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PAJARITO ENVIRONMENTAL EDUCATION CENTER, LOS ALAMOS, NM

The Monarch Butterfly Is Endangered, But Not Federally Listed

By Jenna Stanek

The monarch butterfly is endangered but not federally listed. Let me explain.

In North America, the monarch butterfly is known for its migrations from Mexico and California in the winter to summer breeding grounds throughout the United States and Canada. Monarch butterflies have declined by an estimated 85% over the past two decades. Agriculture and urban development have had an impact on their wintering areas in Mexico and California because of legal and illegal logging and deforestation. Pesticides and herbicides used in agriculture and roadside mowing across their breeding range impact butterflies and milkweeds (*Asclepias* spp.), the only host plant that monarch caterpillars eat. Concern continues about whether there are enough butterflies remaining to keep the population alive.

One such concerned organization is the International Union for the Conservation of Nature (IUCN), an international membership union composed of both governmental and non-governmental members. The IUCN Red List of Species is a checklist of taxa that have undergone an extinction risk assessment based on the currently available data and information that comes from a range of sources, including published scientific papers, books, reports, expert knowledge, indigenous knowledge, and citizen science. The migratory

monarch butterfly was categorized as endangered under the IUCN Red List of Species threatened with extinction on July 21, 2022. The recent designation has brought a lot of attention to the monarch butterfly.

Concern for the monarch butterfly population in the U.S. has also occurred in recent years. On December 15, 2020, the U.S. Fish and Wildlife Service (USFWS) found that adding the monarch butterfly to protection under the Endangered Species Act is warranted but precluded by other higher-priority listing actions, making the monarch butterfly a candidate species under the Endangered Species Act. The USFWS will review the status of the monarch listing—usually annually. The monarch will remain a candidate species until it is determined that listing is warranted and resources are available, or that current conservation actions have recovered the population enough that listing is not warranted. As a candidate species, there are no legal regulations for the monarch butterfly under the Endangered Species Act, but there may be future legal regulations if the monarch is listed as threatened or endangered under the Endangered Species Act.

In short, the new status of the monarch butterfly as “endangered” on the IUCN Red List does not change the current USFWS federal listing decision under the Endangered Species Act.

But did you know that YOU can help the monarch in your own way? If you plant it, they will come! Planting a variety of native flowers with diverse bloom times, varied flower shapes, and mixed

coloration that bloom from spring to fall can help migrating monarch adults. Nectar flowers are very important for adult monarchs, especially for those that are migrating, and are also important for other pollinators too. Planting milkweed is another step you can take that will help monarchs. The most common native milkweeds in Los Alamos are butterfly weed (*Asclepias tuberosa*), showy milkweed (*Asclepias speciosa*), spider milkweed (*Asclepias asperula*), and horsetail milkweed (*Asclepias subverticillata*).🌱

The Big Chill

By Marilyn Lisowski

Did you shiver when you tossed back the covers this morning? Did you feel an icy wind through an open window? Well, every mammal, reptile, bird, and insect in your yard and in the nearest canyon felt it too. Maybe you cranked the window shut, slipped on a warm, woolly sweater, and turned up the heat. But imagine outdoor creatures, no window to slam down, no fuzzy sweater, only skin, fur, or feathers. Nothing motivates them so much as the threat of winter. They could easily perish in the cold.



Black bears go into torpor for the winter; unlike the near-death condition of hibernation, it's a slowing down of breathing and heart rate that is deeper than sleep.

(Photo by Marion Stelts)

Time for action! An elk herd, fattened from grazing in high mountain meadows, clambers down to the edge of Bandelier National Monument, where the grass is still green. Hummingbirds that sipped contentedly at your feeders all summer streak south to Mexico and Central America. Some beetles, dragonflies, and butterflies have already fled. Sandhill cranes soar overhead in great V's to gather in southern New Mexico marshlands.

Those creatures that cannot escape, hunker down as best they can.

At the top of the food chain, our black bears launch into a frenzied search for food. Almost anything is on the menu – rotting apples under trees, berries, insects, birdseed from your feeder, even your pets, and their favorite: your garbage. It's all grub to fatten up. The chunkier they are, the warmer they will stay during their long torpor. Torpor is not the near-death condition of hibernation but a lesser slowing down of breathing and heart rate that is deeper than sleep. This still conserves the bear's energy and allows it to stay deeply asleep in a den with few awakenings, typically from mid-December to April. Can you wake it up? Sure. But why? It will take a swipe at you and sink back into torpor.

Bats that do not migrate go into a fever of moth-chomping, knowing that they will not survive the winter at all if they don't retain enough fat. A bat enters torpor like bears, but deeper, in a hanging bat group to conserve heat. Its heart rate goes from 250 beats per minute to about 10. Its temperature plummets. If something wakes it up, it will probably die.

Have you ever smelled a skunk in winter? Probably not. They munch on grubs, eggs, insects, and worms to pack on fat under their fur. They drift into a light torpor and don't have to leave their warm nest very often to hunt.

Reptiles hibernate with body temperatures so low they sometimes freeze. The lucky ones squeeze into crevices with a little heat, possibly against your house. Snakes gather in burrows.

Honey bees gather around their queen, shivering to keep her warm, and living off honey. Bumblebees, except for their queen, don't worry about coming cold weather, they simply die. The queen, however, thinks about where she will burrow to hibernate; she knows she must lay eggs in spring to replace worker bees, queens, and drones.

Did you know that squirrels do not hibernate? Most species scamper about collecting and burying nuts, acorns, seeds, and berries, and usually remember where they put them. However, the beautiful tassel-eared Abert's squirrels living here don't bother putting food away for winter. They aren't bothered by anything; they play and eat, eat and play. In winter, they pay for

their laziness, as some die of cold and starvation.

Those that survive have devoured enough soft inner bark of ponderosa pines to keep warm. The pines do not die from this carnage, but they do suffer.

Chipmunk habits make more sense; they store food for nibbles in a hidden crevice in rock or under your house next to their winter beds. Between periods of deep hibernation, they wake up to take potty breaks and munch on food before yawning and plunking back down.

Why don't humans hibernate? Ancestors of *Homo sapiens* may well have survived bitter winters in torpor. Scientists examining humanoid bones from a Spanish cave show evidence that they did. Many modern humans escape frigid temperatures by migrating like birds to balmy shores, jungles, or deserts.

As you pull out sweaters, coats, and boots, watch your yard for creatures preparing for the icy weather to come. Note the absence of lizards and insects, beware of desperate bears, and know that with the snow will come a quiet calm. 🦡

Book Review: *Colors of Nature*

By Ed Santiago

"Why is there so little 'nature writing' by people of color?" is the question behind *Colors of Nature: Culture, Identity, and the Natural World*. Did you notice the quotation marks around "nature writing" in my question? It turns out that's a complex question merely to ask, let alone answer. What does it mean, for instance, to imagine that "nature" is in some way separate from us humans or we from her? This illusion of distance is harming us.

The collection features thirty-six writers across four broad sections — Return, Witness, Encounter, Praise — of eight essays each. The editors sought a wide range of voices and backgrounds from which they formed a more cohesive whole than I dared expect. The result is a thoughtful work that informs, challenges, humbles, and rewards. PEEC members are a well-traveled bunch. It's likely that a fair number have bird watched in the Kalahari or hiked in the Cascades — but not many, I suspect, have done so with the perspective of a Black American or Choctaw or Chicano. The body we inhabit shapes how we experience the world. These are



Abert's squirrels devour the cones and soft inner bark of ponderosa pines to keep warm in the winter.
(Photo by Bob Walker)

very different bodies from yours and mine, and from each others'. Sometimes what they say is surprising, even disturbing. All the more reason to listen.

What struck me most is how personal each essay is. I had never realized how accustomed I am to the impassive, once-removed narrative: "Here we see the lion chasing the zebra. We the observers are not affected, nor do we affect the outcome." This is not that kind of book. This is not, let's face it, that kind of world. So when we read about an ant colony, the young Filipino boy enthralled by it is part of the story; genetics, international trade, and microclimates blend in with women's roles and rights in rural Mexico; witnessing a snapping turtle laying eggs is woven with Indigenous cultural traditions and superfund devastation. Natural Science here coexists with culture, history, and lived experience. "But what about, objectivity?", I hear many someones cry out. Objectivity, yes, but tempered with empathy and humility.

One Los Alamos is a local group promoting thoughtful, civil dialogue around our diversity of backgrounds, beliefs, and identities in order to champion shared values and interests that can strengthen our community. Heidi Rogers created the Women of Color Book Club in February 2018 as a way to foster discussion and understanding of lives different from our own. For more information visit: linktr.ee/OneLosAlamos. 🦡

How Can the James Webb Space Telescope Evolve Our Understanding of the Cosmos?

By Dr. Rick Wallace

The James Webb Space Telescope (JWST) was launched on December 25, 2021, and ushered in a new era of space exploration. After 6 months to reach its orbit (4 times further away than the moon), align its 18 mirrors, and calibrate its instruments, JWST returned data that give us a glimpse of its capabilities. Each image released in July 2022 hints at the new discoveries anticipated by JWST as it begins scientific operations.

material that is condensing to form new stellar and planetary systems. A combination of NearIR and MidIR data will allow detailed analysis of star-forming regions to help us understand how star formation begins, how the collapse occurs to form stellar disks, how those disks coalesce into individual planets, and the various parameters leading to different types of planets (such as earth-like planets that might support life).

Another application for JWST sensors is the spectral analysis of the light received from various objects. When the light is spread out across a range of wavelengths, each material (H, O₂, CO₂, methane, etc.) produces a unique set of lines corresponding to specific energy levels related to the quantum structure of that atom or



Figure 1 - Carina Nebula (Photo by NASA, ESA, CSA, and STScI)

JWST's 21-foot mirror has about 7 times the light-gathering power of the Hubble Space Telescope's 8-foot mirror, and much higher spatial resolution in the near infrared (NearIR). As described below, the infrared capabilities of JWST allow it to see different aspects of the universe compared to the mainly visible light capability of Hubble. Near infrared light is at a wavelength that allows it to pass through dust clouds with limited absorption, unlike visible light that is absorbed by the dust. JWST also has a mid-infrared (MidIR) sensor that allows it to collect detailed information on the dust particles themselves.

Figure 1 is a NearIR image of the Cosmic Cliffs in the Carina Nebula. Note holes where newly formed stars have blown away material after their ignition, forming shock waves that send streamers of ionized gas and hot dust away from the nebula, as well as piling up

molecule. By analyzing the relative strengths and other properties of these spectral lines, we can determine the composition, temperature, density, and other properties of the region where the lines were emitted.

One Webb data set shows the initial spectral analysis of the atmosphere of the exoplanet WASP 96b, and clearly indicates the presence of water. As a planet passes in front of its parent star during its orbit, the atmosphere is backlit by the star. Spectral data from the planet can be compared with computer models of the planet's atmosphere to determine the composition, temperature, and pressure/density of the atmosphere, as well as haze and cloud cover. As we continue to calibrate the JWST instruments and spend more time observing specific planets, we hope to eventually see spectra such as Figure 3.

Figure 2 shows a simulated spectrum from an earth-like planet. The presence of oxygen and

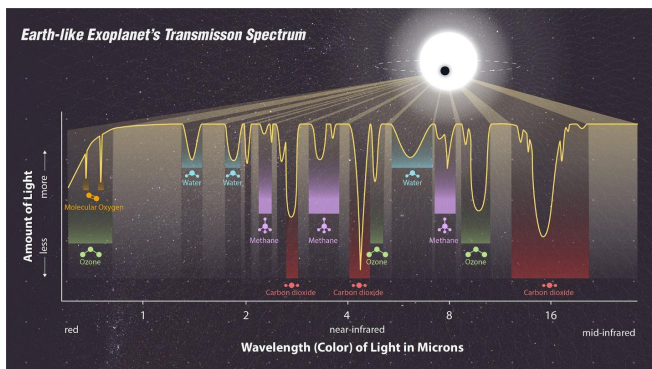


Figure 2 - Earth-like Exoplanet's Transmission Spectrum.
X axis: Wavelength (Color) of Light in Microns
(red, near-infrared, and mid infrared)
Y axis: Amount of light (less, more)
(Photo by NASA, ESA, CSA, and STScI)

methane may indicate biological life processes on the planet. If we obtain such data, it could be our first real indication of extraterrestrial life.

Figure 3 shows a star at the opposite end of its life.

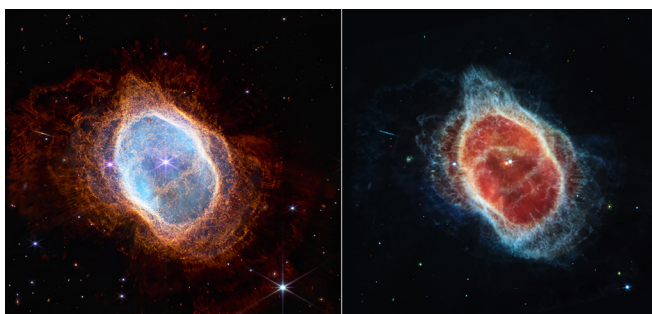


Figure 3 - NearIR on left; MidIR on right
(Photo by NASA, ESA, CSA, and STScI)

NGC 3132 is a star about the same size as our sun that has burned through its fusion fuel. The outer layers of its atmosphere have been puffed out into space, creating a nebula of ionized gases. The core of the star collapsed into a highly compressed object known as a White Dwarf. The MidIR image shows the structure of the dust and clearly shows the dust surrounding the central White Dwarf, which is to the left of the still-shining sun-like companion star on the right. JWST data on the appearance, composition, and movement of various points in the nebula will help us better understand stellar evolution and the end stages of stars with different masses.

JWST first images also include Stephan's Quintet, which are a group of interacting galaxies. JWST has not only imaged the shock waves produced when the galaxies collide but also stars thrown into intergalactic space by the collision. Spectral measurements have determined the composition, temperature, and motion of gases near the central black hole in one of the galaxies. Such data can further our understanding of black holes, accretion disks, the formation of galactic jets, and the formation and interaction of galaxies.

Figure 4 shows thousands of galaxies, including the

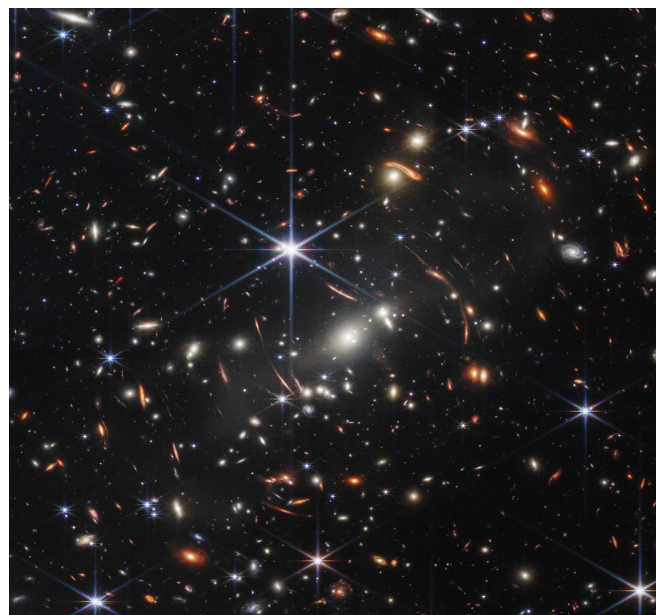


Figure 4 - Webb's First Deep Field (NIRCam Image)
(Photo by NASA, ESA, CSA, and STScI)

farthest galaxy we have ever seen. This galaxy seems to date (if early analysis is verified) to only 300 million years from the Big Bang that formed our universe. This galaxy is already baffling, being brighter and having more heavy elements than current universe formation models predict.

Many additional areas of inquiry will open through the JWST capabilities, showing us the wondrous nature of our vast universe, but also emphasizing the uniqueness (or perhaps not so unique?!) of our earth as a platform for intelligent life. As with other new space telescopes, we expect JWST will discover new aspects of our universe and generate new questions that we do not even know to ask at present. 🧐

A Letter from the Director

The themes for this edition of Nature Notes are transition and discovery, and as we enter into fall, PEEC is undergoing transitions of our own. We have two new staff members that have joined us, Ryan Ramaker as the Visitor Services Manager, and Beth Sanchez as the Lead Educator. Both Ryan and Beth bring incredible experience and passion to the work here at PEEC and I invite you to read more about them below.

Additionally this quarter, the PEEC Board will be transitioning to new leadership and beginning a new strategic planning process. As happens each fall, we will be hosting our annual membership meeting, PEECnic, on October 8th, where you can meet with other members, get to know the staff and board, vote on a slate of board candidates, and enjoy food and activities. We hope you will join us for this celebration and many other exciting community events that will take place at the Los Alamos Nature Center over the next few months.

You are an integral part of PEEC's past and present, and as we grow and change together, your ideas will be vital to PEEC's future. I welcome your input and appreciate your support. 🌱

Onward!

- Jillian



Born in the beautiful state of Washington, Ryan found his love of nature early. His mother was one of the biggest influences on his passion for learning and respect for nature, helping him to see how

connected we all are to the natural world. His interest in hiking, biking, and bushcraft came out of this connection. Ryan moved to Santa Fe, NM, in 2000, and while getting his degree, he stumbled across the world of sustainable technology and restorative agriculture. This discovery has shaped his life.

Ryan has taught classes at REI, built an outdoor equipment rental program, and worked to expand and maintain the Española Healing Foods Oasis.

"The ability to help people reconnect with the land they live on and visit is why I found my way to PEEC", states Ryan. "I am looking forward to finding my place in such a welcoming space." Ryan started at PEEC in September of 2022.



Beth grew up in Northern New Mexico. Her earliest outdoor experiences came from toiling in the family garden, pushing cattle from pasture to pasture in the Carson National Forest, and dare-devil

swimming in a nearby reach of the Rio Grande. In high school, she attended NM Forestry Camp, where her eyes opened to the possibility of tying her love of nature to a career. Next she got a biology degree at UNM and Humboldt State. Since then she has worked as a fisheries biologist for the Forest Service, a Peace Corps volunteer in Panama, and an educator for the "Rivers and Birds" watershed program and the Mesa Prieta Petroglyph recording project.

Beth worked for 10 years as a classroom teacher in NM public schools, including here in Los Alamos. Her dream has always been to share experiences with children so they can learn to love and respect nature. She started that dream at PEEC in August of 2022.

Fall Night Skies

October-December 2022

- ★ **Full moon nights:** October 8, November 8, December 8
- ★ **New moon nights:** October 25, November 23, December 23

- ★ **Every Wednesday at 3pm** the nature center planetarium hosts a free “open house” informal planetarium program. Topics vary depending on the presenter. Come with your questions, curiosity, children, and out-of-town guests!

- ★ **October 8:** Join PEEC on a full moon hike along the canyon in White Rock. Register at peecnature.org
- ★ **October 22:** The Pajarito Astronomers host a dark night at Overlook Park in White Rock. Come observe the skies with local amateur astronomers and their telescopes.
- ★ **November 8:** Get up early to observe a total lunar eclipse! The peak of the eclipse will be around 4 am, but you will be able to observe a partial eclipse even if you get up at 5 am.
- ★ **November 19:** The Pajarito Astronomers host the last dark night of the year at Overlook Park in White Rock. Come observe the skies with local amateur astronomers and their telescopes.
- ★ **December 13:** The Geminids meteor shower is one of the strongest showers. Get out to observe it before the waning moon rises around midnight.
- ★ **December 21:** The Winter Solstice is the shortest day of the year.

Our Mission: Enriching people's lives by strengthening their connections to our canyons, mesas, mountains, and skies.

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“...a beautiful building with a lot of programming available to connect visitors to nature, the environment, ecology, and so much more.”

— Los Alamos Nature Center visitor

Nature center hours:

Monday: 10 – 4
Tuesday: Closed
Wednesday: 10 – 4
Thursday: 10 – 4
Friday: 10 – 4
Saturday: 10 – 4
Sunday: Closed

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Children enjoy a fall hike during PEEC's Wednesday after school club, Forest Explorers. (Photo by Ashleigh Lusher)

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UPCOMING EVENTS

Halloweekend Fun at the LANC **OCTOBER 28**
Small Business Saturday **NOVEMBER 26**
SNOTEL and Forecasting Snow Pack **DEC 8**

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