Edgewood EXPLORER
FRIENDS OF EDGEWOOD • SPRING 2025

FoE Enters Project 467's Seventh Year with Optimism

by Bill Korbholz, Project 467 Program Coordinator

Project 467, Friends of Edgewood's overarching habitat restoration program, was conceived in 2019. Project 467 aims to conserve endangered species and restore our grasslands to their former floral beauty and biodiversity. One of our goals is to restore 50 acres of Edgewood's fertile grasslands to 75% native cover by 2050.

As we enter Project 467 's seventh year, here is a rundown of our work in 2024:

- More than 20 Weed Warriors led by Paul Heiple and Alf Fengler contributed over 1,500 volunteer hours hand-pulling weeds to help control invasive plants in Edgewood's grasslands and oak woodlands.
- We continue our work with Creekside Science to restore the federally listed San Mateo thornmint, white-rayed pentachaeta, and Bay checkerspot butterfly.
- San Mateo thornmint conservation has been amazingly successful. In 2008, there were only 249 known plants in the world, all found in Edgewood. By 2024, our population has increased to about 40,000 plants!
- FoE was awarded a highly-coveted Section 6 grant from US Fish & Wildlife Service to prevent the "extinction of white-rayed pentachaeta through propagation and seeding." The grant runs from 2025 through 2027 and will be executed by Creekside. Pentachaeta seeds have already been installed in a handful of locations within Edgewood.
- We continue to monitor the Bay checkerspot butterfly population in Edgewood. Sadly, no butterflies were sighted in 2024, but we remain optimistic.

In 2024, we pivoted from continuing hydromechanical pulverization (HMP) treatments, a novel approach developed by Creekside to restore fertile grasslands. While the results were promising from this four-year experiment, we deemed that the methodology was no longer feasible because of its cost and lack of scalability. Instead, we initiated a new experiment that we have dubbed Green Grass 2.0.

Green Grass 2.0

Our hypothesis is that native grasses and forbs outcompete non-native grasses and forbs in fertile grasslands that have been dethatched and treated with other methods such as native seeding, mowing, and/or graminicide within three years.

This approach combines hand raking, mechanical dethatching, and hand seeding. Friends of Edgewood volunteers contributed 788 hours of labor for this effort from October 2023 through December 2024. In 2024, program costs were $10,600, which included equipment rental and commercial seed. *continued on page 2*

Green Grass 2.0 volunteers

In February, Bill Korbholz and Perry McCarty attended the California Native Grasslands Association's annual symposium held this year in Hopland, Calif. Bill and Perry met with other attendees and showed off a poster of Friends of Edgewood's Green Grass initiative, detailing our ambitious program to restore 50 acres of Edgewood's fertile grassland by 2050.

The event included presentations on various methods of grassland restoration and a field trip to Heritage Growers, a nonprofit focused on native seed amplification. Heritage Growers is a spin-off of Hedgerow Farms which helped amplify yarrow seeds from Edgewood used in our own grassland restoration efforts.

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We have been at this since 2022 and currently have a little over 2.4 acres of fertile grasslands under management. So far, results look good, but this approach to restoration will take time. Success of Green Grass 2.0 will depend on ongoing support from our dedicated volunteers and member donations.

Edgewood Farms

Edgewood Farms continues to supply seeds for various FoE projects. We used yarrow and common madia seeds from the farm this year for Green Grass 2.0. Farm manager Perry McCarty produced a bumper crop of San Francisco collinsia seeds that our TERTELS team is using to expand the very isolated population of this rare plant.

TERTELS

The TERTELS group aims to map and conserve The Edgewood Rare, Threatened, Endangered, and Locally-Significant plant species throughout the preserve. Program coordinator James Higbie and his team continue to locate and document previously unknown populations of various species. They have also begun a program to expand the population of the rare fragrant fritillary, and to plant valley oak acorns in an effort to recover the disturbance from the shaded fuel break that was done back in 2022.

Other P467 programs include:

- FoE's Camera Trappers, coordinated by Laurie Alexander, who helped document wildlife activity in the preserve.
- FoE's Bluebird Monitors, led by Frances Morse, who reported another successful year with 85% fledglings.
- FoE's Native Garden, where Howie Smith continues to showcase Edgewood's native plants.

Edgewood has an incredible amount of biodiversity packed into 467 acres, but that biodiversity requires help from us Friends. Even though we rely heavily on our wonderful volunteers, we must hire commercial restorationists, rent equipment, and purchase supplemental seeds from commercial growers, all of which can be very expensive.

Read more about P467 on the FoE website. If you would like to support our habitat restoration work, make a donation at FriendsofEdgewood.org/donate and direct your donation to Project 467. Thank you! ❀

Stop by the Ed Center to purchase Friends of Edgewood gear!

Two T-shirt designs – one for youth (left), one for adults (right) – feature wildflowers found in the preserve. Youth T $20. Adult T $25.

FoE jackets – available only to volunteers – are available at a discounted rate of $10.

Enjoy a Decent-Led Hike in Edgewood this Spring

by Barrie Moore

The Friends of Edgewood (FoE) kicks off the 2025 spring wildflower season with a series of docent-led hikes starting March 7. The hikes are offered weekly on Fridays, Saturdays, and Sundays through the end of May.

FoE's expert wildflower docents share insights about Edgewood's extraordinary biodiversity and help visitors spot some of the dozens of different species that bloom throughout the season. These hikes typically cover about three miles and last about three hours, so there is plenty of time to stop and examine what you find along the trail.

In March, Edgewood's oak woodland flowers begin to bloom. Docents already report seeing warrior's plume, hound's tongue, milkmaids, shooting stars, and mouse ears. In April, the serpentine grasslands come alive. By May, late spring flowers dot the hillsides.

The spring wildflower hikes are best for adults or older children interested in learning more about the plants and animals that call Edgewood home. For families with young children, shorter, kid-friendly hikes are offered on select Saturdays and Sundays.

The hikes are free, but you must register in advance on Eventbrite (friendsofedgewood.eventbrite.com). Note that some hikes start from the Bill and Jean Lane Education Center; others start from the Clarkia trailhead.

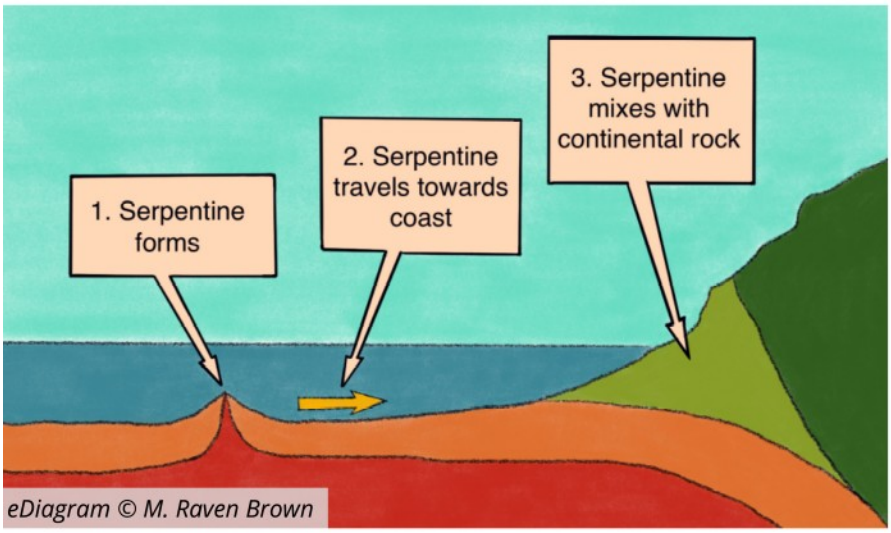
New hikes are typically added two weeks in advance, so check back throughout the season or follow Friends of Edgewood on Eventbrite to be notified when hikes are added. Each week offers something new to discover in Edgewood!

If you have questions about the hikes, email info@friendsofedgewood.org. ❀

Edgewood's Serpentine Endemics: Questions and Answers

by Bruce Homer-Smith

Serpentine soil is unusual worldwide, occurring only where particular geological conditions exist. Here's the main way it forms and gets into our surface soil:



eDiagram © M. Raven Brown

1. Serpentine minerals are formed where igneous magma encounters sea water at spreading centers and fracture zones in the ocean floor. For example, olivine, $(Mg,Fe)_2SiO_4$, encounters sea water, H_2O, and forms one of several possible serpentine minerals, such as $Mg_3Si_2O_5(OH)_4$. These minerals often contain heavy metals such as nickel (Ni), chromium (Cr), manganese (Mn), cobalt (Co) and cadmium (Cd).
2. New serpentine minerals crystalize in the relatively cool ocean water and clump together as rocks, settling on the ocean floor. Rocks with a lot of serpentine are called serpentinite. Over millions of years, they move slowly towards the Continental Plate.
3. Where the plates collide, serpentinite rock slowly makes its way to the surface as heavier rock is pushed down. In California, about 1% of surface rock is serpentinite. In Edgewood Natural Preserve, about one-third of surface rock is serpentinite.

Weathering causes serpentinite rocks to break down into serpentine soil. This unusual soil is challenging for most plants because, compared to other soils, serpentine soil has high magnesium and low calcium concentrations. The elements magnesium and calcium have similar chemical properties, with two outer electrons, as you can see in the periodic table. Plants absorb both magnesium and calcium using similar ion channels and transporters in root cells. High soil concentrations of magnesium can interfere with uptake of calcium which is needed in cell division and to build cell walls.

Also, high magnesium can affect soil structure, reducing water availability and aeration.

In addition, serpentine is often rich in heavy metals, such as nickel, chromium, and cobalt. These metals can be toxic to plants.

Over millions of years, California native plants have encountered the challenge of serpentine soils. Many have evolved to accommodate those challenges. They've developed ways to sequester toxic metals in their tissues. They've developed specialized root systems that allow them to take up calcium even in the presence of high concentrations of magnesium. They've made adaptations for drought resistance. Plants growing in serpentine soil grow smaller than they'd grow in more fertile soil, allowing them to thrive on fewer nutrients.

Non-native plants, without evolutionary time to adjust, generally do poorly in serpentine soil. So, serpentine soil provides a relatively competition-free ecosystem for California natives to grow in.

In Edgewood, dozens of California native plants thrive in our serpentine areas. Some grow in great profusion such as tidy tips, goldfields, and hayfield tarweed. These plants also do well in non-serpentine soil.

But some California species have made such radical adjustments to thrive in serpentine that they no longer grow in the wild away from it. They're our serpentine endemics, which in Edgewood are leather oak, serpentine leptosiphon, Marin dwarf flax, and San Mateo thornmint.

Leather oak (*Quercus durata* var. *durata)* must live in serpentine soils. In addition, it requires potassium, not commonly found in serpentinite, to grow its woody parts. Therefore, it is found at the interface of serpentinite and metamorphic rocks which have potassium. Paul Heiple, geologist and knowledgeable member of FoE and CNPS (California Native Plant Society), says he uses leather oak as a marker for where this geological interface occurs. It happens along the upper Clarkia trail, where leather oak is the dominant shrub.

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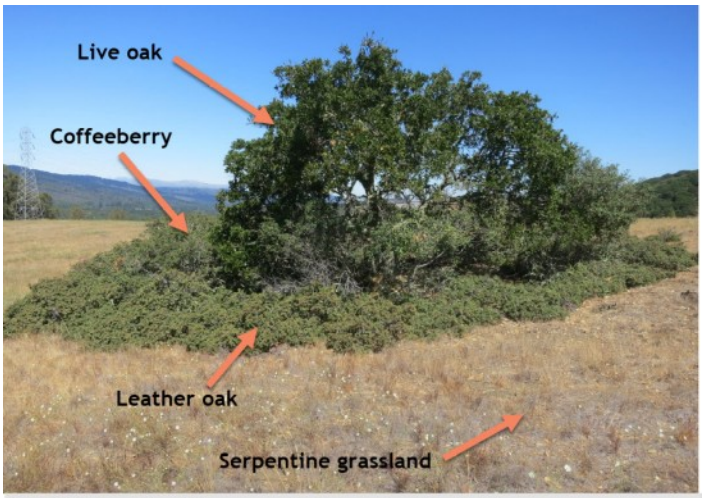
Serpentine Endemics *continued from page 4*



Rock Island in Edgewood *Photo by Paul Heiple*

You can also find leather oak at the edge of Edgewood's rock islands. The islands are formed by a large block of greenstone, chert, greywacke, and metamorphic rock embedded in serpentinite. The island has its own small ecosystem supporting, in the example here, coastal live oak and coffee berry. Leather oak grows at the edge of the rock island, surrounded by serpentine grassland.

Serpentine leptosiphon (*Leptosiphon ambiguus*) has evolved to thrive in serpentine conditions but it is not competitive in other soils that are full of faster-growing, larger plants. Because it can't easily spread through non-serpentine geologies, serpentine leptosiphon's range is limited to the coastal foothills south from San Francisco to San Benito County.

Serpentine Leptosiphon
Photo by Wilde Legard

Even more limited in range is the Marin dwarf flax (*Hesperolinon congestum*). It is endemic to the inner San Francisco Bay Area. Its dependence on serpentine soil makes it quite rare. Marin dwarf flax is protected by California and federal law as a threatened species.

Marin Dwarf Flax
Photo by Kathy Korbholz

Finally, our most rare serpentine endemic is found nowhere else in the world outside San Mateo County – the San Mateo thornmint (*Acanthomintha duttonii*). California and federal law give it even more protection, as an endangered species.

San Mateo Thornmint *Photo © Neal Kramer*

A final question: How has leather oak, a serpentine endemic, managed to spread across large parts of California? How did it move between serpentine islands across the state?

Paul Heiple has a theory. He proposes that oaks as a group do not fit the species concept very well. For instance, leather and scrub oaks each produce huge numbers of acorns that share genetic components of both. If the acorns fall on serpentine soil, leather oaks will grow. Otherwise, scrub oaks will grow. This intergrading allows leather oak genes to pass through non-serpentine areas by presenting themselves as scrub oaks, until they reach new serpentine areas where they develop again as leather oaks.

Our serpentine geology makes Edgewood Natural Preserve a very special place. It creates great diversity, a welcoming environment for California natives, and a home for some rare serpentine endemics.

Thanks to Paul Heiple for his expert and friendly help that made this article possible. ❀

Treasurer Reports 2024 Activities

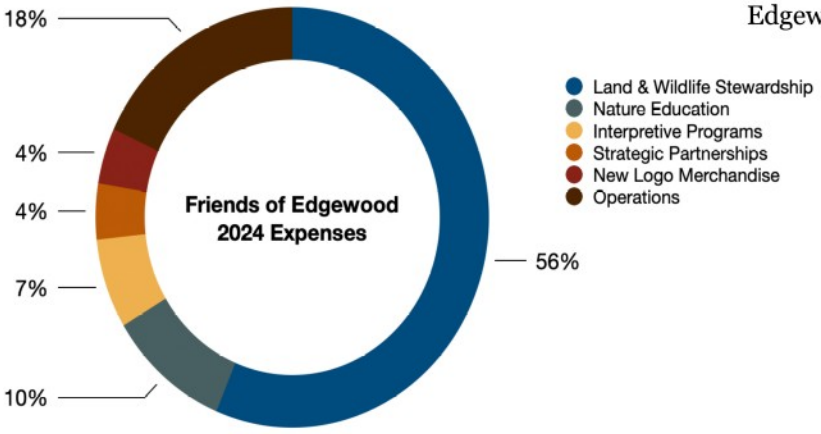
by Angela Mallett, FoE Treasurer

Friends of Edgewood Natural Preserve is an all-volunteer, nonprofit organization with the mission to protect Edgewood's extraordinary biodiversity and foster lasting connections with Edgewood and the larger natural world. Our volunteers participate in 25 programs which we group into three broad categories: land & wildlife stewardship, nature education, and interpretive programs. Additionally, there are 12 ongoing activities related to governance and organizational infrastructure.

Land & Wildlife Stewardship. We protect and restore the animal and plant habitat of Edgewood Natural Preserve in partnership with the San Mateo County Parks Dept., engaging volunteers and professional habitat restoration ecologists. Activities include habitat restoration, seed amplification, weeding of non-native plants, bluebird box monitoring, camera trapping, adopt-a-highway volunteers, plant mapping, and liaison to our county's Weed Management Area.

Nature Education. We provide volunteers to staff the Bill and Jean Lane Education Center in Edgewood, update exhibits, and maintain the office. We provide a quarterly newsletter for all members and other subscribers. Additional activities include the native garden, weekly wildflower surveys, maintaining a display of plants in flower, and an online field guide of plants and animals found at Edgewood. We also participate in educational outreach at local events.

Interpretive Programs. We conduct free, docent-led hikes for the public in Edgewood, which are supported by trainings and enrichment sessions for new and continuing docents each year. Additional activities include trail ambassadors and trail signage. In 2025, we will launch a new Field Trips for Kids program in partnership with community-based organizations in the county.



Our largest expenditure in 2024 was land and wildlife stewardship (managed as "Project 467"), including the Green Grass 2.0 initiative, Edgewood Farms (seed propagation), and San Mateo thornmint and white-rayed pentachaeta restorations. The Green Grass 2.0 team continued dethatching and reseeding selected plots, with a longterm goal to restore 50 acres of Edgewood's fertile grasslands to 75% native cover by 2050. For the convenience of preserve visitors, including those on our docent-led hikes, we rented a portable toilet, which was located near the Sunset Gate during the busiest months. We participated in educational outreach activities at the San Carlos Hometown Days, the Redwood City July 4 festival, and the San Mateo County Parks Foundation SummerFest. If you visit Edgewood Natural Preserve when the Education Center is open, check out the 2024 T-shirts featuring some favorite plants (and a butterfly) found in Edgewood and the Friends of Edgewood logo.

2024 was a great year for revenue, allowing us to pay land and wildlife stewardship expenses without running a deficit. Membership dues and other gifts amounted to around 90% of (non-investment) revenue. We also received generous grants to support our programs. Donations include donations from Donor Advised Funds (DAFs) and Qualified Charitable Distributions (QCDs).

In 2024, the majority (56%) of our expense budget was for land and wildlife stewardship. Our nature education programs, including the Bill and Jean Lane Education Center, and printing and mailing the quarterly newsletter, accounted for 10%. Another 7% went to our interpretive programs which included free docent-led walks. 4% was spent on updating our supply of T-shirts with the FoE logo available in the Education Center. We also granted 4% to our strategic nonprofit partners. The remaining expenses were related to the administration of incoming donations, insurance, and other general operating activities.

As a mature, all-volunteer run nonprofit, the Friends of Edgewood Natural Preserve endeavors to use our financial resources wisely; to spend our yearly funding within our means and to invest for the longer term, to support the continuation and growth of our programs. View our 2024 Annual Report on our website at friendsofedgewood.org/annual-report. Thank you again to our volunteers, members, donors, and friends for your generous support. We appreciate your contributions of money and time to ensure that Edgewood be a resilient place of extraordinary biodiversity that is appreciated and protected forever. ❀

More Than One Way to Color a Bird

Story by Eva Heninwolf, Photos by Lili

The two main sources of bird coloration are pigment coloration, which acts like paints on a canvas, and structural coloration, which results from the interaction of light with tiny structures in a bird's feathers.

Lots of colors in birds – reds, yellows, oranges, black, browns – arise from pigments in their feathers and skin. A pigment is a molecule that provides color by absorbing light of some wavelengths – and reflecting light of others – based on its chemical composition. When we paint colors on a canvas, those colors are all from pigment molecules in the paints. Lesser goldfinches have bellies that are yellow because their belly feathers contain carotenoid (red/orange/yellow) pigments which, down at the molecular level, absorb all non-yellow light, reflecting only the yellow wavelengths back to our eyes.

The blue feathers of jays are not colored this way. There are no blue pigments in birds!

So why does a jay look blue to us? Blue in a bird arises from the interaction between light and tiny structures in the bird's feathers. These nanoparticles, built of keratin (the protein in hair and nails), do two things:

1. They let all wavelengths of light other than blue pass right through them, unaffected.

2. They scatter the blue light back in all directions, so that no matter what angle you look at a blue jay from, it always looks the same blue.

Become a Friend of Edgewood

Help support FoE's habitat restoration programs and activities that connect people to the beauty of nature in Edgewood Park & Natural Preserve.

A donation of any amount is greatly appreciated! Consider becoming a sustaining member by signing up to make a monthly donation of $5 or more.

Pay by credit card at foew.org/donate, or complete the form below and mail with your check.

Thank you for supporting **Friends of Edgewood**.

Please circle your donation amount:

$25 $50 $100* $150* 250* $500* $_____

Name_____

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EXPLORER newsletter preference: ☐ email ☐ mail

*Check if you wish to receive eligible thank you gifts:

☐ 6 Edgewood greeting cards for donations of $100+

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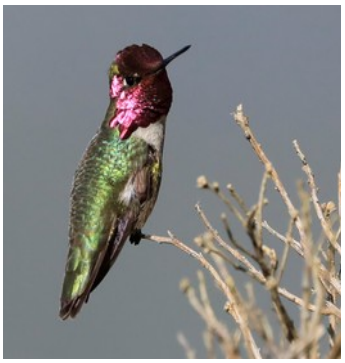
Mail with your check to **Friends of Edgewood,** 3 Old Stage Coach Rd, Redwood City, CA 94062-3801.

Donations are tax-deductible as allowed by law.



Contrast this with the bright colors of a hummingbird, which appear to change as the hummingbird moves. Hummingbirds also have structural coloration instead of pigments, but a different form called iridescence. Iridescence is dependent on your viewing angle and works in a manner similar to what causes the colorful sheen you see on a soap bubble or an oil slick.

You can read more about bird color at Cornell Lab Bird Academy: academy.allaboutbirds.org/how-birds-make-colorful-feathers/ ❀

Est. 1993

Friends of Edgewood

PRESERVE • EDUCATE • RESTORE

Friends of Edgewood Natural Preserve
3 Old Stage Coach Road
Redwood City, CA 94062-3801

ADDRESS SERVICE REQUESTED

Bill and Jean Lane Education Center
at Edgewood Park and Natural Preserve
Open Wednesdays, 9:30 a.m. – 12:30 p.m. and
Saturdays and Sundays, 9:30 a.m. – 4 p.m.

To learn more about Friends of Edgewood, visit our website at foew.org, call us at 650-367-7576, or email us at info@friendsofedgewood.org.

www.instagram.com/friendsofedgewood/

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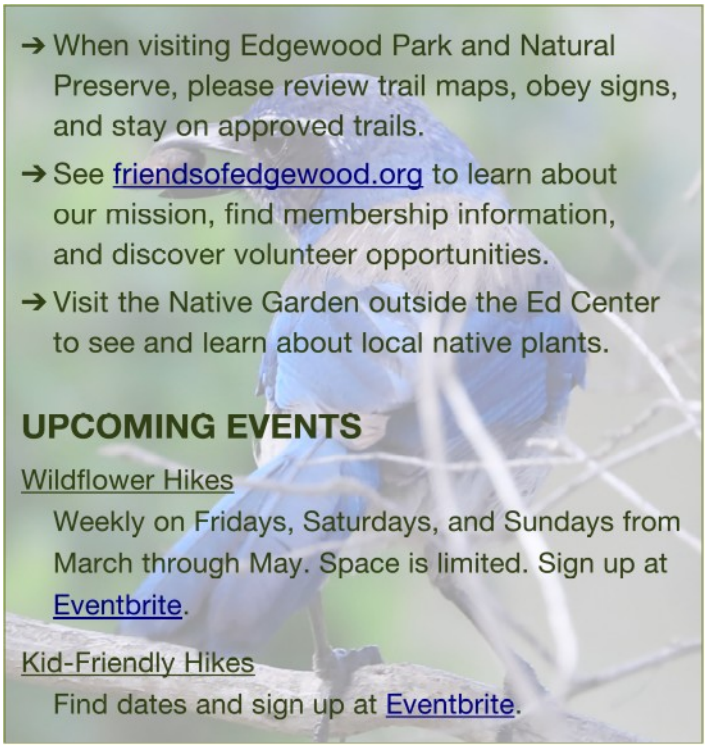

- When visiting Edgewood Park and Natural Preserve, please review trail maps, obey signs, and stay on approved trails.
- See friendsofedgewood.org to learn about our mission, find membership information, and discover volunteer opportunities.
- Visit the Native Garden outside the Ed Center to see and learn about local native plants.

UPCOMING EVENTS

Wildflower Hikes

Weekly on Fridays, Saturdays, and Sundays from March through May. Space is limited. Sign up at Eventbrite.

Kid-Friendly Hikes

Find dates and sign up at Eventbrite.

The Edgewood EXPLORER is published quarterly by Friends of Edgewood Natural Preserve, a nonprofit organization dedicated to preserving and restoring Edgewood and educating the public about its treasures. Friends of Edgewood Board of Directors: Sandy Bernhard, Caroline Bowker, Junko Bryant, Elisa Chavez, Michele W. Conway, Nancy Enzminger, Peter Ingram (president), Bill Korbholz, Kathy Korbholz, Angela Mallett, Perry McCarty, Barrie Moore, Rebecca Reynolds, Matthew Tobin. The newsletter is edited by Michele W. Conway and supported by many friends.