

Ecological Restoration Demonstration Site at the SNAIL Garden: a funding proposal submitted to the NAU Green Fund

Contact Information Project Leader: **Ashlee Simpson** Phone: **(520) 604-2488** E-mail: **acs267@nau.edu**

Project Advisor: **Rachel Mitchell** Phone: **(928) 523-4251** E-mail: **rachel.mitchell@nau.edu**

Sponsoring Department: **School of Earth and Sustainability (SES)**

Project name: **Ecological Restoration Demonstration Site at the SNAIL Garden**

NAU Department/Unit for funding reimbursements (Attach letter of commitment from departmental representative): **School of Earth and Sustainability (SES)**, see attached letter

Does this project involve space needs or construction on campus? **Yes** Have e i e d h e S a c e C i e e D c e c a e d G e l e d p a g e ? **Yes**

Executive Summary

The Society for Ecological Restoration (SER) defines *ecological restoration* as the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration practitioners work to promote biodiversity, environmental structure, and ecological function, as well as investigate the mechanisms and effectiveness of restoration.

The Society for Ecological Restoration at NAU (SER NAU) formed in fall 2018 as a registered student association of SER. We work to promote the mission of SER, which is to advance the science, practice, and ecological education to promote biodiversity, improve resilience in a changing climate, and re-establish an ecologically healthy environment. SER NAU seeks to engage undergraduate and graduate students, as well as faculty and staff, in ecological restoration education and hands-on projects on the NAU campus and throughout Northern Arizona.

In collaboration with Students Nurturing Alternatives in Landscaping (SNAIL), SER NAU proposes to further develop the immediate area around the existing SNAIL garden to include an Ecological Restoration Demonstration Site surrounding the SNAIL Garden footprint (see attached map).

The proposed Ecological Restoration Demonstration Site will serve as an educational tool to teach restoration techniques and engage students in ecological stewardship, while improving both the environmental function and aesthetics of an underused corner of NAU campus. We encourage a partnership between SER NAU and SNAIL and other campus and community collaborators to implement the practice of ecological restoration.

Specifically, establishment of an Ecological Restoration Demonstration Site will involve the following:

Purchase materials and tools to carry out project work Host biweekly SER NAU work days to meet project objectives:

Propagate native plants in the South Campus Greenhouse complex
Site preparation and hardscaping
Plant native seedlings/saplings and maintain native plantings
Directly seed site with native seed mixes
Construct rock swale and Zuni bowl for storm water management
Remove invasive nonnative species
Construct crushed gravel pathways
Host a series of half-day workshops to teach ecological restoration and permaculture landscape design techniques
Fund an undergraduate internship position
Design and install educational signage

The attached schematic with photo examples provides an overview of the project physical design.

The collaboration between SER and SNAIL leverages an overlap in the missions of both organizations, and seizes the unique opportunity to demonstrate how ecological restoration and sustainable food systems can be integrated to create resilient human and natural communities. Our two student groups are in close communication, and have signed a memorandum of understanding related to this partnership (attached).

Relationship to Carbon Neutrality/Green Fund Goals

1. Carbon Neutrality Goals - *Please review the Sustainable Action Plan for the University and identify how your project aligns with the goals of the SAP*

The project will align with the following objectives identified in the Sustainable Action Plan (SAP):

Water Conservation Our proposed project meets Objective 2 (*Implement Water Conservation Projects for Landscaping*) and Objective 3 (*Improved Storm water Management*) from the Water section of the SAP. The project would include planting native perennial plants that, once established, will require little to no supplemental water while providing aesthetic and ecological benefits. Additionally, the project will include micro-catchment and erosion control features that efficiently channel storm water run-off to promote infiltration of water into the soil. These water management features will enhance water conservation on campus. By demonstrating the beauty and efficacy of native plants and erosion control techniques, the project can serve as an on-campus laboratory to test and learn from alternative approaches to water-efficient landscaping. Additionally, the project aligns with the Landscape Master Plan south campus drainage guidelines. The project will enhance the natural drainage patterns in the area with small scale controls, including a swale and Zuni bowl, to evoke a sense of water while slowing and mitigating run-off from the adjacent parking lot. By slowing the water running off of the parking lots, the Ecological Restoration Demonstration Site will enhance infiltration and support native plantings surrounding the controls.

Operations The project also meets Objectives 2 (*Reduce the impact of chemicals used in operations of campus buildings and grounds*), 3 (*Increase conservation of on- and off- campus natural resources*) and 5 (*Function as a Living Laboratory*) from the Operations section of the SAP. To meet Objective 2, the expanded project site will be managed organically without herbicides or pesticides. We will maintain the site using

mechanical and non-toxic methods including manual weed removal and the use of mulch to help shade out potential weed species. In support of Objective 3, we will establish a diverse and attractive native plant community with restored hydrologic and ecosystem function where there is currently a weedy patch of nonnative vegetation. As a demonstration site, this project has been specifically designed in alignment with Objective 5: as a living laboratory, this site will be a place for students to engage in hands-on learning and discovery.

In accordance with the Landscape Master Plan, plantings will be selected based upon the mountain south campus Ponderosa Pine-Arizona Fescue habitat. Only native plants with appropriate water requirements will be used since these are important principles of restoration.

Academics and Research The project represents a new opportunity for NAU students, the campus community, and local organizations to engage and experiment in a living, outdoor, educational laboratory. Individual students, as well as faculty and lab instructors, will be welcome to work with SER NAU to use the demonstration site for independent research projects or other class assignments. We especially hope to engage with undergraduate environmental science/studies, biology, and forestry students who are looking for internship or senior capstone projects.

Students will have the opportunity to conduct internships and research projects on applied ecology and ecological restoration topics, mentored by faculty, staff, and graduate student advisors. Possible research topics could include:

Examining the success of different seeding methods for native plants
Monitoring survival of outplantings
Determining the effectiveness of erosion control structures in increasing soil moisture, sediment depth, and plant growth
Monitoring pollinator visitation at native and non-native plants
Internships and research opportunities for undergraduates will provide an enriching experience for NAU students and maintain the longevity of the project in tandem.

2. Impact - What are the environmental costs and benefits associated with this project?

The indirect environmental costs that we have identified include the energy and materials used in manufacturing and transporting the tools and supplies that will be required to carry out our proposed plan. We will work to minimize these impacts by purchasing durable tools and materials intended to last throughout the life of the project. Beyond materials, there are very few environmental costs associated with this project. In fact, we believe there are costs associated with taking *no action* in our proposed project area (e.g. spread of invasive weeds, water runoff and erosion), the activities that we propose are intended to not only remove sources of degradation, but also to provide ecological benefits. The environmental benefits that we anticipate resulting from this project include increased water infiltration, remediation of runoff from road and parking lot, soil stabilization and erosion control, and increased biodiversity through improved habitat for native pollinators, arthropods, and other wildlife species.

3. Three Pillars of Sustainability: *Describe how your project impacts economic, social, and/or environmental sustainability:*

Economic:

This small-scale restoration project demonstrates multiple techniques that require lower resource input than traditional landscaping, while providing increased ecosystem services. These techniques will be taught to students attending workdays and workshops to educate them on the economic benefits of restoration. Ecosystem services that will be improved by this project--such as erosion control, water infiltration, and pollination--have direct translation to economic value.

Social: Design and implementation of this project will provide NAU students with a unique opportunity to learn marketable skills for future careers in restoration and conservation. We aim to empower students and partners to apply what they learn throughout their lives and careers. Additionally--as evidenced by the United Nations decade of the Decade of Ecosystem Restoration--restoring degraded lands is an effective and necessary way to combat climate change, as well as promote biodiversity, food security, and general human well-being.

Environmental:

The environmental sustainability benefits of this project include mitigating sources of degradation such as storm water runoff and subsequent erosion from several adjacent parking lots, and populations of invasive weeds. Direct ecological benefits will include increased soil stability and water infiltration, nectar resources for native pollinator populations, and habitat for local native wildlife.

Campus Community

4. Visibility - *Is there a public outreach plan? How will faculty, staff, students learn about this? How will this project impact students educationally?*

This project will be planned and implemented by students, staff, and faculty members of SER NAU in partnership with the SNAIL student organization. As part of the proposed project, we will develop several workshops to be accessible to and advertised within the entire university with experts from campus and the broader Flagstaff community. We will encourage faculty from across the university to share these opportunities with their students and integrate the workshops into relevant curricula. Educational signage will improve visibility and engagement with the project by describing the work being done at the site and highlighting sustainable methods used throughout the project.

5. Meets Student Priorities - *Based on the survey results, does your project contribute to one or more of the student priorities? (Please see most recent survey results, available in the downloads tab of the Green Fund website)*

Left blank until survey can be accessed.

6. Campus Community Involvement - *Have you considered and identified departments, programs, faculty, staff, student groups, etc. that might be involved or interact with your project? What campus connections can you make through this*

project?

The collaboration between two student groups, SER NAU and SNAIL, lends the project a strong foundation in regards to campus involvement. As a combined undergraduate and graduate student organization, SER NAU already accesses a wide diversity of students at the university. Our membership spans multiple academic departments and research centers, nurturing campus collaboration across disciplines. We have already engaged other student groups in past work days, including NAU Give, a student volunteer organization, and the Environmental Science and Policy Graduate Student Organization (ESPGSO). The demonstration site will be an on-going opportunity for student organizations, classes, and departments to participate in and learn about ecological restoration.

Project Parameters

7. Economic Feasibility - *Is your project financially efficient? Is this a one-time expense or will you need future funding? Does the project have additional funding sources?*

The proposed project budget will cover initial development of the garden, as well as foundational initiatives to promote campus involvement in the project. After initial expenses, the project area will be maintained and further developed by SER NAU through student volunteer efforts. SER NAU conducts fundraising that will help support future expenses at the site after the project is implemented.

Campus Greenhouse manager, Adair Patterson, has generously committed to provide plant propagation materials and greenhouse space in support of this community project.

8. Program Longevity - *Is this program/project repeatable? How and by whom would the project continue in the future?*

This will be a long-term effort for SER NAU, aligned with the organization's objectives. Though we are still a young group, we already have an active student membership and a dedicated advisors who have identified this project as a key way to put our mission into practice. Our goal is to make SER NAU a visible and active part of campus culture. As the organization continues to grow and projects like the restoration demonstration site gain traction and visibility, we expect sustained involvement from students for years to come. In part, program longevity will be enhanced through an NAU undergraduate intern position included in this proposal. The intern will be tasked with routine maintenance of the project site and helping SER NAU organize volunteer events and workshops. The intern will promote longevity of the project by ensuring newly installed plants are able to establish and by helping outline a seasonal plan for ongoing project maintenance.

9. Reasonable Timeline - *How long will it take to implement your project? What is your timeline for when you will start and when you expect to begin to see results?*

This project will take place in four main phases: Fall 2019, Spring 2020, Summer 2020, and Fall 2020. If awarded a Green Fund grant, we expect to see results beginning immediately in Fall 2019 with the completion of our first work parties. Individual actions

in each phase are described in further detail below:

Item When Action Who

Fall 2019

1

September 21 October 5 October 19 November 2

SER NAU student members

Spring 2020

2 By end of

January

Work parties to clean and maintain the garden, planting seeds in greenhouse

Hire SER NAU Intern to work throughout spring semester

Rachel Mitchell, SER NAU faculty advisor

3

January Greenhouse Planting: sow seeds in containers for eventual outplanting

SER NAU student members, SER NAU student intern

4 March 28

April 4 April 18

Work parties: weeding and site preparation for outplanting. Greenhouse work in inclement weather.

SER NAU student members, SER NAU student intern

5 April 25 Spring Workshop:

The Bee Knee : Planting for Pollinators

TBA

6 By April 25 Design, order, and install interpretive signs

SER NAU student members, SER NAU student intern

Summer 2020

7 May-August

2020

Maintain the garden by planting, weeding, and other activities. Plan for Fall workshop.

SER NAU student intern

Fall 2020

8 Mid-September

2020

Fall Workshop:

Topic TBD based on student direction. Potential idea: Invasive Species Management

SER NAU student members

Preliminary Questions

Does your project require space or construction on campus? If so, where?

Yes, the project will be adjacent to the existing SNAIL Garden footprint just north of the Research Greenhouses (see map attachment). We have reviewed the Space

Committee Document and have prepared a Space Allocation Request form. We have a dedicated John Jaewick, NAU Landscape Architect and chair of the Space Committee.

Have you obtained all necessary approvals for this project?

Yes, included are letters of support from Dr. Nancy Johnson, Director of the SES, Sarah Colby, Senior Business Manager of SES, and Rachel Mitchell, Assistant Professor of SES and SER NAU Advisor. Additionally, we have included the Memorandum of Understanding between SER NAU and the SNAIL Garden expressing the compatibility and shared responsibilities between our student organizations. Please see the end of the application for these attachments.

Will this project provide funding for student wages?

Yes

Please list all additional sources of funding you have asked. Include departments, grants, ASNAU, GSG, etc.

None

Has this project been submitted for consideration before?

No

Have any of the Green Fund Committee members been involved in this project?

Yes, Genevieve Conley has been designated as our Green Fund contact.

Detailed Budget

Item Retailer Quantity Price / Unit

(\$)

Amount Requested

Structural Components & Hardscaping

[Shed](#) Home Depot 1 1,270.80 \$ 1,270.80 \$ 71.16 \$ 1,270.80

Rock Materials, Equipment, and Labor

Total (\$) Sales

Tax

NAU

N/A N/A N/A N/A See below 5 Landscaping

line items and attached quote

FTE labor NAU

Landscaping

36 39.58 \$ 1,424.88 N/A \$ 1,424.88

Crusher Fines for Path

80 42.5 \$ 3,400.00 N/A \$ 3,400.00

Limestone Boulders

NAU Landscaping

NAU

30 199 \$ 5,970.00 N/A \$ 5,970.00 Landscaping

River Rock NAU

Landscaping

12 51.25 \$ 615.00 N/A \$ 615.00

Backhoe Rental

2 100 \$ 200.00 N/A \$ 200.00

Growing Medium

NAU Landscaping

NAU

5 Loads 74 \$ 370.00 N/A Donated by Research

NAU Greenhouse

Greenhouse Complex

Mulch NAU Property

Surplus

20 \$ 60.00 N/A \$ 60.00

[Interpretive Sign](#)

3 cubic yards

Envirosigns 1 1,050 \$ \$ \$ 1,050.00

1,050.00

58.80

\$ [Drip Irrigation](#)

DripWorks 1 249.95 \$

\$ 249.95 [System: Large](#)

249

14.00 [Individual](#)

.95 [Plant Irrigation Kit](#)

Tools and Materials

[Husky 5 lb. Pick Mattock with 36 in. Hardwood Handle](#)

Home Depot 4 31.98 \$ 127.92 \$ 7.16 \$ 127.92

[Hose](#) Home depot 1 33.87 \$ 33.87 \$ 1.90 \$ 33.87

[6 cu. ft. Steel Wheelbarrow](#)

Home depot 2 99.97 \$ 199.94 \$ 11.20 \$ 199.94

Work Gloves - Home depot 72 total: 24

small, 24 medium, 24 large

\$ 143.46 \$ 8.03 \$ 143.46

[Shovels](#) Home depot 6 13.98 \$ 83.88 \$ 4.70 \$ 83.88

[Pitchfork](#) Home depot 2 27.98 \$ 55.96 \$ 3.13 \$ 55.96

[Hand Trowels](#) Home depot 12 8.98 \$ 107.76 \$ 6.03 \$ 107.76

[Handheld pruners](#)

23.91 / pack of 12

Home depot 4 12.98 \$ 51.92 \$ 2.91 \$ 51.92

[Loppers](#) Home depot 2 19.97 \$ 39.94 \$ 2.24 \$ 39.94

[Fiskars Power Tooth Softgrip 10 in. Blade Pruning Saw](#)

Home Depot 2 19.97 \$ 39.94 \$ 2.24 \$ 39.94

[Chicken wire/fencing to protect plants](#)

Home depot 2 75.99 \$ 151.98 \$ 8.51 \$ 151.98

[Rakes](#) Home depot 4 19.98 \$ 79.92 \$ 4.48 \$ 79.92

[Trash pickers](#) Home depot 2 19.97 \$ 39.94 \$ 2.24 \$ 39.94

[Hoop Hoes](#) Home depot 2 17.98 \$ 35.96 \$ 2.01 \$ 35.96

Personnel

Workshop Guest Speakers

NA 2 500 \$ 1,000.00 N/A \$ 1,500.00

Intern Wages NAU student 168 hours

total.

\$12 / hour \$ 2,016.00 \$ 2,016.00

6 hours / week. 8 weeks for Spring 2020, 8 week Fall 2020, 12 weeks for Summer 2020

N/A

Plant Materials

Medium Tree/Shrub

Arboretum 10 24 \$ 240.00 \$ 13.44 \$ 240.00

1 Gallon Perennials
 Native Plant and Seed
 25 12 \$ 300.00 \$ 16.80 \$ 300.00
 1 Gallon Shrubs
 Native Plant and Seed
 20 18 \$ 360.00 \$ 20.16 \$ 360.00
 5 Gallon Shrubs
 Native Plant and Seed
 10 40 \$ 400.00 \$ 22.40 \$ 400.00
 Greenhouse Space
 NAU Research Greenhouse Complex
 1 bench 12 months
 \$11/ bench/ month
 \$ 132.00 N/A Donated by
 NAU Greenhouse
Sub Total \$ 20,249.02
 10% contingency
 \$ 2,024.90
 \$ 8% non-
 1,619.92 capital project management fee
 5.6% Arizona Sales Tax
 \$ 283.54 \$ 283.54
Total \$ 24,177.38

Project Location

Project Design and Integration with the Landscape Master Plan

The attached checklist details the ideas of the physical design. Summarized below is how the project integrates with the Guiding Principles of NAU Landscape Master Plan (LMP). It integrates the Landscape Impact Development (LID) standards in line with both the City of Flagstaff and Northern Arizona University goals.

The project goals coincide with the Guiding Principles of the LMP in the following ways: *We will use native plants that are dryland adapted.* Plantings will be selected based upon the mountain south campus Ponderosa Pine-Arizona Fescue habitat. Only native plants with appropriate water requirements will be used since these are important principles of restoration. *We will employ techniques that use storm water as a resource.* The project aligns with the LMP south campus drainage guidelines. The project will enhance the natural drainage patterns in the area with small scale controls, including a swale and Zuni bowl, to evoke a sense of water while slowing and mitigating run-off from the adjacent parking lot. By slowing the water running off of the parking lots, the Ecological Restoration Demonstration Site will enhance infiltration and support native plantings surrounding the controls. *We will manage the project site organically.* To do this, we will not use herbicides and pesticides within the project area. We will maintain the site using mechanical and non-toxic methods including manual weed removal and the use of mulch to help shade out potential weed species. *We will use durable and long-lasting materials.* We will purchase durable tools and materials intended to last throughout the life of the project. *We will consider the aesthetics of the project site*

throughout all seasons. Although native plantings will exhibit natural seasonal fluctuations, we will design hardscaping that provides visual interest throughout all seasons, including winter. *We will emphasize accessibility in our physical site design.* Crusher fines pathways will provide access within the demonstration site area. We have been in contact with Jamie Axelrod, Director of Disability Resources, and will continue to consult him as we finalize our accessibility plans for both physical space and programmatic elements.

SER NAU and SNAIL Collaborative Agreement The Society for Ecological Restoration at NAU (SER NAU) and the Students Nurturing Alternatives in Landscaping (SNAIL) group plan to work collaboratively in the SNAIL Garden and the surrounding Ecological Restoration Demonstration Site. This document is an official agreement describing how to coordinate shared use of space and supplies.

1. Commitment to Experiential Education- Both groups are committed to maintaining the space as an educational laboratory for students to get hands-on experience in gardening and restoration practices. The garden is driven by student leadership and learning is integrated across disciplines.
2. Site Maintenance. Each group will tend to general site maintenance to ensure the garden space is tidy and cared-for. This includes picking up trash and aiming to maintain a minimal number of weeds in planting areas. We understand that managing weeds is one of the greatest challenges, especially when student involvement is limited. When either group holds an event (workday, educational event, etc.) in the space, we will dedicate time to picking up trash before leaving the garden, even if the trash is not from our group activities.
3. Commitment to Organic and Water-Conserving Growing Practices. Both groups agree to practice organic and water-conserving practices and refrain from using chemical pesticides or herbicides.
4. Tool Care-Both organizations agree to take proper care of all tools. We understand that tools are expensive and letting them degrade due to improper care is wasteful and counter to our shared mission of sustainable

practices. This includes maintaining an up-to-date inventory of all tools (completed once per semester); storing them out of the elements; and repairing broken tools in a reasonable timeframe. 5 .

species Selection- Outside of annual vegetable crops and other non-native edible or ornamental species, both groups agree to not plant invasive species with known noxious properties, even those that are commonly available in the commercial nursery trade. 6. Longevity- Although there is turnover in leadership between the two groups, this will stand beyond the current leadership until the SER and SNAIL groups decide to update or modify this memorandum of understanding.

Ashlee Simpson
Title: SER NAU
President

**Ashlee
Simpson**

Grace
Booher
Title: SNAIL
GARDEN
COORDINATOR

MER Muace Elaine Booher
NORTHERN ARIZONA
UNIVERSITY College of the
Environment, Forestry, and Natural Sciences
School of Earth & Sustainability
928-523-4561 928-523-9220 SES.Admin@nau.edu

School of Earth &

Sustainability 17
September, 2019 NAU
Green Fund

Green Fund Committee Members, After thoroughly reviewing the Ecological Restoration Demonstration Site at the SNAIL Garden project, the School of Earth & Sustainability fully supports this project and agrees to cover the upfront project cost in its entirety, upon the condition of reimbursement from the NAU Green Fund. We understand that the Green Fund will **review** all projects following their completion and determine whether the **funds were** spent within the scope of the project and within the approved timeline. We understand that if the Green Fund Committee determines project funding was spent outside of the project scope, the Green Fund Committee reserves the right to withhold reimbursement funding until the discrepancy is remedied.

We understand that the department of School of Earth & Sustainability assumes full responsibility for any long-term operations and maintenance costs of the Ecological Restoration Demonstration Site at the SNAIL Garden once project implementation is complete. Thank you for your consideration and please contact me with any questions about this project.

Sincerely

,

Dr. Nancy C. Johnson, Regents Professor
and Director School of Earth &
Sustainability 928-523-4561

NORTHERN ARIZONA

**UNIVERSITY College of
the Environment, Forestry, and Natural
Sciences School of Earth & Sustainability**

928-523-4561
928-523-9220
SES.Admin@na
u.edu

September 18,
2019

To whom it may
concern:

This is to verify that Ashlee Simpson's and Rachel Mitchell's SER NAU Green Fund project can use one of our accounts (2690060F24) as a clearing account for expenses and reimbursements relating to this project.

If you have any questions or concerns, please do not hesitate to contact me.

Thank
you,

Samancom

Sarah Colby Business Manager Sr. School of Earth &
Sustainability Ashurst Building #11 room A108 P: 928-523-
7184 | F: 928-523-9220 | Sarah.Colby@NAU.edu

PO Box 5694 928-523-7423 fax Flagstaff, AZ 86011-5694

August 22nd, 2019

LETTER OF SUPPORT

Dear Green Fund,

I write this letter to express my support for the Society for Ecological Restoration (SER) – NAU's SNAIL garden Ecological Restoration Demonstration Site project. I am the faculty advisor for this club and have read and provided commentary on the proposed project, and am familiar with the proposed garden space. This demonstration site provides a valuable on-campus "living laboratory", where students can practice and learn about ecological restoration to restore ecosystem functions like soil stability and pollinator resources. This project not only utilizes underused space on campus, but it will beautify and improve the space and enhance ecosystem functions, all while providing learning opportunities for club members and the broader NAU community. In addition, this project provides a valuable internship opportunity to a student, which will expose them to the management of the garden, allow them to interface with SER's community partners, and help address the pedagogical needs of the student, who may be required to complete a relevant internship in order to graduate.

This project represents an important central focus for the Society for Ecological Restoration – NAU. Having an ongoing garden project on campus will help unify the club and create a sense of accomplishment as the demonstration site develops. Furthermore, this demonstration garden provides a valuable learning opportunity for students across the NAU campus. Courses in SBS and SES (to name a few) can visit the garden to learn more about the use of restoration techniques, native plants, ecosystem functions and services, and how ecological restoration can enhance and preserve these important elements of biological diversity.

If the Green Fund can approve the payment for supplies related to this project, as faculty advisor I will happily continue to support and guide the actions of the Society for Ecological Restoration – NAU as they embark on this important endeavor.

Sincerely,

Rachel M. Mitchell PhD Assistant Professor School of Earth and Sustainability Rachel.mitchell@nau.edu 928-523-4251