Into the **WILD**
EXPLORING WITH THE KP NATURE GUIDE

Naturalist's Notebook

CHRIS RURIK, KP NEWS

Log with bird's nest fungus cups. *Chris Rurik, KP News*

BUFFLEHEADS AND FLICKERS

All this rain has flooded the nearby pastures. You know your pond has just about become a lake when the regular dabblers like mallards and wigeons are joined by diving ducks. Today I've found a pair of buffleheads swimming along a mostly submerged barbed wire fence.

Always entertaining and energetic, buffleheads are one of our smallest ducks. They are here in winter. The females are slate gray with white ovals on their heads. The males remind me of the Nike basketball shoes I used to wear, gleaming white on black.

Along the edge of the flooded field, two birds spook from the ground with a flash of white butt patches. They land upright on the trunk of a dead fir. Their big bills swing as they look back to admonish me. Black spots cover their breasts.

These are northern flickers, the only local woodpecker you will find pecking the ground. Flickers eat ants. Often this means they are high in snags searching for carpenter ants, but just as often they will walk awkwardly through grass and probe the ground. I wonder if the heavy rain has concentrated ants in this place, perhaps even flooded them from their homes.

Research has shown that flickers can read the weather to anticipate where ants will be most active. For example, below 75 degrees ants in open habitats tend to be more active than ants in the forest. Above 75 degrees it is the opposite. Indeed, on a recent warm-for-January day, a fence line thatch ant nest was crawling with ants while a massive one back in the woods remained in its winter dormancy. Foraging animals go where prey is most abundant and safe. Following flickers would be a good way to learn ant behavior.

Which makes me wonder, why are the buffleheads here? They eat snails and aquatic insects and, in saltwater, loads of crabs. Did they merely come to relax or has this pasture somehow held snails or aquatic insects in reserve, waiting for a flood to offer them life? That's the kind of question I like: one best answered in waders.

Far to the north, in summertime Canada and Alaska, buffleheads and flickers have a connection. Buffleheads use old flicker nests, which are holes in trees, for their own nests. A flicker's nest hole is just small enough that larger ducks cannot get in to harass the buffleheads.

RAIN, SLUGS, AND THE BIRD'S NEST FUNGUS

I'm out in a pasture gathering branches that have been blown out of firs when I see a half-buried stick adorned with white growths that look like molds for casting pearls.

Hello to the bird's nest fungus. They are tiny, scurfy things. They grow on wood and dung. The smooth interiors of their cups hold "eggs," each of which contains a mass of spores. The nests I have found are half full of rainwater and empty of eggs — except for one, I notice, which is tucked off to one side. The tiny eggs look like misshapen jelly beans covered in brown goo.

The stick is not big. It will be gone in another year or two, rotted by bacteria and fungi. And there are no bird's nest fungi up in living trees. So how do they get to these fleeting homes? How did the egg that birthed these nests travel through dense tangles of pasture grass, where it cannot grow, to arrive at this fallen stick?

Enter the slug. The spores of bird's nest fungi pass unharmed through the digestive tract of slugs (and that of insects as well). I cannot find any studies on the speed of slug digestion, but it is slow enough that, even at the pace of slug travel, the spores make it a good long way by the time they are pooped out again.

So, you might think the slugs raid the nests to eat the spore eggs, but apparently that would be far too simple. In fact, the eggs are usually eaten off surrounding vegetation, up to several feet from the nests. How they get there explains another old name for bird's nest fungi: splash cups.

When a raindrop hits the lip of a nest, its energy boomerangs around the curved bottom of the cup and flings the eggs into the air. (A raindrop hitting the center of the nest does not disturb the eggs.) The eggs fly off at up to 10 mph. In some species they reach heights proportionate to a human throwing a discus a mile into the air.

And then they must stick to whatever they hit, lest they drop into the dirt below. In species like the one I have found, the eggs are coated in a sticky goo. In other species, the egg is not sticky but attached to a sticky thread coiled in a tiny purse. When the egg hits a blade of grass, the thread gloms on and, like the rope of a tetherball, swings the egg back to rest.

As long as I'm walking backward through the chain of these fungi's reproductive events, let's follow the raindrop upward from its splashdown. For a naturalist like me, acting like a tracker who follows a coyote's prints back to its den can bring to light otherwise hidden connections in the flows of life and energy. A raindrop falls at 20 mph. If it is large, it has the power to dislodge far more than just spore eggs, which need less than 2% of a raindrop's energy to fly. Conservation districts warn against leaving your soil bare because raindrops can literally splash away soil that has taken a thousand years to accumulate.

And from whence did the raindrop come? The energy it holds is not magically created high above. Like the spore eggs it is carried there by a larger force, in this case global weather patterns of evaporation driven by the sun itself. Energy flows in circles — sometimes at the speed of a splash; sometimes at the speed of a slug. ■

At Home with Moths, the Beautiful Bellwethers

Celebrate National Moth week: They are wildly diverse, intimately connected with plants and responsive to change.

CHRIS RURIK, KP NEWS

The days are hot and the nights are warm. By day I'm lucky to see two or three butterfly species. By night the moths swarm, pale shapes like prisms around the edges of my house. At my black light trap, where I catch moths for portraits before releasing them, I find 10, 15 species in a night. With a close look, their beauty matches that of their day-flying cousins, and their diversity, night after night as more species are revealed, each with its own pattern, is wild. A tiger moth arches pure white wings to hide an orange and black body. A lappet moth with cinnamon scalloped wings tucks its head next to leaflike flanges. A dozen micromoths rest like windblown flower petals; I hope to someday learn their names.

The third week in July is National Moth Week. To prepare I've been documenting the moths in our area.

In a way, this new practice of examining them, learning and photographing them, is a form of penance. I've had a long journey with moths. In the not-too-distant past you could find me shouting and cowering when I reached from the shower and one flew from my towel. I once killed a moth on a wall by throwing a book at it. It left a gray dust on the wall. Now I know that what looked like dust had been the scales that patterned its wings. I don't know why my fear was so intense. I even published a piece with the line, "They are night-riders birthed in Satan's closet." I was trying to be funny. And people laughed. But humor born in fear rarely stays funny. It's a dead-end street.

Penance, on the other hand, is supposed to be a mud pit. Yet these moths have opened to me a vista. After beetles, moths and butterflies are the most diverse order of insects, with 155,000 described species and counting. In North America there are about 700 species of butterflies. There are over 12,000 species of moths. Why such diversity? And what does it tell us about the world around us?

For an answer, it helps to pay attention to

Spotted tussock moth (Lophocampa maculata)
Pero sp. (i.e., a species in the genus Pero)
Unnamed prominent moth (Pheosia californica)
Large gray dagger (Acronicta insita)
Cinnabar moth (Tyria jacobaeae)
Labrador carpet moth (Xanthorhoe labradorensis)
Paraseptis adnixa (no common name)
Unidentified carpet moth
Large yellow underwing (Noctua pronuba)
Venusia sp.

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the way moths spend most of their lives — as caterpillars. Caterpillars can be found on every kind of flowering plant, and they have adapted to chow down on leaves in unique and intricate ways. Most of them specialize on a single family of plants, or even a single species. The free-flying adults show up anywhere — they sip nectar here and there to fuel their flights in search of mates, or lack mouthparts entirely and do not feed — but the caterpillars are always near their plants of choice. And plant diversity is legendary.

Recent research supports a long-held hypothesis that flowering plants and moths diversified in tandem, each reinforcing the others' proliferation. Using the genetics of hundreds of moth species and models that calculate rates of evolutionary change, scientists have sketched out the moth family tree, peering into deep time to see when the major lineages diverged.

Sure enough, a major radiation happened in the Cretaceous period of 90 million years ago, the time of the dinosaurs, when flowering plants spread rapidly across the world, evolving into thousands of fantastic forms and challenging the reign of conifers, ferns and cycads.

The other night a moth of the genus Pero appeared, looking like a little hieroglyph, its wings stiff and crossed with a twiglike streak. In terms of numbers, Pero are similar to hummingbirds — the genus has about 300 species, all in the Americas, in every conceivable habitat, with its highest diversity in the mountainous terrain of South America where bands of unique vegetation stripe valleys many thousands of feet deep. Topography and diversity go hand in hand.

But there are other reasons for diversity. Two megadiverse moth families with hundreds of representatives on the Key Peninsula, Noctuidae and Geometridae — the genus Pero is in the family Geometridae — achieved their incredible numbers 60 million years ago, long after the Cretaceous explosion of flowering plants. It's not a random number. It follows close on the heels of one of the most destructive events in Earth's history: the famed dinosaur-killing asteroid impact. So much dust went into the atmosphere that all photosynthesis stopped for months or years. 80% of animal species went extinct. The few survivors held on by a thread. When the sun returned and plants regrew, they spread into a landscape in which everything had been rearranged. With most of life reduced to ghosts, moths and mammals had space to radiate into a multitude of species.

> SCIENTISTS CALL THEM BIOINDICATORS: DIVERSE, INTIMATELY CONNECTED WITH PLANTS, RESPONSIVE TO CHANGE.

So moths make great bellwethers. Scientists call them bioindicators: diverse, intimately connected with plants, responsive to change. You could blindfold me, spin me around, drop me off at night in a dark place and, assuming I had my black light trap in my back pocket, I could get a pretty good sense of the terrain based on the moths that paid me a visit. By sampling moths over the coming years, identifying patterns, I hope to witness in real time the ways the wild life around us, from moths to caterpillars to flowering plants and right down to soil and moisture, is reacting to the changes rocking our landscape.

Scientists who study deep time talk about "the great adaptive radiations of the past," each following an asteroid-level trauma. Today the trauma is far more diffuse — patches of clear-cut and pavement and sprayed chemicals intermixed with preserved forest and overgrown margins. It's an ongoing freeform rearrangement of wild communities, with the losses far outweighing the rebirths. What will result from such trauma? How many species will slip away like ghosts beneath our notice? Will wildlife adapt, or will it take deep time for species to radiate again?

As I prepare for National Moth Week, I'm thinking about just how much of the rearrangement is akin to throwing a book at a moth on a wall. Ignorance and fear walk hand in hand. Our default preference is the blank wall, the mowed lawn, the simplistic idea of Moth, rather than the tangled wild filled with hundreds of moth species, each with its own story.

Having begun to appreciate the vista that moths provide, the blank wall sure seems like a lonely thing. ■

NATIONAL MOTH WEEK

July 17-25 is the 10th annual National Moth Week. This event "celebrates the beauty, life cycles and habitats of moths," according to **www.nationalmothweek.org**."'Moth-ers' of all ages and abilities are encouraged to learn about, observe and document moths in their backyards, parks and neighborhoods." A citizen science project, the event provides scientists with data about moths around the world.

Finding and photographing moths can be as easy as leaving a porch light on overnight and snapping pictures with your cell phone in the morning. More ambitious moth-ers might string up a white sheet, use a black light or mercury vapor light, or take a mobile setup to the beach or forest. The website lists ways of contributing sightings. Observers can also send images to Chris at nature@keypennews.org.

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Where Beaches Are Born

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Agates and oysters. A clear tide. Stories.

I am south of Driftwood Annie's point, strolling Pitt Passage with two veteran beach walkers. The going is wonderfully slow.

"It changes so much, you know," says one of my companions. It is late winter and the rocks of the upper beach are wrinkled with long undulations that will disappear by spring. "Even just week to week, seems like. Or it's your perception."

Many of our beaches grow steeper in winter. Storms act as bulldozers. Our waves may not compare to ocean waves, but they are enough to send rocks scurrying; sand rises and falls through the seasons like the tide itself. We pass a row of abandoned pilings. Another beach walker, coming the other way, says that to him these pilings lean more every year.

Beaches are aikido masters. Everything on them is loose. By transferring the violent energy of waves into individual rocks that then jump, tumble, heap and fall, they prove that it is in fact possible to dissipate violence rather than pass it on to the next guy or magnify it through generations. But — and this is a big but — to achieve such a feat, you cannot remain unchanged.

As in aikido, you must realign yourself along the path of the incoming energy and contort yourself to direct it safely toward dissipation. I'm thinking of friends I have helped through trauma. It's not something you can do dispassionately. The trauma flows through you as you help them seek release; it transforms everything it touches.

Nature teaches that transformations need not be feared. If anything is to be feared, it is the thing that proclaims itself unchanging. All around me is anatomy of the beach's latest contortions. It makes for unstable walking. Is it any surprise that anything solid here, piling or bluff, will eventually fall?

Farther down the beach we come to a terrain of crumbling bluffs. They are case studies in what geologists call punctuated equilibrium. Things stay the same for a long time, years or millennia, before change comes as fast as a punctuation mark. True for dinosaurs and true for these steep scarps of packed sand. Imbricated in their faces are layers of rock cobbles. We step around blocks of fallen sand into glistening alcoves to see treasures that have been borne and buried by long-lost glaciers and are now brought to light by waves. Above, trees lean like the hands of a hundred drunken clocks. Over decades, the bluff beneath them slumps with small landslides. Some trees sink into the beach, getting a new foliage of seaweed, while others hang on and manage to return their growth to vertical. On the elbow in one we spy a sapsucker.

This is where our beaches are born. Our geology is unique enough that research on its interactions with the sea has coined a new geological term: feeder bluff. So called because they feed Puget Sound's beaches with the rocks and sand they need to exist and perform their aikido, feeder bluffs are scattered from Neah Bay to Olympia. The Key Peninsula has more than most South Sound shorelines.

Up and down the peninsula are dozens of cells of sediment movement. Sediment in the form of sand and rock enters a beach from a feeder bluff. Waves push the sediment in punctuated pulses along shore until it reaches a bend in the shoreline and settles. Look at a map and notice where sand spits appear. Imagine how sand moves.

A recent mapping project, available on the Department of Ecology website, shows the part in this process — feeder bluff, transport zone, deposition zone — played by every stretch of beach in Washington. For any beach you walk you can learn the source and destination of its sediment.

It's not an exaggeration to say that without feeder bluffs, the beaches we know would slowly vanish. Scientists estimate that 90% of Puget Sound's sediment comes from eroding bluffs and only 10% from rivers and streams. Rivers carry far more clay and silt than sand and rocks. Without our unique array of feeder bluffs, Puget Sound would probably be carpeted with thick and sticky muck rather than the rocks of every hue we know and love, especially in its convoluted southern reaches.

Scientists are documenting this now where bluffs have been armored with bulkheads to protect yards and homes from landslides. (As my old hydrology professor would have said: "That's not a landslide problem. That's a building problem. A building-a-house-where-a-landslide-will-happen problem.") Starved of sediment by bulkheads, beaches grow narrow and muddy. Waves come in more strongly and they are not dissipated but reflected by the bulkhead back into the water, where they cross threads with other waves and stir up a mess of ill energy.

Where I live the property owners worry about a sand spit that carries in its sediment layers of cook pits and canoe launches that go back centuries. Sea level creeps higher. Large driftwood has become a rarity. Plans have been floated to anchor logs atop the sand spit to help it stand firm. I once shared their fear but now I'm not so worried. I don't see the spit as a static thing.

Maybe it comes from spending time with folks like my companions today. Beach walkers are a particular breed with a gaze that roves from individual rocks and bits of glass to cloud formations and wave patterns. Though they walk the same stretches of beach every week, they expect to find something new every time. They have been trained by subtle rearrangements, glinting oddities, the way distant influences appear within upheaval — the alignments left by passing traumas.

Beaches of loose rock can be buoyant. They can erode fear if you let them. Just south of my local sand spit is a quarter mile of mostly unarmored bluffs, and winter after winter as I have seen them crumble, my worries have been eased. As sea level rises, waves will lick those bluffs more and more often, providing that particular cell with larger and larger slides of sediment. Provided the bluffs are not armored, perhaps it will be enough to keep the spit's head above water.

At the farthest point on our walk, we come to the edge of a stunning natural amphitheater. The beach curves below a hundred vertical feet of sediment that has been falling in sheets and fans. The statewide mapping effort has a special term for such outsized bluffs: "feeder bluff exceptional." This is one of 15 on the Key Peninsula. It feels like a place where the world is being created. I think I might need to make a pilgrimage to each. ■