Andrews Forest LTER8 Annual Report Template

Year 3 (Nov 1, 2022 – Oct 31, 2023)

*You may use this template to organize your report on your activities and research associated with the last year of the Andrews Forest LTER8 grant. This template covers what is required of NSF via the Research.gov reporting system.*

***Upload your information to the*** [***online form***](https://docs.google.com/forms/d/e/1FAIpQLSehPEbdrYi7xHjWZGp_siAkKxboCSSjlCaBg7RZb_FRn-0MxQ/viewform?usp=sf_link)***.***

Accomplishments

TITLE OF YOUR PROJECT: Canopy microclimate and physiology

**Major Activities:**

Published a paper arguing that widespread foliar damage following the June 2021 Heat Dome was driven primarily by heat damage and not needle desiccation and drought damage (Still et al. Tree Physiology *43*(2), 203-209, 2023)

Submitted a proposal to NSF on heat stress physiology in December 2022 (unfunded, but we plan to re-submit in early 2024)

Worked on overview manuscript assessing impacts of the June 2021 Heat Dome on tree physiology and growth, primarily through analysis of dendrometry data at the Andrews

Research on canopy leaf microclimate and stem dendrometry was negatively affected by the Lookout fire – I was unable to access trees to download sensors and am unclear which trees and sensors survived the fire.

**Specific Objectives:**

Submit revised collaborative proposal to NSF on heat stress in Douglas fir

Work with new MS Student, Gabby John, and Mark Shulze to prepare and analyze electronic dendrometer data against long-term climate datasets to better understand growth and water status dynamics of old-growth trees across the landscape. Compare point to band dendrometer data on trees instrumented with both types.

When possible, assess impact of Lookout Fire on instrumented trees and if necessary, re-install new sensors on same or new old trees at contrasting landscape positions.

**Significant Results (including major findings, developments, or conclusions):**

Still et al. paper showed that widespread foliar damage following the June 2021 Heat Dome was driven primarily by heat damage and not needle desiccation and drought damage as was suggested by an earlier analysis

**Key outcomes or other achievements:**

Prior to the Lookout fire, I worked with Mark Schulze and Adam Sibley to install vertical microclimate and dendrometer sensors in old-growth trees in contrasting landscape positions across the Andrews Forest to better understand how microclimate and tree responses vary spatially

What opportunities for training and professional development has the project provided? (From NSF "For NSF purposes, please summarize the contributions to the research and teaching skills and experience of those who have worked on the project, including undergraduate students, graduate students, post-docs, college faculty, and K-12 teachers. If your project supported postdoctoral researchers, then you must include a summary of the mentoring activities conducted.")

An OSU postdoctoral scholar, Adam Sibley, was employed part-time on this project in the 2022 summer.

Still worked with a Professor at Southern Oregon University (Dr. John Gutrich) to submit a successful ROA award that will fully fund one undergraduate and partially fund two other undergraduate students at his university.

How have the results been disseminated to communities of interest? (From NSF: "Describe how the results have been disseminated to communities of interest. Include any outreach activities that have been undertaken to reach members of communities who are not usually aware of these research activities, for the purpose of enhancing public understanding and increasing interest in learning and careers in science, technology, and the humanities.")

My chapter on Heat Dome impacts work published in Sixth Oregon Climate Assessment (“Impacts of the June 2021 Heat Dome on Pacific Northwest Forests” by Chris Still, Linnia Hawkins, and Adam Sibley). DOI Oregon Climate Assessment: [https://doi.org/10.5399/osu/1161](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.5399%2Fosu%2F1161&data=05%7C01%7CChris.Still%40oregonstate.edu%7C8d4c94296f884982ae0508dafd929423%7Cce6d05e13c5e4d6287a84c4a2713c113%7C0%7C0%7C638101103242611946%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=SGxdh5x8Yziet3DkBT2F08XOnTLJHZTZqIsj2x12NCE%3D&reserved=0)

Was interviewed by Mark Mason for his radio program on KEX about heat and forest impacts

Paper on Heat Dome was covered on the front page of the Seattle Times (https://www.seattletimes.com/seattle-news/environment/how-extreme-heat-scorched-pacific-northwests-evergreen-trees/)!

Spoke with Sarah Trent, reporter with HCN, about Tree Phys commentary. Story published: <https://www.hcn.org/articles/north-forests-in-the-once-cool-forests-of-the-pacific-northwest-heat-poses-a-new-threat>

ESA conference presentations:

*Widespread foliage scorch in the wake of the 2021 heat dome heat wave in the Pacific Northwest: patterns, drivers of vulnerability, and lessons for future heatwaves*

Adam Sibley et al.

*Impacts of the June 2021 Heat Dome event on trees and forests of the Pacific Northwest, USA*

Still et al.

Gave talk at Andrews Monthly meeting (“*Impacts of the June 2021 Heat Dome on the H.J. Andrews Experimental Forest and Forests of the PNW*”)

Co-presented with Dave Shaw on “Firmageddon” and Heat Dome impacts at the Andrews Forest to the Academy for Lifelong Learning in Corvallis, OR

Gave a talk on extreme heat impacts at the Oregon Maple Conference the University of Portland

What do you plan to do during the next reporting period to accomplish the goals?

(From NSF: "Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.")

Work with new MS Student, Gabby John, and Mark Shulze to prepare and analyze electronic dendrometer data against long-term climate datasets to better understand growth and water status dynamics of old-growth trees across the landscape. Compare point to band dendrometer data on trees instrumented with both types.

Assess impacts of Lookout Fire on canopy microclimate and physiology project and determine a plan for how to proceed

**Products**

Please send your Andrews Forest LTER related publications (as PDFs) to [hjapubs@lists.oregonstate.edu](mailto:hjapubs@lists.oregonstate.edu)

List any products resulting from your project during the specified reporting period, such as:

**Journals:**

**Books:**

**Book Chapters:**

**Thesis/Dissertations:**

**Conference Papers and Presentations:**

**Other Publications:**

**Technologies or Techniques:**

**Websites:**

**Other Products:**

Participants

You must list participants who have worked one month or more for the project reporting period. There are no limits on the number of participants you list for this section.

What individuals have worked on the project?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Email** | **Most senior project role** | **Nearest person month worked** | **Contribution to project** | **Funding support** |
| Chris Still | Chris.still@oregonstate.edu | Primary Investigator | 1 | Advising, help with field work and manuscript revisions |  |
| Mark Schulze | Mark.schulze@oregonstate.edu | Co-PI | 1 | Field work and manuscript revisions | None |
| Adam Sibley | Adam.m.sibley@gmail.com | Postdoctoral scholar | **1** | Field work, data analysis, manuscript preparation | Partial summer salary support |

**What other organizations have been involved as partners?**

* Type of Partner Organization (choose from: academic, nonprofit, industrial or commercial, state or local government, schools, other)
* Name
* Location
* Partner’s contribution to the project (choose from: facilities, personnel, In-kind, collaborative, other)

**Have other collaborators or contacts been involved?**  (Some significant collaborators or contacts within the recipient's organization may not be covered by "What people have worked on the project?" Likewise, some significant collaborators or contacts outside the recipient's organization may not be covered under "What other organizations have been involved as partners?" For example, has there been any:

* collaborations with others within the recipient's organization; especially interdepartmental or interdisciplinary collaborations;
* collaborations or contact with others outside the organization; and
* collaborations or contacts with others outside the United States or with an international organization

Impact *From NSF: "This component will be used to describe ways in which the work, findings, and specific products of the project have had an impact during this reporting period."* Do the best you can. Brief is encouraged.

**What is the impact on the development of the principal discipline(s) of the project?** (From NSF: "Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research and/or pedagogical methods in the principal disciplinary field(s) of the project. Provide postdoctoral mentoring or other mentoring.")

Our findings highlight the importance of microclimate as it relates to the physiology of upper canopy leaves and tree growth, and in particular their tolerance to heat and moisture stress.

**What is the impact on other disciplines?** (Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.)

**What is the impact on the development of human resources?** (For purposes of NSF, this should address "all efforts to broaden participation in science and engineering." How has the project provided opportunities for research, teaching and mentoring in science and engineering areas?

**What was the impact on teaching and educational experiences?** (Describe how the project made an impact or is likely to make an impact on teaching and educational experiences. For example, has the project: developed and disseminated new educational materials; led to ideas for new approaches to course design or pedagogical methods; or developed online resources that will be useful for teachers and students and other school staff?

**What is the impact on physical resources that form infrastructure?** (Describe ways, if any, in which the project made an impact, or is likely to make an impact, on physical resources that form infrastructure, Including physical resources such as facilities, laboratories, or instruments.)

**What is the impact on institutional resources that form infrastructure?** (Describe ways, if any, in which the project made an impact, or is likely to make an impact, on institutional resources that form infrastructure, such as establishment or sustenance of societies or organizations.)

**What is the impact on information resources that form infrastructure?** (Describe ways, if any, in which the project made an impact, or is likely to make an impact, on information resources that form infrastructure. Include information resources, electronic means for accessing such resources or for scientific communication. Information resources should include data services and preservation.)

**What is the impact on technology transfer?** (Describe ways in which the project made an impact, or is likely to make an impact, on commercial technology or public use.)

**What is the impact on society beyond science and technology?** Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world.

This work helps to inform society about the impact of extreme heat events - made more likely and worse by anthropogenic climate change - on our forest ecosystems