



STUDENT SUSTAINABILITY COMMITTEE

Funding Application – Step II

Funding Criteria

A. General Rules

1. Students, faculty, and staff are encouraged to submit requests for funding. Student-led projects require a faculty or staff sponsor in order to have funds awarded.
2. Funding can only go to university-affiliated projects from students, faculty, staff, and departments.
3. All SSC projects must make a substantial impact on students. This may be a direct impact or an impact through education and engagement. All SSC funding is 100% from student green fees, so the projects funded by the students must benefit them.
4. SSC encourages innovation and new technologies – creative projects are encouraged to apply.
5. Unless a type of expense is specifically listed below as having restrictions, SSC can generally fund it. The items referenced below should not be taken as comprehensive list.

B. Things SSC Can Fund, On A Case-By-Case Basis

1. SSC can fund feasibility studies and design work; however, it must work toward ultimately addressing a sustainability need on campus.
2. SSC can fund staff positions that are related to improving campus sustainability. Strong preference will be given to proposals receiving matching funding from departments and/or plans for maintaining continuity of the position after the end of the initial grant.
3. SSC can fund outreach events with a central theme of sustainability, provided their primary audience is the general campus community.
4. SSC discourages funding requests for food and prizes but will consider proposals on a case by case basis that prove significant reasoning.
5. SSC can fund repairs and improvements to existing building systems as long as it works toward the goal of improving campus sustainability; however, a preference is shown to projects utilizing new or innovative ideas.
6. SSC can provide departments with loans for projects with a distinct payback on a case by case base. Loans will require a separate memorandum of understanding between SSC and departmental leadership pledging to repay the award in full and detailing the payback plan.

C. Things SSC Will Not Fund:

1. SSC will not fund projects with a primary end goal of generating revenue for non-University entities.
2. SSC will not fund personal lodging, food, beverage, and other travel expenses.
3. SSC will not fund any travel expenses.
4. SSC will not fund tuition or other forms of personal financial assistance for students beyond standard student employee wages.

Your Step 2 funding application should include this application, the supplemental budget form, and any letters of support.

Please submit this completed application and any relevant supporting documentation to Sustainability-Committee@illinois.edu. The Working Group Chairs will be in contact with you regarding any questions about the application. If you have any questions about the application process, please contact the Student Sustainability Committee at sustainability-committee@illinois.edu.

General & Contact Information

Project Name: A student-driven recensus of the Trelease Woods Forest Dynamics plot

Total Amount Requested from SSC: \$72,721

Project Topic Areas: Land & Water Education Energy
 Transportation Food & Waste

Applicant Name: Prof. James Dalling

Campus Affiliation (Unit/Department or RSO/Organization): Department of Plant Biology

Email Address: dalling@illinois.edu

Check one:

- This project is solely my own **OR**
 This project is proposed on behalf of (name of student org., campus dept., etc.):

Project Team Members

Name	Department	Email
Prof. James Dalling	Dept Plant Biology	dalling@illinois.edu
Prof. Jennifer Fraterrigo	Dept. NRES	jmf@illinois.edu
Mr. James Ellis	Prairie Research Institute	jellis@illinois.edu
Name	Department/Organization	Email Address

Student-Led Projects (Mandatory):

Name of Faculty or Staff Project Advisor:

Advisor's Email Address:

Financial Contact (Must be a full-time University of Illinois staff member)

Contact Name: Penny Broga

Unit/Department: School of Integrative Biology

Email Address: broga@illinois.edu

Project Information

Please review the proposal materials and online content carefully. It is highly recommended you visit a working group meeting sometime during the proposal submission process.

Please provide a brief background of the project, its goals, and the desired outcomes:

You may copy and paste your Step 1 application answer if nothing has changed.

Trelease Woods is an exceptionally rare example of undisturbed, old growth eastern deciduous forest in Illinois. A university property since 1917, it has a long history of ecological research, making it one of the most studied forests in North America. Highlights include transformative work on food webs, forest succession, and climate change effects on phenology (leaf flush and flowering of trees and forest herbs). Unique datasets exist on the vegetative composition of Trelease dating back to the 1920s, however until 2018 there was no complete tree inventory of the forest. With SSC support we trained 70 students that over 3 years mapped, measured and identified every tree (31,980 individual trees) using the standardized protocol of ForestGeo – a global network of forest dynamics plots coordinated by the Smithsonian Institution. Trelease Woods is now the 73rd plot to join this network (<https://forestgeo.si.edu/sites/north-america/trelease-woods>). Completion of this census has allowed us to provide hands-on training opportunities in forest ecology to an unprecedented number of undergrads from four different UIUC colleges. It also leveraged funding from the Provost's Initiative on Teaching Advancement and Integrative Biology to support an RA to generate class projects for >300 undergrads a year to use data from the census in IB203,372, and NRES219.

Inclusion of Trelease Woods in the ForestGeo network requires us to recensus Trelease Woods every five years. This allows researchers from around the world to synthesize data on how forest ecosystems are changing. A critical component of this work is to determine what role forests play as either carbon sources or sinks in the global carbon budget. Recensusing Trelease will also contribute to local-scale carbon monitoring efforts, helping campus determine carbon storage trends for this property. Accordingly, in Fall 2023 we will recensus Trelease using the same protocol as 2018. We will remeasure all trees to record tree growth and mortality and add new trees that have grown large enough to be included in the census. This is a key step in establishing the Trelease Woods plot. Our recensus will provide

- Training for an additional 50+ undergraduate census workers during Fall semester 2023, Spring 2024 and summer 2024
- The first measurement of forest growth and mortality for Trelease
- New undergrad research opportunities to track changing carbon storage patterns in forests
- Opportunities to educate students on the critical importance of forest conservation in reducing carbon emissions and mitigating the effects of emissions of atmospheric CO₂ levels.

Where will the project be located? Are special permissions required for this project site?

If special permission is required for this location, please explain and submit any relevant letters of support with the application.

Trelease Woods is approximately 2 miles north and east of Urbana and has been a university owned and managed property since 1917. The 60-acre old growth forest is under the management of University of Illinois Natural Areas. The Natural Areas Coordinator responsible for stewarding Trelease woods is Mr. James Ellis. Mr. Ellis is a project team member and played a key role in the first census of the woods. Permission to tag and map all trees in Trelease Woods was obtained from the UI Committee on Natural Areas ahead of the first census.

Although the site is close to campus there is no public transport that can be used to access Trelease. For the first census (2018-21) we rented a university vehicle for undergraduate student use (paid for by the School of

Integrative Biology). This will continue during the recensus. For safety, the vehicle will remain at the site at all times while students are in the forest.

Other than the project team, who will have a stake in the project? Please list other individuals, groups, or departments affiliated directly or indirectly by the project. This includes any entity providing funding (immediate, future, ongoing, matching, in-kind, etc.) and any entities that benefit from this project.

Please attach letters of commitment or support at the end of the application.

Primary beneficiaries of this project will be undergraduate students in ACES – Department of Natural Resources and Environmental Sciences, and LAS – School of Integrative Biology. Students participating in the forest census are drawn primarily from these units, although we have advertised widely on campus, and have attracted students from other majors (e.g., School of Earth, Sustainability and Environment concentration in Earth’s Biosphere and Ecology, Landscape Architecture and the School of Business). We aim to establish a diverse mix of students (major, family background, race and ethnicity) among the census crews.

One primary goal of the initial census was to add Trelease Woods to the global Forest Geo plot network, which currently includes forests associated with Washington University St Louis, Indiana University and the University of Michigan. Trelease Woods has now been successfully added to this network as the 73rd research site (<https://forestgeo.si.edu/sites/north-america/trelease-woods>). Trelease has therefore become a new hub in the largest global forest monitoring network. Under the Forest Geo model, plot PIs entering the Forest Geo network make a commitment to repeat surveys every five years. In return, data from the ForestGeo plot are available for forest ecology researchers world-wide, who either use the data directly, or propose network-wide experiments or analyses that plot partners (including undergraduate students) can engage in. Additionally, students trained in census techniques are well positioned for other forest inventory jobs. For example, students trained in the Trelease census have been invited to work on the Luquillo forest plot recensus in Puerto Rico and the Tyson forest dynamics plot in St. Louis.

As described in the section below, LAS and NRES also have a stake in this project because use of the Trelease Woods census data has been integrated into our core ecology course offerings. With the advent of the recensus dataset students will be able to track how carbon storage has changed in Trelease over the last five years and explore patterns of tree mortality following the arrival of the emerald ash borer (an insect pest that has killed the vast majority of ash trees since 2017).

How will this project involve and/or benefit students?

This includes both direct and indirect impact.

This project impacts a very large number of students in IB and NRES either directly through participation in project activities, or indirectly, through integration of the Trelease census into the undergraduate ecology curriculum.

Student involvement in the Trelease recensus consists of three groups:

(1) The plot recensus team. Based on the initial census (which trained 70 students) we anticipate that ~50 undergraduate students will be involved in the (shorter, faster, and less expensive) recensus of Trelease Woods. Typically, students directly involved in the recensus spend 4-8 hours per week in the forest through the Fall and second half of the Spring semester, or as hourly workers through the summer. These students are trained in forest census work, tree species identification, data entry and data checks by the project team members and by a graduate student coordinator (supported by an RA). In addition to field activities, students

will also be provided opportunities to use a series of data science modules that we have developed specifically for manipulation and analysis of Trelease woods data.

(2) Undergraduate students doing independent research. During the first census several students elected to continue working in Trelease after completing a semester in the census team. These students earned independent research credit and worked on completing additional components of the carbon budget (soil and woody debris fractions). We anticipate that a subset of students involved in the recensus will also wish to follow up their involvement in the census with an independent research project.

(3) Undergraduate students taking ecology classes in NRES and SIB. After completion of the first census in 2021 we received funding from the Provosts Initiative for Teaching Advancement (PITA) and matching funds from the School of Integrative Biology to create lesson/lab plans for introductory ecology classes that use the Trelease census dataset to learn data science skills in the R programming environment, and to use analysis of the data to test hypotheses in the field. This hybrid data science/field ecology approach generates translatable data science skills while at the same time generating opportunities for students to engage in forest ecology research. This is a significant step from previous class activities in Trelease. Students will first work with the census data to identify a testable hypothesis, then go to Trelease, spend time in the forest collecting information from mapped trees and then finally analyze and present the data they have generated. More than 200 students a year will engage with these projects through NRES and SIB classes. A recensus of the plot, providing the first forest dynamics data (tree growth, mortality and recruitment) will allow us to expand the range of lab activities significantly. We propose to use the project RA's time during the first half of Spring semester 2024 (when it is too cold for students to go to the field) to build on the existing set of ecology class projects that we have developed.

How will you bring awareness and publicize the project on campus? In addition to SSC, where will information about this project be reported?

We are requesting support for this project at this time so that we have adequate time to publicize this opportunity to undergraduate students during the spring semester. We will give presentations to classes in Integrative Biology and NRES promoting research opportunities in Trelease Woods (IB150 Organismal and Evolutionary Biology; IB203 Ecology; NRES 219) and at the Integrative Biology Fall welcome for first-year students. We will also use online media (e.g. SIB twitter account), the SIB spotlight weekly newsletter and IB Discord channel. We will publicize the project in the NRES newsletter and solicit interest through NRES student advisors. This publicity will be used to invite students to attend informal information sessions about the census and an exploratory field trip to Trelease woods.

We will reach the broader student community by highlighting research opportunities at Trelease in the general education NRES course NRES 105 - Climate Change and Ecosystems. This course reaches 300 students on average from the College of Business, Engineering, LAS, Fine & Applied Arts, DGS, Media, and ACES. Additionally, we will use the news story in the LAS alumni newsletter and a video produced by the LAS communications team to promote the project. The video story is available on the SIB website: sib.illinois.edu/news/130.

We will also meet with the RSO group Students for Environmental Concerns to highlight opportunities for students to participate in the census in 2023 and become involved in independent research.

The Trelease Woods site, and its unique funding structure, has also been highlighted through ForestGeo media. There is a dedicated webpage about the site (<https://forestgeo.si.edu/sites/north-america/trelease->

[woods](#)). In addition May 2022 Dalling gave a seminar introducing the Trelease Woods to the ForestGeo science community (<https://forestgeo.si.edu/seminar-series-past-speakers>)

Financial Information

In addition to the below questions, please submit the supplemental budget spreadsheet available on the Student Sustainability Committee [website](#). Submission of both documents by the submission deadline is required for consideration of your project.

Have you applied for funding from SSC before? If so, for what project?

We received two sets of funding from SSC in 2018 and 2020 which in large part supported the establishment of the Trelease woods census plot.

If this project is implemented, will you require any ongoing funding required? What is the strategy for supporting the project in order to cover replacement, operation, or renewal costs?

Please note that SSC provides funding on a case by case basis annually and should not be considered as an ongoing source of funding.

We anticipate that the costs of continuing censuses of Trelease woods will diminish with time. The first (2018) census was particularly long as each tree had to be mapped individually, and permanently marked with paint and numbered tags. The length and materials cost of the recensus will therefore be significantly lower for the recensus. However, the first recensus typically also highlights problems with the initial census that need rectifying (for example trees that were missed, mapped or identified incorrectly). A major part of this census work will therefore be spent by the RA editing and updating the data. For future censuses (after 2023) we will also request supplementary funding directly from ForestGeo. Funding opportunities from ForestGeo are currently closed (<https://forestgeo.si.edu/training-and-fellowships/grants-program>).

Please include any other obtained sources of funding. Have you applied for funding elsewhere?

Please attach any relevant letters of support as needed in a separate document.

As SSC does not pay for travel expenses, during the last census PI Dalling paid for all transport costs associated with travel by undergraduate students to Trelease Woods from his own research funds. This amounted to >\$2000. Dalling will cover these costs for the recensus. In addition to mileage covered by Dalling's ICR account, the School of Integrative Biology provides a vehicle for student travel.

Environmental, Economic, and Awareness Impacts

How will the project improve environmental sustainability at the Urbana-Champaign campus? If applicable, how does this project fit within any of the [Illinois Climate Action Plan \(iCAP\)](#) goals?

This project addresses iCAP goals in the area of Agriculture, Land Use, Food, and Sequestration related to determining the carbon sequestration value of existing university plantings. While the focus of iCAP is to inventory trees and other plantings on the main campus, the university also manages a network of natural areas that sustain carbon-rich old-growth forest. These provide a benchmark of soil and biomass carbon storage of natural vegetation in the C-U area for comparison with new plantings, and will provide information on the carbon storage potential of native species introduced into campus planting initiatives. Graduate student Jennifer Alvarez, working with project PIs Fraterrigo and Dalling is currently working with the current and historic Trelease census data to determine how different native species have contributed to carbon storage in Trelease Woods. We have also been in contact with Mr. Brent Lewis, coordinator of the campus tree inventory, to ensure that data collected at Trelease and on campus are comparable. A full set of the Trelease census data are now available for integration with the campus tree inventory project.

How will you monitor and evaluate the project's progress and environmental outcomes? What short-term and long-term environmental impacts do you expect?

Some examples include carbon emissions, water conservation, green behavior, and reduced landfill waste.

The first census of Trelease provided the core data needed to determine biomass carbon storage in Trelease woods. These data have already been incorporated into core ecology classes. For example, IB203 students measure tree diameters in secondary forest and compare carbon storage to that recorded by our project in Trelease woods. Our above ground biomass data has also now been combined with soil carbon data collected during 2021/22 provide a total ecosystem carbon estimate. However, the next goal is to determine how carbon storage is changing in Trelease. Is it increasing, static or declining? Large-scale mortality of ash trees in Trelease, starting in 2017, is likely to have significantly reduced standing forest biomass. We will measure changes in biomass carbon at Trelease in the next census and apply this information to other similar woodlands that are part of the university's network of natural areas - including Brownfield, Hart, Rutan, Richter and Funk Woods and the Vermillion River Observatory. In total the university manages 224 ha (553 acres) of mature or late secondary forests. Future student projects can sub-sample from these woodlands in conjunction with Trelease Woods data to generate carbon storage estimates for all university wooded areas.

The first project milestone will be completion of remeasuring all woody trees in the Trelease plot, and the mapping and measuring of all new recruits to the tree population. We anticipate finishing this in Summer 2024.

The second milestone will be the completion of data quality checks on the full Trelease dataset, including review of species identifications for hard to identify species (elm, ash and hickory species). We anticipate finishing this in Fall 2024.

The third project milestone will be integration of the recensus dataset into materials available of analysis by undergraduate students. We anticipate that this will be completed by fall 2024 in time for use during fall semester classes (IB203 and IB372) where students do project work in Trelease woods. Completion of the second census will allow students to work on group projects directed by TAs and professors that run these courses, or as independent research projects mentored by Dalling and Fraterrigo. Examples of potential

projects that students can explore include: How does tree mortality vary from the edge to the interior of Trelease Woods? Do trees in the neighborhoods of dead elms grow faster (increase light availability) or more slowly (canopy damage from falling trees)? Which tree species contribute most to ecosystem carbon storage?

Beyond these milestones there are several potential impacts of the census that can be measured over the long-term:

(1) Contribution of Trelease to our understanding of regional and global carbon budgets. We welcome collaboration with other members of the ForestGeo science community. A measurable environmental impact will be the extent that the Trelease data are used in, and contribute to, science and policy papers that address climate change effects and mitigation measures associated with managing or enhancing forest cover. For example, we were contacted in November 2022 by Brazilian researchers from the University of São Paulo who wish to use the Trelease dataset to study the functional role of rare species in global forests.

(2) Contribution of census activities to the training of the next generation of environmental scientists. Work on the Trelease census will provide a diverse pool of students with experience and transferable skills which are likely to impact their career choices and career success. We maintain a database of census participants to permit long-term engagement with these "Trelease alumni", and provide them with news on opportunities for careers and additional internship opportunities through the ForestGeo network. For example, we recently sent out opportunities to students to work in ForestGeo plots in Virginia, Puerto Rico, and St. Louis. We will consult with CITL and Illini Success on developing surveys of students engaged in the census before and after working on the plot to determine how the experience has influenced attitudes towards, and preparedness for careers in ecology and environmental science.

(3) Adoption of management for iCAP objectives from Trelease data. Data from the recensus, will provide growth data for native species indicating which species can maximize carbon sequestration. An additional impact will be the extent to which Trelease Woods census data informs planting designs and species choice for restoration and carbon sequestration on campus. We will therefore make Trelease data available to campus leaders and faculty involved in iCAP activities, in particular the Land and Water iCAP Team.

(4) Additionally, we will seek to use Trelease data to inform tree planting decisions in the neighboring cities. . Dalling has been invited to apply to serve on the Urbana Tree Commission, which oversees tree planting policy. There is therefore an opportunity to advance policy in the cities to favor plantings both to support native biodiversity and to maximize carbon sequestration. To that end, Fraterrigo will also share information about the census with the Resilience iCAP Team, which includes representatives from Urbana, Champaign, and Savoy.

What are your specific outreach goals? How will this project inspire change at UIUC?

Our project is able to reach an exceptional number of students - either through direct participation in the Trelease recensus, or through the use of recensus data in IB and NRES classes. We anticipate that we will reach >200 students per year through these experiences, highlighting the importance of natural forest, and nature-based solutions, in mitigating climate change effects through carbon storage and by highlighting the importance of old-growth forest for biodiversity conservation. Links of our project to the ForestGeo forest monitoring network will also highlight to students the global significance of Trelease Woods as sentinel site for monitoring climate change effects on forests world-wide.

If applicable, how does this project impact environmental injustice or social injustice?

Deforestation is a major contributor to global carbon emissions, while the 2022 Intergovernmental Panel on Climate Change report indicates that existing forests account for one third of the CO₂ emissions absorbed over the last decade. Deforestation rates are highest in poorest countries and disproportionately affect low-income and indigenous communities that depend on forest products. Efforts to reduce emissions from deforestation and degradation (REDD) depend on the ability to monitor forests both from remotely sensed data and from ground surveys. Our project contributes to training students from SIB and NRES with technical skills needed for forest monitoring.

Lab and field research experiences are also a critical step for undergraduate students in selecting careers. The ability to experience first-hand the work environment associated with ecological research can either motivate students to pursue career options in environmental sciences, or conversely help them reach a realization that they are better suited to other career paths. Participation in the Trelease Woods census may be the first opportunity that students that come from lower income backgrounds or under-resourced school districts have to work in a natural area, opening up possibilities for careers that they had not previously considered. This is particularly important because it is widely reported that under-represented minority (URM) students have a low rate of engagement in environmental sciences, and are therefore under-represented in environmental organizations (e.g. Taylor (2014) The state of diversity in environmental organizations https://orgs.law.harvard.edu/els/files/2014/02/FullReport_Green2.0_FINALReducedSize.pdf)