

POLLINATOR HABITAT DESIGN



OPEN SOURCE AG
2024



COVER PAGE

CONSERVATION AGRICULTURE PLANNING GRANTS PROGRAM OFFERED BY : CA DEPARTMENT OF FOOD AND AGRICULTURE

DIA 148 Participant

Kelly Cooper | Conservation Agriculture Planning Grants Program
23-0374-000-SG | Open Source Ag
2620 Grey Hawk Way, San Miguel
California 93451

TSP

Blaze Elation | Elationscapes
6447 Webster Road, Creston
California 93432
805-400-4999
blazeelation@gmail.com

Farm Identification

Open Source Ag, Kelly Cooper
2620 Grey Hawk Way, San Miguel
California 93451
559-670-0352

Statement

I certify the work completed and deliver for this DIA

- Complies with all Federal, State, Tribal and local laws and regulations
- Meets the General and Technical Requirements for this DIA
- The planned practices are based on NRCS Conservation Practice Standards in the state Field Office Technical Guide where the practices are to be implemented.
- Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the participant.
- Incorporates alternatives that are both cost effective and appropriate to address the resource issue(s) and participants objective(s).

TSP Signature : _____ **Date :** _____

I accept the completed DIA deliverables as thorough and satisfying my objectives

Participant Signature : _____ **Date :** _____

NRCS administrative review completion by:

Signature : _____ **Title :** _____ **Date :** _____

NOTES & CORRESPONDENCE

TSP & PARTICIPANT

- Kelly Cooper contacted Elationscapes regarding Pollinator Habitat Design - August 26, 2023
- Kelly Cooper contacted Elationscapes regarding upcoming work to be done including: new bare root fruit tree planting work - September 6, 2023
- Elationscapes places bare root fruit tree order for 18 trees - September 20, 2023
- Elationscapes Site Visit at Open Source Ag - In-Person site visit meeting with Kelly Cooper | Discussed grant details, began Pollinator Habitat Design work - September 21, 2023
- Elationscapes Site Work - General farm management and pollinator habitat design data collection - September 25 - 29, 2023
- Elationscapes Site Visit and Work - discussed pollinator layout and water location for future plantings - October 10-11, 2023
- Elationscapes Site Work - Winter observations, weed control, mulching fruit trees and other areas - December 7-8, 2023
- Elationscapes in office Pollinator Habitat Design work - December 20, 2023
- Elationscapes shared current design - December 22, 2023
- Kelly Cooper responded positively to initial design concepts - December 23, 2023
- Discussion of cover crop seed mix and soil amendments for bare root fruit tree planting - January 29-30, 2024

CONTINUED

- Elationscapes Site Work - tilled, cover cropped, planted 18 bare root fruit trees with discussed soil amendments - January 31, 2023
- Kelly Cooper sent Elationscapes email with PDF of California Coastal Woodland Pollinator Report - Elationscapes extracted bloom schedule info - January 31, 2024
- Elationscapes office work - Drafting Pollinator Habitat Design - February 5, 2024

TSP & DR. KIM CHACON

- Elationscapes met Kim Chacon, instructor at Cal Poly SLO with PhD in geography, at native plant nursery. Dr. Chacon's dissertation at UC Davis focused on Strategic Habitat Analysis for Bees in California - September 26, 2023
- Elationscapes contacted Dr. Chacon regarding a request for information and resources to aid Pollinator Habitat Design - December 11, 2023
- Dr. Chacon responded with files and information containing research materials and recommendations tailor to Elationscapes work on Pollinator Habitat Design - January 12, 2024
- Video Conference Call - Elationscapes & Dr. Chacon - results from call here - February 6, 2024

DESIGN OVERVIEW

Pollinator Habitat Design Summary

This pollinator plan outlines a comprehensive strategy to attract, nourish, and sustain four native bee species: *Halictus spp.*, *Megachile spp.*, *Osmia spp.*, *Peponapis spp.*, alongside honey bees on Open Source Ag farm property. Recognizing the vital role pollinators play in our ecosystem and farm productivity, we are committed to creating a haven for these diverse and essential creatures.

Objectives

Enhance Habitat: Establish a network of diverse and interconnected blooming plants throughout the growing season, catering to the specific needs of each pollinator species. This includes incorporating early, mid-season, and late-blooming wildflowers, native shrubs, and trees into hedgerows, field borders, and designated pollinator havens.

Nurture Nesting Sites: Provide a variety of nesting options for both ground-nesting and cavity-nesting bees. This may involve creating undisturbed soil areas with loose substrate, offering bundles of hollow stems, and constructing bee hotels.

Promote Sustainable Practices: Eliminating the use of insecticides and herbicides, opting for organic pest control methods that safeguard pollinator health. Encourage integrated pest management practices that work with natural predators and promote biodiversity.

Target Pollinator Species

- *Halictus spp.* – Sweat bee
- *Megachile spp.* – Leafcutter bee
- *Osmia spp.* – Mason bee
- *Peponapis spp.* – Squash bee

Existing Crops

Fruit Trees

- Apple
- Pear
- Peach
- Nectarine
- Cherry
- Apricot
- Fig
- Muhlberry
- JuJube
- Olive

Berries

- Grapes
- Blackberries
- Raspberries
- Blueberries

Vegetable

- Summer Squash
- Tomatoe
- Pea
- Bean
- Pepper
- Raddish



leafcutter bee

<https://www.albertanativebeecouncil.ca/kids-and-bees>

<https://www.xerces.org/endangered-species/wild-bees>

Key Threats



Food in the form of abundant flowering plants that provide access to pollen and nectar throughout the growing season.



Protection from pesticides which kill non-target insects and degrade habitat by removing or contaminating flowering plants



Access to shelter and nesting sites including host plants for butterflies, pithy-stems and dead wood for cavity-nesting bees, and bare earth for ground-nesting bees.



Advocates willing to make changes in their landscape, teach others, and spread the word to encourage pollinator-friendly practices in their community.

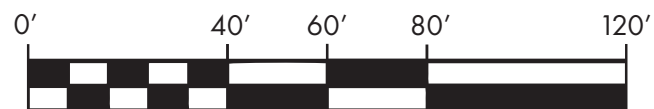
EXISTING SITE PLAN DESIGN



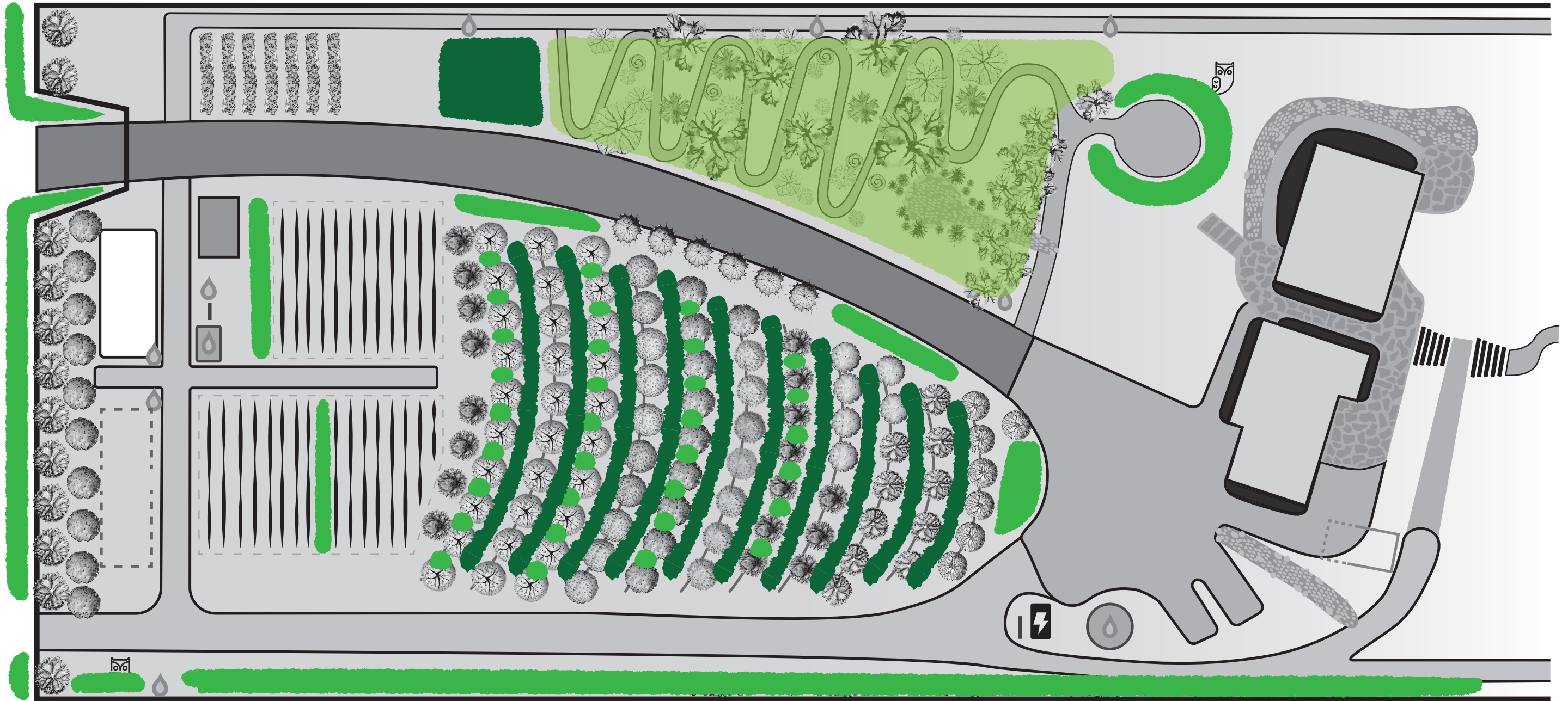
ELATIONSCAPES

COOPER'S RESIDENCE

2620 GRAY HAWK WAY
SAN MIGUEL, CALIFORNIA 93451
DECEMBER, 2023



PROPOSED POLLINATOR PLANT FORAGE MAP



Planting Zones :

 non-irrigated annual seeding

 irrigated perennial planting

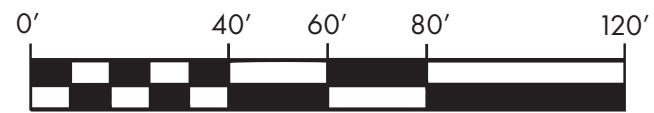
 non-irrigated one-time seeding



ELATIONSCAPES

COOPER'S RESIDENCE

2620 GRAY HAWK WAY
SAN MIGUEL, CALIFORNIA 93451
DECEMBER, 2023



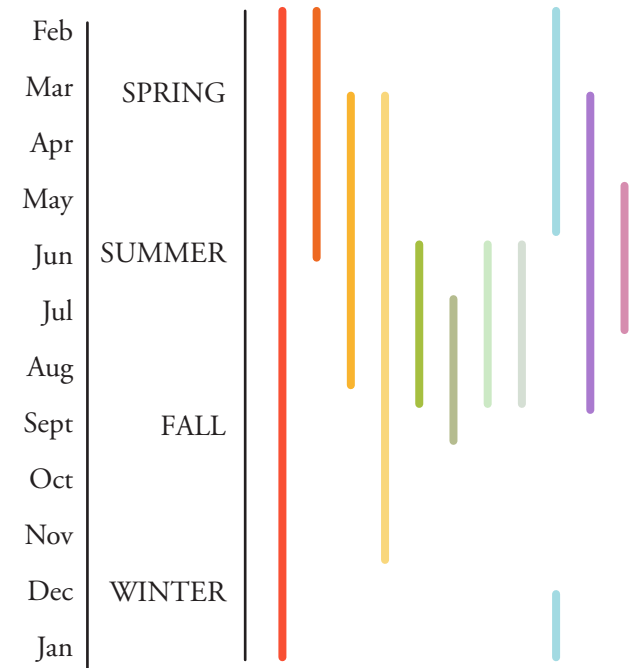
POLLINATOR PLANT SELECTION

* Xerces Society

Irrigated Perennial Plant Zone

- • *Arbutus marina*
- • *Ceanothus spp.*
- • *Erigeron spp.*
- • *Eriogonum fasciculatum*
- • *Heteromeles arbutifolia*
- • *Lavendula spp.*
- • *Mentha spicata*
- • *Perovskia atriplicifolia*
- • *Rosmarinus officianalis*
- • *Salvia spp.*
- • *Stachys byzantina*

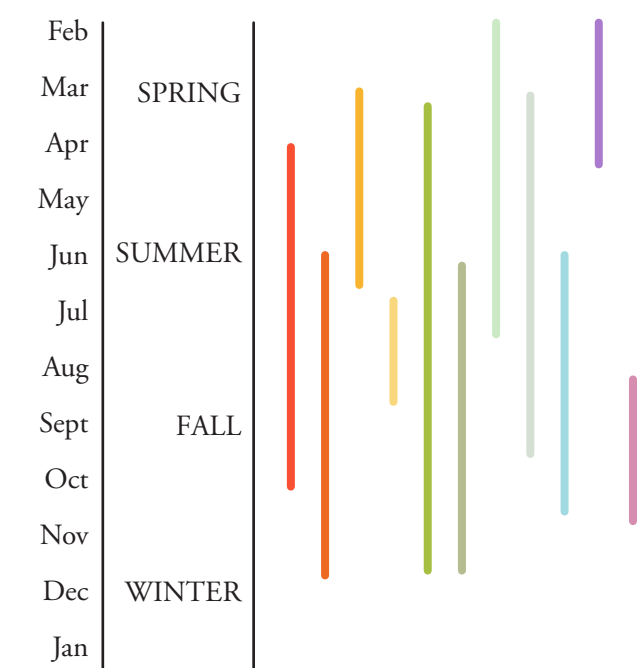
Seasonal Bloom Chart



* Non-Irrigated One-Time Seed Mix

- • *Achillea millefolium*
- • *Clarkia unguiculata*
- • *Eschscholzia californica*
- • *Festuca rubra*
- • *Grindelia camporum*
- • *Helianthus annuus*
- • *Nemophila menziesii*
- • *Phacelia californica*
- • *Phacelia tanacetifolia*
- • *Stipa pulchra*
- • *Trichostema lanceolatum*

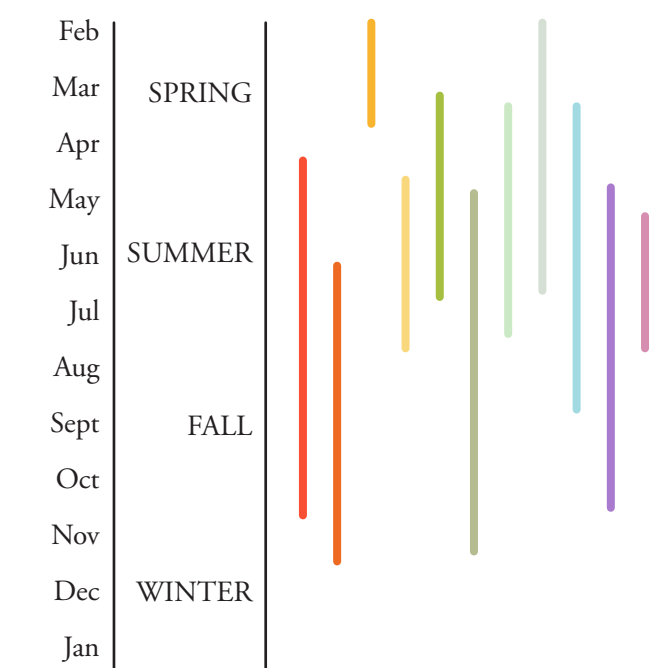
Seasonal Bloom Chart



* Non-Irrigated Annual Seed Mix

- • *Achillea millefolium*
- • *Ammi majus*
- • *Brassica hirta*
- • *Clarkia unguiculata*
- • *Eschscholzia californica*
- • *Grindelia camporum*
- • *Layia platyglossa*
- • *Nemophila menziesii*
- • *Phacelia californica*
- • *Phacelia tanacetifolia*
- • *Raphanus sativus*
- • *Trifolium incarnatum*

Seasonal Bloom Chart



POLLINATOR PLANT SELECTION

Irrigated Perennial Zone

This plant list was derived from the research completed by Dr. Kim Chacon conducted at the UC Davis Arboretum focused on identifying top foraging plants for native and non-native bees - the honey bee. We selected plants by choosing top visited plants from both categories of native and non-native bees while cross referencing research identifying plants which are favored by our four selected bee species.

Planting Notes

- Plant 1 gallon size plants in Spring
- Top dress each plant with 1 cup compost
- Plant Spacing
 - » Arbutus Marina: 25'
 - » Ceanothus: 10'
 - » Hetermoeles arbutifolia: 10'
 - » All other plants: 5'
- Install 1/2" drip line with 1/2 gallon rainbird emitter per plant positioned uphill of the plant
- Mulch planting area with 3-4" of wood chip mulch

Non-Irrigated One-Time Seed Mix

"This seed mix has been formulated based on field trials and monitoring conducted by the Xerces Society and other conservation partners. This mix is sold by several local producers including Nature's Seed or, for quantities over 10 pounds please contact Hedgerow Farms. The mix is comprised of native wildflowers and grasses and is designed to provide permanent, high quality foraging resources for a diversity of pollinators and other beneficial insects. The recommended seeding rate is approximately 8.2 PLS lbs/acre. Remember to order your seed by the Pure Live Seed (PLS) pound. Please print or email this list to your native seed supplier to inquire about purchasing through that source."
- Xerces Society

Seed Rate

8.6 PLS / Acre

PLS = Pure Live Seed

One-time seeding in early Spring

Non-Irrigated Annual Seed Mix

"This seed mix has been formulated based on field trials and monitoring conducted by the Xerces Society and other conservation partners and is appropriate for planting in most parts of California's Central Valley and Central Coast regions. It is comprised of annual and perennial native wildflowers and non-native forbs, brassicas and legumes and includes spring, summer and fall blooming species known to be attractive to pollinators and other beneficial insects. This seed mix is recommended for vineyards, fruit orchards, or other situations where permanent cover is desired. The recommended seeding rate is approximately 13.70 PLS lbs/acre. Remember to order your seed by the Pure Live Seed (PLS) pound. Please print or email this list to your native seed supplier to inquire about purchasing through that source."
-Xerces Society

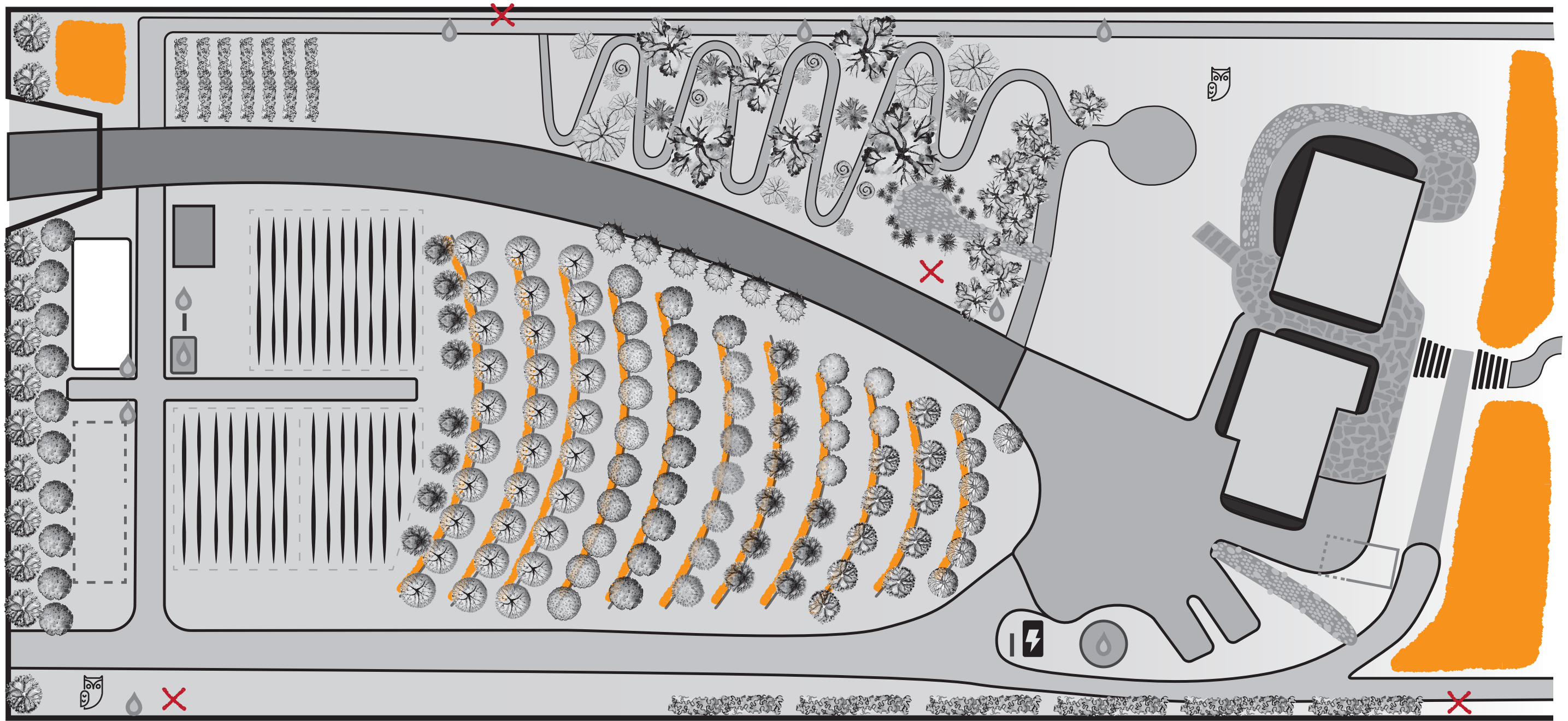
Seed Rate


13.7 PLS/ Acre

PLS = Pure Live Seed

Yearly seeding in early Spring

NESTING SITES MAP

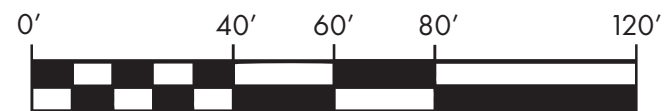


 undisturbed soil area

 nesting bee structure



COOPER'S RESIDENCE
2620 GRAY HAWK WAY
SAN MIGUEL, CALIFORNIA 93451
DECEMBER, 2023



POLLINATOR HABITAT NESTING STRUCTURES

CAVITY NESTING STRUCTURES

Most Cavity Nesting Bees look for pre-made holes in pithy plant stems, abandoned beetle holes in tree trunks, or pre-drilled holes in wooden bee blocks set out for them. Carpenter bees make their own nest holes by excavating wood with their mandibles; they prefer untreated wood and are sometimes found nesting in wooden garden trellises.

Tips

Sunny site:

Position nest in a sunny, south-facing location.

Stable home:

Once placed, leave the nesting site undisturbed to avoid abandonment. • Color pop: Use colorful tubes to help female bees identify their specific nest.

Natural allure:

Artificial pheromones can be used to attract bees to establish nest sites.



Megachile and Osmia bees emerge in Spring, nature's unsung heroes of pollination. These solitary cavity nesting bees play a vital role in ensuring abundant harvests and thriving ecosystems. Unlike their social honeybee cousins, Megachile and Osmia bees boast an impressive 95% pollination effectiveness, carrying dry pollen directly on their furry bodies, maximizing pollen transfer with each flower visit.

What makes these bees even more special? They don't require complex hives. Instead, they rely on pre-existing cavities like pithy plant stems or readily accept man-made nesting options. With a simple preference for pencil-width tubes, these dedicated pollinators can thrive in bamboo stems or even humble wood straws. By providing these easily accessible nesting sites, we can offer them a helping hand and reap the rewards of their efficient pollination services.

Target Bee Pollinator Species

- *Megachile spp.* - Leafcutter bee
- *Osmia spp.* - Mason bee



image cite : I

NESTING SITES

Target Bee Pollinator Species

- *Peponapis spp.* – Squash bee
- *Halictus spp.* – Sweat bee

GROUND NESTING BEE HABITAT



Ground Nesting Bees

Roughly seventy percent of California's native bees are solitary ground nesters that dig their nest holes in bare soil or beneath a thin layer of leaves. After mating, females search for the right place and soil type to begin their nests; that might be under plants or on the sloping sides of mounded planting beds. It's the female's job to build and provision the nest; the males are too busy looking for more females.

Protect Our Underground Pollinators:

Helictus and Peponapis bees, vital to healthy ecosystems, nest in undisturbed soil. Sadly, their homes are threatened by tilling and soil disruption. Here's how we can help:

Leave some land wild: Let designated areas rest untouched, providing safe havens for these bees.

Autumn leaves, welcome guests: Allow fallen leaves to decompose naturally – they're cozy blankets for underground nests.

Ditch the mulch: In designated areas, skip the mulch – bees need easy access to dig their homes.

This small shift benefits these amazing pollinators and helps nature thrive!