

Field School

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This article uses the form of a creative non-fiction essay to illustrate that the teaching of an ecology field school can be informed by lessons learned from natural history. Throughout the essay, I use migration as a lens through which to interpret the teaching opportunities and challenges that occur in a two-week, capstone field course provided every two years at my university's research station. Just as shorebirds refuel and rest at migratory staging areas, field school has its own educational waypoints that mark the progress of both individuals and the larger group. As a unique way of knowing that allows university students to attend to the natural world, this story argues that field schools make an important contribution to biology students' undergraduate education and are worth preserving.

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Here's how to start. Buy food for fourteen people for two weeks. Stuff rough totes with equipment: spotting scopes, mist nets, GPS units, maps, compasses, measuring tapes, Pesola scales, Longworth traps, densiometer, plant press. Assemble a reference library—field guides, statistical texts, ecology papers, books on sketching. Remember the slim volume of William Stafford's poems. Schedule day hikes, lectures, meals, and chores. Compile a course-pack. Restock the first aid kit.

Imagine yourself a western sandpiper, scurrying down an Arctic beach, gobbling isopods, packing on fat. Education, not biology, drives you, but your journey falls within the definition of migration. Out and then back—any periodic two-way movements made by animals. Hold onto that image. It will help in the days ahead.

Some migrants traverse continents. Arctic terns wing from one pole to another. Grey whales swim from the Bering Sea to Baja California. Others travel vertically: earthworms wiggle down to avoid winter's frost; zooplankton and their predators alter their depth, swimming toward and then away from the ocean's surface. Each season, the migrants pass us by, mostly unnoticed, flying overhead, swimming up rivers, drifting on winds. Years ago, before my daughter was born, I joined them. An itinerant naturalist, I followed work to Alaska in the summer, back to the Columbia River in the fall, and onto Baja California in the winter. Driven by instinct or calculation, every migration is a leap of faith. Every migrant searches for something—plentiful food, a safe place to give birth, a warm place to wait out the winter.

Now that I teach at a small university, I migrate only every other year to co-teach a field school. We don't go far—only two hours away by car—and the forces governing our movements are less mysterious than those driving Pacific salmon up rivers and creeks. It is by no means a mass migration; our convoy only consists of two instructors, a cargo van, and twelve students, but like the salmon that abandon the salty rhythm of the sea for the fresh turbulence of a river, our migration is more than just movement—it is the stuff of transformation.

Migrating

Like many species, we migrate collectively. This year, we first gather to lug totes of dry food and equipment, along with coolers of fresh vegetables and frozen meat, from the Science Building to the waiting vans. Better than any formal introductions, this communal act of physical drudgery kick starts our awareness of each other. One student's mother remains behind after other parents have left. I am surprised when she pitches in, trudging up and down the stairs. Just before the final tote is loaded into the van, she pulls me aside to plead, "You'll take care of my girl, won't you? She's my only one."

Every migration faces challenges. The great collective migrations of songbirds, caribou, and monarch butterflies arise out of individuals' instinctual responses to the stimuli driving them forward and their own need for company. But there are no guarantees. All teaching carries risk; each time we get up in front of our students, we expose our passion for our subject, our faith in our

students and ourselves. But it's one thing to swing for the stars, cajoling your students to come along for the ride, knowing you'll go home at night. It's another thing to do it while your husband carries your share of child-care and house-cleaning, while you miss your daughter's first piano recital, while the students' physical safety is your responsibility.

Last night, my personal gear packed in bags at home, I lay awake too long, mentally reviewing student medical forms, rising in the dark to check that the key to the research station was in my pack, worrying if Nancy and I could guide one more group to each of field school's educational waypoints. Would the group come together? Would the students fall in love with natural history? Would they find their way to asking and answering their own questions? Collective migrations can be powerful: the V formation of geese shares the burden of wind drag and the collective experience of the group helps overcome individual errors. From experience, I know where field school can go, but just before I fall asleep, I wonder why I ever agreed to make this trip again.

Now, in the early morning sunlight, I survey our group. Twelve students—varying in independence and adaptability. Twelve students, who along with Nancy and me, will find this year's route, attending to each day's possibilities while mitigating the distance from home. Failure is always a possibility: low clouds and rain blow birds and bats off-course, sometimes irrevocably. Even if we arrive, some routes will be better than others, but right now, all we can do is leave.

As we head north, more than just bodies crowd the van I am driving. Unspoken emotions—excitement, trepidation, exhaustion from staying up all night to pack, relief that this trip marks the end of exams—bounce inside like oversized balloons. Our route winds upstream, against the current of the North Thompson and Clearwater Rivers. Each fall, Pacific salmon smell their way home through these waters, using memory as their guide. Faced with the unknown landscape of field school, the students dredge my memory for guideposts. “Has anyone ever been hurt?” “Do we get any time off?” “What time do we get up?” “How do we decide on a research project?”

Stories roll out—the student who sliced off the end of his thumb preparing dinner, the year two students' snoring drove the other ten into sleeping under the cookhouse tables, the day we found the bridge across Hemp Creek collapsed and had to wade the spring flood barefoot, boots hanging from our neck, arms linked. Storytelling provides direction: *this is the terrain, here's*

how to adjust your compass declination. Storytelling builds identity: this is the community of field school, here's how to join.

Field school is chaos—at least during arrival. Nestled within a maturing forest of birch and aspen and Douglas-fir, our ramshackle research center consists of a bunkhouse and a cookhouse surrounded by a cluster of small outbuildings including outhouses and two un-electrified staff cabins. Before we can hit the first trail, the perishable food has to be sorted into fridge and freezer and the cargo van unpacked. Anxious to start, to get the students looking, I want to unload and go, but the students scatter into the bunkhouse, intent on finding their bunks and exploding their packs. My impatience builds until I realize this behavior is their version of defining territories—no different than the resident wolves in this valley scent-marking. Marking territories is a first step in enabling cohabitation.

Some territories need no definition. Out of habit, Nancy lugs her gear to the newer cabin with glass windows and I turn to the older cabin that is closer to the cookhouse. Inside the bunkhouse, however, students have milliseconds to choose which of the wooden sleeping platforms stacked three high to make their own. This decision resounds with complication. While it's easy to assess each bunk's potential warmth based on its proximity to the stove or its height, other information like who snores and who doesn't comes only after the first night. Proximity to friends matters too. Bunk selection is not trivial; some years, the greatest tension in the group arises from an inability to find sleep in a communal space. This year, I am relieved when a few self-aware students—light sleepers, heavy snorers, or perhaps just those with a high privacy threshold—pitch bright orange and yellow tents behind the cookhouse.

Any pilgrimage, by definition, transforms the behavior of the pilgrim. The biology of migrants must include the ability to adapt—behaviorally or physiologically to differing environments. The first leg of salmon migration adjusts their body chemistry to tolerate saltwater; their return leg switches it back. Even migrating song birds will alter the activity of their digestive tract in order to conserve energy in flight. Our travel is not arduous, yet even within this modest migration, behaviors must change. Each field school, Nancy and I bring the group together to review the minimum standards of hygiene, courtesy, and safety required for a multi-day, group excursion. The talk is part ritual, part due diligence, but I've come to believe that what we *do* matters more than what we *say*. The transition from city to forest, from lecture hall to trail, alters all of us.

Field school is learning to hear. A petite woman with a thick cap of dark hair that serves as nest to a dizzying array of reading glasses in different shapes and colors, Nancy is our interpreter of bird song. In early May, this means that we should be outside well before the sun rises at 5:30 am, but Nancy eases students into dawn listening, cheerily “good morning, good morning” the students awake at 6:00 am. Our first breakfast is abbreviated—coffee or tea and a small bowl of oatmeal—and by half-past six, we are out the door. This far north, this early in the season, the cold is relentless. All feeling disappears from our fingers and toes as we hold still to listen to one song and then another. We may not be able to see the small grey form of the Ruby-crowned Kinglet, but all of us learn to recognize its iconic *chubby, chubby cheeks* song. By the end of two weeks, we will know which birds are resident and which birds visit, like we do, as migrants.

Field school is routine layered upon the novelty of the natural world. Individual days vary, but the intent is the same—to read the landscape and its inhabitants as our primary text. Most interpretation occurs outside; some requires the bunkhouse chalkboard. Much of it Nancy and I do, but for the first few days, other faculty visit us, introducing the threads that weave together field ecology: geomorphology, ecosystem classification, aquatic ecology, plant pathology, small mammal trapping. We visit specific sites—the poor fen at Placid Lake, the interior temperate rainforest at Spahat Falls, the wet meadow surrounding Jim’s beaver pond, the deciduous forest of birch and aspen along Battle Mountain Road. Only in late afternoon do we return to the research center. One group of students turns toward the cookhouse—their name is up on the chore list for dinner; the rest find space on the picnic tables outside.

With our rustic kitchen facilities, dinner prep is always prolonged, and Nancy and I walk a triangle between the students in the cookhouse, those working outside, and our own preparations for the next day. We keep course paperwork—schedules and lists and handouts—in a file folder in the back of my van, and Nancy and I perch on its bumper, deciding what will work and what won’t. Itineraries change, everything is contingent. This year, we balance erratic spring weather with flagging student energy, bear activity with bird song, plant collecting with sampling design. Inside the cookhouse, the windows cloud with condensed steam from the boiling pots of water that will be used for dishwashing.

Migrating shorebirds refuel and rest at staging areas staggered along their route. Dinner serves the same function for students, but it’s hard for me to relax during dinner—at least in the beginning. With the fourteen of

us spread haphazardly across two long tables, dinnertime behavior marks the cohesion of the group. Some years, the silence of polite strangers lasts well into the first week, but this year, a woman, tall and thin with a bubbly laugh, is quick to open up, regaling the entire group with stories about her Italian *nona*. By the third evening, *nona* stories lead to an offhand comment about how much all of us will know—whether we want to or not—about each other by field school’s end. Quick as a flash, another student, who knows more about horses than I ever will about plants, jumps up and says, “You mean we’ll recognize Lyn’s behavior when she finds a new moss?” And then in a staggeringly accurate imitation, she bends over, squeals (*I squeal?*), swivels her ball cap so the bill is facing the rear, raises hand lens to eye and jumps up and down, saying, “Oh, wait, oh, oh, you have to see, you have to see.”

As the entire group coalesces into a giddy mass, including me with a bright red face, I know the first leg of the journey is complete. These moments of united laughter are as unpredictable as the weather; I’ve never taught a field school without them, but their persistence and inclusiveness varies from year to year. Determined in part by chance, in part by the rhythm of our days, these moments form a muscle that once flexed reappear readily. After the mimicry, the dam of hesitancy is completely breached and stories pour from the students. Encircled by the group, each vignette is rampantly funny; I know they won’t translate well beyond field school.

After dinner, there are plants to press, field notes to write, specimens to key, research methods to consider. I stay as long as I can, helping students identify mosses and spelling out Latin names, but fatigue dogs me before the students are done. Field school is becoming so tired that phrases like “You’re between a hard and a rock place” tumble out of my mouth. The moment the words sound against the walls of the bunkhouse I know they will form part of the ongoing comedy routine. This year, I am providing more than my share of raw material.

Field school is learning to see. Most students arrive unable to name the trees, let alone the mosses, in our forest. When you’re first learning field botany, bigger is better, and we work from the top down, sorting spruce from fir, paper birch from trembling aspen. It doesn’t take long. By the end of our first hike along the Myrtle River, students can separate spruce’s potato-chip bark from the deep furrows of Douglas-fir and the blunt, mountain-alder buds from the Sitka alder’s pointy buds.

Field school is exposure of a different kind. One student, quiet and unassuming, demonstrates the eye of a great field biologist, spotting new birds and plants before anyone else in our group. A woman who struggles with written exams stalks flying insects with the determination of a big game trophy hunter. Another student who I relied upon in lecture for his insightful questions transforms into a non-stop, sarcastic chatterbox. I am irritated until I realize that I can tell him to shut up without offense. Others sort into those that are amiable (“I’ll do whatever the group wants”) and those that exert their own intention on the group (“Lyn, can I suggest...”). One woman’s insistence expands with the number of days since our last shower at the nearby resort.

When it gets to be too much, when I’ve answered the same question over and over again, I think of Arctic terns. On their breeding grounds, these birds nest bill to tail, using proximity to others as a hedge against predators, the cacophony from their colonies enveloping chick and adult alike.

Only when I retreat to the quiet refuge of my cabin do I realize that my irritation signals our arrival at another migratory waypoint.

In the constellation of my students’ education, this course is an oddball. Rather than generalized textbook examples from distant landscapes, field school immerses us in the natural history of one place. Our research center sits on the fringe of Wells Gray Provincial Park, a mountainous landscape rich with waterfalls and volcanic geology. Wilderness lies at our back. Most years, the early season keeps us out of the bulk of the park, but even on the fringe, amongst the intermittent houses crowded up against the one road into the valley, the land burgeons with other species’ lives. In fourteen days, attentiveness to the vivid world surrounding us becomes habit.

Field school is unplugged, maintaining the primacy of direct experience. We have no internet connection and there is no cell service this far up the valley. One of the first landmarks the students learn each year is the exact curve on the Clearwater Valley road where connectivity is lost. Over the years, the location has advanced north in the valley but still remains beyond walking distance.

Of course, in any migration, not all migrants arrive. Torn from the sky, lost to hunger, directional apparatus confused by human technology, their carcasses litter long established routes. The challenges of field school threaten less, but even here, some migrants will fly further than others. Field school’s migration searches

for another way of knowing, a place where lessons can be learned from the land as well from books or computer screens. Nearly all the students master the pieces—identifying the individual bits of the ecosystem surrounding us. Some are particularly good at recognizing the collective patterns (even the exception to the pattern) formed by the pieces. But not all can leap from observation to prediction, from prediction to testable hypothesis.

The expectation is there—students begin field school knowing that it culminates with an independent research project—and within the larger group, we model the process. This year, working with the aquatic biologist, we discover that Philip Creek to the north harbors far fewer insects than similar-sized Moul Creek to the south. Later, with the geomorphologist, we uncover evidence that depauperate Philip Creek has flooded catastrophically, probably repeatedly—large, water-worked boulders lay scattered well beyond its banks. At dinner that night, Nancy and I query the students on possible processes underlying this pattern. How could we test our hypotheses? Are there enough high and low-flood frequency streams in the valley? How could we find them? What would we sample? What factors might confound our results?

For those students who can then make this leap without guidance, it’s transformative. Author Ted Chamberlain asks, “If this is your land, where are your stories?” In the alchemy of field school, good questions can spread like wildfire. I’d like each student to find their own question, but this year, when one student remains hesitant, shadowing Nancy and me with endless questions about her research project, I worry less and suggest she collaborate with another student. Leading and following represent alternate, but often equally viable, strategies in groups who travel together. Then, on our final day together, when students present their research to the group, I hear what I had been hoping for. Regardless of whose question began the project, students tell collaborative tales—ones where ideas were reshaped not just by each other, but also by the lessons that club mosses or blue-bead lilies or night-flying moths had to teach. I sit in the back, taking notes, grinning inside as I hear how the challenge of scientific inquiry, arising out of natural history experience, wove the pattern of the land into the students’ intellectual journey.

In the square boxes of city life, few students know the names of the iconic plants and animals sharing their home. Their lives are busy, driven by work and school and family. The rhythms of their day rarely correspond to those of the surrounding ecosystem. Even as I

understand it, my students' lack of connection with the natural world terrifies me. How will they fight for what they don't know? The writer David Orr says that he doesn't know if it's possible to love the planet, but that it's possible "to love the places we can see, touch, smell, and experience." It doesn't happen every field school, but this year, all twelve students fall in love—a few seeming against their will—with the slant of light in the early morning, the unique yellow-green of unfolding aspen leaves, the scramble of a red-backed vole making its way home.

There is no teacher's manual for field school. Instead, it's an oral tradition, a layered knowing, that arises from many teachers, not all of which are human. Each year, we learn from the rhythm, the mean and variance, of the natural history that surrounds us. I've taught Nancy the names of common mosses and she's taught me to expect the bright *maids*, *maids*, *get your teakettle ettle ettle* of the Song Sparrow in wet marshy areas. Both Nancy and I teach from the gifts of those who came before us. Tom showed us where bears den in the sinuous hunch-backed shape of a glacial esker, Dave left plant lists for each of the trails we follow, Val mapped small mammals in the forest behind us, and Trevor, the naturalist who lives across the road, donated the land and buildings that make up our research station. In the tradition of field school, teachers come and go, but the practice of attending to the natural world remains.

Globally and locally, migrations stitch together disparate ecosystems. Salmon carry nitrogen gathered from the ocean up freshwater streams. When bears haul salmon carcasses into the forest, nitrogen from the ocean supplies mosses and trees. Pilgrimages, out and then back, require the ability to benefit from multiple habitats but transitions are not always easy. On our last day, the cargo van arrives before its scheduled time. It's happened before, and I should expect it, but I'm still irritated. I'm not ready for new bodies. It's hard not to be grumpy as we load the van. After driving my van to the end of our driveway, I stop, turn off the ignition and get out of the van to lock the gate.

Soft to the touch, the wooden gate is weathered grey by seasons here I've never known. Beside me, leaves of wild rose and saskatoon extend fully. As the u-bolt slides into its notch, I inhale the rich smell of a forest rushing to the full suck of summer. I exhale, imagining the carbon dioxide I expel being gathered into photosynthesizing leaves. Field school is reciprocal exchange—between a land and its inhabitants, between student and instructor. Transformation, sometimes big, sometimes small, is inevitable.

Ending

Here's how to end. Drive south. Know that field school finishes before all the totes and coolers are unloaded. Expect disjointed conversations to ricochet within the van once you drive within cell service. Each one-sided conversation will fracture the foundation of the group until individual pieces rift free. As you drive the second hour, down past the winding curves of the North Thompson, anticipate the quiet of exhaustion as the students fall asleep, one by one. In the final minutes of the drive, you guess which of the sleeping students will find their own way back upriver, about who might someday lead their own group.

In the months ahead, the students will disperse across the university. When one of them appears in class, you will stumble, the familiarity of field school inappropriate in the confined space of a lecture hall. You will take too long to grade their collections and final research papers. Nancy and you will mark their field notebooks together, your grading rubric continuously redefined under the force of their engagement. Even their mistakes are glorious. When you read one student's realization that the *nuthatch* Nancy kept telling her to see in the tree was a *bird* and not a special nut-holding container, you laugh until your stomach hurts.

The young of some species migrate instinctually, directions imprinted upon their genes. Juvenile European eels swim from Florida across the Atlantic when they are just four inches long. Other migratory species guide their young. Whether guided by instinct or elders, migrations are vulnerable to human pressures. The mountain caribou that haunt the upper slopes of Wells Gray's mountains migrate from the open alpine down into the subalpine forest and then back up again. Depressed by habitat loss, caribou numbers have plummeted and it is likely that this species' migration will be lost from Wells Gray.

In education and biology, diversity matters. In the midst of courses on molecular genetics and biochemical techniques, field school ties students to a way of knowing that cycles back past Lewis and Clark and Darwin and Linnaeus. Each time it is taught, field school revives its oral tradition and offers the possibility of reproduction, as students rise to the lure of natural history as a way of knowing. Practice, not genes, maintains field school, but each year, the results of that practice percolate through student networks, building the demand for the next field school.

Months later, rushing from one lecture to another in the Science Building, a student will stop you to say, “It was golden, Lyn.” And it was. Natural history taught you all—student and teacher, migrant and resident. Field school’s magic arose out its risks, its unpredictability. Migration is the biological metaphor that supports the story of field school, and the collective intent of the group, enlivened by gifts given by the living, breathing world, was potent. There are no guarantees. But as the

student disappears into the throng of moving bodies, it doesn’t matter. You know that you’ll go back upriver. You can’t help it. Field school is hope, and you’re not ready to risk its loss.

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