dwelling species (unpublished report - Natureserve 2019).

The SFI Conservation Impact Project has also collaborated on a number of projects that focused on species or taxonomic groups (e.g., woodland caribou, Denryter et al. 2016). Other projects have been limited to broader taxonomic groups, as a specific means evaluate contributory value to biodiversity (e.g., "forest birds", unpublished report ABC 2021). Although such projects results are more difficult to translate broadly across the entirety of the SFI footprint in North America, due to differences in species, wildlife communities and forests, consistent findings suggest an overall contribution of managed forests to conservation goals across numerous species groups and geographies. These studies collectively revealed some important findings about the contributory value of SFI Certified forestlands toward biodiversity:

- SFI Certified lands in the Southeastern US support a diversity of birds, as well or better than the surrounding landscape. All 11 of the project's focal species were represented on SFI Certified Lands within the study areas. For some focal species (particularly Prairie Warblers), SFI Certified lands provided as good and, in several cases, better habitat than did surrounding landscapes (ABC 2021).
- SFI Certified lands support equal or higher avian diversity compared to forest lands not certified to SFI (BAM 2020). This work also led to the development of an online SFI Conservation Value Assessment tool to help understand the value of SFI Certified sustainable forest management for bird biodiversity (BAM 2021).
- SFI Certified forests provide good opportunities and provide protection for seasonal small water bodies or "vernal pools", which unique qualities provide habitat for a diversity of

plants and animals. As important elements of biodiversity, SFI collaborated with partners to better track and quantify these features using LiDAR, and to better understand their seasonal dynamics (Roux et al 2021).
- SFI collaborated with partners to develop and refine the application of LiDAR technology to estimate biodiversity in forested landscapes. Although this technology requires significant effort, it can effectively quantify the diversity of plant species (Gan et al. 2020).

Conclusions/ wider implications of findings

SFI's Conservation Impact Project has confirmed, through collaborative research, the importance of third party audited SFI Certified forestlands to meeting critical climate and biodiversity objectives in managed forests of the United States and Canada. The large scale of SFI Certified forests (365 million acres, or 147 million ha) particularly provide unique opportunities relative to wide ranging species, species at risk, species reliant on early successional types, and elements of biodiversity that require attention at landscape scale, such as large-scale diversity of composition and structure.

These certified forests also serve as an engine for the capture and storage of carbon, as demonstrated by Conservation Impact research. With the newly adopted Climate Smart Forestry objective, SFI Certified forestlands will assuredly continue to provide such benefits, and do so with increasing intentionality and measurable outcomes in the future. Beyond carbon values, SFI's Conservation Impact studies make clear that these forests provide a measure of adaptability in the face of multiple future scenarios which could result from a changed climate. Although these studies were limited to SFI Certified forests of the United States and Canada, they imply similar potential values relative to credibly certified forests globally.

Since certified forests provide a wide range of attributes ranging beyond climate and biodiversity, to include generation of products, protection of water resources, provision of livelihoods and quality of life, etc. these findings should be considered as evidence of the broader contribution of such forests to a wide range of human and environmental goals. Because credible certification includes verification from independent third-party audits, these conservation values can be assured with a high level of certainty. Given the scale of managed forests globally, credible forest certification should be considered an integral element of global conservation strategies, additive to the critical values provided by protected areas.

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LandVest, LP Building Products, Lyme Timber Company, Maryland Department of Natural Resources, McShan Lumber, Molpus Woodlands Group, Plum Creek Timber Sale, Rayonier, Resolute Forest Products, Resource Management Service, Spruce Products Ltd., The Westervelt Company, Tolko, West Fraser, Weyerhaeuser

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