

and the spiritual mingle like grounds mingled with humus, transformed like steam rising from a mug into the morning mist.

What else can you offer the earth, which has everything? What else can you give but something of yourself? A homemade ceremony, a ceremony that makes a home.

ASTERS AND GOLDENROD

The girl in the picture holds a slate with her name and "class of '75" chalked in, a girl the color of deerskin with long dark hair and inky unreadable eyes that meet yours and won't look away. I remember that day. I was wearing the new plaid shirt that my parents had given me, an outfit I thought to be the hallmark of all foresters. When I looked back at the photo later in life, it was a puzzle to me. I recall being elated to be going to college, but there is no trace of that in the girl's face.

Even before I arrived at school, I had all of my answers prepared for the freshman intake interview. I wanted to make a good first impression. There were hardly any women at the forestry school in those days and certainly none who looked like me. The adviser peered at me over his glasses and said, "So, why do you want to major in botany?" His pencil was poised over the registrar's form.

How could I answer, how could I tell him that I was born a botanist, that I had shoeboxes of seeds and piles of pressed leaves under my bed, that I'd stop my bike along the road to identify a new species, that plants colored my dreams, that the plants had chosen me? So I told him the truth. I was proud of my well-planned answer, its freshman sophistication apparent to anyone, the way it showed that I already knew some plants and their habitats, that I had thought deeply about their nature and was clearly well prepared for college work. I told him that I chose botany because I wanted to learn about why asters and goldenrod looked so beautiful together. I'm sure I was smiling then, in my red plaid shirt.

But he was not. He laid down his pencil as if there was no need to record what I had said. "Miss Wall," he said, fixing me with a disappointed smile, "I must tell you that *that* is not science. That is not at all the sort of thing with which botanists concern themselves." But he promised to put me right. "I'll enroll you in General Botany so you can learn what it is." And so it began.

I like to imagine that they were the first flowers I saw, over my mother's shoulder, as the pink blanket slipped away from my face and their colors flooded my consciousness. I've heard that early experience can attune the brain to certain stimuli, so that they are processed with greater speed and certainty, so that they can be used again and again, so that we remember. Love at first sight. Through cloudy newborn eyes their radiance formed the first botanical synapses in my wide-awake, newborn brain, which until then had encountered only the blurry gentleness of pink faces. I'm guessing all eyes were on me, a little round baby all swaddled in bunting, but mine were on Goldenrod and Asters. I was born to these flowers and they came back for my birthday every year, weaving me into our mutual celebration.

People flock to our hills for the fiery suite of October but they often miss the sublime prelude of September fields. As if harvest time were not enough—peaches, grapes, sweet corn, squash—the fields are also embroidered with drifts of golden yellow and pools of deepest purple, a masterpiece.

If a fountain could jet bouquets of chrome yellow in dazzling arches of chrysanthemum fireworks, that would be Canada Goldenrod. Each three-foot stem is a geyser of tiny gold daisies, ladylike in miniature, exuberant en masse. Where the soil is damp enough, they stand side by side with their perfect counterpart, New England Asters. Not the pale domesticates of the perennial border, the weak sauce of lavender or sky blue, but full-on royal purple that would make a violet shrink. The daisylike fringe of purple petals surrounds a disc as bright as the sun at high noon, a golden-orange pool, just a tantalizing shade

darker than the surrounding goldenrod. Alone, each is a botanical superlative. Together, the visual effect is stunning. Purple and gold, the heraldic colors of the king and queen of the meadow, a regal procession in complementary colors. I just wanted to know why.

Why do they stand beside each other when they could grow alone? Why this particular pair? There are plenty of pinks and whites and blues dotting the fields, so is it only happenstance that the magnificence of purple and gold end up side by side? Einstein himself said that "God doesn't play dice with the universe." What is the source of this pattern? Why is the world so beautiful? It could so easily be otherwise: flowers could be ugly to us and still fulfill their own purpose. But they're not. It seemed like a good question to me.

But my adviser said, "It's not science," not what botany was about. I wanted to know why certain stems bent easily for baskets and some would break, why the biggest berries grew in the shade and why they made us medicines, which plants are edible, why those little pink orchids only grow under pines. "Not science," he said, and he ought to know, sitting in his laboratory, a learned professor of botany. "And if you want to study beauty, you should go to art school." He reminded me of my deliberations over choosing a college, when I had vacillated between training as a botanist or as a poet. Since everyone told me I couldn't do both, I'd chosen plants. He told me that science was not about beauty, not about the embrace between plants and humans.

I had no rejoinder; I had made a mistake. There was no fight in me, only embarrassment at my error. I did not have the words for resistance. He signed me up for my classes and I was dismissed to go get my photo taken for registration. I didn't think about it at the time, but it was happening all over again, an echo of my grandfather's first day at school, when he was ordered to leave everything—language, culture, family—behind. The professor made me doubt where I came from, what I knew, and claimed that his was the *right* way to think. Only he didn't cut my hair off.

In moving from a childhood in the woods to the university I had unknowingly shifted between worldviews, from a natural history of

experience, in which I knew plants as teachers and companions to whom I was linked with mutual responsibility, into the realm of science. The questions scientists raised were not "Who are you?" but "What is it?" No one asked plants, "What can you tell us?" The primary question was "How does it work?" The botany I was taught was reductionist, mechanistic, and strictly objective. Plants were reduced to objects; they were not subjects. The way botany was conceived and taught didn't seem to leave much room for a person who thought the way I did. The only way I could make sense of it was to conclude that the things I had always believed about plants must not be true after all.

That first plant science class was a disaster. I barely scraped by with a C and could not muster much enthusiasm for memorizing the concentrations of essential plant nutrients. There were times when I wanted to quit, but the more I learned, the more fascinated I became with the intricate structures that made up a leaf and the alchemy of photosynthesis. Companionship between asters and goldenrod was never mentioned, but I memorized botanical Latin as if it was poetry, eagerly tossing aside the name "goldenrod" for *Solidago canadensis*. I was mesmerized by plant ecology, evolution, taxonomy, physiology, soils, and fungi. All around me were my good teachers, the plants. I found good mentors, too, warm and kind professors who were doing heart-driven science, whether they could admit it or not. They too were my teachers. And yet there was always something tapping at my shoulder, willing me to turn around. When I did, I did not know how to recognize what stood behind me.

My natural inclination was to see relationships, to seek the threads that connect the world, to join instead of divide. But science is rigorous in separating the observer from the observed, and the observed from the observer. Why two flowers are beautiful together would violate the division necessary for objectivity.

I scarcely doubted the primacy of scientific thought. Following the path of science trained me to separate, to distinguish perception from

physical reality, to atomize complexity into its smallest components, to honor the chain of evidence and logic, to discern one thing from another, to savor the pleasure of precision. The more I did this, the better I got at it, and I was accepted to do graduate work in one of the world's finest botany programs, no doubt on the strength of the letter of recommendation from my adviser, which read, "She's done remarkably well for an Indian girl."

A master's degree, a PhD, and a faculty position followed. I am grateful for the knowledge that was shared with me and deeply privileged to carry the powerful tools of science as a way of engaging the world. It took me to other plant communities, far from the asters and goldenrod. I remember feeling, as a new faculty member, as if I finally understood plants. I too began to teach the mechanics of botany, emulating the approach that I had been taught.

It reminds me of a story told by my friend Holly Youngbear Tibbetts. A plant scientist, armed with his notebooks and equipment, is exploring the rainforests for new botanical discoveries, and he has hired an indigenous guide to lead him. Knowing the scientist's interests, the young guide takes care to point out the interesting species. The botanist looks at him appraisingly, surprised by his capacity. "Well, well, young man, you certainly know the names of a lot of these plants." The guide nods and replies with downcast eyes. "Yes, I have learned the names of all the bushes, but I have yet to learn their songs."

I was teaching the names and ignoring the songs.

When I was in graduate school in Wisconsin, my then husband and I had the good fortune to land jobs as caretakers at the university arboretum. In return for a little house at the edge of the prairie, we had only to make the nighttime rounds, checking that doors and gates were secure before we left the darkness to the crickets. There was just one time that a light was left burning, a door left ajar, in the horticulture garage. There was no mischief, but as my husband checked around, I stood and idly scanned the bulletin board. There was a news

clipping there with a photo of a magnificent American elm, which had just been named the champion for its species, the largest of its kind. It had a name: The Louis Vieux Elm.

My heart began to pound and I knew my world was about to change, for I'd known the name Louis Vieux all my life and here was his face looking at me from a news clipping. He was our Potawatomi grandfather, one who had walked all the way from the Wisconsin forests to the Kansas prairie with my grandma Sha-note. He was a leader, one who took care of the people in their hardship. That garage door was left ajar, that light was left burning, and it shone on the path back home for me. It was the beginning of a long, slow journey back to my people, called out to me by the tree that stood above their bones.

To walk the science path I had stepped off the path of indigenous knowledge. But the world has a way of guiding your steps. Seemingly out of the blue came an invitation to a small gathering of Native elders, to talk about traditional knowledge of plants. One I will never forget—a Navajo woman without a day of university botany training in her life—spoke for hours and I hung on every word. One by one, name by name, she told of the plants in her valley. Where each one lived, when it bloomed, who it liked to live near and all its relationships, who ate it, who lined their nests with its fibers, what kind of medicine it offered. She also shared the stories held by those plants, their origin myths, how they got their names, and what they have to tell us. She spoke of beauty.

Her words were like smelling salts waking me to what I had known back when I was picking strawberries. I realized how shallow my understanding was. Her knowledge was so much deeper and wider and engaged all the human ways of understanding. She could have explained asters and goldenrod. To a new PhD, this was humbling. It was the beginning of my reclaiming that other way of knowing that I had helplessly let science supplant. I felt like a malnourished refugee invited to a feast, the dishes scented with the herbs of home.

I circled right back to where I had begun, to the question of beauty. Back to the questions that science does not ask, not because they aren't

important, but because science as a way of knowing is too narrow for the task. Had my adviser been a better scholar, he would have celebrated my questions, not dismissed them. He offered me only the cliché that beauty is in the eye of the beholder, and since science separates the observer and the observed, by definition beauty could not be a valid scientific question. I should have been told that my questions were bigger than science could touch.

He *was* right about beauty being in the eye of the beholder, especially when it comes to purple and yellow. Color perception in humans relies on banks of specialized receptor cells, the rods and cones in the retina. The job of the cone cells is to absorb light of different wavelengths and pass it on to the brain's visual cortex, where it can be interpreted. The visible light spectrum, the rainbow of colors, is broad, so the most effective means of discerning color is not one generalized jack-of-all-trades cone cell, but rather an array of specialists, each perfectly tuned to absorb certain wavelengths. The human eye has three kinds. One type excels at detecting red and associated wavelengths. One is tuned to blue. The other optimally perceives light of two colors: purple and yellow.

The human eye is superbly equipped to detect these colors and send a signal pulsing to the brain. This doesn't explain why I perceive them as beautiful, but it does explain why that combination gets my undivided attention. I asked my artist buddies about the power of purple and gold, and they sent me right to the color wheel: these two are complementary colors, as different in nature as could be. In composing a palette, putting them together makes each more vivid; just a touch of one will bring out the other. In an 1890 treatise on color perception, Goethe, who was both a scientist and a poet, wrote that "the colors diametrically opposed to each other . . . are those which *reciprocally* evoke each other in the eye." Purple and yellow are a reciprocal pair.

Our eyes are so sensitive to these wavelengths that the cones can get oversaturated and the stimulus pours over onto the other cells. A print-maker I know showed me that if you stare for a long time at a block of

yellow and then shift your gaze to a white sheet of paper, you will see it, for a moment, as violet. This phenomenon—the colored afterimage—occurs because there is energetic reciprocity between purple and yellow pigments, which goldenrod and asters knew well before we did.

If my adviser was correct, the visual effect that so delights a human like me may be irrelevant to the flowers. The real beholder whose eye they hope to catch is a bee bent on pollination. Bees perceive many flowers differently than humans do due to their perception of additional spectra such as ultraviolet radiation. As it turns out, though, goldenrod and asters appear very similarly to bee eyes and human eyes. We both think they're beautiful. Their striking contrast when they grow together makes them the most attractive target in the whole meadow, a beacon for bees. Growing together, both receive more pollinator visits than they would if they were growing alone. It's a testable hypothesis; it's a question of science, a question of art, and a question of beauty.

Why are they beautiful together? It is a phenomenon simultaneously material and spiritual, for which we need all wavelengths, for which we need depth perception. When I stare too long at the world with science eyes, I see an afterimage of traditional knowledge. Might science and traditional knowledge be purple and yellow to one another, might they be goldenrod and asters? We see the world more fully when we use both.

The question of goldenrod and asters was of course just emblematic of what I really wanted to know. It was an architecture of relationships, of connections that I yearned to understand. I wanted to see the shimmering threads that hold it all together. And I wanted to know why we love the world, why the most ordinary scrap of meadow can rock us back on our heels in awe.

When botanists go walking the forests and fields looking for plants, we say we are going on a *foray*. When writers do the same, we should call it a *metaphoray*, and the land is rich in both. We need them both; scientist and poet Jeffrey Burton Russell writes that "as the sign of a deeper truth, metaphor was close to sacrament. Because the vastness

and richness of reality cannot be expressed by the overt sense of a statement alone."

Native scholar Greg Cajete has written that in indigenous ways of knowing, we understand a thing only when we understand it with all four aspects of our being: mind, body, emotion, and spirit. I came to understand quite sharply when I began my training as a scientist that science privileges only one, possibly two, of those ways of knowing: mind and body. As a young person wanting to know everything about plants, I did not question this. But it is a whole human being who finds the beautiful path.

There was a time when I teetered precariously with an awkward foot in each of two worlds—the scientific and the indigenous. But then I learned to fly. Or at least try. It was the bees that showed me how to move between different flowers—to drink the nectar and gather pollen from both. It is this dance of cross-pollination that can produce a new species of knowledge, a new way of being in the world. After all, there aren't two worlds, there is just this one good green earth.

That September pairing of purple and gold is lived reciprocity; its wisdom is that the beauty of one is illuminated by the radiance of the other. Science and art, matter and spirit, indigenous knowledge and Western science—can they be goldenrod and asters for each other? When I am in their presence, their beauty asks me for reciprocity, to be the complementary color, to make something beautiful in response.

MISHKOS KENOMAGWEN: THE TEACHINGS OF GRASS

I. INTRODUCTION

You can smell it before you see it, a sweetgrass meadow on a summer day. The scent flickers on the breeze, you sniff like a dog on a scent, and then it's gone, replaced by the boggy tang of wet ground. And then it's back, the sweet vanilla fragrance, beckoning.

II. LITERATURE REVIEW

Lena is not fooled easily, though. She wanders into the meadow with the certainty of her years, parting grasses with her slender form. A tiny, gray-haired elder, she is up to her waist in grass. She casts her gaze over all the other species and then makes a beeline to a patch that to the uninitiated looks like all the rest. She runs a ribbon of grass through the thumb and forefinger of her wrinkled brown hand. "See how glossy it is? It can hide from you among the others, but it wants to be found. That's why it shines like this." But she passes this patch by, letting it slide through her fingers. She obeys the teachings of her ancestors to never take the first plant that you see.

I follow behind her as her hands trail lovingly over the boneset and the goldenrod. She spies a gleam in the sward and her step quickens. "Ah, *Bozho*," she says. Hello. From the pocket of her old nylon jacket she takes her pouch, deerskin with a beaded red edge, and shakes a little tobacco into the palm of her hand. Eyes closed, murmuring, she raises a hand to the four directions and then scatters the tobacco to the ground. "You know this," she says, her eyebrows a question mark.

"To always leave a gift for the plants, to ask if we might take them? It would be rude not to ask first." Only then does she stoop and pinch off a grass stem at its base, careful not to disturb the roots. She parts the nearby clumps, finding another and another until she has gathered a thick sheaf of shining stems. A winding path marks her progress where the meadow canopy was opened by the trail of her passage.

She passes right by many dense patches, leaving them to sway in the breeze. "It's our way," she says, "to take only what we need. I've always been told that you never take more than half." Sometimes she doesn't take any at all, but just comes here to check on the meadow, to see how the plants are doing. "Our teachings," she says, "are very strong. They wouldn't get handed on if they weren't useful. The most important thing to remember is what my grandmother always said: 'If we use a plant respectfully it will stay with us and flourish. If we ignore it, it will go away. If you don't give it respect it will leave us.'" The plants themselves have shown us this—*mishkos kenomagwen*. As we leave the meadow for the path back through the woods, she twists a handful of timothy into a loose knot upon itself, beside the trail. "This tells other pickers that I've been here," she says, "so that they know not to take any more. This place always gives good sweetgrass since we tend to it right. But other places it's getting hard to find. I'm thinking that they might not be picking right. Some people, they're in a hurry and they pull up the whole plant. Even the roots come up. That's not the way I was taught."

I've been with pickers who did that, yanking up a handful that left a little bare spot in the turf and a fuzz of broken roots on the uprooted stems. They too made offerings of tobacco and took only half, and they assured me that their method of picking was the correct one. They were defensive about the charges that their harvesting was depleting sweetgrass. I asked Lena about it and she just shrugged.

III. HYPOTHESIS

In many places, sweetgrass is disappearing from its historic locales, so the basket makers had a request for the botanists: to see if the different ways of harvesting might be the cause of sweetgrass's leaving.

I want to help, but I'm a little wary. Sweetgrass is not an experimental unit for me; it's a gift. There is a barrier of language and meaning between science and traditional knowledge, different ways of knowing, different ways of communicating. I'm not sure I want to force the teachings of grass into the tight uniform of scientific thinking and technical writing that is required of the academy: Introduction, Literature Review, Hypothesis, Methods, Results, Discussion, Conclusions, Acknowledgments, References Cited. But I've been asked on behalf of sweetgrass, and I know my responsibility.

To be heard, you must speak the language of the one you want to listen. So, back at school, I proposed the idea as a thesis project to my graduate student Laurie. Not content with purely academic questions, she had been looking for a research project that would, as she said, "mean something to someone" instead of just sitting on the shelf.

IV. METHODS

Laurie was eager to begin, but she hadn't met Sweetgrass before. "It's the grass that will teach you," I advised, "so you have to get to know it." I took her out to our restored sweetgrass meadows and it was love at first sniff. It didn't take her long to recognize Sweetgrass after that. It was as if the plant wanted her to find it.

Together we designed experiments to compare the effects of the two harvesting methods the basket makers had explained. Laurie's education so far was full of the scientific method, but I wanted her to live out a slightly different style of research. To me, an experiment is a kind of conversation with plants: I have a question for them, but since we don't speak the same language, I can't ask them directly and they won't answer verbally. But plants can be eloquent in their physical responses and behaviors. Plants answer questions by the way they live, by their responses to change; you just need to learn how to ask. I smile when I hear my colleagues say "I discovered X." That's kind of like Columbus claiming to have discovered America. It was here all along, it's just that he didn't know it. Experiments are not about discovery but about listening and translating the knowledge of other beings.

My colleagues might scoff at the notion of basket makers as scientists, but when Lena and her daughters take 50 percent of the sweetgrass, observe the result, evaluate their findings, and then create management guidelines from them, that sounds a lot like experimental science to me. Generations of data collection and validation through time builds up to well-tested theories.

At my university, as at many others, graduate students must present their thesis ideas to a faculty committee. Laurie did a wonderful job of outlining the proposed experiment, ably describing multiple study sites, the many replicates, and intensive sampling techniques. But when she was through speaking there was an uneasy silence in the conference room. One professor shuffled through the proposal pages and pushed them aside dismissively. "I don't see anything new here for science," he said. "There's not even a theoretical framework."

A theory, to scientists, means something rather different from its popular use, which suggests something speculative or untested. A scientific theory is a cohesive body of knowledge, an explanation that is consistent among a range of cases and can allow you to predict what might happen in unknown situations. Like this one. Our research was most definitely grounded in theory—Lena's, primarily—in the traditional ecological knowledge of indigenous peoples: If we use a plant respectfully, it will flourish. If we ignore it, it will go away. This is a theory generated from millennia of observations of plant response to harvest, subject to peer review by generations of practitioners, from basket makers to herbalists. Despite the weight of this truth, the committee could only struggle not to roll their eyes.

The dean looked over the glasses that had slid down his nose, fixing Laurie with a pointed stare and directing a sidelong glance toward me. "Anyone knows that harvesting a plant will damage the population. You're wasting your time. And I'm afraid I don't find this whole traditional knowledge thing very convincing." Like the former schoolteacher she was, Laurie was unflinchingly calm and gracious as she explained further, but her eyes were steely.

Later, though, they were filled with tears. Mine, too. In the early

years, no matter how carefully you prepared, this was nearly a rite of passage for women scientists—the condescension, the verbal smack-down from academic authorities, especially if you had the audacity to ground your work in the observations of old women who had probably not finished high school, and talked to plants to boot.

Getting scientists to consider the validity of indigenous knowledge is like swimming upstream in cold, cold water. They've been so conditioned to be skeptical of even the hardest of hard data that bending their minds toward theories that are verified without the expected graphs or equations is tough. Couple that with the unblinking assumption that science has cornered the market on truth and there's not much room for discussion.

Undeterred, we carried on. The basket makers had given us the prerequisites of the scientific method: observation, pattern, and a testable hypothesis. That sounded like science to me. So we began by setting up experimental plots in the meadows to ask the plants the question "Do these two different harvest methods contribute to decline?" And then we tried to detect their answer. We chose dense sweetgrass stands where the population had been restored rather than compromising native stands where pickers were active.

With incredible patience, Laurie did a census of the sweetgrass population in every plot to obtain precise measures of population density prior to harvest. She even marked individual stems of grass with colored plastic ties to keep track of them. When all had been tallied, she then began the harvest.

The plots were subject to one of the two harvest methods the basket makers had described. Laurie took half of the stems in each plot, pinching them off one by one carefully at the base in some plots and yanking up a tuft and leaving a small ragged gap in the sod in others. Experiments must have controls, of course, so she left an equal number of plots alone and did not harvest them at all. Pink flagging festooned the meadows to mark her study areas.

One day in the field we sat in the sun and talked about whether the method really duplicated the traditional harvest. "I know that it

doesn't," she said, "because I'm not replicating the relationship. I don't speak to the plants or make an offering." She had wrestled with this but settled on excluding it: "I honor that traditional relationship, but I couldn't ever do it as part of an experiment. It wouldn't be right on any level—to add a variable that I don't understand and that science can't even attempt to measure. And besides, I'm not qualified to speak to sweetgrass." Later, she admitted that it was hard to stay neutral in her research and avoid affection for the plants; after so many days among them, learning and listening, neutrality proved impossible. Eventually she was just careful to show them all her mindful respect, making her care a constant as well, so that she would not sway the results one way or the other. The sweetgrass she harvested was counted, weighed, and given away to basket makers.

Every few months, Laurie counted and marked all the grass in her plots: dead shoots, living ones, and brand-new shoots just pushing up from the ground. She charted the birth, the death, and the reproduction of all her grass stems. When the next July rolled around she harvested once more, just as women were doing in the native stands. For two years she harvested and measured the response of the grass along with a team of student interns. It was a little tough at first to recruit student helpers given that their task would be watching grass grow.

V. RESULTS

Laurie observed carefully and filled her notebook with measurements, charting the vigor of each plot. She worried a little when the control plots were looking a little sickly. She was relying on these controls, the unharvested patches, to be the reference point for comparing the effects of harvesting in the other plots. We hoped they would perk up when spring came.

By the second year, Laurie was expecting her first child. The grass grew and grew, as did her belly. Bending and stooping became a little more difficult, to say nothing of lying in the grass to read plant tags. But she was faithful to her plants, sitting in the dirt among them, counting and marking. She said the quiet of fieldwork, the calm of sitting in a

flower-strewn meadow with the smell of sweetgrass all around, was a good beginning for a baby. I think she was right.

As the summer wore on, it became a race to finish the research before the baby was born. Just weeks away from delivery, it became a team effort. When Laurie was done with a plot, she would call out for her field crew to help hoist her to her feet. This too was a rite of passage for women field biologists.

As her baby grew, Laurie came to believe with increasing conviction in the knowledge of her basket-making mentors, recognizing, as Western science often does not, the quality of observations from the women who had long had close relationships with plants and their habitats. They shared many of their teachings with her, and they knit many baby hats.

Baby Celia was born in the early fall, and a braid of sweetgrass was hung over her crib. While Celia slept nearby, Laurie put her data on the computer and began to make the comparisons between the harvesting methods. From the twist ties on every stem, Laurie could chart the births and deaths in the sample plots. Some plots were full of new young shoots that signaled a thriving population, and some were not.

Her statistical analyses were all sound and thorough, but she hardly needed graphs to tell the story. From across the field you could see the difference: some plots gleamed shiny golden green and some were dull and brown. The committee's criticism hovered in her mind: "Anyone knows that harvesting a plant will damage the population."

The surprise was that the failing plots were not the harvested ones, as predicted, but the unharvested controls. The sweetgrass that had not been picked or disturbed in any way was choked with dead stems while the harvested plots were thriving. Even though half of all stems had been harvested each year, they quickly grew back, completely replacing everything that had been gathered, in fact producing more shoots than were present before harvest. Picking sweetgrass seemed to actually stimulate growth. In the first year's harvest, the plants that grew the very best were the ones that had been yanked up in a handful. But, whether it was pinched singly or pulled in a clump, the end

result was nearly the same: it didn't seem to matter how the grass was harvested, only that it was.

Laurie's graduate committee had dismissed this possibility from the outset. They had been taught that harvesting causes decline. And yet the grasses themselves unequivocally argued the opposite point. After the grilling Laurie received over her research proposal, you might imagine she was dreading the thesis defense. But she had one thing skeptical scientists value most: data. While Celia slept in her proud father's arms, Laurie presented her graphs and tables to demonstrate that sweetgrass flourishes when it's harvested and declines when it is not. The doubting dean was silent. The basket makers smiled.

VI. DISCUSSION

We are all the product of our worldviews—even scientists who claim pure objectivity. Their predictions for sweetgrass were consistent with their Western science worldview, which sets human beings outside of "nature" and judges their interactions with other species as largely negative. They had been schooled that the best way to protect a dwindling species was to leave it alone and keep people away. But the grassy meadows tell us that for sweetgrass, human beings are part of the system, a vital part. Laurie's findings might have been surprising to academic ecologists but were consistent with the theory voiced by our ancestors. "If we use a plant respectfully it will stay with us and flourish. If we ignore it, it will go away."

"Your experiment seems to demonstrate a significant effect," said the dean. "But how do you explain it? Are you implying that the grass that was unharvested had its feelings hurt by being ignored? What is the mechanism responsible for this?"

Laurie admitted that the scientific literature held no explanations for the relationship between basket makers and sweetgrass since such questions were not generally deemed worthy of scientific attention. She turned to studies of how grasses respond to other factors, such as fire or grazing. She discovered that the stimulated growth she had observed was well known to range scientists. After all, grasses are beautifully

adapted to disturbance—it's why we plant lawns. When we mow them they multiply. Grasses carry their growing points just beneath the soil surface so that when their leaves are lost to a mower, a grazing animal, or a fire, they quickly recover.

She explained how harvesting thinned the population, allowing the remaining shoots to respond to the extra space and light by reproducing quickly. Even the pulling method was beneficial. The underground stem that connects the shoots is dotted with buds. When it's gently tugged, the stem breaks and all those buds produce thrifty young shoots to fill the gap.

Many grasses undergo a physiological change known as compensatory growth in which the plant compensates for loss of foliage by quickly growing more. It seems counterintuitive, but when a herd of buffalo grazes down a sward of fresh grass, it actually grows faster in response. This helps the plant recover, but also invites the buffalo back for dinner later in the season. It's even been discovered that there is an enzyme in the saliva of grazing buffalo that actually stimulates grass growth. To say nothing of the fertilizer produced by a passing herd. Grass gives to buffalo and buffalo give to grass.

The system is well balanced, but only if the herd uses the grass respectfully. Free-range buffalo graze and move on, not returning to the same place for many months. Thus they obey the rule of not taking more than half, of not overgrazing. Why shouldn't it also be true for people and sweetgrass? We are no more than the buffalo and no less, governed by the same natural laws.

With a long, long history of cultural use, sweetgrass has apparently become dependent on humans to create the "disturbance" that stimulates its compensatory growth. Humans participate in a symbiosis in which sweetgrass provides its fragrant blades to the people and people, by harvesting, create the conditions for sweetgrass to flourish.

It's intriguing to wonder whether the regional decline in sweetgrass might be due not to overharvesting but rather to underharvesting. Laurie and I pored over the map of historical locations for sweetgrass created by a former student, Daniela Shebitz. There were blue dots

where sweetgrass used to be found but has since disappeared. Red dots marked the few places where sweetgrass was reported historically and where it is still thriving. These red dots are not randomly scattered. They are clustered around Native communities, particularly those known for their sweetgrass basketry. Sweetgrass thrives where it is used and disappears elsewhere.

Science and traditional knowledge may ask different questions and speak different languages, but they may converge when both truly listen to the plants. To relate the story the ancestors told us to the academics in the room, however, we needed to use scientific explanations expressed in the language of mechanism and objectification: "If we remove 50 percent of the plant biomass, the stems are released from resource competition. The stimulus of compensatory growth causes an increase in population density and plant vigor. In the absence of disturbance, resource depletion and competition result in a loss of vigor and increased mortality."

The scientists gave Laurie a warm round of applause. She had spoken their language and made a convincing case for the stimulatory effect of harvesters, indeed for the reciprocity between harvesters and sweetgrass. One even retracted his initial criticism that this research would "add nothing new to science." The basket makers who sat at the table simply nodded their heads in agreement. Wasn't this just as the elders have said?

The question was, how do we show respect? Sweetgrass told us the answer as we experimented: sustainable harvesting can be the way we treat a plant with respect, by respectfully receiving its gift.

Perhaps it is no coincidence that it is Sweetgrass that reveals this story. *Wiingaashk* was the first to be planted by Skywoman on the back of Turtle Island. The grass gives its fragrant self to us and we receive it with gratitude. In return, through the very act of accepting the gift, the pickers open some space, let the light come in, and with a gentle tug bestir the dormant buds that make new grass. Reciprocity is a matter of keeping the gift in motion through self-perpetuating cycles of giving and receiving.

Our elders taught that the relationship between plants and humans must be one of balance. People can take too much and exceed the capacity of the plants to share again. That's the voice of hard experience that resonates in the teachings of "never take more than half." And yet, they also teach that we can take too little. If we allow traditions to die, relationships to fade, the land will suffer. These laws are the product of hard experience, of past mistakes. And not all plants are the same; each has its own way of regenerating. Some, unlike sweetgrass, are easily harmed by harvest. Lena would say that the key is to know them well enough to respect the difference.

VII. CONCLUSIONS

With their tobacco and their thanks, our people say to the Sweetgrass, "I need you." By its renewal after picking, the grass says to the people, "I need you, too."

Mishkos kenomagwen. Isn't this the lesson of grass? Through reciprocity the gift is replenished. All of our flourishing is mutual.

VIII. ACKNOWLEDGMENTS

In a field of tall grass, with only the wind for company, there is a language that transcends the differences between scientific and traditional understandings, the data or the prayer. The wind moves through and carries the grass song. It sounds to me like *mishhhhhkos*, over and over again on ripples of moving grass. After all it has taught us, I want to say thank you.

IX. REFERENCES CITED

Wiingaashk, Buffalo, Lena, the Ancestors.

MAPLE NATION: A CITIZENSHIP GUIDE

There's just one gas station in my community. It's right there at the stop-light, also the only one. You get the picture. I'm sure that it has an official name, but we just call it the Pompey Mall. Coffee, milk, ice, dog food, you can get most anything essential to life at the mall. Duct tape to hold things together and wd-40 to get them apart. There are tins of last year's maple syrup, which I pass up, since I'm on my way to the sugar house where new syrup awaits. The clientele runs largely to pickup trucks and now and then a Prius. There aren't any snowmobiles revving at the pumps today, because the snow is just about gone.

Since it's the only place to fuel up, the lines are often long and today people stand outside in the spring sunshine, leaning against the cars, waiting their turn. Conversation, like the shelves inside, tends toward essentials—the price of gas, how the sap is running, who's got their taxes done. Sugaring season and tax season overlap around here.

"Between the price of gas and the tax man, I'm just about bled dry," Kerm gripes as he replaces the nozzle and wipes his hands on greasy Carhartts. "Now they want to raise taxes for a windmill down to the school? All on account of global warming. Not on my dime." One of our town officials is ahead of me in line. She's an ample woman, a former social studies teacher at the school, and does not hesitate to wag a finger in the banter. She probably had Kerm in class. "You don't like it? Don't complain if you're not there. Show up to a damn meeting."

There's still snow under the trees, a bright blanket beneath the gray trunks and the blush of reddening maple buds. Last night, a tiny