SkyHarvest

Bear Springs Ecological Restoration Project

25 January, 2022

"We have exceeded the carrying capacity of the Earth, and we are asking it for more than it has to give without damage to its life-supporting systems. The consequences are increasingly visible in more extremes across the globe. This is the time for that big leap."

Julie Ann Wrigley

Contents

Defining the problem

Globally, groundwater is becoming more scarce. Arid regions now make up 33% of the earth's landmass. And in desert environs such as Bear Springs, the rainwater that does come falls in such large volumes, and in such short amounts of time, that only marginal amounts can be absorbed. Instead, flash floods careen down the length of the watershed, eroding hillsides and carrying precious topsoil miles away.

Over the centuries, industrial and agricultural pursuits have further reduced the soil's ability to support life.

As groundwater disappears and soil quality degrades, vulnerable lands can support less vegetation. Fewer plants mean less decaying leaf matter and therefore less nutrients are returned to the soil. Without protective groundcover, the soil becomes subject to heat and wind, and the process of degradation accelerates.

Soil, water and vegetation provide the very basis for life on Earth. And as seen here on both sides of Bayer Valley, erosion is well established, carrying away increasing amounts of soil, water, and habitat viability.

And so it is the mission of SkyHarvest
to restore a vibrant quality of life
for all who walk here,
ensuring a robust, sustainable habitat
for wildlife and humans.

Who is SkyHarvest?

SkyHarvest is a newly-formed nonprofit that partners globally with land stakeholders to plan, fund and implement ecological restoration projects in order to reduce carbon in the atmosphere, while creating healthy and sustainable ecosystems for animals, plants and people.

SkyHarvest partners with Sonoran Permaculture Guild

SkyHarvest's envisioned role in global habitat recovery strengthens through a partnership with Dan Dorsey and the Sonoran Permaculture Guild. Serving as the manager of SPG and as its lead teacher and designer for the last eighteen years, Dan has taught workshops and courses throughout Southwest drylands, in Mexico and on Native American nation's territory. He has designed and implemented almost 200 sustainable habitat models.

What is Permaculture?

Permaculture is a contraction of the words "permanent", "agriculture" and "culture". According to SPG, permaculture is a way to live sustainably in a region for many generations, taking care of people and environment at the same time. Permaculture uses ecology as the basis for designing sustainability into food production and distribution, housing, appropriate technology, and community and economic development. By studying and then mimicking patterns and systems found nature, it is a worldwide movement for regenerative design and implementation with many thousands of projects completed in over 120 countries.

SkyHarvest partners with Borderlands Restoration

SkyHarvest will partner with Borderlands Restoration Network (BRN) to source plant materials. BRN is a 501c3 based in Patagonia, Arizona, that works to rebuild, restore, and reconnect wildlife, land, and people in the Arizona/Sonora borderlands.

The Native Plant Program of BRN aims to promote and protect biodiversity and ecosystems in the Sky Islands by producing and providing access to regionally-sourced, restoration-quality native plants and seeds.

BRN Native Plant Program staff will draw on theiryears of experience and expertise of the native flora of the region to curate a target species list for the project site and will collect up to 160lbs of seed following protocols established by the BLM's Seeds of Success program to ensure ethical harvest and genetically diverse seed lots.

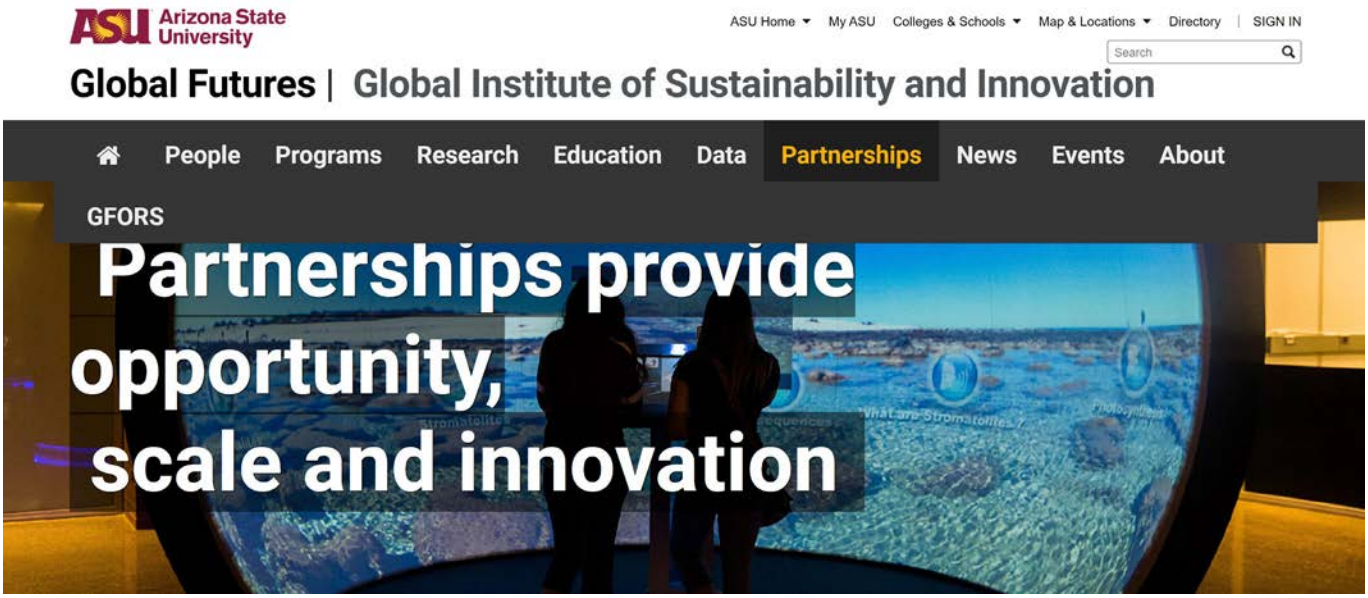
BRN staff will conduct an initial site visit in January 2022 to asses the seed needs and species palette, and then will lead volunteers in seed collection during three different educational events, providing training and guidance on how to collect without harming the reproductive health of mother populations, how to build in genetic diversity of collections, and how to collect during the plants' "natural state of dispersal" for optimal seed viability.

BRN staff will also provide additional seed collection and will source supplemental seed from regional producers.

SkyHarvest partners with Arizona State University

Working with Arizona State University, SkyHarvest is positioning to offer partner programs to Bear Springs that will increase economic viability and global visibility to the remote location BECAUSE of habitat restoration efforts.

The first focus in Spring 2022 will be to establish a carbon sequestering baseline at the Bear Springs property. On-going monitoring and assessment protocols will be developed and implemented to better enhance on-the-ground results, as well as to generate global attention and authority as a successful sustainability model.



The data will also contribute to problem-solving and sustainability of planetary life-support systems.

SkyHarvest then plans to dovetail into the business end of global habitat restoration benefitting Bear Springs with introductions to business practices, economic development and sustainability incentives such as carbon offset credit sales that would fund on-going habitat restoration and promote sustainable tourism at Bear Springs.

Bear Springs Ecological Restoration Plan

The Bear Springs habitat is a high desert ecosystem with historically notable biodiversity that has been damaged by human activities. The five-part plan is designed to remedy the effects of these activities: erosion, soil degradation, species reduction, lowered aquifers and stress on economies.

1. Design and construct site-specific earthworks-based rainwater catchment and retention methods.
2. Restore and protect soil viability.
3. Reseed native vegetation without irrigation.
4. Design and plant a demonstration site with mature irrigated vegetation and interpretative signage.
5. Enhance economic viability through sustainability.

1. Rainwater catchment & retention

SPG is designing site-specific catchment models based on slope angles and contours, to slow rainwater as it falls for maximum local absorption.

2. Build soil viability

The designs keep soil in place and stop erosion, and catch organic leaf material that rebuilds soil vitality and protection from wind and heat.

3. Reseed Vegetation

a. Seed stock will be locally wildcrafted with Borderlands Restoration.
b. And with climate changes underway, species from both higher and lower elevations will be blended and sown with the historical guilds, ready to respond to whatever climate conditions prevail.
c. When collection of certain species proves to be too time-consuming, seed stock will be purchased.

4. Install demonstration site

Irrigated and planted paths with interpretive signage at Site 1 will illustrate results and provide education for model emulation.

5. Economic Viability

Arizona State University is underway deigning partner programs for Bear Springs that will increase economic viability and visibility.

Putting the plan into action
Bear Springs Site 1

Water Flow on Site Following Contour Lines and Wash

The first site is a gently-sloped (<15degrees) 1.75 acre located on S Old Fort Bowie Road west of the temple. Wrapping around the stupa and medicine wheel herb garden, this site is at 4,600' elevation.

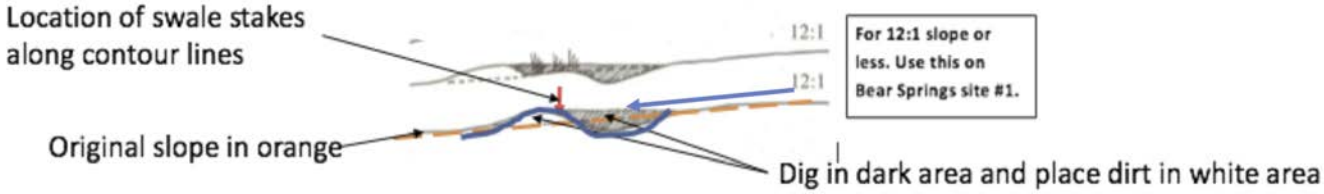
The earthworks plan for a predominately creosote monoculture with infrequent scattered mesquite, acacia and grasses will be swale-based.

Leasing tractor equipment on-site and providing all handtools and disposables, SkyHarvest will undertake the following steps with three sessions of 1 week each:

1. Mark contours with water levels.
2. Cut 3' x 12' swales that follow contour (lines shown in gold)
3. Hand-shape swale termination points.
4. Rake in and mulch a mixture of biochar and mixed seeds.
5. Restore abandoned cut road to healthy habitat.
6. Design and install a demonstration garden with monitoring protocols and measuring devices for methods at sites 1 and 2.
7. Capture metrics data monthly and report bi-annually to donors.

Site 1 swales construction example

"Before" pictures, showing the cutting of water harvesting swales and planting native seeds in elevation-contoured swales.



Cross-Section of swale for Bear Spring's 1 Site (not to scale)

Here is a sequence showing the project at year one (first picture) through year eight.

Now the site is a thriving urban forest of native trees, shrubs & wildlife supported soley by water harvesting swales.

Site 1 Demonstration Garden with Interpretive Signage

Arid lands habitat restoration is a long-term project. The quiet time of growth will be filled with education through extensive, museum-quality interpretative signage and mature irrigated habitats in multiple languages. Captivating vignettes complete with mature trees and understory vegetation will be installed throughout the site and become destinations in their own right.

Interpretive signage dotted along paths with mature foilage will reveal the vision so that visitors and donors can gain insights of how the long-term goals of habitat restoration are achieved. Different types of signage will engage people with different learning styles and increase the range of Bear Springs' project appeal. In this way, visitors can better understand, appreciate and feel inspired with the year-to-year progress of the project.

It is a primary objective of the project to present needed information at this time of climate change through implementation of carbon offset solutions. Interpretative signage will be an instrumental and fun method for easy emulation and global success.

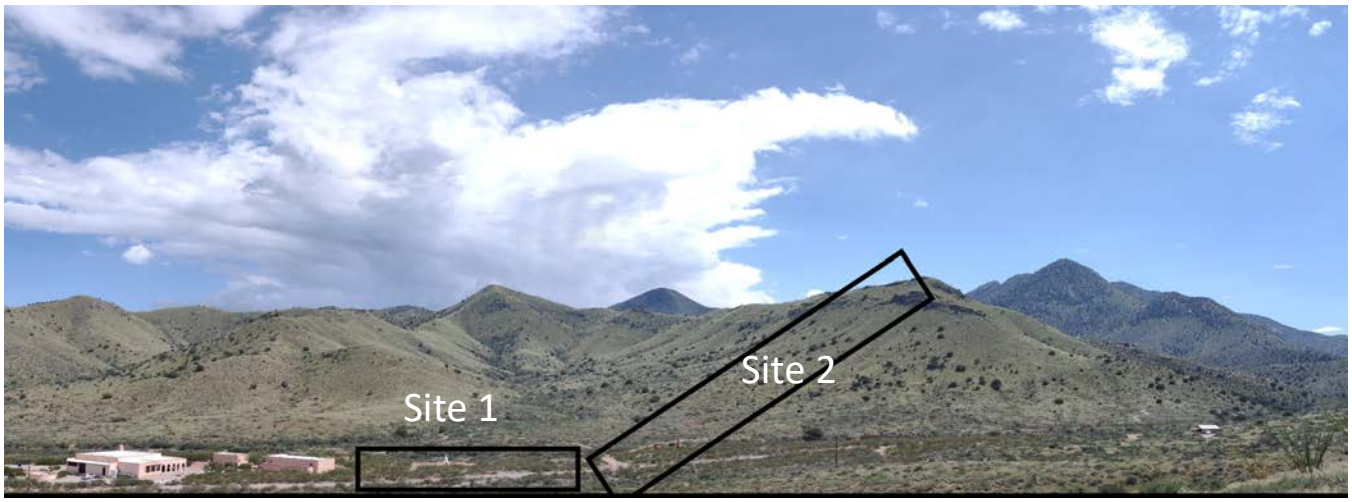
SkyHarvest will work with Bear Springs, Sonoran Permaculture Guild, Curtis Landscaping, Gila Watershed Partnership and Borderlands to plant and describe a laddered representation of a 10-year habitat restoration process in arid lands.

40 locally-grown trees of different ages representing the predominant species will be irrigated and planted with related understory species.

Interpretative signage will be placed along landscaped paths describing:

1. Arid Lands Restoration
2. Permaculture
3. Earthworks
4. Soil
5. Flora
6. Fauna
7. Carbon Sequester
9. Rainwater Harvest
10. Climate Change
11. Weather Station

Bear Springs Site 2



Site 2 encompasses a 3-acre strip of cleared, eroded, and exposed soil with some established grasses, spotty juniper, fewer oaks and no equipment access.

This group of slopes are steep (>15degrees) on the front of the western ridge at Bayer Valley from 4600’ elevation to 5266’ elevation.

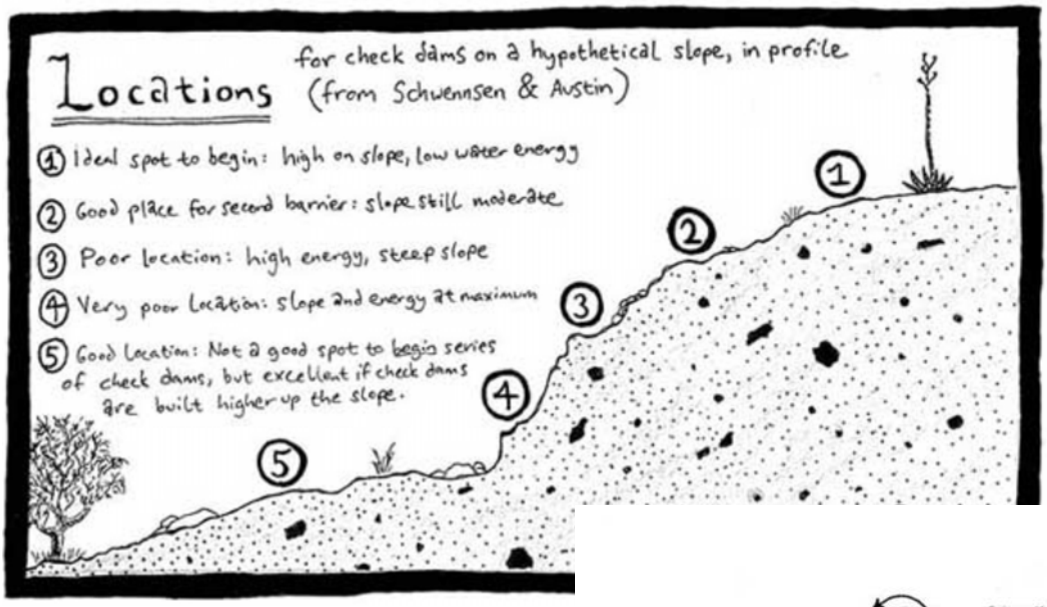
Earthworks plan development will begin in January 2022.

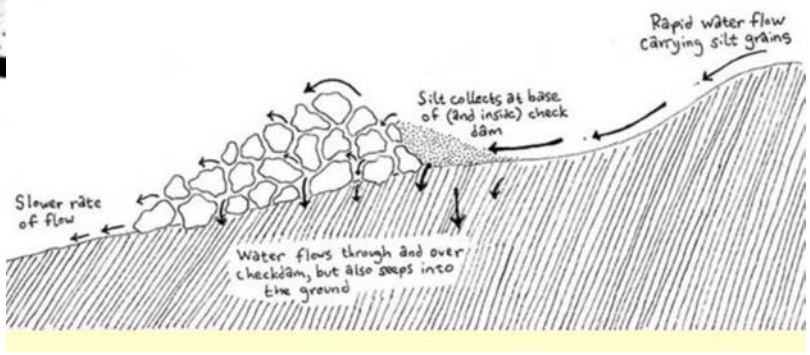
Sky Harvest will bring volunteer crews varying in size from 12 to 50 for implementation, coordinating the schedule and lodging with Bear Springs.

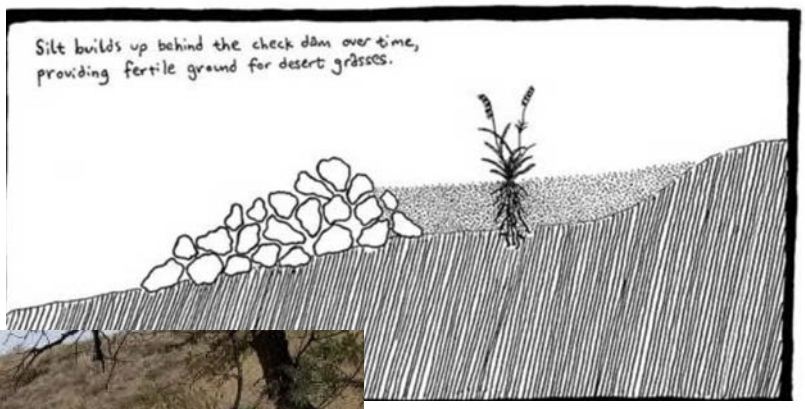
Crews will repeat the plan for Site 1, with earthworks designs and locations based on slope contours. Catchments will be hand-constructed. Site 2 methods, materials and matrics will be represented and developed at the Site 1 demo garden.

Seed stock planted in fertile and moist catchment basins will germinate and thrive into maturity without irrigation.

Site 2 basin construction examples







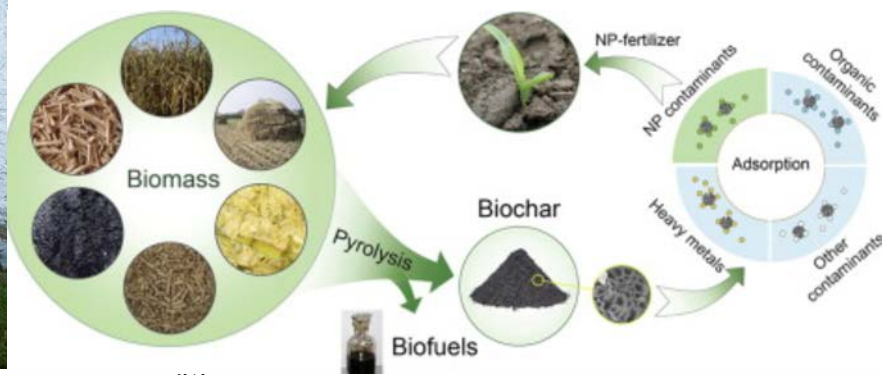
Three volunteer hands-on education weeks per year

People are excited to learn about this activity in times of climate crisis and widespread focus on habitat rehabilitation. 12 volunteers will be provided paid food and lodging, and 36 at most will cover their own costs.

SkyHarvest will expand the Bear Springs volunteer base by recruiting from sustainability project organizations, they will coordinate volunteer crew schedules and services with Bear Springs, and feed crews with locally-grown food provided by Katie Hartman in Bisbee to further support conversations on habitat restoration. SkyHarvest will also bring in sustainability keynote speakers for enhanced educational and public relations opportunities during the volunteer

Tools & Materials

In addition to leasing on-site tractor equipment for Site 1, SkyHarvest will provide all handtools, disposables and job-related gear.



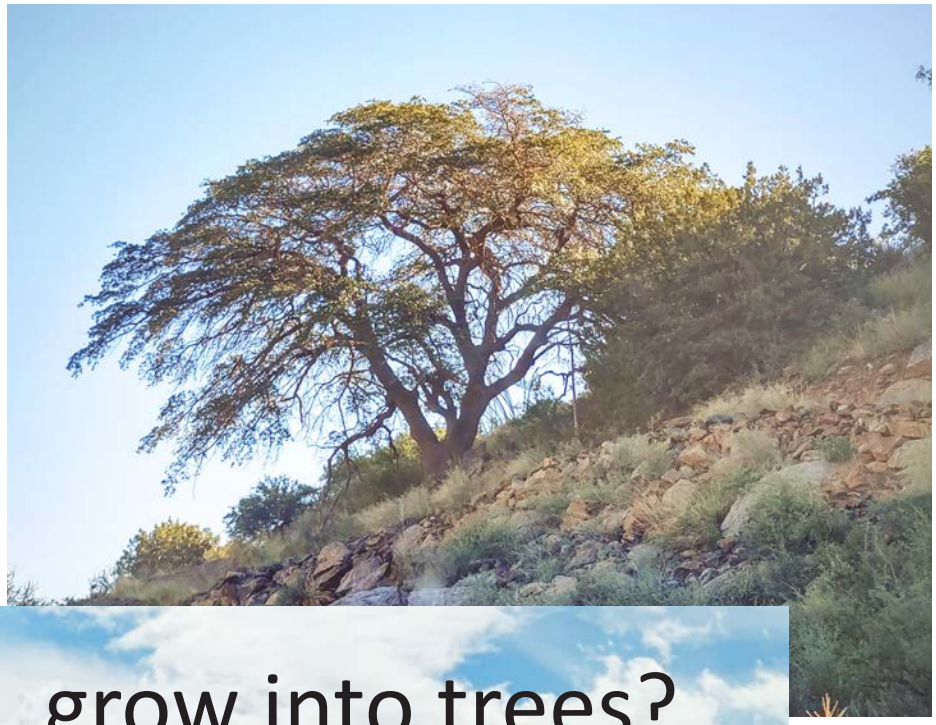
Seeds

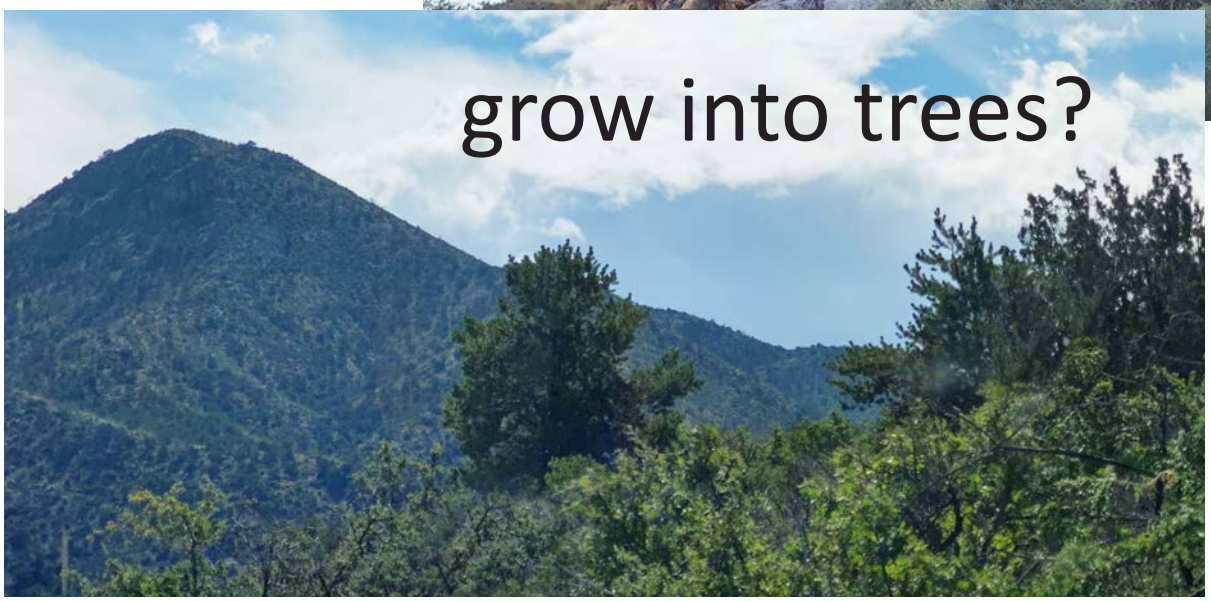
Volunteers will wildcraft local seed stock guided by Borderlands Restoration Network. SkyHarvest will purchase other heritage species if any are too time-consuming to gather.

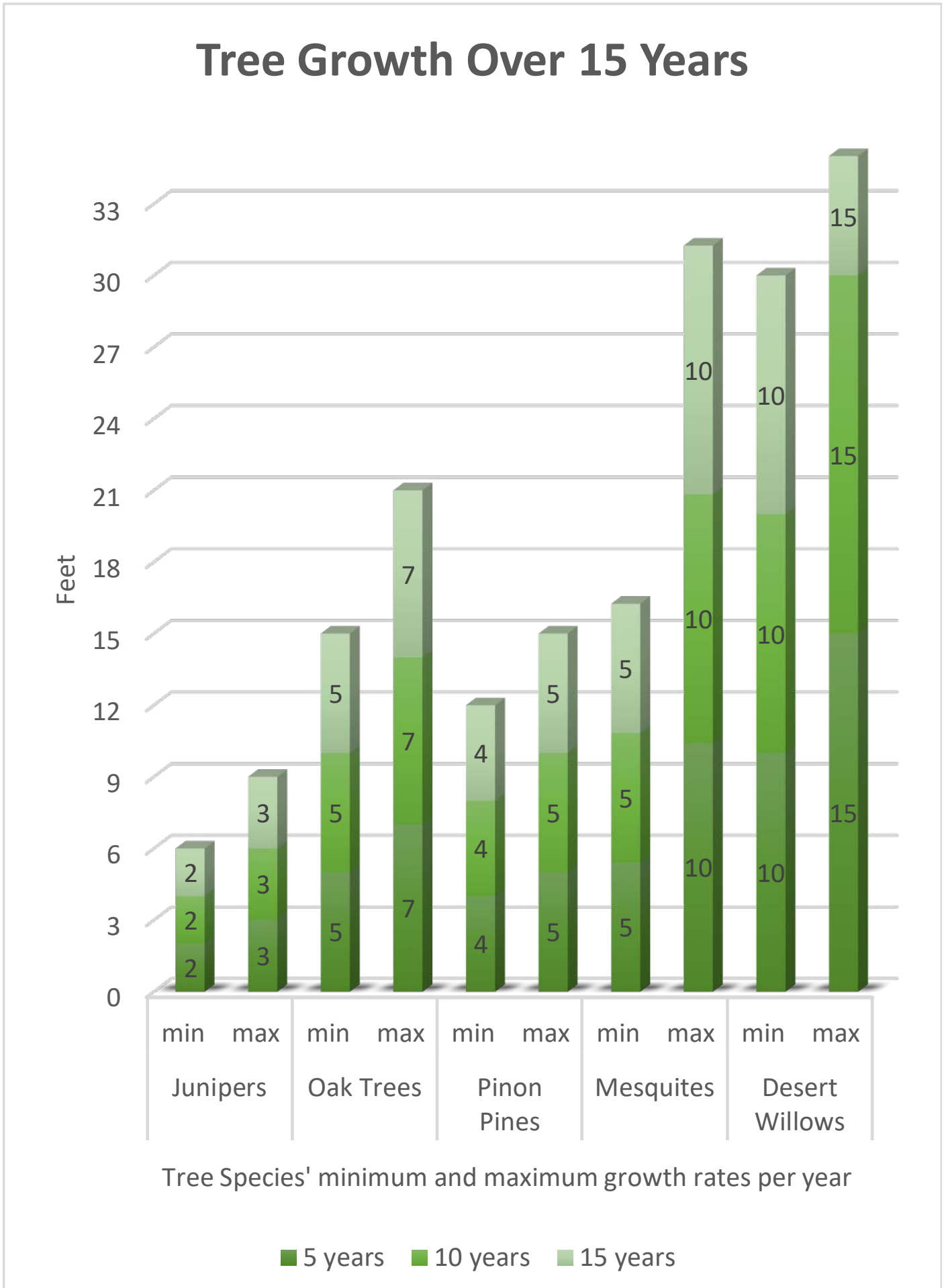
In anticipation of the climate change that is resulting in unpredictable climatic conditions, i.e., rain levels and temperatures, species selection will include pioneer species from adjacent ecosystems. We are also working with mushroom spores for mycorestoration benefits that promote regeneration of degraded environments.

In this way, Bear Springs will be "The Great Experimenter" preparing and planning for an unknown future, while leading the way in arid lands restoration.


How fast
do seeds




grow into trees?


Tree Growth Over 15 Years
Feet
0
3
6
9
12
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21
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33
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3
3
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Junipers
Oak Trees
Pinon Pines
Mesquites
Desert Willows
Tree Species' minimum and maximum growth rates per year
5 years
10 years
15 years

Ecotourism and economic viability

Throughout this highly visible project, SkyHarvest will present Bear Springs as an ecotourism destination. Global Ecotourism Network (GEN) defines ecotourism as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and creates knowledge and understanding through interpretation and education of all involved (visitors, staff and the visited)”. Ecotourism is a form of tourism that unites communities, conservation, and sustainable travel, and involves travelling to remote and pristine destinations where the fauna, flora, and cultural heritage are the center of attractions.

According to a new report published by Allied Market Research, the ecotourism market size was $181.1 billion in 2019, and is projected to reach $333.8 billion by 2027, registering a CAGR (compound annual growth) of 14.3% from 2021 to 2027. Aug 9, 2021.

Bear Springs habitat rehabilitation and sustainability programs will attract a growing segment of the population looking for solutions to an increasing concern in climate change. With combined carbon offset activities and economic sustainability objectives, habitat restoration activities at Bear Springs will become a magnet - and Bear Springs a habitat restoration authority - for this growing market.

Earthworks Planning Schedule

Site 1 Preliminary Plan is completed
Site 1 Demonstration Garden Plan overview presented 2/15/22
Site 2 Plan will be completed by 2/18/22

Plans include:

Watershed Hydrology & Catchment Plan
Irrigation Plan
Vegetation List
Seed List & Wildcrafting Schedule
Labor Estimates
Implementation schedules
Best metrics to monitor progress and evaluate success.

Project Metrics

Progress will be documented with close-up photos of each basin before, during and after construction and bi-monthly thereafter to determine and document construction stability, seed viability, germination rates and species population. Photo documentation will also occur after every major rain event, if that occurs inbetween. Aerial site documentation will occur monthly. Annual follow-up analysis will occur with additional SPG consultation and site-visit.

Implementation Schedule

1st Quarter 2022

1/15 Commence demonstration garden development
1/15 Commence event contract, production & promotion for Volunteer Sessions 1-6
1/15 DMRC irrigation through demonstration garden is installed
1/24 Commence Site 2 plan development
1/24 Wildcrafted seed inventory and seed quotes are prepared
1/30 Approve contract with DMRC by the end of January
1/30 Request and issue 1st Quarter Operating Funds to SH
2/6 On-Site Permaculturist arrives on site to prepare for volunteer session
2/15-2/16 Tractor work for swales on site 1

2/19 - 2/26, Volunteer Session 1, 20-45 volunteers at DMRC

a. Document baseline, commence data collection, and report
b. Begin installation of demonstration garden
c. Construct 1425 earthworks at Sites 1 & 2
d. Wildraft, procure, pelletize and sow seed inventory
e. Sow seed

3/15 SH irrigation is installed
3/22 30 trees planted by partner nursery
3/25 Plant understory shrubbery

2nd Quarter 2022

5/29 - 6/4, Volunteer Session 2, 30-50 people at DMRC

a. Plant seeds for monsoon Sites 1 & 2 total 1425 basins
b. Collect metrics data, analyze, adjust, repair, report
c. Wildcraft, pelletize and sow seed inventory
d. Continue demonstration garden development and installations

3rd Quarter 2022

Project management only

Collect metrics data, analyze, adjust, repair, replant, report

4th Quarter 2022

11/12 - 11/20 Session 3, 30-50 people at DMRC

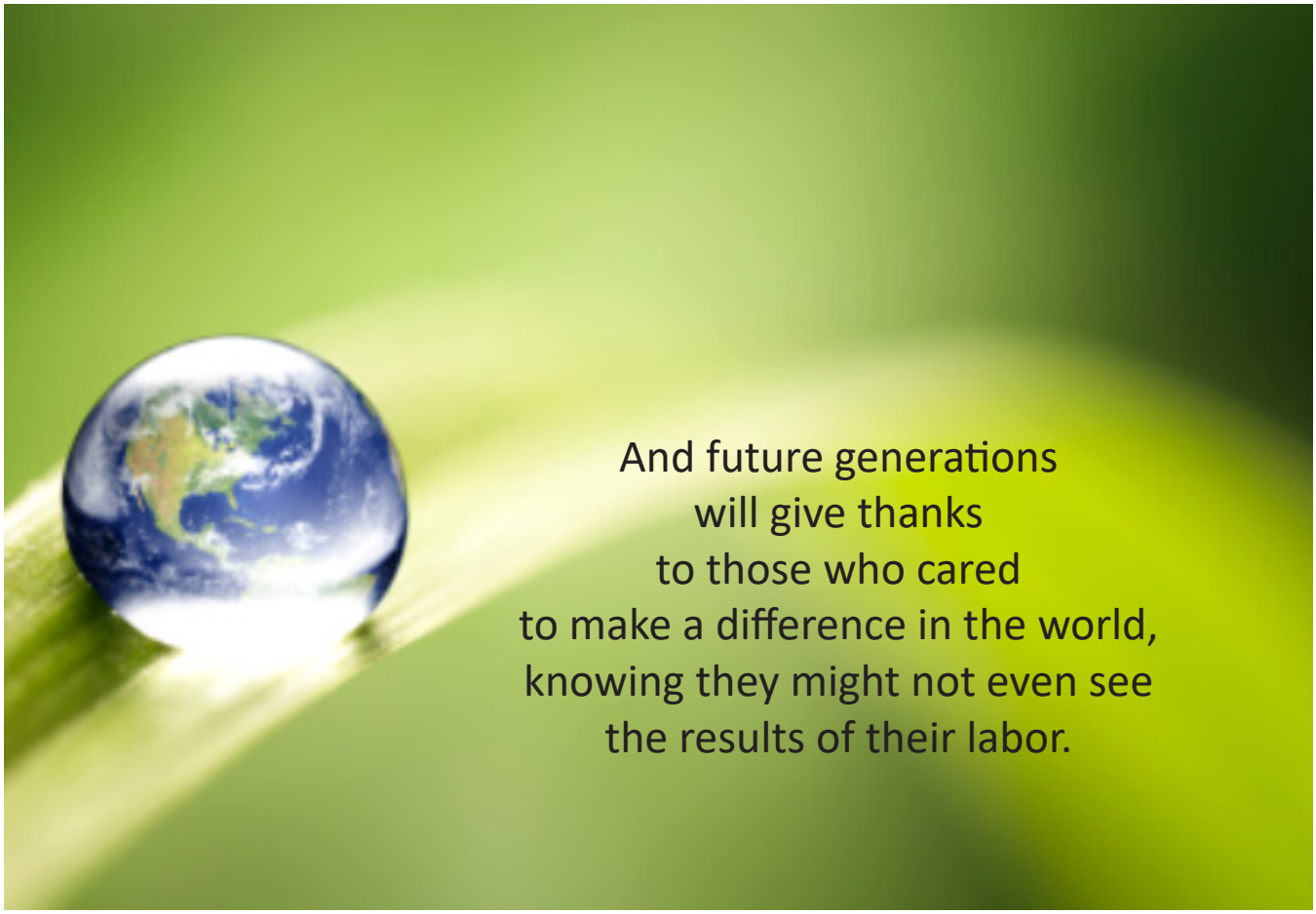
a. Prepare for winter rains
b. Collect metrics data, analyze, adjust, repair, replant, report
c. Wildcraft, pelletize and sow seed inventory

1st, 2nd, 3rd, and 4th Quarters 2023

Dates in 2023 tbd for Sessions 4, 5 and 6, 30-50 people at DMRC

a. Earthworks and seeding on same schedule as 2022
for the balance of 4500 basins
b. Collect metrics data, analyze, adjust, repair, report
c. Wildcraft, pelletize and sow seed inventory


Native animals will thrive
with the restoration of lush habitat,
abundant food and clean water.
Thank you for helping them.


And future generations
will give thanks
to those who cared
to make a difference in the world,
knowing they might not even see
the results of their labor.