

Field Notes & Ecology



A publication of the

Field Naturalist & Ecological Planning Programs

at the University of Vermont

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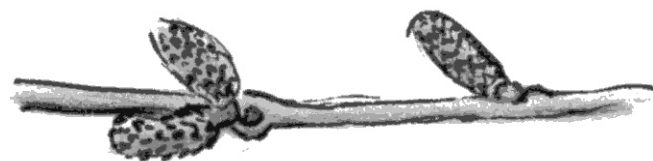
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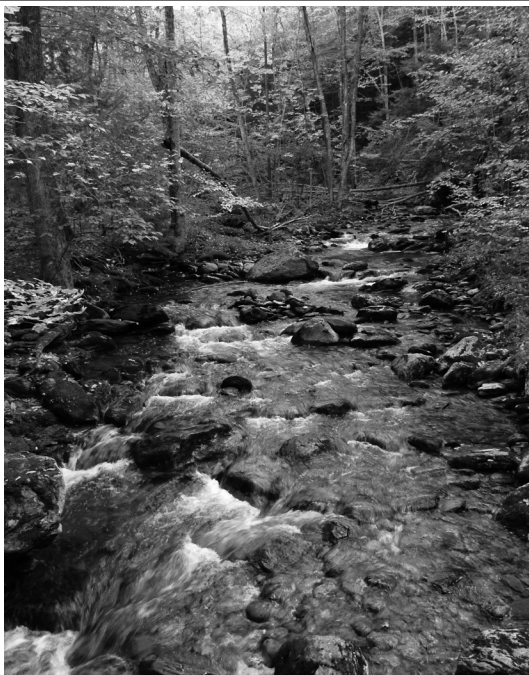
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A note on naming conventions:

The first Field Naturalist class was dubbed the “A Team” and the first Ecological Planners were Team 1. When the end of the alphabet arrived (in the form of class Z-10), the FNEPs discussed how to continue the naming convention. The class of 2011 chose the name AA Team, and the Latin binomial *Alces alces*, with the integration of FN and EP classes in mind (no more of the letter-number system—all FNEPs are on the same team now). This still didn’t settle the naming problem, though. The FNEP class of 2012 debated. BB Team? But then what to do in 26 years, start over with AAA Team? And in 52 years, AAAA Team? Or should we try something completely different? We finally adopted the name AB Team (*Abies balsamea*, *Abies* ’12 for short). This moniker honors the classes that preceded us while extending an equal nod to those to who will follow us, by leaving them with a long-lived naming convention and the opportunity for more Latin binomials. FNEPs won’t have to come up with a new naming convention until the year 2686.





The AB '12 Editorial Staff:

Content Editor: Rachel Garwin

Content Editor: Leah Mital-Skiff

Layout & Design: Cathy Bell

Managing Editor: Audrey Clark

Photo and Illustration Credits:

Cover (blue jay)

by Bernd Heinrich

Back cover (grouse)

by Bernd Heinrich

All twig and bud illustrations

by Audrey Clark

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pp. 18-19: t-shirt, Charlie Hohn



What skills and abilities will the naturalists of the future need to move a rapidly changing world toward conservation? The editors of the 2011 Field Notes and Ecolog newsletter posed this question to our contributors, with the hope that they would stimulate us to think more imaginatively as well as pragmatically about our work. A naturalist of the past, Aldo Leopold, offered an alternative conservation paradigm that is still pursued by contemporary conservationists. What skills, abilities, and mindsets can we offer the future? What conservation approaches will be most effective?

Recently, we heard the echoes of Leopold's enduring relevancy in a surprising place: couched in the legalese of a conservation easement. The phrase "to run with the land in perpetuity" caught our imaginations and evoked the challenges of learning from and caring for a landscape far into the unforeseeable future. Monitoring and adapting to the inevitable changes on a property, while also keeping a vision of how the land fits into larger patterns and processes, would play critical roles in allowing the easement to adapt to the changing times.

Conservation easements that endure forever are one tool for conservation. Another is educating naturalists to read the landscape and plan for its management, stewardship, and longevity within the context of change. It is easy for hiking, biking, non-deodorant-wearing outdoor junkies to long for the past where one could drink from clear streams flowing through old-growth forests. The naturalist of today, however, must also romanticize the future and grapple with how subsequent generations must live.

In the Field Naturalist and Ecological Planning programs, we read landscapes through dichotomous keys, forestry prisms and cruising sticks, hand lenses, field journals, and careful observation. We practice conservation that integrates techniques of the past with our visions of the future. We highlight these visions in this edition of the Field Notes and Ecolog. Jeffrey Hughes and Deane Wang focus on working landscapes and engaging the public, Rachel Garwin suggests that collaboration with conservationists in distant landscapes can offer insight into our own place, and Walter Poleman points out that expanding urban areas need naturalists, too. Alicia Daniel's "For the Love of Science" urges us to temper science with heart; Cathy Bell reminds us that simple, focused observation keeps us grounded. In "Missing the Birdsong for the Tweets," Charlie Hohn encourages current and future naturalists to use technology to connect the public with place. Danielle Owczarski's poem, inspired by Robert Frost and land-use changes in Ricker Basin, honors the cycles that link past, present, and future. Sketches, photos, and artistic interpretations of our work illustrate our collective imaginings of present and future roles of naturalists.

As always, we invite you into these pages, and we hope you enjoy our musings and visions for the education, thoughts, and approaches of future naturalists. Finally, we encourage you to join us in running with the land in perpetuity.

Naturalists of the Future

by Jeffrey Hughes

Depending on the group you travel in, “naturalist” might refer to a Darwinian searcher of truths, an ace identifier of plants and animals, a child of nature (look for unshaven, exposed body parts), an environmental educator, or a worshipper of nature as god. Thirty years ago, Dr. Hub Vogelmann envisioned a different type of “naturalist,” the “field naturalist.” Ten years ago, we stretched the concept of “naturalist” even further by envisioning “ecological planners.”



If that’s the past and present, what’s the future? I believe it’s

the Field Naturalist and Ecological Planning Program—if we define “naturalist” as informed environmental steward. We have evolved far beyond the multi-disciplinary approach to understanding landscapes, where a team of experts from different disciplines staple their findings together into a report and then wonder why no one cares. People’s values and understandings and misunderstandings are part of every landscape context and, in the end, they carry greater weight than the opinion of any outside expert. Being able to read people’s values and understandings and misunderstandings—and work with them—must be part of the future naturalist’s toolbox.

Another addition to the future naturalist’s toolbox should be a fundamental understanding of forestry and agriculture practices, including why they’re practiced the way they are. Wild, dramatic landscapes may nourish our souls, but most of these special places are already protected and, compared to other landscapes, there’s little to be done by the many crusaders who are eager to do it. I believe that professional naturalists of the future will make their mark by practicing their craft in working landscapes. Dan Janzen and others did just that in Costa Rica 40 years ago, and the country is very different as a result.



Last, professional naturalists of the future must have the hallmark skills championed by the Field Naturalist and Ecological Planning Program since the beginning: terrific oral presentation skills, ability to write engagingly for any audience, and an ability to understand the whole as well as the parts. There is no hope of changing the environmental status quo without them.

Jeffrey Hughes is the director of the Field Naturalist graduate program, as well as an associate professor in the Plant Biology Department and the Rubenstein School of Environment and Natural Resources.

Transition Ecology

by Deane Wang



Recent studies estimate that humans appropriate from 20-30% of total global net primary productivity. When you think of the extensive forests and broad expanses of ocean and all the life and productivity going on in these places, the one-fifth to one-third estimate of all that productivity going to humans is a bit frightening. The living planet, or Gaia system, is losing a large percentage of what regulates atmosphere and nutrients, feeds biodiversity, drives evolution—to one single species, humans.

The future stewards of the planet (e.g., field naturalists and ecological planners) will need to understand how this human management changes global processes so that their management of ecosystems can compensate for this

loss of working natural capital. Much of past conservation work has been reactive—stop that wetland from development, save that habitat from destruction, restore that mountain after mining. Future conservation will need to be more proactive in managing and designing “natural” areas that can function to rebalance natural processes and products in a human-dominated world. Ecological design of the human production systems will also be critical in that rebalancing process.

As an example relevant to naturalists and ecological planners, recent attention in wildlife conservation has focused on using agricultural landscapes to provide habitat for certain wildlife species. While not prime habitat, better-designed agricultural landscapes can help to supplement natural areas as habitat and thus foster landscape-level permeability, alternative food sources, and “sink” habitat that can contribute to genetic diversity and meet the requirements for minimal viable population sizes. This restoration of the cultural landscape using principles of ecological and sustainable design requires a new generation of differently-trained professionals. These ecological evangelists will also need to communicate and collaborate with other professionals (agriculturalists, planners, foresters, business people, lawyers, etc.) and community members across a broad cultural spectrum.

Who is this next generation of conservationists, versed in maximizing natural capital and social capital in an increasingly crowded, climate-changed world? Our intention is that Field Naturalists and Ecological Planners will be at the forefront of this movement to transition to a more balanced world.

Deane Wang is the director of the Ecological Planning Program and an associate professor in the Rubenstein School of Environment and Natural Resources.



A Field Guide to First-Year FNEPs

Common name: First-years

Scientific name: *Abies balsamea* '12

Family: Field Naturalists and Ecological Planners

Physical characteristics: Scruffy biped, often seen in mud-splattered Carhartts and natural-fiber clothing. Rarely seen without a backpack stuffed with extra layers, binoculars, field guides, measuring tapes, water bottles, and snacks aplenty. Known for wearing hand lenses to bed by accident and having the appropriate boot for every occasion. Sometimes seen lying on the floor of the third-floor office of the Jeffords building using colored pencils, happily exclaiming that they are doing graduate-level work. Summer pelage includes sandals and sunglasses; winter morphs barely recognizable under layers of down and fleece, but a good field mark is the thermos of hot chocolate or tea in one hand and the field notebook in the other. Varies in size from dwarven to medium-sized; no giants (5' 0" – 6' 0"). Male is larger than females and has considerably less hair (on the head).



Behavior: First-years tend to travel in same-species herds, especially in a decrepit but spirited old van named Gizelle. They stare at computers for hours, but become exuberant when released into the woods; they are prone to despair when inside for too long and are difficult to maintain in captivity. Individuals have been spotted skinning roadkill and making up elaborate names for lichens with their noses pressed to tree trunks. Vocalizations include "Oooh! Look at that!" and "I'm going to key out this plant!" Note the frequent laughter.



Life history: Extremely intelligent and physically active; full of moxie. Some are converted city slickers; others are lifelong outdoor junkies. They are born into the FNEP family in the August Reading the Landscape class, undergo a rocky adolescence during the fall semester, and reach maturity in early December via the nugget presentation. They continue to mature into adulthood during the Master's project. After project completion, FNEPs disperse to nearby locales or far-flung places to fulfill their ambitions to move the world.

Habitat: Woods, grasslands, bogs (or fens?), ski slopes, Jeff's and Deane's offices, cluttered apartments, desks, Gizelle, and friends' houses for potlucks. Often sleep under the stars, though also found in Jeffords late at night. Diurnally active outdoors, but nocturnal during meteor showers and amphibian migrations.

Geographic range: Casual vagrant from Arizona, New Mexico, Wyoming, Montana, Minnesota, New Hampshire, Pennsylvania, and Vermont. Currently ranges throughout Vermont and New England. Also found in Maine, the Sierra Nevada, Puerto Rico, and Europe.

Demographics: Range in age from 25–38. Female-to-male sex ratio is 7:1. Only two offspring in the entire population. Generally not economically wealthy, but spiritually rich.

Diet: Some individuals are herbivores; others omnivores. No strict carnivores. Opportunistically consume delectable pastries on field-day bakery stops. When working late at school, first-years typically devour cheap hospital food. Late-afternoon field diet is comprised mostly of chocolate-covered espresso beans, which results in erratic behavior and uncontrollable giggle fits. They are known to consume 20,000 calories' worth of chocolate chips over three weeks and 48 Snickers bars in ten days. Strongly prefer eggs from free-range chickens and beets from Community Supported Agriculture. When confronting deadlines, some individuals forget to eat, while others must eat hourly to avoid collapse.



Breeding habits: Highly varied, from almost never to extremely frequently, depending on amount of homework and relationship status. Only one individual in the entire population has offspring, and has no intention to make more.

Similar species: May be confused with second-year FNEPs, *Alces alces*, distinguished by first-years' lack of intrabreeding, longer hours in the library, and frequent snail hugs.

Introducing the Class of 2012: Team AB (The Abies)



Cathy Bell It's tough for me to pin down a single formative experience that gave rise to my love of the natural world. I could talk about growing up in suburban New Jersey, splashing after crayfish in the brook that ran through my yard. Or I could reminisce about a fifth-grade lesson on the Bill of Rights that led me to venture into the world of environmental activism. But I also think of ditching my high school's senior prom to go hiking; watching grizzly bears dig up elk thistle at dusk in Yellowstone, where I worked as a ranger for most of the last five years; making plaster casts of animal tracks with kids in a one-room schoolhouse in rural South Dakota; and the delight I felt when, as a first-year Princeton student, I took a geology field trip to the Sierra Nevada and suddenly could visualize tens of thousands of years of earth history unfolding on the landscape.

As someone who is constitutionally incapable of specializing, I'm glad to have found a home in the Field Naturalist Program. My next big step? Summer fieldwork in Sequoia National Park, where I will look at microhabitat characteristics of alpine plants to assess their vulnerability to climate change.



Emily Brodsky I tend to become fascinated with just about everything. Consequently, I've collected quite an assortment of interests over the years: language, travel, crafts, farming, field research, and above all, ecology and natural history. In that realm, I find everything from birds to rocks to fungi equally intriguing. Ever since I received my B.S. in environmental education from Unity College, I've been on a quest to incorporate my wide-ranging interests into a viable career. This quest has taken me to three states and six countries, where I have found myself doing such things as releasing sea turtle hatchlings into the sea, leading hikes through tropical rainforests, harvesting organic produce, counting migrating hawks, and (slightly less glamorous but no less important) fundraising for a nonprofit. After several years of exploration, I realized that my seemingly varied interests all tie into one underlying theme: the interface between humanity and the natural environment. The Ecological Planning Program is helping me better understand how ecosystems function and how humans fit into the mix. Eventually, I plan to use that understanding to facilitate healthy relationships between human communities and the natural resources that support them. In the meantime, I'm having a great time exploring Vermont!



Audrey Clark I grew up in northern Virginia, frequenting the Shenandoah Valley on weekends with my family. There, I learned from the influence of my parents and friends that caring about others (both human and more-than-human) is the essential thing that gives my life meaning. I moved to Boston when I was 14, where I was a raucous and naughty teenager who wanted to move the world in a more heartfelt, artful, wild, and just direction. I took that feeling out to Arizona, where I attended Prescott College, a school committed to social justice and environmental conservation. I fell in love with natural history and conservation biology, and after graduating, I worked field biology jobs all over the world. While trying out the wrong graduate program, I took a walk on the beach and remembered my dedication to natural history, so I applied to be a Field Naturalist. As an FN, I've learned that one person can move the world. I've also learned that I can do more than I think. I still hope to move the world in a more heartfelt, artful, wild, and just direction, and given what I've learned as an FN, I will.



Introducing the Class of 2012



Rachel Garwin Despite growing up in the urban environs of Washington, DC, I feel strongly connected to the natural world. Family trips to the North Woods of Wisconsin plus excursions to the mountainous West instilled in me a sense of wonder for tannin-steeped lakes, precipitous peaks, and the smell of wet sand beneath red pines. I sensed magic in these places, and I knew understanding them was paramount to protecting them. My interdisciplinary environmental science and public policy studies as a Harvard undergrad aided me in this goal, but I was often left with more questions than answers.

I subsequently discovered the world of outdoor and environmental education. Falls and springs found me teaching watershed ecology and nature awareness to middle-schoolers on the shores of the Chesapeake Bay. With summer approaching, I migrated to northern Minnesota, where I instructed canoe expeditions for Outward Bound. I overwintered in snowbound pockets of the country, including Alta, Utah, and Bozeman, Montana. Throughout my wanderings, I returned to a common theme: a desire to understand wild places and connect others to them. Fortunately, I found the Ecological Planning Program, where I seek to deepen my understanding of natural processes and methods of conserving their encompassing landscapes.



Leah Mital-Skiff I was born in love with the outdoors, as most of us are, with a childhood of romping around the woods, riding bikes, and river rafting. Growing up in New Mexico, I got my first taste of backpacking in 6th grade on a 90-degree day in the desert and hated it. By 8th grade, I was converted. I made my way to Vermont with all intentions of returning to the Southwest after college, but loved Vermont immediately. I studied sociology/anthropology and Spanish at Middlebury College and spent a year in Ecuador, where I met my husband, Rob Skiff, in a gringo bar.

After graduating, I co-founded Vermont Commons School, a place-based 7th-12th grade independent school. Over 12 years at Vermont Commons, I taught Spanish, led backpacking and international trips, managed budgets, fundraised, wiped off tables, drove vans, and laughed with my students. During that time, I also became a mom of two boys, Austin and Anjay. When the younger started kindergarten, I entered the FNEP Program. As the first parent in the history of the program, I don't know how the rest of my classmates get by without kids to throw snowballs and leaves at after a day of school work.



Doug Morin Born and raised in Vermont's freedom-loving neighbor to the east, New Hampshire, I grew up playing outside and visiting the White Mountains. At Skidmore College, I took an introductory environmental science class and was hooked. I earned my degree in environmental science while spending my free time teaching, hiking, and climbing in the nearby Adirondack Mountains.

After college, I spent three years at field stations and molecular laboratories around the country, studying the ecology, evolution, and behavior of a variety of birds. Between jobs, I visited the sights of the West (20 National Parks down, 38 to go!), but never found a place where I felt more at home than New England.

Tiring of esoteric academic research, I felt increasingly drawn to applied environmental conservation. Happily, I discovered the Ecological Planning Program and now enjoy getting my hands dirty—literally and figuratively. In the future, I hope to address environmental issues at multiple scales with approaches emphasizing interdisciplinary analysis, community interaction, and education. In the meantime (and when I am not working) I can usually be found hiking, climbing, cooking, reading, or listening to public radio.

Team AB (The Abies)



Danielle Owczarski Most of my favorite childhood memories took place in the outdoors. In early spring I wrapped my feet in plastic bags and tromped around in my neighbor's swamp catching frogs and scooping up eggs to bring home to my parents. The bouquet of choice for my mother was princess pine and the dried fertile fronds of sensitive fern. My Old English sheepdog, Pumpkin, and I wandered the woods moving from place to place making our usual rounds in the forest. I climbed the large boulder erratics, traversed the river "canyon," and walked the birch plank to the highest point, swinging down and grasping an arcing sapling that placed me neatly on the ground. My profound connection with nature has left me with the desire to share my enthusiasm and knowledge with others, no matter their background or dogma, and bring to them the understanding, wonder, and respect I have obtained from the natural world. I have worked for and interacted with a variety of organizations and individuals and believe we all have common roots: we depend on a healthy environment to endure and thrive. My goal is to work across political and social boundaries as a voice for the natural environment.



Team Abies hard at work, as usual.



Lindsay Watkins I grew up in Hershey, Pennsylvania, surrounded by the smell of chocolate, but I have always preferred the smells of leaves, soil, and wood smoke. Since graduating from high school, I've been migrating north in search of colorful, cozy autumns and long, snowy winters.

I wasn't much of a nature nerd as a kid, but I fell in love with the outdoors on an Outward Bound course after high school. At Cornell University, I split my time between studying natural resources and working for Cornell Outdoor Education. After graduation, I found myself in New Hampshire teaching outdoor and environmental education programs for the Appalachian Mountain Club (AMC). The White Mountains felt like home, so I decided to stay and spent several years coordinating education programs for the AMC and ski patrolling at Wildcat Mountain.

Some of my favorite things, in no particular order, include snowboarding, cycling, hiking, woodstoves, cheese, canoeing, my kitties, amphibians, the alpine zone, maple syrup, headstands, red wine, sleeping in my hammock, and my amazing family and friends.

I love deepening my understanding of the natural world as a Field Naturalist, and I'm still figuring out what I want to be when I grow up.

Thinking Outside Vermont: Developing Partnerships

by Rachel Garwin

I grabbed the smooth-trunked blue mahoe with the crook of my arm to keep from sliding down the treacherous slope. Leaf litter and loose soil gave way beneath my feet as I scrambled to bring the end of the tape measure to Emily's feet. Emily, meanwhile, leaned against a straight trunk to steady herself while sighting through her clinometer to the canopy of Tree 198. Our Place-Based Landscape Analysis (PBLA) class had little experience with the forestry tools we found in our hands that morning. Thrity (pronounced "3t") Vakil, the director of a small sustainable forestry outfit in the southeastern part of Puerto Rico, taught us the basics and let us loose in the blue mahoe plantation. From our conversations about the challenges of sustainable forestry on an island with no timber market, we knew she sought advice from us. But who were we—ten naturalists- and ecologists-in-training from Vermont—to suggest management options to a tropical forestry operation? What could possibly be gained by comparing temperate Vermont forests to the tropical forests of Puerto Rico? Indeed, this latter concern dogged us throughout the semester and became a fundamental question of the class.

Historically, PBLA asked students to investigate a single site from multiple research areas in order to create a useful deliverable to a partner organization. Last year's team, for instance, conducted an ecological assessment of The Nature Conservancy's Raven Ridge property and made management recommendations. This year, however, partners-



in-instruction Walter Poleman (FN-K) and Chris Nytech (EP-7) re-imagined the PBLA experience as a way of building partnerships between Vermont and Puerto Rican ecologists, conservationists, and communities. To compare two different forest ecosystems, we each selected a lens (such as carbon storage, community forestry, or wildlife connectivity) through which we could investigate both places.

This approach was not without pitfalls, however. The class spent the first six weeks struggling with the appropriateness of applying lessons learned in Vermont's temperate forests to Puerto Rico's tropical ones. Wasn't the ecology completely different? Were we staring into the yawning maw of ecocolonialism? We entered Puerto Rico humbly, unsure of what we could really offer.

Our first morning in Puerto Rico didn't bolster our confidence. Dr. Ariel Lugo (director of the USFS's Institute of Tropical Forestry) challenged us to compare and contrast temperate and tropical forests. We suggested that tropical forests are warmer and wetter, they have greater biodiversity, and they store most biomass above ground, accounting for poorer soils than temperate forests. Dr. Lugo smiled as we suggested our textbook-learned differences, but he called the last two "myths" supported by little factual basis. No single "tropical forest" exists, Dr. Lugo explained; instead, the tropics consist of a



Through Place-Based Landscape Analysis

diverse matrix of wet forests, montane moist forests, and even coastal dry forests, to name a few. This false generalization led to the promulgation of considerable misconceptions about nutrient cycling and soil quality in some tropical areas. We sat beneath the towering, exotic Caribbean pines even less sure of the value of applying our decidedly New England-centric knowledge and experience to Puerto Rico.

This perception changed, however, as we explored the island and met with a slew of land managers, researchers, community leaders, and conservationists. Our final stop brought us to the El Verde Field Station, on the doorstep of the Luquillo Long-Term Ecological Research Station in El Yunque National Forest. After meeting with more Forest Service officials and University of Puerto Rico researchers, we began to sense analogous histories between Vermont and Puerto Rican forests. While walking through the tabonuco forest, Dr. Jess Zimmerman—the director of the Institute for Tropical Ecosystem Studies—showed us a remarkable change in forest composition as soon as we crossed a creek. The waterway had been the boundary of an old coffee plantation, since re-grown but lacking many of the native trees (including tabonuco, *Dacryodes excelsa*, for which the forest type is named) present not 100 yards away in the neighboring primary forest. What caused this noticeable change in species composition? Dr. Zimmerman argued that the coffee farmers had so altered the soil by planting arborous legumes and raising the pH with lime that many formerly common native species would no longer grow in areas where they once thrived. As Dr. Zimmerman pointed out more indicators of past land use, I couldn't help but think back to days reading the landscape with the rest of the AB '12 cohort in Alicia Daniel's (FN-E) Field Practicum class. Land use changes play out boldly across the Vermont landscape as well, and we made it our business to read the stories they left. It was exciting to see that others use the same nature



detective skills we do, just with different clues.

As both present and future naturalists, we can learn from partnerships between conservation efforts in far-flung regions. The people with whom we met sincerely welcomed whatever we had to offer, whether they were perspectives on Vermont forest history, ideas for engaging a public un-

concerned with neighborhood stream quality, or thoughts on promoting conversation among researchers. Even with our limited tropical forestry background, we measured over thirty blue mahoe trees, dramatically more than any other volunteer group. Thrity was beyond thrilled. Our bevy of new experiences—including hiking to a cloud forest, watching bioluminescent plankton light up as fish swam in a darkened lagoon, and swimming in the warm waters of the Atlantic—only reinforced the importance of protecting ecological integrity around the world. Above all else, it will be willingness to engage with others that best furthers our naturalist goals.

Rachel Garwin (AB '12) discovered many things in Puerto Rico, including a newfound interest in birds. Among the cohort, Rachel is best known for the exuberant arm gestures that animate whatever she says.



BRISTOL CLIFFS

"The flint
them

Another beautiful, rainy Friday in the woods!
A somewhat-stream-of-consciousness Event Map.



riest jumble of
all" ~ John Elder



The Call of the Urban

by *Walter Poleman*

My brother and I have taken divergent paths in life and, not surprisingly, ended up in quite different places. His path through the music industry has led to the skyscrapers, soft pretzels, and yellow cabs of Manhattan, while mine as a naturalist has taken me to the northern hardwoods, dirt roads, and general stores of rural Vermont.

Yet sometimes our paths cross. This past winter I found myself hiking a transect south from the Metropolitan Museum of Art to the Financial District where my brother's radio station is located. Central Park, blanketed in white from a record-breaking storm two days before, had a magical glow in the afternoon light, and I was struck by my relative solitude and sense of peace as I strolled through the snow-covered terrain. The first people I encountered were gathered at the base of a huge oak, pointing at a small bird ratcheting methodically up the side of the tree: a male hairy woodpecker, flashing red as it gleaned. As I continued south after this brief encounter, I became increasingly tuned into the natural features of this urban setting: the bedrock outcropping through the rolling terrain, the trees silhouetted against the towering edifices that surround the park, the chickadees flitting in their branching crowns. My conditioned naturalist mind began to ponder, who else inhabits this place? What kind of bedrock lies beneath? What did this land look like before Europeans arrived?

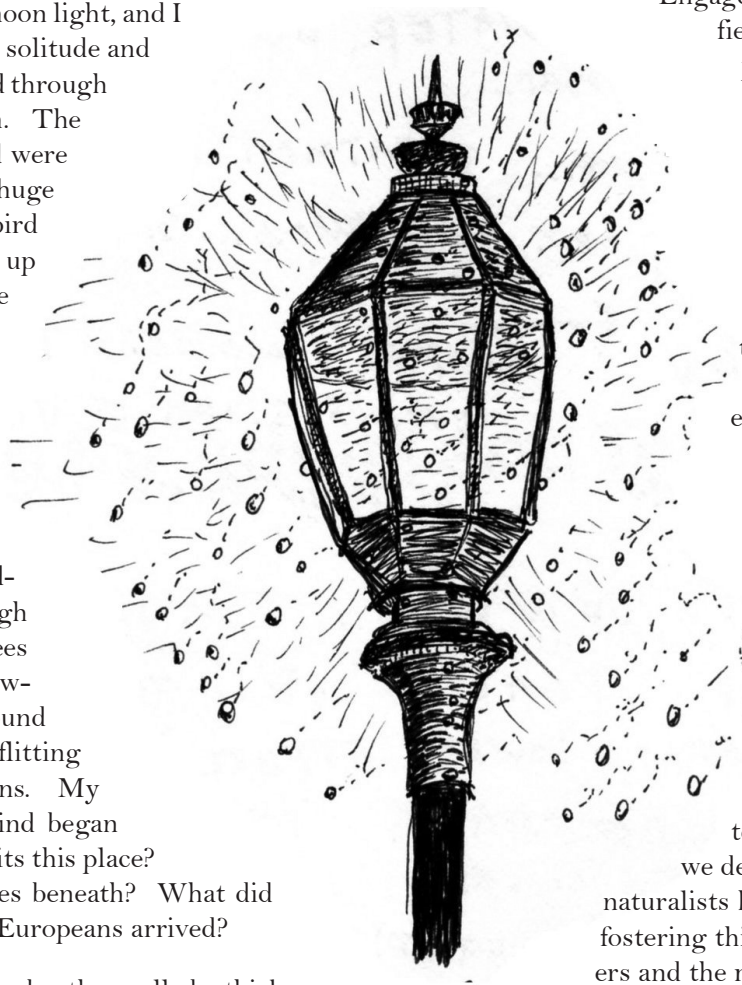
After dinner that night, my brother pulled a thick book off the shelf called *Mannahatta: A Natural History of New York City*. As I leafed through annotated maps, species lists, artist renderings, and journal entries, I got a sense of what the island looked like through Henry Hudson's eyes during his first encounter in 1609: "...prodigious in its abundance, resplendent in its diversity." The book's author, Bronx Zoo ecologist Eric Sanderson, even closes with a chapter on what a sustainable Manhattan could look like 400 years into the future. We then watched

an episode of the Ken Burns documentary about the unfolding story of the city, including the fascinating back-story of Central Park's roots as rural farmland. I was hooked.

When I returned to Vermont, I felt determined and excited to explore the natural history of our version of urban: Burlington. Though it has only a hundredth the population, Burlington shares with NYC a 400-year history since European discovery, a rich story of indigenous inhabitation stretching back 10,000 years, and a fascinating geologic history. The idea of making Burlington the next PLACE

(Place-based Landscape Analysis & Community Engagement) community quickly solidified in my mind. The irony that a program inspired by a mission to protect the rural landscape from sprawl would now celebrate its urban source was not lost on me. However, I have always been fascinated by the concept of place—geographic settings where nature and culture intertwine and unfold through time—so why not jump into the deep end?

If I am any indication, naturalists of the future will be drawn (and even called) to explore and practice their trade in urban settings. In our quest to inhabit this planet sustainably, we will need to more thoughtfully concentrate our collective footprint in densely populated areas, and humbly and creatively reintegrate with the natural systems we depend upon. I am convinced that naturalists have an important role to play in fostering this connection between city dwellers and the more-than-human world.



Walter Poleman is a Field Naturalist from the K Team, as well as director of UVM's GreenHouse Residential Learning Community. He runs a Place-Based Landscape Analysis course for FNEPs each spring.



For the Love of Science

by Alicia Daniel

I don't know what Field Naturalists and Ecological Planners of the future will look like, but I do know my prayer for us. In the future, and by that I mean starting today—now—I hope we can approach our work with our deep love of the natural world. As respected scientists and compassionate human beings, it is time to claim our right to explore, expand, and celebrate our connection to other living beings. We can no longer afford to be forced, in the name of science, to choose between logic and love.

This shift to a more holistic approach to science has happened before. Respected anthropologists no longer travel to distant lands to observe other people from a lofty position of superiority—filtering their lives and experiences through the cool objectivity of once accepted scientific practice. This clear, purely mental lens distorts reality. Through this lens, ancient spiritual practices and the ways in which people's daily lives are woven into their unique landscapes often become trivialized. Fellow human beings, "research subjects," don't lend themselves to being treated as objects. Not only is it demeaning to them, it also robs us of the opportunity to incorporate their wisdom into our own lives. Fortunately we have woken up to the folly of this approach, but only as it applies to human beings.

We are poised to wake up to this knowledge as it applies to the rest of the natural world. Science backs up this innate feeling of connection. The story of evolution shows us that our relatedness to other living beings is not a First Nations metaphor—it is biology. Over billions of years, the spark of life that began in a primordial pool radiated out to create the vast array of life that includes snow leopards and fleas, willow trees and us. The life spark in every living thing is in you and me. The very same one. As Isaac Nadeau showed so clearly in his slide program three years ago, if you travel back down the evolutionary tree (be careful jumping over all those missing branches!) you will arrive at a single common ancestor for every living thing.

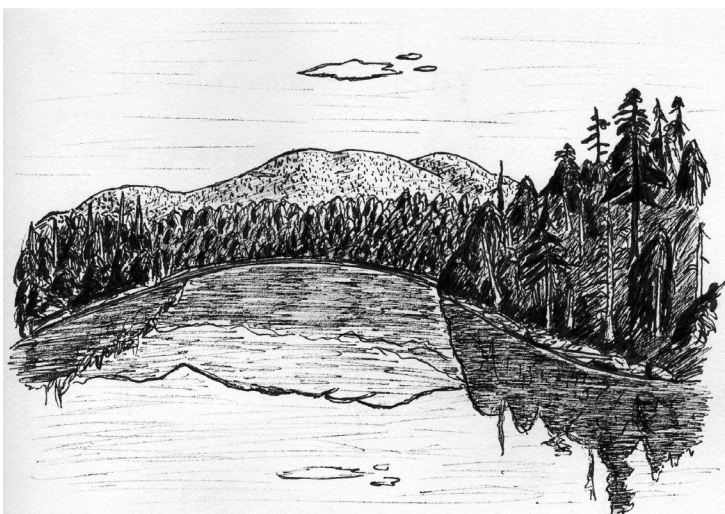
Sit with that for a minute.

So how does it feel to operate in the world of science without hanging up our reverence when we put on our lab coats or our field jackets? This is the new frontier we are pioneering together. Necessarily it will include a radical expansion of accepted language. When we talk about white pine we can still talk about photosynthesis and thigmomorphogenesis (adaptations like "flagging" away from prevailing winds). Those are good words, but we also need to communicate understandings like the ones that you come to by drumming or sitting silently in the woods as a witness: Trees have no beating heart. This grandmother white pine is hollow in the center. The sparkle all happens in the great green fire

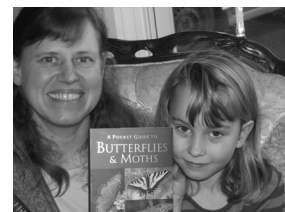
of the crown. As rooted as she is in the ground, she is pulling life down from the sun. What have I learned from her?

Imagine for a moment going to a professional meeting of a national conservation organization where people refrain from walking around discussing scientific research and pressing issues with Spock-like precision. We need to be able to show up at even the most professional, the most scientific,

talks with clear evidence of a beating heart. A greater balance of mental, physical, emotional, and spiritual strength will be our reward. So will joy and grief. For there is no doubt that within our lifetimes we will lose more species than we will gain, watch more forests cut down than we will see regrow. But Joanna Macy, Buddhist eco-philosopher, states so profoundly that we must not make our love of the earth conditional on our perception of her health. We are in a time of shifting our relationship to the earth away from treating her as a supply house and a sewer. We won't know until the last moment whether the new song we are singing is a song of rebirth or a requiem, but there is no excuse to retreat. And certainly not to the cool remoteness of science as we have known it.



Each autumn, Alicia Daniel, an E Team Field Naturalist, leads first-year FNEPs in their explorations of the Vermont landscape through the Field Naturalist Practicum.



Waiting for Wildlife

by Cathy Bell

Motionless on the hillside, I sit. I wait.

It's a Tuesday in the middle of January, and I've nestled myself into a comfortable spot here in the woods above Weld, Maine. Though it's only 2:45 in the afternoon, the sun is already low off my left shoulder. I've propped myself comfortably against a mossy boulder and am taking in an expansive view to the north and west. The ground drops away before me, leveling out to form a wooded hollow about forty feet below. Slanting sunlight illuminates a stand of paper birch, making their white trunks seem vivid and close by. Deer trails, crisscrossing each other through the snow, lead from my cozy spot down into the hollow.

The packed and trampled snow, abundant pellets of scat, and scuffed-up patches of exposed duff around my boulder are a sure sign that this is a high-traffic area for deer. They've bedded here on more than one night, it seems. And why not? This is a sheltered spot. Hemlocks create a tightly-closed canopy overhead, preventing radiant heat loss on a cold winter's night. There is little undergrowth, which is good news for me: I would have an unobscured view if any wildlife were to come along.

The afternoon is nearly silent, with just the occasional drone of an airplane high overhead. Abruptly, a woodpecker drums somewhere off to the west: d-d-d-d-d-d-d-dum! d-d-d-d-d-d-d-dum! d-d-d-d-d-d-d-dum! The pacing is rapid, with beats too fast to count, which makes me assume it's a hairy woodpecker. The bird is urgently trying to communicate something to someone, but I'm deaf to the meaning. Could this drumming really be a ter-

ritorial behavior, in the depth of winter? Nesting season seems quite a ways off.

As I sit, I begin to notice things about my little hemlock patch. There's a thick duff layer here, with long white pine needles as well as hemlock. It's cushiony to the touch, and it smells pleasant. Here and there, mosses grow, vivid green against their neutral backdrops of bark or rock. Brightly-colored crustose lichens are crowded onto the surfaces of the larger boulders, and for some reason this makes me think of our urban areas. How colorful and cheery cities would be if lichens grew on our buildings! But most lichens are too sensitive to air pollution to thrive in such close proximity to car exhaust and diesel fumes, and no self-respecting Manhattan building manager would ever allow things to start growing on his skyscraper. That's what power washers are for.

Turning my attention back to the present, I let my gaze play across the platy bark of the hemlock not six feet in front of me. I'm stunned to register that the bark is punctuated by numerous sapsucker holes, each about the

diameter of a pencil. The holes have been at eye level all along, and I'm only just noticing them now, after I've already been sitting here for almost an hour! I laugh aloud at myself, and then look carefully. The holes are irregularly spaced and are quite low to the ground. The highest are at about three feet. And, hmmm, this is interesting—the holes are all drilled through



the thickest part of the bark. Not a single hole is in one of the fissures between the plates.

I wonder why. Is it harder to access the cracks if you're a sapsucker clinging to the side of the tree? Is it a simple matter of percentages? I scan the tree, but the fissures seem to make up enough area that at least one of these four dozen holes should fall in a furrow, if all other things were equal.





A woodpecker drums again in the distance. Some minutes later, I hear it tapping more slowly and purposefully. This time, it seems, the woodpecker is scouting for food.

A pair of chickadees flits past, noisily calling back and forth. Tsip! Dee-dee-dee! I find it's hard not to smile when chickadees are around. I think of how small they

are beneath their feathers, and how difficult it is for them to generate enough heat to survive in this cold.



I shiver once, despite the cozy embrace of my puffiest down jacket. The cold is starting to seep in. I've been here for over an hour

and a half now, and I'm reluctant to leave. Surely, if I just wait a little longer, a deer or fisher will show itself? But the sun has dropped below the ridge now, and my surroundings are rapidly losing color as twilight races across the sky. It's time to head back to the warmth, light, and laughter of the cabin.

Upon my return, I am regaled with stories of barred owls and porcupines. It seems as though my winter ecology classmates all witnessed exciting happenings during their observation time. Eventually, noticing me smiling quietly in the corner, someone asks what I saw while I was sitting out in the woods. "Nothing," I reply, though nothing could be further from the truth.

Naturalists of the future, heed this. Take time to sit and simply *be* in nature. Recognize that, as the pace of everyday life accelerates around us, we need to keep ourselves rooted in what's real. The scent of crushed hemlock needles, the hard chill of outcropping bedrock, the urgency of an animal seeking food—these are the things that matter. These are the things that connect us to our world and inspire us to protect it.

Each year, Field Naturalists and Ecological Planners have the opportunity to join renowned naturalist Bernd Heinrich at his cabin in the Maine woods for a weeklong course in winter ecology. Cathy Bell (AB '12) wrote this essay during that week.



Missing the Birdsong for the Tweets?

by Charlie Hohn

In the last few years “smartphones” have exploded in popularity. These devices include not just a phone, but also Internet access, GPS, and a camera. Initially, advertisers were the first to jump on this technology, but I’d like to propose a different response—one a bit more radical, but with the potential to revolutionize the way we look at and talk about the natural world.

There is a common perception that Internet-enabled phones are toys of the wealthy. As it turns out, however, smartphones are cheaper and more accessible than most computers. In fact, a recent Pew poll found that urban minority groups and residents of less wealthy countries are increasingly adopting relatively cheap and easy-to-use smartphones in lieu of computers. While some use these devices to disperse ads, others use them as a tool of free speech and democracy. We also have the potential to use smartphones in citizen science and ecology. Yet many biologists are reluctant to capitalize on this opportunity, sometimes simply because they don’t like the idea of bringing smartphones into the natural world.

Just across a parking lot from the Field Naturalist campus workspace, Centennial Woods is my personal refuge when I am overwhelmed by stress and need to get outside. Yesterday I walked into Centennial Woods, and while listening to the wind in the large white pine trees, I wondered if the “Facebook Places” feature on my iPhone, which lists local businesses, could potentially include natural features as well. Not surprisingly, I found several restaurants and bars, a hospital, a coffee shop, even a funeral home. No mention of Centennial Brook, which I could hear babbling in the distance, the white pines, the beaver meadow nearby, nor for that matter any mention of Centennial Woods at all.

In the Field Naturalist Program, we learn that there are no easy answers to conservation problems. Solutions don’t come from arguments, but from open communication between citizens, policymakers, and scientists. Rather than just using smartphones for advertisements, could we use them to share place-based information about the natural world? I went ahead and added “Centennial Woods” to the list of services nearby. Now, anyone who uses the Facebook app on the UVM campus will see Centennial Woods alongside their favorite bars and clothing stores.

There is a lot of concern that our tools and technology separate us from our surroundings. This is sometimes true, but tools also enhance our observation and information gathering skills. Extensive tool use is one of our main adaptations as a species. Humans have used maps to record and share

landscape information for thousands of years. Undoubtedly, the creation of maps drastically altered how humans viewed their landscape. I wonder whether some people feared that maps would disconnect us from the landscape or lead to an over-reliance causing many to become hopelessly lost if their maps were misplaced. Maps even constituted a loss of privacy—people could record and share the location of your home with strangers. Yet, societies adapted to maps, and now it is hard to imagine venturing into the forest without one.

GPS-enabled smartphones have the potential to change the way people look at landscapes almost as profoundly as the appearance of maps did. In the least, the technology certainly has the potential to be more than a virtual billboard factory. Of course, it is our responsibility to make it so. Those of us who have access to this technology now will determine its future.

Some feel that excess information is a distraction, but as a scientist and naturalist, I disagree. Information represents opportunity, and knowledge represents power—the ability to make positive changes. We just need to remember to cultivate our sense of wonder and mystery along with our desire for knowledge. We are far from knowing everything about the world around us, and no matter what tools we bring into the woods we will still be surrounded by wonder and beauty.

Field Naturalist Charlie Hohn (AA ’11) frequently explores new tools for connecting people to urban watersheds and the rest of the natural world.



What Did You Do Last Summer?



Tate Bushell During the 2010 summer I worked with the New Hampshire and Maine chapters of The Nature Conservancy (TNC) to develop a set of monitoring protocols for their pine barrens restoration projects. Each chapter manages a small (few thousand acres) degraded pitch pine-scrub oak woodland, which are being restored with prescribed fire. The purpose of TNC's monitoring program is to assess restoration success by comparing the effect of different restoration efforts on attributes that are considered ecologically meaningful.

My time on the project exposed me to the wonderful world of land management, including theoretical ecology, applied naturalism, and of course... setting fire to forests. To write a useful set of monitoring protocols, I wrestled with restoration "endpoints" and "the essence of the pine barrens." This entailed battling swarms of black flies while crawling through thickets of scrub oak. While not in the pine barrens, I lived in a small cabin on a pond in eastern New Hampshire. From my dock I watched a loon chick mature and blueberries come and go.



Rose Graves Imagine yourself as a bear standing on the top of Hurricane Mountain, in the Adirondacks of New York. Looking east toward Lake Champlain, you would see a patchwork of forests, wetlands, agricultural lands, scattered residences, and a few small towns. The "Northway" and several state highways would stand out as they cut across the landscape. How would you get from these mountains to the lake shore?

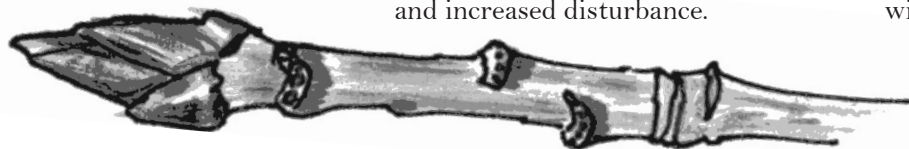
Working with the Northeast Wilderness Trust to answer that question, I used GIS-based models to identify the most likely movement pathways for black bear, bobcat, and fisher between large wilderness areas in the Adirondack High Peaks and Split Rock Wild Forest on the western shore of Lake Champlain. By maintaining pathways containing few human-caused barriers to wildlife movement, we offer opportunities for wildlife to meet their life needs in the present and into the future. Conservation of the identified linkages will maintain existing connectivity between the Adirondack High Peaks and Champlain Valley, providing seasonal habitat for bears, bobcats, and fisher as well as allowing these species the flexibility to adapt and shift in the face of major threats, such as climate change and increased disturbance.



Charlie Hohn Adjacent to three large rivers and prone to severe summer thunderstorms, Pittsburgh is a city defined by water flow. Unfortunately, much of the runoff from Pittsburgh is channeled into a combined stormwater-sewage system that often routes sewage into nearby rivers rather than allowing runoff to infiltrate into the soil.

For my project, I am working with the Pittsburgh Parks Conservancy to create a watershed outreach plan for the Four Mile Run watershed. This watershed includes Schenley Park, a large fragment of urban nature within the city. The outreach plan addresses ways to improve the watershed within the park (restoration of streams and wetlands) and in the adjacent city (use of rain gardens, rain barrels, and pervious substrates). The goal is for runoff to be viewed as a resource, not a liability. Outreach materials will be largely technology- and demonstration-based and will address all audiences living in or using the watershed area.

In addition to helping improve watershed health in Pittsburgh, my project has allowed me to expand my experience with outreach, and to use various media, including art, to communicate with a diverse audience.



What Did You Do Last Summer?



Zac Ispa-Landa For my Master's project, I worked with the Land Stewardship Program (LANDS), a 9-week summer conservation internship that is a partnership between UVM and the Student Conservation Association. The program was started by a Field Naturalist six years ago, and the leadership of the program has been handed down through the FNEP generations ever since. Each FNEP who is passed the torch contributes a written piece to the body of work associated with LANDS. I'm developing a "Whole Farm Assessment" handbook to expand the scope of LANDS (and any future College Sustainability Corps) to include the field of sustainable agriculture in its repertoire. This summer we will partner with Vermont Land Trust for LANDS's first agroecology project.

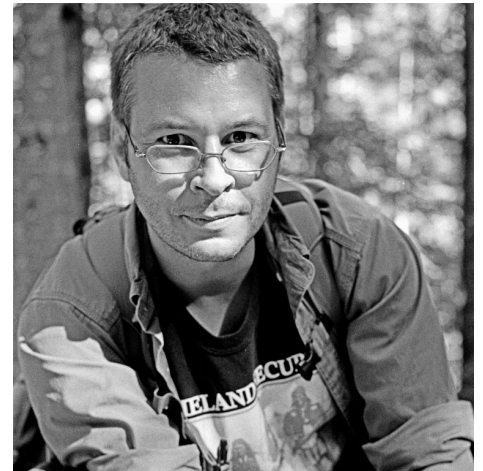
I am also serving as the LANDS Program Manager. With the invaluable help of my co-leader, Leah Mital-Skiff, and my advisor, Deane Wang, I will be implementing the 2011 program from start to finish. So my Master's work is really more of a process than a product. And the outcomes of that process—the mentoring of aspiring young conservationists; the creation of much-needed maps, reports, data, and recommendations for land protection agencies; and the furthering of a unique model of service learning—are the most important results of my work.



Pam Johnston Modern-day agriculture is one of the biggest threats to biodiversity and natural systems across the globe. But for me, it's also one of the biggest sources of hope for our planet. Wildlife conservationists often view agriculture as a major obstacle, especially for elusive wide-ranging predators. But with proper design, we can have productive as well as wildlife-friendly landscapes that may actually benefit these species in light of increasing sprawl and development.

My project for the Northeast Wilderness Trust sent me diving into the world of GIS, scratching my head over multi-scale conservation approaches, and pondering how to best communicate the concept of "wildlife permeability" in a meaningful way. "Permeability" refers to the degree to which an organism can move unimpeded through a landscape. I created a GIS model to assess current permeability conditions for black bear, bobcat, and fisher in Vermont's Champlain Valley, then looked at highly-permeable areas on a smaller scale. What was it about those areas (in the real world) that would allow for wide-ranging mammal movement? Where have the species been observed? And how can these lands be enhanced and/or conserved to allow continued movement between lowland resources and forested uplands of the Green Mountains?

My document presents these assessment results as well as recommended practices in "A Landowner's Guide to Wildlife Permeability Management." The Northeast Wilderness Trust is excited to share my work with local community groups and other organizations who share the vision of conservation in working landscapes.



Neahga Leonard I spent the summer of 2010 in Shenandoah National Park designing a monitoring protocol for endangered plant species thought to be indicators of environmental change. I tested the protocol on two species, *Huperzia appalachiana* (Appalachian fir-clubmoss) and *Sibbaldiopsis tridentata* (three-toothed cinquefoil), which are Pleistocene relict plants surviving on several small high elevation outcrops of igneous origin within the park.

The aim of the protocol is to provide park managers with a simple, repeatable, and expandable method for evaluating change in ground cover over time. The results will be correlated with climate data, and the results will provide an indication of what sort of vegetation changes park managers can expect in the Shenandoah area.

This information will assist park managers in making informed decisions concerning the management of natural resources within Shenandoah National Park.

The Adventures of Team *Alces alces*



Bryarly McEachern The Vermont Institute of Natural Science (VINS) in Quechee, Vermont, is primarily known as a bird rehabilitation center with world-class raptor education programs. VINS is keen to expand the scope of its programs by using the natural assets of its property to support undergraduate-level research, to educate the public about biodiversity conservation and land stewardship, and to make meaningful connections with neighboring communities.

My task was to help VINS explore its options for land management, research, and education in relation to two areas on their property: a 5-acre meadow (former sand quarry) and a 3-acre white pine stand. These sites represent common landscapes in Vermont whose management often perplexes landowners. The meadow is analogous to either old agricultural fields or residential developments where topsoil and native vegetation have been removed. Middle-aged white pine stands commonly dominate Vermont's abandoned pastures, with fewer plant species and

lower structural diversity than the forests that preceded them. VINS has the opportunity to model management strategies that improve habitat for native plants, insects, mammals, and birds in these environments.

The central questions driving my work were, "What is here? What could be here with and without active management? What management strategies and respective educational programs would fulfill VINS's goals and interest the public?" Because VINS's main stewardship objective is to increase native biodiversity, I did a baseline biodiversity survey of the meadow's plant and microarthropod communities and compared it to two reference meadows to see how land-use history affects diversity. I researched old-field management strategies, interviewed nature center staff, spent time with teachers from local schools to gauge their interests, and attended a three-day intensive workshop on place-based education. I also visited sites where successful and unsuccessful white pine management strategies had been tested.

The result of my mental and physical peregrination is a three-part report including a landscape inventory and biodiversity study, proposed research projects for engaging citizen scientists and undergraduates, and a public outreach/engagement plan.



A "Flat Naturalist" counterpart (left) accompanied each member of team Alces alces into the field last summer.



Sam Schaefer-Joel My Master's project was comprised of three separate phases. I began in May 2010 as a co-leader for the LANDS College Conservation Corps. Zac Ispa-Landa, Lydia Menendez, and I worked together to assemble and train an amazing group of nine interns. Throughout the summer, we worked with a broad array of partners on a variety of land stewardship projects across the state. Projects included surveying for invasive insects and plants in Vermont's state parks, providing land management recommendations to the Jericho Land Trust, and monitoring soils within harvest units in the Green Mountain National Forest.

The second phase of my project began in the fall, working with the GreenHouse Residential Learning Community at UVM to write a curriculum for a class on human nutrient cycles. I was able to teach the class I developed—"Farms to Feces: Food in Human Ecosystems"—to a great group of college students during the spring semester.

As the final phase of my project, I worked with the GreenHouse staff to develop a plan designed to increase the level of engagement among returning residents to the GreenHouse Residential Learning Community.

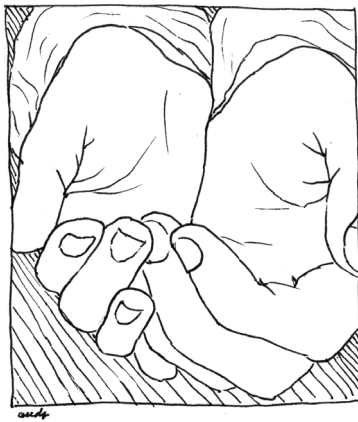


Response to Mr. Frost

by Danielle Owczarski

illustrated by Audrey Clark

As you walk along the path you begin to lose track of time.
Exposed is the rotting wood of the butternut tree once tall and welcoming.
You feel the cold rain sinking into your bones and you can smell the decay.
Your mother sits along a wall of stacked stones washing your dress.
You can see her face, it is smooth and soft and you walk towards her.
She is aging with every step you take and you stop to preserve her.
She too, begins to waste away into the ground and the insects
separate her into small pieces, preparing her for the maple trees.



You breathe in deeply, inhaling everything, and cough.
A piece of history gets caught in your throat and you dislodge it.
In your hand you hold a forgotten scene.
It is of a man and a woman who are surrounded by thick woody vines.
She cradles a small child in her arms and you look closer into your hand.
The child cries out and you are comforted by its appearance.
In its face you see a reflection of yourself
and you snuggle gently into the woman's arms.

The trees disappear and the sunlight shines brightly on your face.
The wind blows strong across the landscape and sweeps you off your feet.
You land atop a barn and gaze across the straw colored expanse,
and can see miles of grazing pastures, sugarbushes, and partitioned crops.
Supple slippery moss grows rapidly on the shingles and you lose your footing
falling hard into a ditch filled with water and leaves.
The frigid liquid moves into your mouth and nose and into your lungs.
Your body becomes stiff and rigid and you float to the surface.

A dog howls and you open your eyes to flickering sunlight.
The ground beneath you is white and brittle and as you start to stand up
your foot sinks into the sandpaper snow.
The air is warming and smoke travels like mist through the sugar maple trunks.
You look at your arm and sap is dripping from a spout into a gray mottled bucket.
You feel faint as the thin clear liquid drains from your body.
A squirrel scurries up along your emptying appendage and licks the sweet sap.
You drift in and out of consciousness and sway softly in the breeze.



You are taken to a place deep and dank
 and the pressure on your chest is oppressive and overwhelming.
 You reach out and feel decaying wood and splinters slip into your fingernails.
 You raise your arms upward and again nothing but rotting timber.
 Roots of arbor vitae pierce your enclosure and extend into your skin.
 You can feel the worms and the grains of soil as you grind your teeth.
 Slowly you are sinking, withering, morphing into your surroundings.
 You become part of your mother, your neighbor, and your brother.

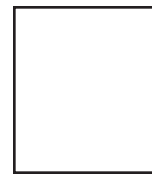


Gasping for air you are lifted from the sweet waters of a deep spring.
 Faces are looking down on you with adoration and expectation.
 Your eyes sting and drops of water are splashed onto your forehead.
 Originating above you a low chant of deliverance rings in your ears.
 A soft warm feeling moves into your small malleable shoulders
 and travels along your torso and into your toes.
 The low voice tilts you upright and your mother runs her hand smoothly
 along the pale white garment that hangs far past your feet.

The rain begins slowly at first and drops darken the landscape.
 The droplets become larger and fall faster gaining momentum.
 The wind howls and you are completely saturated.
 The water rises to your ankles, then to your knees, pulling you down
 into the sopping abyss and you reach out to your mother fearfully.
 She extends her arm to offer you a dark blue chalice saying sweetly,
 "Here are your waters and your watering place.
 Drink and be whole again beyond confusion."

During their first semester, all FNEPs participate in the Field Naturalist Practicum, taught by Alicia Daniel. After each field trip, students produce an essay, artwork, or analysis. Danielle Owczarski (AB '12) wrote this poem after a trip to Ricker Basin.

The University of Vermont
Department of Plant Biology
111 Jeffords Hall
63 Carrigan Drive
Burlington, VT 05405



ADDRESS CORRECTION REQUESTED

Master's Project Call for Proposals

Do you need technical assistance with a high-priority field research project? We seek to match Field Naturalists and Ecological Planners from the class of 2013 with Master's projects sponsored by environmental organizations on the cutting edge of conservation science.

We are looking to link FNs and EPs with projects that challenge them to use their intensive training to its fullest. Our graduate students are professionals who are expected to demonstrate their unique skill sets while working with sponsoring organizations. FNs and EPs work closely with their communities and sponsors throughout the process to ensure that the product directly addresses the sponsor's needs.

In return for the services provided, we ask sponsors to contribute \$5,000 to our Sponsored Master's Research Project Fund. This contribution is used in its entirety to help defray tuition expenses of the student.

We plan to match students with projects by January 2012 so that students can work with sponsors during the spring (2012) semester to plan for the summer field season. Data analysis and report writing continue into the fall semester, with products delivered to sponsors between December 2012 and May 2013. If you are interested in having an FN or EP work with your organization, please contact:

Jeffrey Hughes
jwhughes@uvm.edu
(802) 656-0708

Deane Wang
dwang@uvm.edu
(802) 656-2694

Field Naturalist Program
Department of Plant Biology
(802) 656-2930
www.uvm.edu/~fntrlst/

and

Ecological Planning Program
Rubenstein School of Environment & Natural Resources
(802) 656-2694
www.uvm.edu/rsenr/ep/

